OilChain Inc.

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ADSH SECURITY ARCHITECTURE

Rev.	Date	Modification Description	Prepared	Checked	Approved
01	11/03/21	Rev1	TO	PA	CS

Introduction

One of the main purposes of ADSH is to provide security to infrastructure and its airspace.
To do this, it uses the best software and hardware that the state of the art can offer today.

Purpose and target audience

The purpose of this white paper is to provide information on the benefits of the ADSH solution.

It can significantly reduce landing and take-off accidents by using a multi-layered hardware / software control system capable of increasing pilot awareness,

provides protection to plants through our network of local ground stations, physically located in sensitive areas, providing electrical and electronic self-diagnosis, meteorological conditions with Cloud Height, access control in land and air, intrusion detection with facial recognition, always guaranteed communications and other features.

guarantees data and operations, implementing AI algorithms and Blockchain protocols to avoid the use of single vulnerable servers in data processing and make all information transparent and available (to stakeholders) but impossible to tamper with.

for the next flights in UAM we manage the charging stations for customers by simplifying and automating the billing process, monitoring the energy status, ensuring physical and data protection, etc.

Our Software

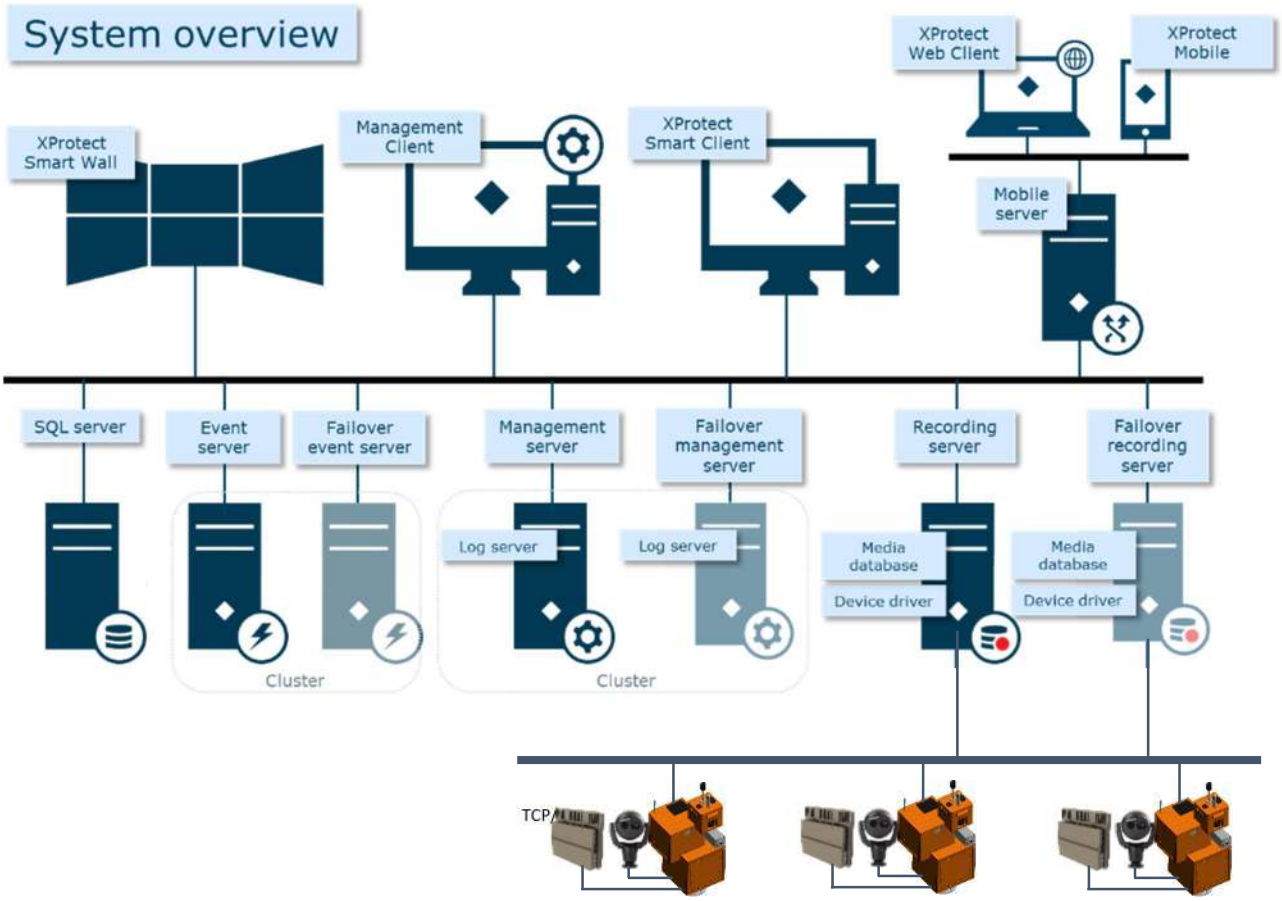
We always show our customers the two mainly used software platforms and based on some design parameters, we recommend whether to adopt brands such as Genetec or Milestone which are among the best software in the world.

Each software meets the integration needs of ADSH and its purpose.

Management Software Architecture

for

VIDEO SURVEILLANCE - OBSTRUCTION DETECTION - TRACKING WITH HYBRID CAMERA



Radar/PTZ/ADSH

Management server

The management server is the central component of the VMS and is responsible for handling the sys- tem configuration, distributing configuration to other system components, such as recording servers, and for facilitating user authentication. The configuration data is stored in a standard Microsoft SQL server, which is installed either on the management server itself or on a separate dedicated server.

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System component and client repository

In addition to the management server's VMS function, the management server also hosts two download pages with installers for all other system components and clients. This makes it easy and convenient for administrators or integrators to download and install system components and client applications on additional servers and workstations, without the need to copy the component installers to USB thumb drives and hand carry them to the other computers. In upgrade scenarios, the management server will also host the new updated component versions once it has been updated. It can thus again be used as a distribution point for the other server and client components that should be upgraded.

Failover management server

Failover support on the management server is achieved by installing the management server in a failo- ver cluster using Microsoft Windows Server Failover Clustering (WSFC) or by using third-party software that offers similar failover functionality – for instance this could be Evidian SafeKit. Running the management server in a failover cluster will ensure that another server can take over the management server function, should the active server fail.

Recording server

The recording server is responsible for the core VMS functionality of communicating with cameras and surveillance devices, for recording, storing, and securing the retrieved media as well as providing VMS clients access to the live and recorded media.

The recording server handles these functions:

- Communication with devices – for instance cameras, *Radar for Obstruction detection, PTZ Hybrid camera (Thermal image + HD Visible image) audio and video encoders, I/O (input/out-put) modules (for Helipad/Vertiport automation),* metadata sources, etc.
- Recording and storing video, audio and metadata media retrieved from the devices for the set retention time
- Encrypting and signing the recorded media in the media database
- Providing client access to live and recorded video, audio, and metadata
- Securing and controlling client access to live and recorded media
- Providing access to device status
- Performing motion detection and generate Smart Search metadata
- Triggering system and video events on device failures, events, etc.

Furthermore, when using Milestone Interconnect, the recording server is responsible for communication with the remote interconnected system.

Device drivers

An essential part of the recording servers are device drivers. These drivers work as the interface between the recoding server and the devices (cameras, video and audio encoders, I/O modules, metadata sources, etc.). A dedicated device driver is needed for each device or series of devices from the same manufacturer. In addition to the dedicated device drivers, the VMS also supports an ONVIF driver that can be used for ONVIF-compliant devices.

If a dedicated driver has not been developed for a specific device or video system, and the specific de- vice or video system is not ONVIF compliant, then in many cases a 'universal' driver can be used. Alternatively, a custom dedicated driver can be developed for the specific device or video system by using the Milestone Integration Platform Software Development Kit (MIP SDK).

The device drivers are by default installed with the recording server. However, the drivers are installed as a separate device pack and can thus be updated later by downloading and installing a newer and up- dated device pack without having to update the recording servers or any other VMS components.

Media database

The retrieved video, audio, and metadata are stored in the dedicated Milestone-developed, high-performance media database, which is optimized for recording and storing streamed real-time video, audio, and metadata.

The media database supports various unique features such as: multistage storage architecture, video grooming, Scalable Video Quality Recording™ (SVQR), encryption and digital signatures. The multistage storage architecture enables splitting the media database into a "live" database and one or more "ar- chive" databases. This allows the storage system and media database to be distributed across different storage technologies making it possible to design and optimize the VMS and storage system for both performance (live recording), size (archive retention) and cost.

Failover recording server

The failover recording server is responsible for taking over the recording server tasks should a standard recording server fail.

The failover recording server can operate in two modes:

- Cold-standby - acting as failover for multiple recording server.
- Hot-standby - acting as a dedicated failover for a single recording server.

The difference between cold-standby and hot-standby failover modes is that in cold-standby failover mode the failover recording server does not know which server to take over in advance. This means that it cannot preload the configuration and start its process until a recording server

fails. Loading the configuration and starting the processes increases the failover startup time compared to hot-standby.

In hot-standby mode, the failover time is significantly shorter because the failover recording server al- ready knows which recording server it should take over recording for and thus can preload the configuration and start up completely - except for the last step where it connects to the cameras. So, when a recording server is stopped or fails, the only thing the hot-standby failover recording server needs to do is to connect to the cameras and start recording, which takes very little time.

Event server

The event server handles various tasks related to events, alarms, maps, XProtect® Access, XProtect® LPR, XProtect® Transact and third-party integrations via the Milestone Integration Platform Software Development Kit (MIP SDK). All data handled by the event server, such as alarms, maps and data from add-on products are stored in the same SQL server that the management server uses.

Events

All system events are consolidated in the event server (if a function is subscribing to them), making them available for the other features and integrations in the event server.

Alarms

The event server hosts the alarm feature, alarm logic, and alarm state, as well as manages the alarm database.

Maps and Smart Maps

The event server hosts the Maps and Smart Map features that are configured and used by the XProtect Smart Client.

Milestone XProtect Access

The event server hosts the XProtect Access add-on product. XProtect Access enables integration of access control systems using a standardized access control framework. When integrated, the VMS and the access control system can be controlled from one centralized interface.

Milestone XProtect LPR

The event server hosts the XProtect LPR add-on product. XProtect LPR enables detection and registration of license plate information from vehicles and links the license plate information with video from the VMS.

Milestone XProtect Transact

The event server hosts the XProtect Transact add-on product. XProtect Transact extracts transactional data from point-of-sale (POS) systems, barcode scanning systems and other data systems that generate textual data and pairs that data with video from the time of the transaction.

MIP SDK

The MIP SDK enables integrations with the XProtect VMS products. In the event server, the MIP SDK can be used to create plug-ins for the event server, enabling integrations of the VMS and third-party sys- tems.

Failover event server

As with the management server, failover support on the event server is achieved by installing the event server in a failover cluster using Microsoft Windows Server Failover Clustering (WSFC) or by using third- party software that offers similar failover functionality – for instance this could be Evidian SafeKit.

Running the event server in a failover cluster will ensure that another server can take over the event server function, should the active server fail.

Log server

The log server is responsible for storing all log messages for the entire system. The log server uses the same SQL server as the management server and is typically installed on the same server as the management server but can be installed on a separate server if the combined load of the management and log server is too high for a single server.

The system can log three types of logs:

- System log:
  The system administrator can choose to log errors, warnings, information, and combinations of these. The default is logging errors only.
- Audit log:
  The system administrator can choose, in addition to log-in and administration logs, to log user activity in the clients.
- Rule log:
  The rule log can be used by the system administrator to create logs on specific events.

Mobile server

The mobile server is responsible for hosting the XProtect Web Client and function as a gateway to the VMS for the XProtect Web Client and XProtect Mobile users.

In addition to hosting the XProtect Web Client and function as a gateway to the VMS, the mobile server is also responsible for providing access to the video, either by streaming video directly to the clients, or by transcoding it to JPEG. Streaming the video directly or transcoding it to JPEG depends on the usage:

- For live viewing of H.264 and H.265 streams - Stream the video untouched through the mobile server
- For live viewing of all other codecs and for all playback regardless of codec - Transcode it to JPEG

The reason transcoding is needed for some codecs and playback is because not all browsers or smart phones support all of the codecs that the VMS and cameras support, and secondly, because more re- fined control and playback capabilities are needed for playback – for instance the ability to playback video backwards.

If many users playback recordings at the same time, or view live video from cameras configured with other codecs than H.264 and H.265, the mobile server will have to transcode a lot of video – which is a very resource demanding task. In these cases it is highly recommended to install the mobile server on a dedicated server - preferably on a server that has an Intel CPU with Intel Quick Sync Video support, or has an NVIDIA card installed, because the transcoding load in these cases will be offloaded to the GPU.

SQL server

The management server, event server and log server use an SQL server to store configuration, alarms, events, log messages, etc.

The XProtect VMS products installer includes a Microsoft SQL Server Express edition that can be used freely.

For larger systems with more than ~300 cameras, it is recommended to use Microsoft SQL Server Standard or Enterprise edition on a dedicated server. These editions can handle larger databases, have a better utilization of system resources, offer automatic backup functionality, as well as have 'Always On' functionality.

Client components

Management Client

The Management Client is the administration interface for the VMS.
The VMS is designed for large-scale operation and the Management Client is therefore designed to be run remotely, for example from the VMS administrator's computer.

XProtect Smart Client

The XProtect Smart Client is the main client for the VMS, offering a full set of advanced features. It is de- signed for day-to-day use by VMS operators.
The XProtect Smart Client is designed to be run remotely on the operator's computer and supports hardware accelerated video decoding and multi-screen use in full-screen mode as shown below, or as floating windows where the windows can be resized and moved freely.
Furthermore, the XProtect Smart Client has tabs dedicated to different primary tasks:

- Live: Live monitoring
- Playback: Playback, investigation, and export
- Search: Searching for recordings based on search parameters
- Alarms: Alarm management
- System monitors: Monitor state and load of servers, storage, cameras, etc.

In addition to the standard tabs, the XProtect add-on products as well as third-party integrations can add additional tabs that provide user interfaces dedicated to specific functions - for instance:

- XProtect Access: Access control integrations
- XProtect LPR: License plate functionality
- XProtect Transact: Viewing transactional data

XProtect Mobile

XProtect Mobile is the client that is designed for the user on-the-go. It offers easy access to live and play- back of cameras of ADSH, as well as access to doing investigations, triggering events, managing alarms, helipad automation and con- trolling XProtect Access integrations.
Furthermore, the XProtect Mobile can be used as a remote camera for the VMS by using the device's built-in camera and microphone and the video push feature. When activated, the video and optionally audio from the device's camera and microphone is streamed back to the VMS and recorded like a stand- ard camera and microphone.
XProtect Mobile is available for Apple® and Android™ devices.

Additional products and components

In addition to the Milestone XProtect VMS products, Milestone has a suite of add-on products and utili- ties, of which a few are highlighted below.

XProtect Smart Wall

XProtect Smart Wall is Milestone's advanced video wall product that is designed to work as a flexible can- vas to increase operators' situational awareness and improve response times. It displays relevant video cameras and other surveillance related content, giving operators a complete overview of large surveil- lance installations.
XProtect Smart Wall is fully integrated with XProtect Smart Client that allows users to control the XPro- tect Smart Wall in an easy and intuitive way. Furthermore, the content shared on the XProtect Smart Wall can also be displayed locally in the users' XProtect Smart Client.
In extension to user control of content on the XProtect Smart Wall, cameras and other content can automatically be sent to the XProtect Smart Wall by using the VMS' rule system that is based on events and/or time schedule. Alternatively, it can be controlled from third-party systems by using the MIP SDK. XProtect Smart Wall is included in XProtect Corporate and can be purchased as an add-on for XProtect Expert. The XProtect Smart Wall is not supported for XProtect Professional+.

MIP SDK

The MIP SDK is a comprehensive tool that facilitates the integration of third-party applications and systems with Milestone's XProtect VMS. The MIP SDK provides flexible access to the VMS and supports nearly all functions and features, for instance: viewing live/recorded video, audio and metadata, event integration, rule integration, viewing performance data and configuration of the VMS. To support the integration of different third-party applications and systems, the MIP SDK has different integration methods, including protocol integration, component integration and a unique plug-in abstraction layer. Using the plug-in integration, solutions become a fully integrated part of the XProtect VMS user interface.

Software Manager

The Software Manager is a tool that, from a central point, can be used to remotely install and upgrade recording servers, recording server device packs and XProtect Smart Clients on servers or computers in the surveillance network. For larger installations, the tool makes it easy and fast to upgrade components such as recording servers and device packs that are installed on multiple servers.

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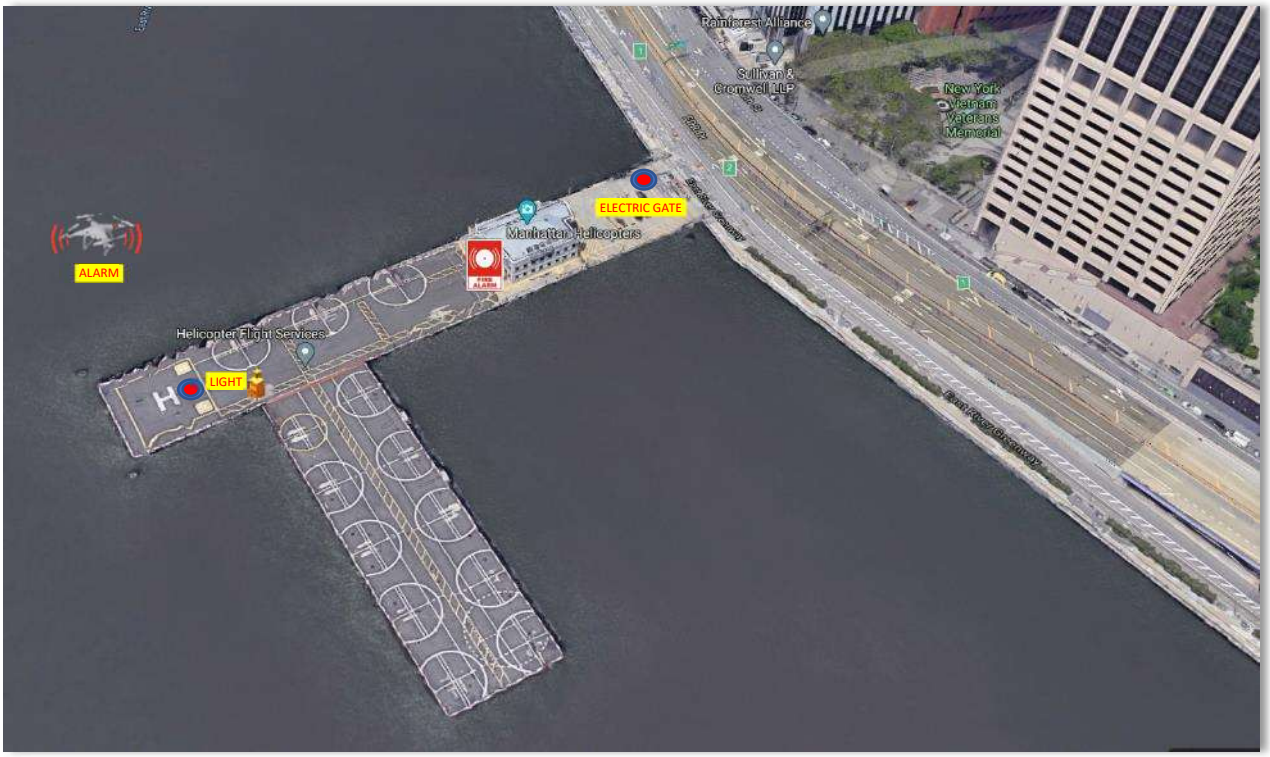
Interactive multi-layered map function

Operational hub for situational awareness and control

Milestone XProtect VMS products include an interactive map function that provides operators with real-time situational overview, and the ability to instantly access any ADSH or control any security peripheral and helipad automation connected to the VMS surveillance system.

The operational hub

Providing control room operators with an easy-to-navigate system overview of all ADSH connected at Radar, Hybrid PTZ and other security devices, and a wealth of control functions, the map is a true operational hub. This makes the operation of even large installations easy and efficient.



Key benefits

- Provides operational overview of large and complex systems
- Operational hub enabling status reporting from, and control of all connected devices
- Increased efficiency and faster response to incidents

Key features

- Obstruction detection and tracking
- Map images can be in standard graphic file formats including JPG, GIF, PNG and TIF
- Supports any number of layered maps such as city, street, building and room

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- Instant camera preview on “mouseover” and one- click shows all cameras on map (max. 25 cameras)
- Integrated control of speakers, microphones, and events and output I/O control including: doors, gates, light and access control systems
- Real-time status monitoring indication from all system components including cameras, I/O devices and system servers
- Graphical visualization of the system status through color coding
- Hierarchical propagation of status indications to higher ordered maps

Supported map objects

The following devices can be operated and controlled via the map function:

- Cameras
- Microphones
- Speakers and PA systems
- Detectors/input devices
- Output devices for control of any external equipment
- Doors and other access points (when used with XProtect Access)
- Integrated third-party applications
- Recording servers
- Interconnected systems

Instant access to live video and audio

Operators have instant access to live video from any ADSH on a map through a simple no-click mouseover or multi camera selection.

Full control at the operators’ fingertips

As the true operational hub, the map function enables operators to control any security device connected to the system. This means that the operator can control everything from lights to doors and gates directly from the map. It is also possible to make announcements via speakers and PA systems directly via the map.

Multi-layered maps – easy navigation

The map function operates with a hierarchy of static maps, each including a set of cameras and other security devices. The individual maps are linked together through hot zones. The primary purpose of hot zones is to facilitate navigation and drilldown to the next level in the map hierarchy. This would, for example, be used when navigating from an overview map to a specific building. An

unlimited number of maps may be used in an installation. The map also plays an important role in improving efficiency when handling alarms and incidents. In the event of an alarm, operators are notified instantly, where flashing indications in the map guide the operator to locate the device triggering the alarm. Alarms may be picked and acknowledged directly from the map without using the alarm list. It is also possible to suppress alarm notifications for a given interval, or until a predefined date/time.

A tool for system administrators

In the same way as the map function is an efficient operational tool for security operators, system administrators also benefit from using the map for monitoring operational system status. When activated, the status notification indicates when cameras, recording servers and interconnected systems require attention, or are not operational. Different status level indications (alarm, warning and errors) clearly indicate the severity of a system issue, allowing the administrator to take prompt action on critical matters.

In addition to the warning and status notifications in the map, it is possible to view performance details for a system object (recording server and cameras) through a simple mouse click.

Hardware Architecture

From previous writings, ADSH's hardware and software architecture has been designed for mixed use for airspace security and infrastructure.

Specifically, the hardware is divided into:

1. **Radar Echodyne**

   Adsh uses Echodyne Radar to detect obstacles on landing and take-off areas.

   In case of detection, the Genetec software (or Mylestone) both on a graphic map and from a live image through a hybrid PTZ camera, will send the data to the control room.

   Furthermore, in addition to the graphic representation (live video + map) and though I / O ADAM, ADSH will simultaneously send a warning to both the VTOL and the control room.

   Furthermore, in addition to the graphic representation (live video + map) and through I / O ADAM (see attachment Equipment of facilities management), ADSH will simultaneously send a warning to both the VTOL and the control room (see figure ...)

   Real-time images and a graphic map can also be monitored by the rider via a tablet.

   The tablet has two ways to do this, the first through an internet connection (Sat/5G) made available by the aircraft, the second through a direct wifi link between the aircraft and ADSH.

Going back to talking about radar Echodyne's patented Metamaterial Electronically Scanning Array (MESA™) radar provides a true ESA radar at a small fraction of the cost. MESA, which powers our EchoGuard 3D surveillance radar, operates just like a high-end phased array radar, instantly steering a high-resolution beam around a 3D field of view, providing real beam scanning in both azimuth and elevation.
Additional precision is provided by MESA integration with Echodyne's Acuity, an intelligent radar control software suite that enables maximum user configurability. Acuity unlocks the power of MESA technology through deep customization, intelligent radar resource allocation, and data processing algorithms. This unique blend of agile hardware and intelligent software provides unprecedented precision for establishing 3D security perimeters through early detection of UAVs.
The affordable price point combined with a size and form factor that makes for easy deployment means airports and other facilities can deploy multiple units to provide coverage that might otherwise be blocked by buildings or other obstructions.

More Precise Tracking

The system's <10 msec time per unique beam direction with nearly instant pointing update rate allows in excess of 100 unique look directions per second which are scheduled on a real-time basis, interrogating up to 20 airborne targets at rates as high as 10Hz while still searching the full FOV for new contacts.
While the system's 2° Az x 6° El beam is well matched to highly zoomed camera systems, the ability to bracket a tracked target with a cluster of sequential beams allows interpolation techniques that yield high angular track (~1°) resolution for extremely precise camera pointing allowing maximum range identification and enhancing EM jammer or other countermeasure performance.

Active Interrogation of the Airspace

Echodyne's MESA technology, coupled with its Acuity software, gives the radar the ability to track and interrogate multiple simultaneous objects within the airspace, focusing attention on signatures that could be associated with threats.

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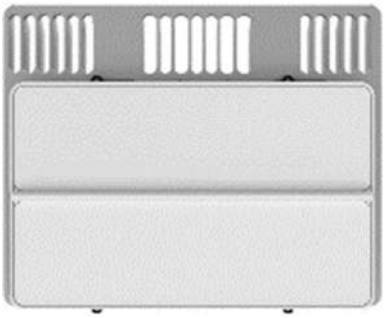
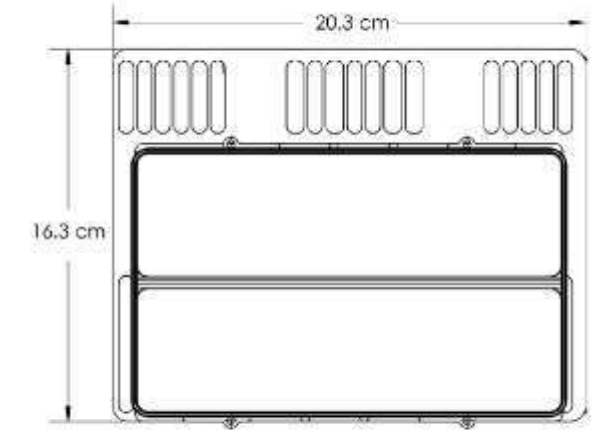
Beyond precise target 3D position and velocity tracking, radar provides a rich dataset of information not available in other sensing modalities. Incoming target velocities can be used to prioritize threat levels.

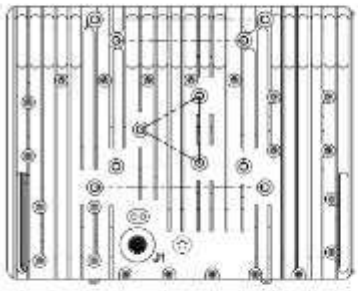


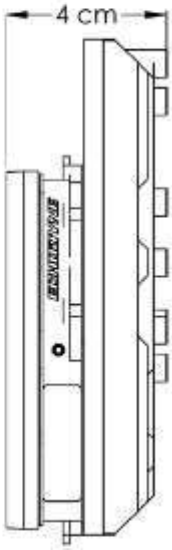
Target altitude can be used to discriminate from ground clutter, and target properties such as radar cross section indicate the size of the object and potential payload danger. Close following drones can be distinguished as separate threats and hovering drones can be detected via their propeller motion at ranges beyond the typical security perimeter.

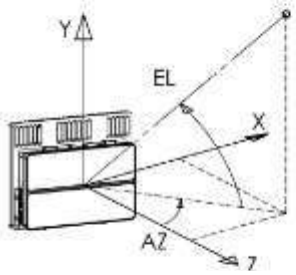
EchoGuard Tracking Ranges

3D Airspace Management Radar









Performance

Instrumented Range	6 km
Range (sUAV)	> 900 m (Phantom 4) > 1.2 km (Matrice 600)
Range (vehicle)	> 3.5 km
Range (human)	> 2.2 km
Field of view	120° azimuth x 80° elevation
Angular resolution	±1° azimuth x ±3° elevation
Frequency	24.45 - 24.65 GHz (multi-channel)

Search While Track

Scan volume	User configurable
Search update rate	~1 Hz for 120° az x 60° el volume
Track acquisition rate	New tracks acquired <1 sec
Search While Track	Tracks updated up to 10 Hz while radar intelligently scans rest of FOV
Max tracks	Up to 20 simultaneous tracks
Modes	Operational modes enable quick simple tracking of humans & UAVs

SWaP and Environmental

Size	20.3 cm x 16.3 cm x 4 cm
Weight	1.25 kg (2.75 lbs)
Power	DC +15 V to +28 V
Operating	< 50 W (Operating) < 15 W (Hot standby)
Operating temp	-40°C to +75°C
Weather Protection	IP67

Integration and Data

Control I/O	Gigabit Ethernet
Power I/O	Snap lock 12 pin connector
Data output	R/Vmaps: 40 MB/s Detections: 1 MB/s Tracks: 25 kB/s
Mounting	VESA 75 & 100 mm

FCC Identifier

2ANLB-MESASSR00053

2. Intrusion control panel. (UTC Fire&Security)

Electronic components with 3 Shields CNPP NFA2P - electronic security certification for a complete system, the highest level available. NFA2P standard includes a certification of robustness to cyber-attacks. Include Ethernet, 4G/5G communication.

Technical specifications

System	
Product type	Integrated Access Control
Panel type	Hybrid
No. of keypads / readers	16
Data Gathering Panels (DGP)	15
No. of alarm groups	16
Specified cable	WCAT52 WCAT54

Inputs	
Max no. of inputs	32
Onboard inputs	8
Inputs plug-in expansion	8

Outputs	
No. of outputs	128
No. of onboard outputs	5

Area	
No. of areas	4

User/Cards	
Max. no. of users	more than 1000
Max. no. of cards	2000 - 65532
Max. no. of PIN codes	2000 - 65532

Access control	
Standard doors on control panel	4
Door groups	128
Intelligent doors on 4-door DGPs	28

Communication	
Onboard transmission type	PSTN
Transmission extension	GSM/GPRS/IP
Databus type	RS485

Event log	
Alarm event log	250-1000
Access event log	10000

Electrical	
Power supply type	230 VAC
Power supply value	230 VAC +10%, -15%, 50 Hz
Mainboard current consumption	150 mA
Max system current	950 mA at 13.8 V ±0.2 V
Max aux power current	840 mA
Auto-reset fuses	5
Glass break fuses	1

Physical	
Physical dimensions	315 × 388 × 85 mm
Housing	Medium Metal

Environmental	
Operating temperature	-10 to +55°C
Relative humidity	95% (non-condensing)
Environmental Class	Class II, indoor
IP rating	30

Standards & regulation	
EN50131 Grade	Grade 3
Compliancy	CE

*110V-60Hz Version like Interlogix Monitor XL

3. Perimeter protection radar for ADSH. (n.04 unit)

Main advantages of Inxpect radar technology

The MSK series intelligent motion sensors are based on FMCW radar technology and are integrated into each side of ADSH.

Thanks to the innovative Inxpect technology, the MSK-101 sensor represents a leap forward with respect to traditional microwave or passive infra-red sensors, guaranteeing unrivalled performance in intrusion detection while minimizing false positives due to small animals or variable weather conditions. Unlike traditional motion sensors, thanks to its advanced architecture, the MSK products calculate in real time the distance of the moving target and estimate the weight.

The signal processing algorithm adopted by Inxpect enables fi ltering of the motion generated by pets, birds and insects, resulting in a drastic reduction of false alarms. Thanks to the ability to deliver motion signals to alarm control panel within two

5.1 Technical data

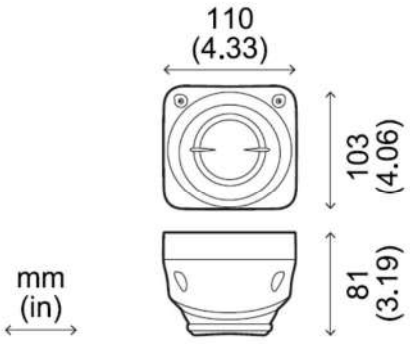
5.1.1 General specifications

Detection method	Inxpect motion detection motor based on FMCW radar
Frequency	Working band: 24–24.25 GHz Transmission power: ≤ 13 dBm Modulation: FMCW
Detection interval	0.5–20 m (2–66 ft), depending on the installation conditions. Configurable in 30 cm (1 ft) increments.
Field of vision	Sensor horizontal plane: 90° Sensor vertical plane: 30° Height: 0.5–3 m (1.6–10 ft)
Detection speed	> 0.05 ms (2 in/s)
Relays	4 solid state relays, each max. 400 mA, 40 V dc (NO or NC configurable, default NC)
Power supply	12 V dc *
Absorption	max. 100 mA
Electrical protections	Inverted polarity Overcurrent through integrated fuse (max. 5 s @ 3 A)
Dimensions	103 x 110 x 81 mm (4.06 x 4.33 x 3.19 in)
Material	Technopolymer
Operating temperature	From -40 to +70 °C (from -40 to +158 °F)
Degree of protection	IP66 and IP68
Cable diameter	4–7 mm (0.16–0.27 in)
Approvals	CE Contains FCC ID: UXS-SMR-3X4 Compatible with EN50131-2-3 class IV grade 3 and UL639***

***Note** *: the device has been designed to be supplied by an external power supply unit for alarm systems, internally protected by a short-circuit.*

Note*: the instructions presented in this manual are sufficient for meeting the requirements of standard UL639. Installations not consistent with these instructions could also comply with the standard.*

5.1.2 MSK-101 dimensions



5.1.3 Back plate dimensions

ck plate dimensions" on page 33.

configurable areas, MSK-101 can significantly increase the level of security in all anti-intrusion systems.

Examples of the field of vision with horizontal sensor direction (volumetric)

NOTICE: the detection start and end values do not guarantee detection of a standing person. The reported values may slightly vary based on the installation conditions.

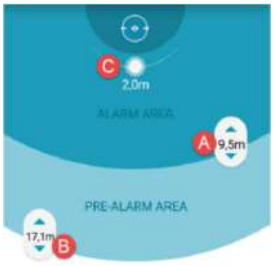
Note: only some heights are reported, but every intermediate value is allowed and guarantees optimum performance. The dimensions of the field of vision expressed in meters and feet are as follows.

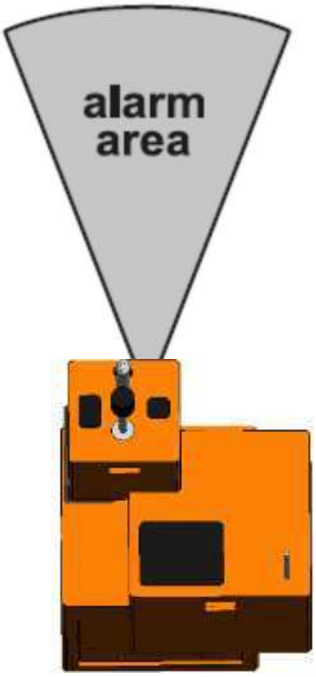
h (m)	α (°)	s_1 (m)	s_2 (m)	s_3 (m)
1	0	0.5	*	20
1.5	0	0.5	20	20
2	-15	2.5	16	16
2	-30	2	7.5	10
2.5	-15	3	17	17
2.5	-30	2.5	7	10
2.5	-45	2	6.5	6.5
3	-30	2.5	7	10
3	-45	2	4.5	6.5

h (ft)	α (°)	s_1 (ft)	s_2 (ft)	s_3 (ft)
3.2	0	1.6	*	65
4.9	0	1.6	65	65
6.5	-15	8.2	52	52
6.5	-30	6.5	25	32
8.2	-15	9.8	55	55
8.2	-30	8.2	23	32
8.2	-45	6.5	21	21
10	-30	8.2	23	32
10	-45	6.5	15	21

Alarm and pre-alarm areas

Within the sensor field of vision, the alarm and possible pre-alarm areas define the area that is monitored by the sensor. If a pre-alarm area is not defined, the alarm area corresponds to the entire monitored area.





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4. Industrial Wide Gap Surface Mount Magnetic Contacts.
   (for protect the opening panel of each module 1,2,3 ADSH)
   The 2700 Series High Security magnetic contacts with triple-biased reeds are resistant to defeat by external magnets. For added security, magnetic field tamper and pry tamper are standard features. Each 2700 contact and actuation magnet set is factory compensated for the effects of steel. Some models are UL Listed for use on safes and vaults.

   • Triple biased for increased security
   • No field adjustment
   • Pry tamper included
   • Supervision and remote test options available
   • UL listed for safes and vaults – 2707A, 2707AD

   Specifications Voltage 30V AC/DC maximum Current 0.25A maximum Power 3.0W maximum Dimensions (LxWxH) 4.25 x 1.50 x .75 in. (10.80 x 3.81 x 1.91 cm) Material Brushed anodized aluminum Listing UL-634.

5. **Self-Contained Outdoor Siren**
   The AS395 is a self-contained, outdoor siren in an attractive, tamper resistant enclosure. The housing is made of 3.5mm polycarbonate. All screw are rustproof and the PC board is potted in polyurethane to exclude humidity and eliminate corrosion problems. The built-in siren provides a loud audible signal (112db @ 10ft.). An add-on strobe blends smartly into the appearance while providing easily recognizable visual identification.

6. **IP Camera Bosch (n.04 unit)**

   The FLEXIDOME IP IR is built for high quality, 24/7 performance, with a range of reliable surveillance features, including Video Analytics.
   Video Analytics The built-in video analysis reinforces the Intelligence-at-the-Edge concept and now delivers even more powerful features. Essential Video Analytics is ideal for use in controlled environments with limited detection ranges. The system reliably detects, tracks, and analyzes objects, and alerts you when predefined alarms are

triggered. A smart set of alarm rules makes complex tasks easy and reduces false alarms to a minimum. Metadata is attached to your video to add sense and structure. This enables you to quickly retrieve the relevant images from hours of stored video. Metadata can also be used to deliver irrefutable forensic evidence or to optimize business processes based on people counting or crowd density information.

High Dynamic Range

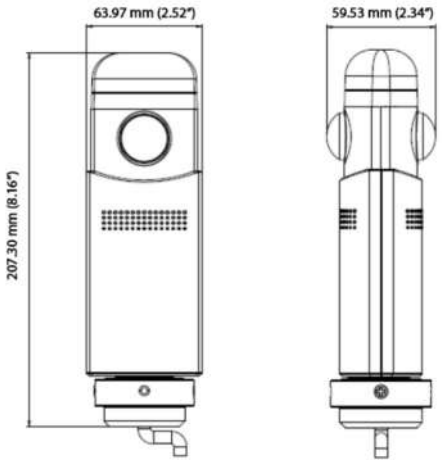
The high dynamic range mode is based on a multipleexposure process that captures more details in the highlights and in the shadows even in the same scene. The result is that you can easily distinguish objects and features, for example, faces with bright backlight. The actual dynamic range of the camera is measured using Opto-Electronic Conversion Function (OECF) analysis according to IEC 62676 Part 5.

Intelligent streaming.

Smart encoding capabilities, together with Intelligent Dynamic Noise Reduction technology and analytics, reduce the bandwidth consumption to extremely low levels. Only relevant information in the scene, like motion, or objects found with the analytics, need to be encoded. The camera is capable of triple streaming which allows the camera to deliver independent, configurable streams for live viewing, recording, or remote monitoring via constrained bandwidths. Each of these streams can be adapted independently to deliver high quality video, perfectly tailored to purpose, while reducing bit rate by up to 90% compared to a standard camera.

7. **USAVision VR360** (on top Module 1 – ADSH).
   VR360 is a Virtual Reality IP c amera made true with two 4 MP fisheye panoramic cameras The camera provides a live view of the surveillance area with an all-inclusive 720° angle range of view and extended depth of field, enabling a total coverage of wide-open areas. When streamed online or viewed through the GV-Eye or YouTube mobile app, users can watch the 720°, VR video from the camera for an immersive experience. Equipped with IR-cut filter and IR LEDs, GV-VR360 is capable of day and night surveillance under contrasting illumination conditions. Utilizing H.265 video codec, the camera allows better compression ratio while maintaining high image quality at reduced network bandwidths. The camera adheres to IK10 and IP67 standards.

   Key Features
   • Dual 4MP fisheye provides 720° panoramic view with no blind spots
   • 1/2.9'' progressive scan low lux CMOS
   • Dual streams from H.265 or H.264
   • Up to 30 fps at 3840 x 2160
   • Day and night (with removable IR-cut filter)
   • Intelligent IR
   • 4 IR LEDs
   • IR distance up to 10 m (32 ft)
   • One-way audio
   • Built-in / external microphone
   • 1 sensor input and 1 alarm output
   • DC 12V / PoE (PoE+, IEEE 802.3at)
   • Vandal resistance (IK10 for metal casing)
   • Ingress protection (IP67)
   • VR Mode for YouTube & GV-Eye
   • Smart device APP support
   • Live streaming via YouTube
   • Defog

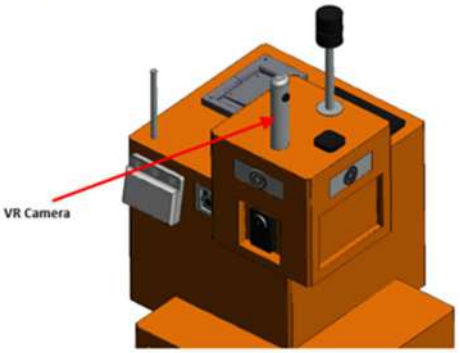


The Ipad mini already used by EFB pilots will have a dedicated app to connect to any helipad.

Through the app it is possible to activate the lighting system.

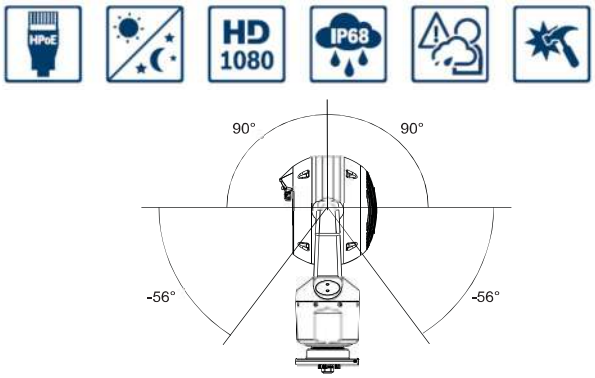
BE-ON-SITE EFFECT

The pilot connect at any time and from any place to the helipads / vertiports for a visual feedback.



8. Bosch Security MIC 9000i/Other MIC IP Model

- Total integration for radar tracking with both Genetec and Milestone.
- Ruggedized IP PTZ camera with high performance thermal imager and HD visible imager sitting side-by-side.
- Designed to provide the highest availability of useable images regardless of lighting conditions in extreme environments (weather, dust/debris/smoke, etc.)
- Unique metadata fusion feature provides the ultimate in situation awareness.
- Exceptional early detection capabilities: Object detection up to 4517 m (14,820 ft) based on DRI criteria.
- Advanced on-board intelligent video tracking, object detection even when camera is on tours.



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The MIC IP fusion 9000i camera is an advanced PTZ surveillance platform designed to provide early detection in mission-critical applications. With its dual visible/thermal imaging capabilities, the MIC IP fusion 9000i camera is the perfect solution for robust and high-quality imaging needs.
The camera's distinctive, ruggedized design is well suited for extreme environments and adverse weather conditions such as high winds, rain, fog, ice, and snow.
Precision engineered using Bosch's domain expertise in material and mechanical engineering, the camera offers the most advanced imaging and positioning system solution available on the market.

Exceptional imaging performance

The MIC IP fusion 9000i camera incorporates a high-performance thermal imaging core and a 1080p starlight camera integrated in the same housing. This allows the camera to deliver simultaneous thermal and visible video streams, maximizing the ability to detect and react to long-range threats.

Thermal imager

The thermal imager incorporates the latest un-cooled vanadium oxide microbolometer technology. This high sensitivity thermal imager is equipped with a fixed focal length A thermal lens that balances the field-of view with maximizing the detection distance. User-adjustable settings for contrast and gain allow operators to optimize the image, ensuring delivery of the highest quality video. In addition, a wide variety of user-selectable thermal color modes are available allowing further optimization of the thermal image.
Depending on model mix, QVGA resolution (320 pixels) and VGA resolution (640 pixels) versions are available, with choice of low (<9Hz) or high (30/60Hz) frame rates.

Visible imager

The 1080p60-capable visible imager has starlight technology and a 30x optical/12x digital zoom lens that provides high-quality images, excellent color performance, and unbeatable low-light sensitivity.
High dynamic range ensures clear image reproduction in the most challenging high-contrast scenes.

Ruggedized design for extreme applications

The MIC IP fusion 9000i camera is designed for surveillance applications beyond the mechanical capabilities of normal PTZ domes or conventional positioning systems.

- **Ingress**

The camera is environmentally sealed and complies with Type 6P and IP68 standards, when attached to a MIC-DCA or a MIC-WMB. This level of protection eliminates any risk of dust or water ingress, making the camera a perfect choice for use in extreme en- vironments with rain, dust, snow, flying debris, and other challenging conditions.

In addition, the MIC camera's ingress protection method does not need periodic maintenance, which is required on cameras with pressurized housings.

- **Wide operating temperature range**

The camera's operating temperature range of -40 °C to +65 °C (-40 °F to +149 °F) enables reliable surveillance monitoring in global locations from cold northern latitudes to hot equatorial and desert regions.

- **Rugged construction**

The all-metal body has been engineered to with- stand IK10-level impacts, and continuous low-frequency vibration. With its symmetrical, cross-sec- tion designed surfaces, the camera is also well- suited to operating in sites with high wind condi- tions.

- **Excellent corrosion protection**

The camera benefits from Bosch Automotive do- main knowledge in material engineering and coatings. As a result, the superior metallurgy, chromate based pre-coating, and paint finish of the camera provides unprecedented protection against corro- sion. Reliability is ensured by the camera's ability to withstand a 2000-hour salt atmosphere at elevated temperature corrosion resistance test, according to the ASTM B117 test method.

- **Window Wiper and Defroster**

The camera features a highly durable, silicone wiper which removes moisture from both the glass and germanium windows. In addition, both windows in- corporate embedded defrosters that minimize build-up of snow and ice, ensuring the highest-pos- sible image details in extreme cold and moist conditions.

The wiper can also be integrated with third-party washer systems for regular cleaning and maintenance activities.

Intelligent Video Analytics on the edge

The camera includes the latest release of Intelligent Video Analytics for monitoring both the visible and the thermal image streams. Designed for mission-critical applications, the video analytics can reliably detect, track, and analyze moving objects while suppressing unwanted alarms from spurious sources in the image, even in harsh weather conditions.

Advanced tasks like multiple line crossing, loitering, idle / removed object detection, crowd density estimation, occupancy and people counting are available for live alarming and forensic search. Object filters based on size, speed, direction, aspect ratio, and color can be defined.

Set-up time is minimized because only the installation height of the camera must be entered to calibrate the analytics.
After the camera is calibrated, the analytics engine can automatically classify objects as upright person, car, bike, or truck.

Video Analytics while camera is moving

The Intelligent Video Analytics can trigger an alarm when the visible imager detects objects in motion in alarm fields while the camera is moving.
These alarm fields are defined once across all PTZ camera views. Any part of those fields that is currently within the camera's view becomes active. Thus, guard tours sweeping across the monitored areas in order to provide an intruder less time to slip by can now automatically alarm on those intruders as well.
If desired, the alarm can even be used to trigger the camera's Intelligent Tracking feature.

Metadata Fusion imaging

The metadata fusion feature enables operators to receive notification of detected events from both thermal and visible image streams, regardless of which image stream they are viewing. This gives operators a much higher level of situational awareness, and eliminates the need to monitor both visible and thermal images constantly.
For example, a standard camera viewing a scene with limited visibility produces an image such as the one below. The same scene viewed using the visible imager of the MIC IP fusion 9000i camera would include metadata fusion events detected by the thermal imager, as shown below. Once alerted, operators can switch to the thermal image (below) of the scene, where they can easily see the objects creating the alarm. Hence, the metadata fusion feature provides enhanced situational awareness.

Intelligent Tracking

The newest generation of the Intelligent Tracking feature ensures smoother camera motion for more comfortable viewing and more reliable tracking of objects even under challenging scenes.
On the visible imager, when Intelligent Video Analytics application detects objects or individuals, the camera can automatically activate the Intelligent Tracking feature, which controls the pan/tilt/zoom actions of the camera in order to track objects and keep them in view.
Areas with potentially interfering background motion (moving trees, pulsating lights, and busy roads) can be masked out.
The camera supports 2 Intelligent Tracking modes:

- Auto mode: In this mode, the camera follows any object that has triggered an alarm in the

Intelligent Video Analytics application. This mode is most useful for scenarios where the alarm cases can be clearly defined, for example, when no motion is expected at all.

- Click mode: In this mode, users can click on any object detected by the Intelligent Video Analytics application to enable the camera to track the movement of the selected object. This mode is most useful for scenarios where normal scene activity is expected.

H.265 Video encoding

The camera is designed on the most efficient and powerful H.264 and H.265/HEVC encoding platform. The camera is capable of delivering high-quality and high-resolution video with very low network load. With a doubling of encoding efficiency, H.265 is the new compression standard of choice for IP video surveillance systems.

Intelligent streaming

Smart encoding capabilities, together with Intelligent Dynamic Noise Reduction technology and analytics, make the bandwidth consumption drop to extremely low levels. Only relevant information in the scene, such as motion or objects found with the analytics, are encoded.
The camera is capable of providing 4 streams of thermal video and 4 streams of HD visible video simultaneously (8 streams total). This allows the camera to deliver independent, configurable streams for live viewing, recording, or remote monitoring via constrained bandwidths.

Image Stabilization

Cameras on unstable mounts can move sufficiently to change the field of view. The higher the zoom value, the larger the change of the field of view. This change can make images unusable.
The camera has an Image stabilization algorithm that lets the camera sense continuous vibration. If it detects vibration, the camera corrects the shaky video in the vertical axis and the horizontal axis. The result is excellent image clarity and a stable field of view on the monitor. The Image stabilization function is important to eliminate movement that unstable camera mounts cause.
Note: Image stabilization is available on the visible camera only.

Certification and approvals

For a full list of all related certifications/standards, please refer to the Product Tests Report, available on the online catalog, on the Documents tab of the product page for your device.

Standards	Type
Emissions	EN 55032 class A FCC: 47 CFR Part 15 B, class A RCM: AS/NZS CISPR 32
Immunity	EN 50130-4 EN 50121-4
Environmental	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-30

Safety	EN 60950-1 EN 60950-22 UL 60950-1, Ed. 2 C4N/CSA C22.2 No. 60950-1-07, Ed. 2 EN 62368-1 UL 62368-1
Marks	cUL, CE, WEEE, RCM, EAC, FCC, RoHS
ISO Quality Systems	ISO 9001 ISO 14001

9. Network Video Recorder

Features

- Intel i7-6822EQ QC/ Intel i5-6442EQ QC SoC
- Support TPM2.0
- Extreme graphic performance, support up to 1080p 120fps video encode&decode
- Stackable extension design, option extension kit for applications
- Isolated 12 ~ 24VDC wide-range power input
- Diversity communication extensible, ex. WLAN, WWAN
- Anti-vibration & shock proof, certified by MIL-STD-810G
- NEMA TS2-certified, -34 ~ 74 °C
- Certified for general standard, CE, FCC, CB, UL, CCC and BSMI
- Built-in Advantech remote management software WISE-PaaS/RMM

Processor System	CPU	Intel i7-6822EQ QC SoC	Intel i5-6442EQ QC SoC
	Frequency	2.0GHz	1.9GHz
	Cache	8 MB	6 MB
	BIOS	AMI EFI	
Memory	Technology	DDR4 2133MHz	
	Max. Capacity	32G	
	Socket	2 x 260-pin SO-DIMM	
Graphics	Chipset	QM170	
	Graphic Engine	DirectX 11.3, OGL 4.4, OCL 2.1 Encode: H.264, MPEG2/4, VC1, WMV9 Decode: H.264, MPEG2 HEVC: H.265	
	HDMI	HDMI 1.4a for HD video playback, 1080P at 60Hz	
	Dual Display	Dual HDMI	
Ethernet	LAN1	10/100/1000 Mbps Intel i219 GbE, support Wake On Lan	
	LAN2	10/100/1000 Mbps Intel i210 GbE, support Wake On Lan	
Audio	Interface	Realtek ALC888S, High Definition Audio. Line-out,Mic-in,Line-in	
IO Interface	Serial Ports	3 x RS-232/422/485 port with auto flow control	
	USB Interface	3 x USB3.0 Type A	
	GPIO	4 x DI & 4 x DO w/ 1.5KV isolation, Input Voltage: 0 to 30 V_{DC}, Output Current: Max. 500 mA per channel, On-state Voltage: 24 V_{DC} nominal, open collector to 30 V_{DC}	
	CANBus	Optional	
Other	Watchdog timer	255 levels timer interval, setup by software	
Expansion	Mini PCIe	#1, Full-size Mini PCIe (SATA/PCIe/USB) w/external SIM socket #2, Full-size Mini PCIe (PCIe/USB) w/external SIM socket #3, M.2 2230 E key	
Storage	SSD/HDD	1 x 2.5" SATA drive bay	
	mSATA	1 x full size mSATA socket (Mini PCIe #1)	
Software Support	Microsoft Windows	Win7, WES7, Win8, WSE8, Win10	
	Linux	Support by project	
Power Requirement	Power Type	ATX	
	Power Input Voltage	12~24V_{DC} w/isolation	
	Isolation	1.5 KV	
Power Consumption	Typical	22W	
	Max.	45W	
Mechanical	Construction	Aluminum housing	
	Mounting	Wall mounting kit	
	Dimensions (W x H x D)	260 x 73 x 160.2mm	
	Weight	3.2 Kg	
Environment	Operating Temperature	With extended temperature peripherals: -20 ~ 70 °C with 0.7m/s air flow	
	Storage Temperature	- 40 ~ 85 °C (-40 ~ 185 °F)	
	Relative Humidity	95% @ 40 °C (non-condensing)	
	Vibration During Operation	MIL-STD-810G, Method 514.6	
	Shock During Operation	MIL-STD-810G, Method 516.6	
	EMC	CE, FCC Class B, CCC, BSMI	
	Transportation	NEMA TS2-2016 Environmental	
	Safety	UL, CCC, BSMI, CB (No RED certification)	

OilChain Inc.

16192 Coastal Highway, Lewes, Delaware 19958, County of Sussex

AES -AUXILIARY EMERGENCY SYSTEM-

Rev.	Date	Modification Description	Prepared	Checked	Approved
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Operators are called upon to continually face new market challenges, with the need to improve the quality and offer of products and services while ensuring both the safety of infrastructures and people and environmental sustainability.
Our many years of experience and continuous interaction with reference players in the sector have allowed us to design and develop technologically advanced solutions, able to respond to specific needs and critical factors including:

- Protection and monitoring of corporate assets.
- Predictive maintenance & Business Continuity.
- Environmental protection.
- Secure communications in emergency situations.

AES Scenarios

Command and control platforms for industrial and «safety & security» systems require increasingly secure and reliable interconnections with devices used to implement peripherals and the collection / sending of information on the health of assets, often distributed on a scale geographical and operating in areas not covered by electricity and terrestrial, fixed or mobile networks.
For these reasons, the Oilchain "AES" system was born, able to ensure:

- Agnostic data communications, with global coverage, secure and reliable.
- Customized solutions, thanks to an ecosystem of modular peripherals adaptable to different people fields of application.
- Scalability guaranteed by a very high granularity of the modules.
- Energy autonomy thanks to photovoltaic technology.

"*Compact*"	Simple installation, small to low electronics consumption.
"*Power Independent*"	Car powered by its own photovoltaic system.
"*Plug & Play*"	Auto-configuration with respect to the Application Server at the time of first boot.

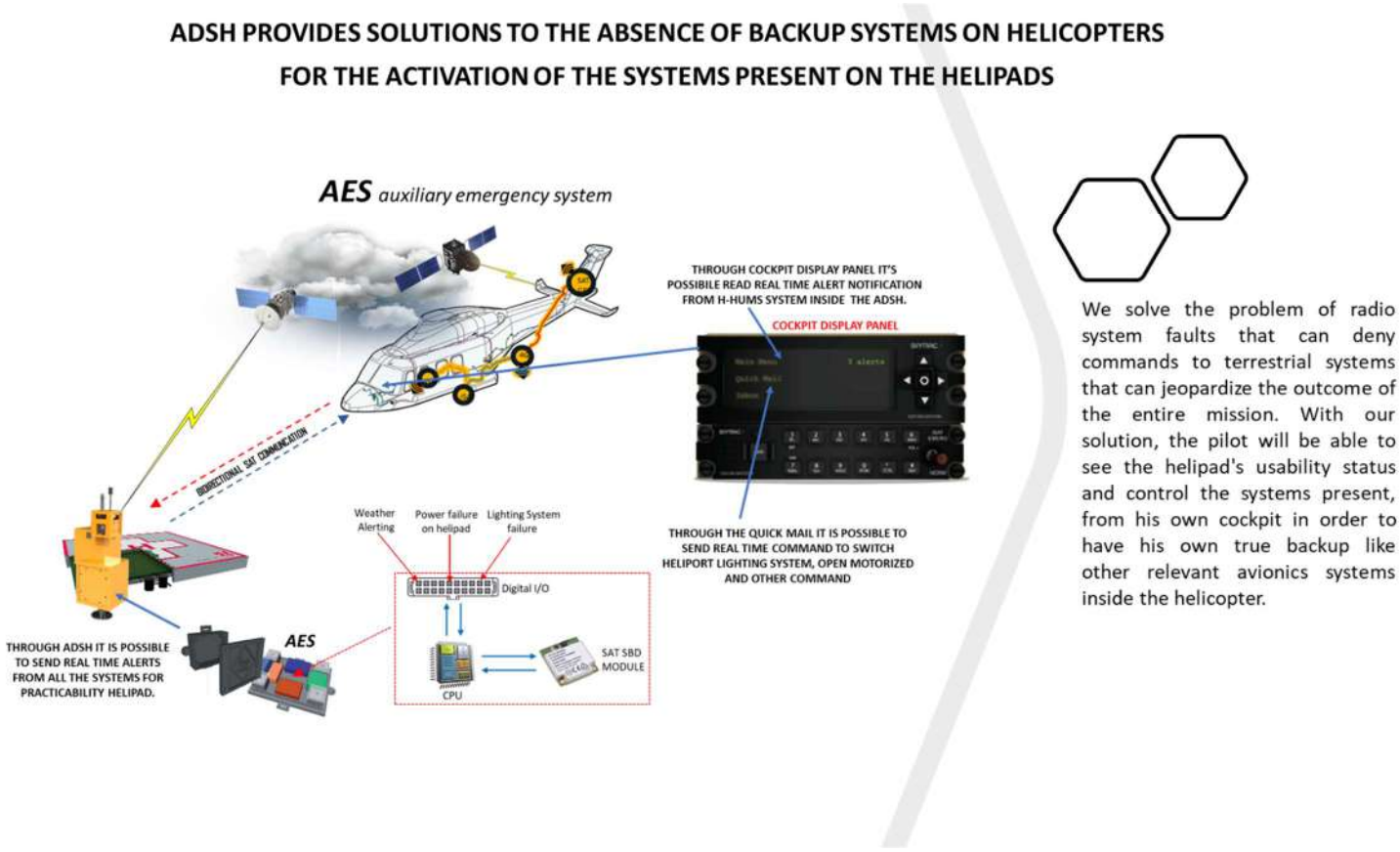
With:

Powered by photovoltaic panel and buffer battery.
Bus for system expansion.
Digital and analog I / O for interfacing with reality.

- Sending alarm such as: weather alerting, Power failure on helipad, Lighting system failure, other
- Receive command to activate output such as: Lighting system, automatic gate, other.

Accelerometer on 3 axes +/- 2G for the immediate detection of vibrations, movements anomalies and attempts to tamper with the AES.

Use cases.



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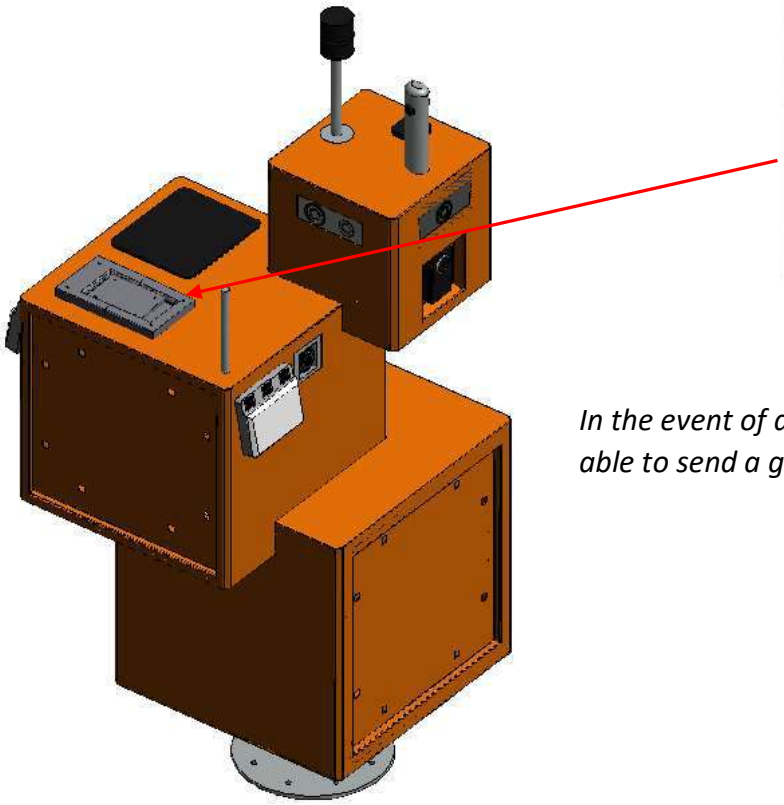

AES

In the event of a total failure of ADSH, the AES will be able to send a general alarm warning.

Iridium satellite technology was chosen for the transfer of messages.

Iridium has the key features for every application of command & control distributed even in areas with limited visibility of the sky.
The Iridium module integrated into the AES, allows the sending and receiving of SBD (Short Burst Data) strings and represents, today, the most efficient system for the transmission of command & control messages.
All messages, after being encrypted, are transferred to / from the Application Server through a proprietary network protocol.

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AES - Technical Specifications

CPU:	ARMCortex, 48 MHz clock, 3.3V power and logic, 256K of FLASH for programs and data
MONITOR DISPLAY:	Monochrome 128x32 high resolution OLED
NBIoTSat:	Iridium SBD9603 Short Burst Data with worldwide coverage including poles
ACCELEROMETER:	3 axis, 14Bit ADC, +/- 2G HighRes, +/- 8G LowRes
BATTERY:	LiPo battery 2.000mA, 3.7V
SOLAR PANEL:	9W 6V
POWER MODULE:	5V load power supply with DC / DC step-up converter, automatic LiPo battery charger, management automatic charging current for maximum efficiency between load power supply and recharge battery, 500mA of maximum charge current
ENCLOSURE:	Specifically designed to obtain the whole IP67 standard system and 4 magnets in a single block 2.5Kg Neodymium for quick installation on ferromagnetic material

The Application Server (AS) is a platform capable of managing simultaneous communication with AES devices.

It constantly monitors all connected AES, analyzing every single data received, according to the alert thresholds individually configured. If it detects anomalies or data beyond the set threshold, it generates an alarm signal. It offers a modern, responsive and intuitive web interface for monitoring, configuring and querying connected devices. Any alarms, status changes, lack of communication are displayed clearly and immediately via pop-up.

There are different levels of access, which vary according to the roles and permissions granted to each user (Administrator, Operator, Guest). It is based on a scalable architecture depending on the number of devices to be managed, to ensure the best service in terms of stability and performance. It also has a number of functions ("API") for communication, integration and data exchange with third party systems.

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AIRSPACE

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Introduction

In recent years ADS-B emerged as a cost-effective surveillance technology with great potential towards innovative applications.

ADS-B involves the aircraft using a certified position source to determine its own position and broadcasting it in short intervals by means of a data link in radio frequency spectrum. This functionality is usually referred to as ADS-B Out.

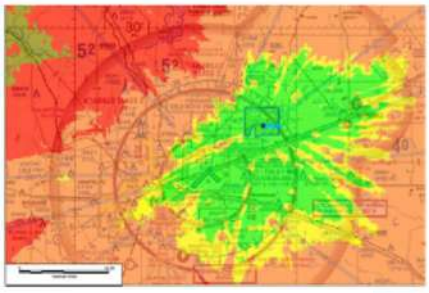
Conversely, an aircraft can be fitted with an ADS-B receiver – processor to display the detected ADS-B transmissions from other aircraft to the pilot. This is then referred to as ADS-B In.

With ADS-B, real time visibility is provided to air traffic control and to other equipped ADS-B aircraft with position and velocity data transmitted periodically. ADS-B also provides the data infrastructure for inexpensive flight tracking, planning, and dispatch.

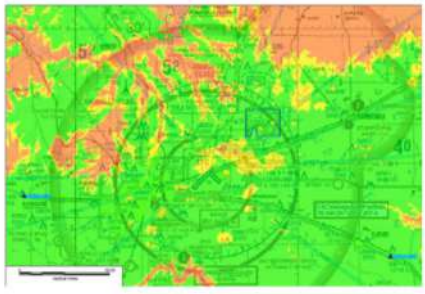
In high complexity environments such as the US airspace, ADS-B is envisaged to operate in conjunction with existing independent cooperative chains, greatly enhancing accuracy, data availability and reducing frequency load.

Airspace improvements

ADSH closes existing gaps in ADS-B coverage, providing operators with real-time views of other aircraft flying within coverage gaps at low altitudes — and ensuring low altitude surveillance of ADS-B equipped aircraft for UAS/VTOL/eVTOL asset tracking and sense and avoid (SAA) systems.
The data from all the ADSHs located on the ground will be merged with all the real-time aircraft surveillance data derived from the FAA system from more than 650 ADS-B ground stations with more than 425 FAA radar systems. This unique combination of local infrastructure and NAS surveillance data makes ADSH, thanks to the multiplicity of integrated devices, a complete situational awareness solution for the UAS / VTOL / eVTOL market for low altitude flights.



Coverage before solution



Coverage after solution

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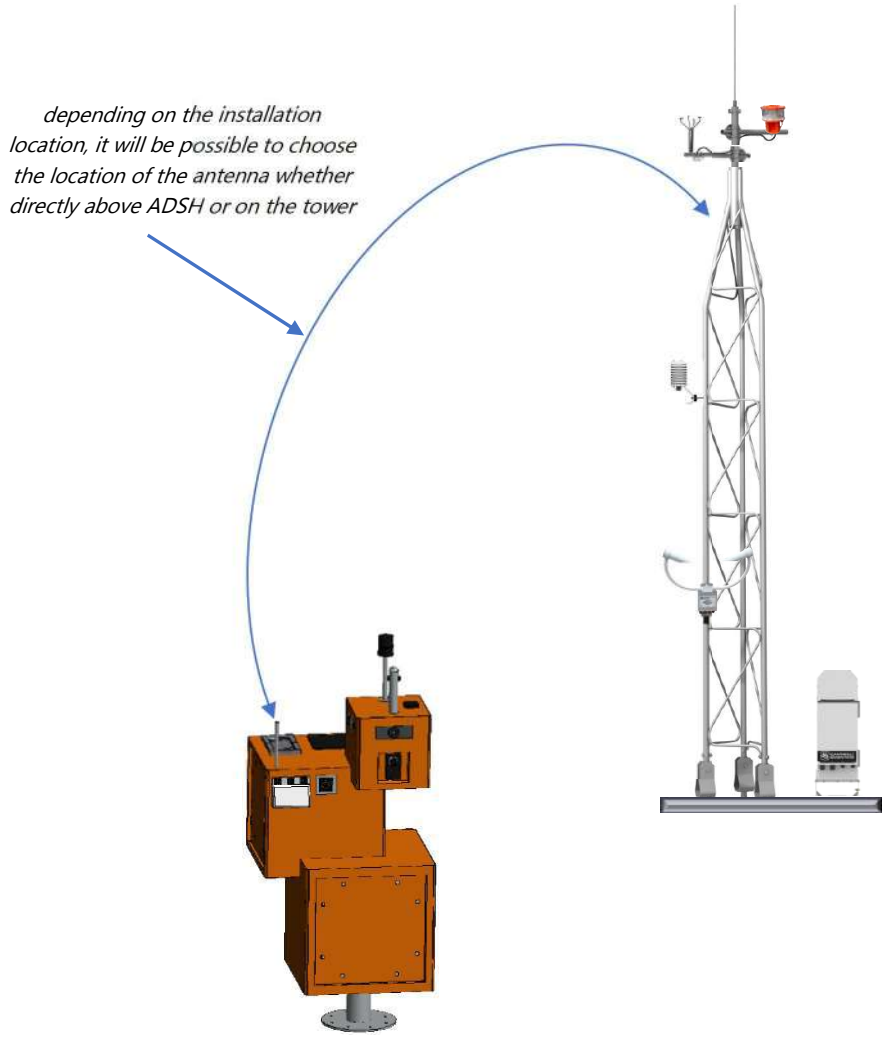
Furthermore, this tracking tool is also indispensable for the digitization of everything that happens on helipads / vertiports in peripheral and unattended sites, where unauthorized overflights and landings could occur.



ADSH, thanks to the global supervision of helipads / vertiports, will have a database of recorded transponders and video frames of the events; this also to protect the infrastructure manager.
All data can be monitored in real time thanks to ADSH's broadband systems and can be managed from any control room of any relevant organization.
The ADSH solution also involves the use of blockchain technology to ensure the confidentiality and inviolability of data.

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Software solution

The proposed solutions offer improved situational awareness, safety, security, environmental compliance and operational efficiency for airports.
Our proposed solutions offer an integrated aviation management platform for airport operators with tools that assist in proactive management of surface operations, aerodrome and perimeter security, noise monitoring and community engagement, gate management, billing, vehicle tracking, traffic flow monitoring and airport analysis.

The most widely used web-based airport noise monitoring system in North America.

The solution is the first web-based environmental monitoring system and is currently utilized at more than 60 airports worldwide; utilizes multiple surveillance feeds to provide robust views of all airborne assets and airport surface traffic data.
The application allows clients to create standard or ad hoc custom reports that are shared with the public through published reports or web-based community information portals improving community relations.

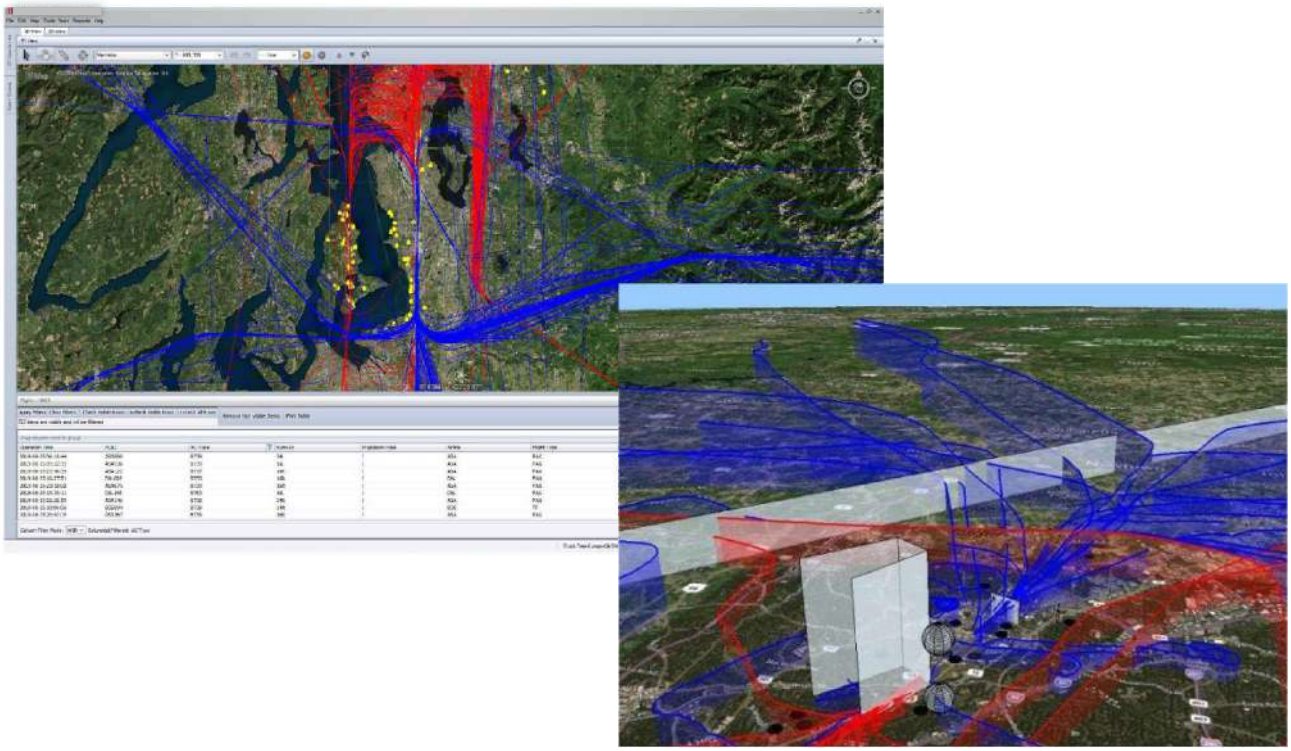
The NextGen Flight tracking Solution for Greener Airports

- Reduced costs through quick installation and minimal hardware requirements
- Secure and reliable with greater availability
- Improves community relations through transparency in reporting community information portals improving community relations.

The software solution is developed as a simpler way to address airfield noise. A web-based software service built with cloud capabilities that include comprehensive aircraft tracking systems provides quality 2D and 3D images. It assists airports in improving environmental compliance by displaying accurate flight tracks and noise impacts.
The software platform is a complete integrated management system for the management of airport and air operations that the airport provides operators and air navigation service providers (ANSPs) with applications that assist in the proactive management of surface operations; airport and perimeter security; noise community monitoring and involvement; fleet and resource monitoring; and traffic flow monitoring.

Features

- Web-based architecture and common database.
- Intuitive graphical user interface with robust reporting capabilities.
- 2D/3D GIS platform with easy map uploads.
- Real-time and historical flight tracking powered by NextGen surveillance data.
- Quickly and easily generate noise contours for a defined period based on actual aircraft and flight track data.
- Configure Virtual Noise Monitors (VNMs) at any location in the airport vicinity.
- Professionally hosted data center.



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ADSH WITH AWOS SYSTEMS

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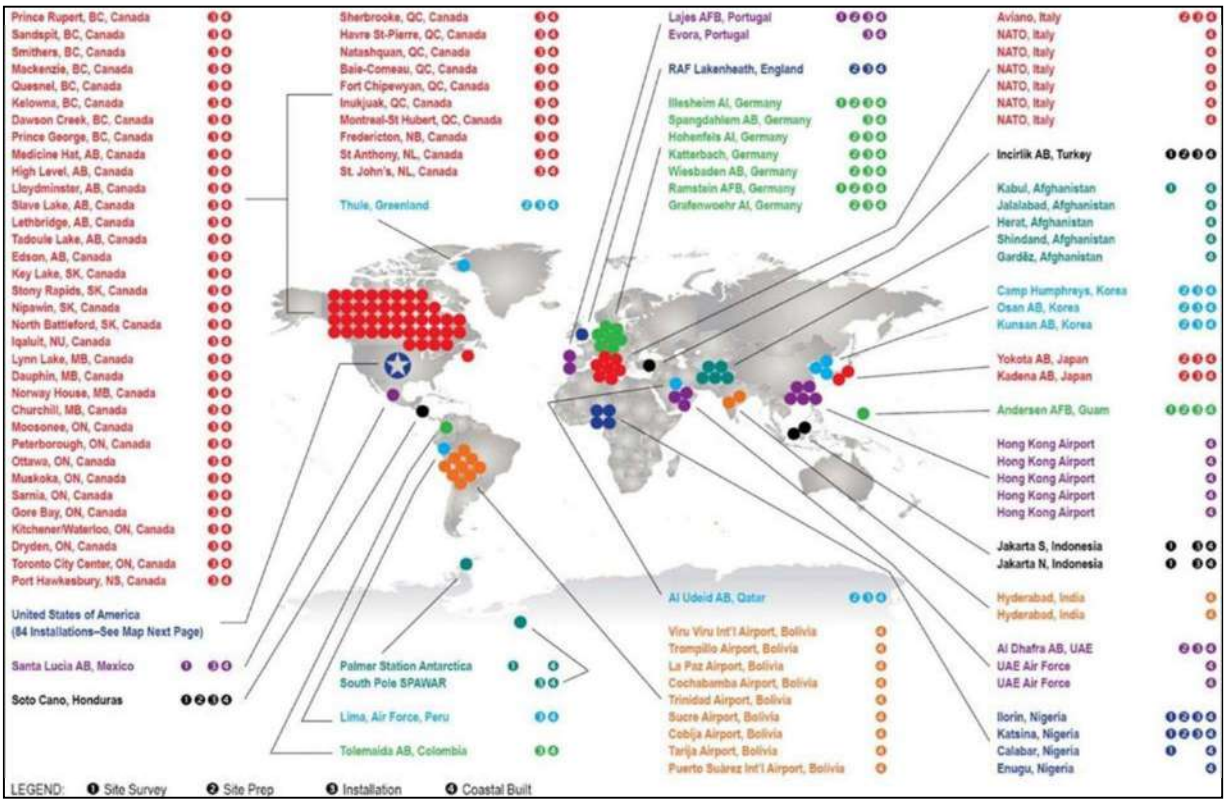
ADSH has several solutions for managing meteorological data. For customers with standard requirements AWOS Oilchain Inc can offer the complete solution. This AWOS solution counts at least 1200 airport sites around the world.

High-level overview of AWOS system installations worldwide.



The weather parameters available from ADSH with AWOS systems implementation are:

- Wind speed.
- Wind direction.
- Wind gust.
- Ceiling/Cloud base and amount for 5 layers and the total sky coverage.
- Visibility.
- Present weather (including precipitation type).
- Measured pressure, altimeter setting (QNH), station pressure (QFE), QFF (if needed).
- Temperature.
- Relative humidity.
- Precipitation.
- Dewpoint (derived).

The proposal for the system includes the following top level components:

Sensors and Field Equipment

Sensors & field equipment	QTY
resent Weather/VIS	1
Wind speed and direction (gust)	1
Pressure, in FDCU enclosure	1
T/RH in naturally-aspirated radiation shield	1
Ceilometer	1
Field Data Collection Unit (FDCU)	1
Data Processing Unit (DPU)	
6 m mast, lightning rod, grounding, obstruction LED(s)	1
Data Communication radio modem in FDCU	1
AWOS fan-less server DPU	1

Software

Component
Web, IP based AWOS software

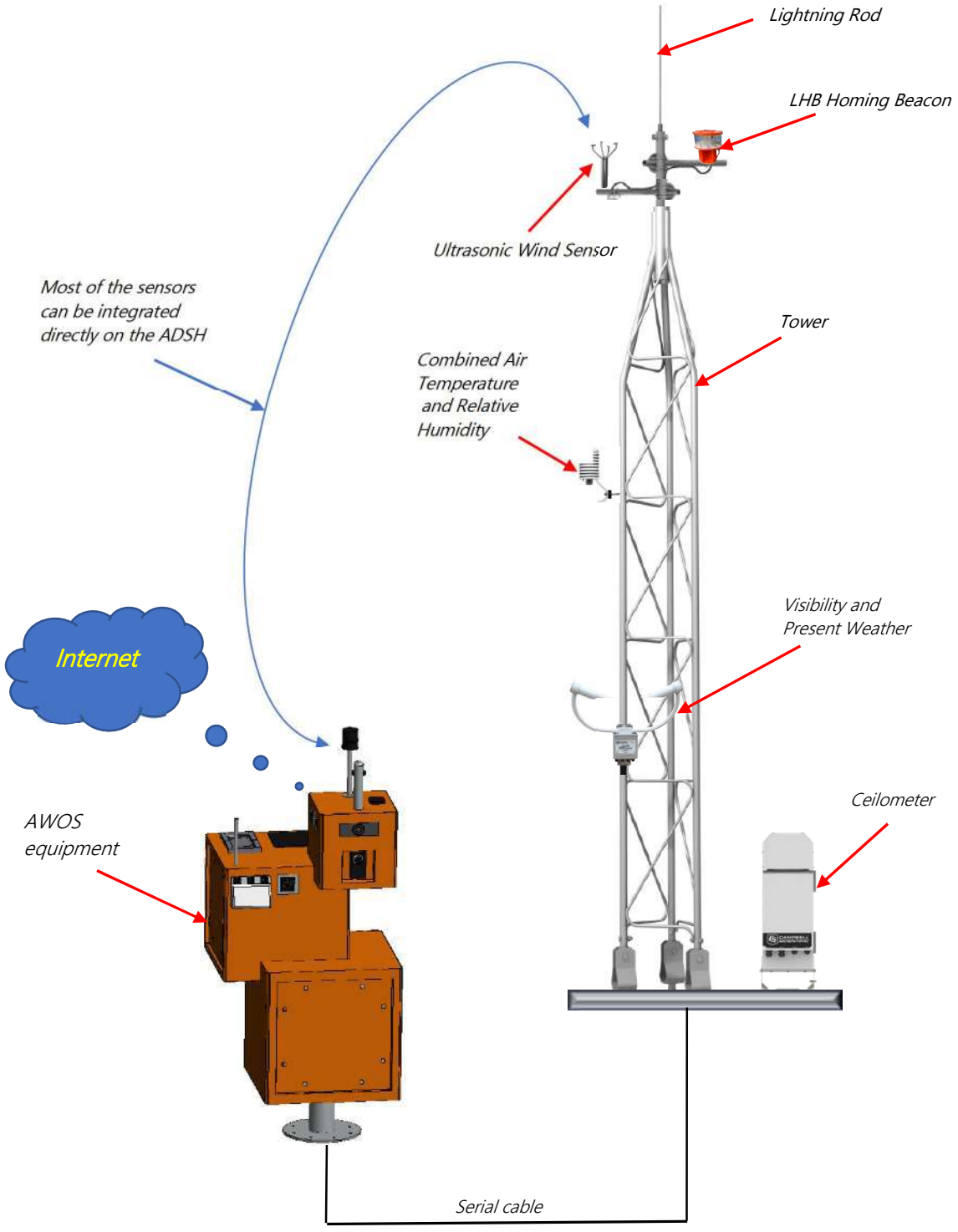
Voice Broadcasting System

Voice Broadcasting System	QTY
VHF GTA radio system	1

Sometimes it is necessary to take the text of meteorologic reports, convert them to a spoken message with a voice synthesizer, and to broadcast them over a radio to the pilots. Optionally, the system can include a click control for the radio (ROLC) where the pilot presses the push-to- talk button on his microphone a few times, which in turn activates the broadcasting. To enable this feature, we need to add:

- a VHF ground to air (GTA) radio and antenna,
- voice synthesizer and audio card to AWOS servers; also,

Graphical Representation of Helipad AWOS tower



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SENSORS

ADSH provides weather data to the National Weather Centers, helipad / vertiport managers, pilots and control rooms and others.

The selection of AWOS heliport hardware is based on the primary need for reliability, accuracy and uncompromising performance within the operating environment. As weather and climate vary greatly around the world, we have intentionally designed our AWOS hardware and software input solutions for maximum flexibility and configurability to support the majority of sensors and sensor types available. This combination of flexibility and configurability provides our customers with the most advanced and customized state of the art in sensor and system technology currently available on the market.

Wind Speed and Direction

Wind speed and direction are typically measured by an ultrasonic wind sensor as ultrasonic wind sensors have superior advantages over their mechanical counterparts such as no moving parts, require minimal maintenance, and require no recalibration.

The heated ultrasonic wind sensor can be installed either on the 3 meter breakable mast, or on module 1 of the ADSH. The heated ultrasonic wind sensor can be installed either on the 3 meter breakable mast, or on module 1 of the ADSH.

Barometric Pressure

The barometer will be mounted on the frangible shaft.

A barometer with one transducer is possible, but it is recommended to use 2 transducers for the heliport. The sensors meet or exceed the accuracy, hysteresis and repeatability characteristics of ICAO and WMO compliance over a wide temperature range. The sensors will be supplied with a factory calibration certificate.

Pressure sensors based on resonant silicon pressure technology offer the best possible performance in demanding conditions. Since multiple transducers are present, pressure readings are cross-checked and tested by algorithms to ensure reliability in the pressure reading.

Air Temperature, Relative Humidity, and Dew Point (Calculated)

Relative humidity and air temperature are measured using a digital probe and displayed in the

AWOS management software. The sensor selected for this system incorporates a PT100 sensor for temperature measurements and a Hygromer® HT-1 humidity sensor. This sensor uses Air Chip technology to provide automatic diagnostics, automatic correction and alarms.
The Rotronic HC2A-S3 sensor will be installed in a naturally aspirated radiation shield to improve the accuracy of temperature measurements. This radiation shield is made of UV stable white plastic.

Visibility, Present Weather, Runway Visual Range and Runway Light Intensity Measurement

Our AWOS measures and reports visibility.
The AWOS server collects visibility data from the CS125 forward scatter visibility sensor. In precipitation events optical sensors may experience added errors due to liquid dripping in front of the detector or emitter windows. The CS125's unique downward angled sensor hood optics reduce the risk of contamination of the optics by allowing liquid precipitation to quickly drain and the downward optics also help to reduce blockage due to blowing snow. Additionally, interference to the sample volume from the sensor by flow distortion or heat is minimized based on the sensor head configuration.

Sensor specifics are as follows:

Visibility Measurement

The CS125 forward scatter visibility measurement principle is accepted by ICAO and WMO for use in aviation applications. Visibility measurements are reported as forward scatter Meteorological Optical Range (MOR) and Extinction Coefficient (EXCO) in the range 10 m to 75 km.

Present Weather Measurement

The determination of precipitation type in the CS125 forward scatter sensor is made by observing the intensity of scattered light and the transit time for each precipitation particle. These parameters are used to estimate the particle size and determine if it is liquid or frozen using well established relationships. The CS125 Present Weather sensors include a backscatter receiver, which improves the determination of the weather codes. The ratio of forward to back scattered light is significantly different for liquid and frozen particles, allowing to report the correct precipitation code reliably, even in the most challenging conditions.

Cloud Height (Ceiling) and Sky Condition

ADSH's AWOS solution uses a small ceilometer to measure cloud base height and vertical visibility. Its measuring principle is based on the LIDAR technology of the pulsed diode laser.

This instrument can measure up to 5 layers of clouds. Up to 4 cloud levels will be reported in our aviation software. Sky conditions are reported in okta and displayed on the software using ICAO Doc 9837 help.
The Ceilometer automatically monitors its performance parameters, including window contamination, key voltages and currents, indoor temperature and relative humidity.

Masts and Mounting Accessories

The 3m mast includes a lightning dissipation system with grounding and crossarms.
The mast is of a lattice design to allow for the mounting of sensors with standard, off-the-shelf U-bolts and other mounting hardware. Frangibility Certifications ICAO DOC 9157 FAA 150/5345-45C

FDCU

The Field Data Collection Unit (FDCU) collects and processes all data from weather sensors. The components of the FDCU are located inside the ADSH module 2 and include data logger, power supplies, backup battery, surge protection device, circuit breakers, maintenance door, barometers, all other equipment necessary for operations on the field, data communications and heating. The FDCU is built predominantly with COTS (Commercial Off the Shelf) components and most components are connected via DIN rails to facilitate maintenance and service.

Datalogger and Serial Expansion Modules

The data logger is a low-power device that measures sensors, drives direct communication and telecommunications, analyzes data, controls external devices and stores data and programs in an integrated non-volatile memory. The electronics are RF shielded by a unique sealed stainless steel enclosure. A battery-buffered clock ensures accurate timekeeping. The data logger integrated in the ADSH is compatible with almost all available sensors, including analog sensors (both voltage and current), thermocouples, serial, SDI-12, pulse and frequency. It communicates with a PC via direct USB port, 10 / 100baseT Ethernet port, multidrop modem, short range modem, telephone modem (landline, digital and voice synthesized cellular), RF telemetry and satellite transmitters.

Features Include:

- Operational temperature range: -40° to 70°C.
- Connects directly to a computer's USB port.
- Captures quickly changing data values with fast analog measurement capabilities (300+Hz).
- Differentiates even slight changes in data values with higher resolutions measurements (24 bit ADC).

- Includes two non-isolated current input channels for directly connecting sensors with 0-to-20 mA or 4-to-20 mA current outputs.
- Directly connects to Ethernet.
- Includes microSD card drive for extended memory requirements.
- Provides simple serial sensor integration and measurement with SDI-12, RS-232, and/or RS-485.
- Supports full PakBus networking.
- Includes embedded web page for direct connection via web browser.

Power Supplies and Backup Systems

The FDCU utilizes COTS components for the power supply and backup systems. The primary power comes into the FDCU via mains power and passes through a 10A mains filter to increase the system's reliability in regions with suspect and unreliable AC power. The FDCU uses a primary 24 VDC, 20A, 100-240 VAC power supply. This allows a single FDCU to accommodate mains power sources from all regions of the world. The primary power supply is DIN Rail-mounted for ease of installation and replacement. The FDCU also incorporates DIN Rail-mounted OVP devices to increase system protection and reliability. The FDCU also incorporates an Uninterruptible Power Supply (UPS) with a backup battery to support the system for more than 4 hours in the event the mains power goes down. The backup battery size will depend on customer requirements for backup power requirements.

Charging Regulator

The FDCU utilizes a charging regulator, the CH201. The CH201 is a microcontroller-based smart charge controller that is ideal for charging 12VDC VRLA batteries. The charger uses MPPT (maximum power point tracking) technology to safely manage amperage and voltage for optimal battery charging and longevity. It has dual inputs for use with a solar panel and/or any 15 to 50 Vdc charging source. The dual inputs provide the option for fail-safe charging. The CH201 also outputs various parameters to allow close monitoring of the battery and power usage via RS-232 or SDI-12. In this system, the CH201 charges the battery and supplies power to the peripherals and data logger. The 12V output is regulated and switched, with the ability to charge a 12V battery at a rate of 10A.CH201 Features Include:

- Dual inputs for simultaneous charging, allowing a fail-safe if one source drops out.
- Real-time measurements of charging source voltages, battery voltage, battery charging current, load current, charge state, and on-board temperature, plus a check-battery flag.
- Efficient continuously adaptive MPPT (maximum power point tracking).
- Two-step constant voltage charging and temperature compensation to optimize battery charging and increase battery life.

- Reverse battery protection.
- Programmable LVD (low-voltage disconnect) to protect batteries.
- Two 15 to 50 Vdc inputs to accommodate multiple solar panels.
- Synchronous rectification in the switching regulator for increased DC/DC conversion efficiency.
- Individually programmable current limits on both of two inputs.
- Solid-state circuit breaker for automatic reset and more precise trip current.
- DC-to-DC converter with built-in output current control
- Serial communication wiring through three terminals

Ground to Air (GTA) Radio

Projects may require a VHF or UHF ground to air (GTA) radio or transmitter to broadcast the observations to an aircraft. Such a transmitter or radio is typically required for ATIS and voice broadcast solutions. For a budgetary, low transmission power solution, *the VAL Avionics AWOS 2000 VHF Transmitter is recommended and is the unit selected for this helipad AWOS*. The AWOS 2000 is designed for one-way communication and conforms to FAA specifications. This is a DC- powered, low transmission powered system that only comes in VHF. The AWOS 2000 will also require a 90-246 VAC power supply, power cord, surge suppressor (PolyPhaser VHF50 HN), a VHF antenna (Antenna Products VHF DPV-35 Single Band GTA), and Type N 150- and 50-foot antenna cables.

The premium transmitter solution is the Park Air Systems T6 Transmitter. This transmitter is capable of both VHF and UHF communication and can transmit in a variety of waveforms, such as AM Voice, ACARS, VDL-M2, and AM Wideband. Furthermore, the T6 is capable of VoIP audio. It meets ICAO Annex 10 standards, as well as EN 300 676, EN 301 489, and ED-137. The T6 is also capable of both 25 kHz and 8.5 kHz channel spacing. The transmission power can be configured from 5 to 50 W (specify when ordering). The T6 allows for continuous transmission even when switching between AC and DC power sources. The T6 will also require surge suppression (PolyPhaser VHF50 HN), VHF or UHF antennas (Antenna Products VHF DPV-35 Single Band GTA or UHF DPV-37 Single Band GTA), and Type N 150- and 50-foot antenna cables. For mounting in a 19” rack, the T6 would require a T6-A-CMA2 19" Cabinet Mounting Adaptor.

Computer Server Hardware Equipment

The processing software runs on an industrial PC which is integrated into the ADSH.Moxa MC-1200
Specifications:

- Fanless Industrial PC
- 2.6Ghz Core 5-7300U Processor
- 8 GB RAM
- 128 GB SSD
- Windows or Linux

AWOS/RVR Software

Overview

The AWOS (Automated Weather Observing System) software used by ADSH combines modern features and functionality with the flexibility and reliability desired by today's airports. It has been designed to ensure compliance with the International Civil Aviation

Organization (ICAO) and the World Meteorological Organization (WMO) within a flexible structure that is sensor independent, highly configurable and can be modified to meet internal local requirements.
ADSH's software acquires, processes, visualizes and stores critical meteorological measurements from each airport installation.
ADSH provides web-based clients for various user profiles. Major user profiles include air traffic controllers (ATCs), weather observers, system administrators, and maintenance personnel. These profiles will be discussed in more detail in the following sections.
The software can run on Windows or Linux based operating systems. It has been designed to meet the requirements of modern aviation stakeholders related to software security and assurance.

Design

The software complies with the regulations defined in ICAO Annex 3 and has the flexibility to meet the requirements of the Manual of Standards (MOS) Part 172 - Air Traffic Services.
It is encrypted and can be configured in HTTPS. User profiles can only be created by system administrators and access to all user profiles requires authentication with encrypted passwords.
The software manufacturer followed the EUROCAE ED 153 guidelines for ANS Software Safety Assurance (ED-153) when designing, setting requirements and implementing the software.
Specifically, the software has been designed to meet ED-153 Software Assurance Level (SWAL) 4, which takes into account human operators and procedures working as part of a total solution with an Automated Weather Observation System (AWOS).

User Profiles

The software consists of four primary user profiles. These will be described in the following Sections. Additional user profiles also exist for users tasked with creating and disseminating Terminal Aerodrome Forecasts (TAFs), SYNOPs, CLIMATS, etc.

Air Traffic Controller (ATC)

The air traffic controller (ATC) profile within the software presents the most critical elements required by an air traffic controller in an intuitive and easy to use display. Selectable day and night modes combine with high contrast color schemes and appropriate font sizes to ensure that air traffic controllers can easily read this display with minimal effort (see Figure below).

Air Traffic Controller (ATC) profile example display in night mode. Wind speed and direction (2-minute
average, 2-minute average crosswind, and 2-minute average tailwind) shown for two runways on the left and ride side of the display. Parameters such as temperature, dew point, QNH, QFE, cloud height, and Runway Visual Range (RVR) can be displayed according to runway installation position or as values representative of the airport (e.g. temperature at a Met Garden).

ATC views can be displayed on various screen sizes with various resolutions, including small touchscreens. These touchscreens can be used on their own but are often provided as backup displays. Below Figure 3-2 shows an example of a touchscreen display for wind speed and direction for a specific runway in use (or operation).

Instantaneous, 2-minute average, and 10-minute average wind speed and direction values can be

displayed for air traffic controllers. The range of wind directions over a given time period is typically highlighted in a specific color, such as green in Figure 3-2 below. Tailwind and crosswind components can be displayed as text below the 360-degree wind direction dial or through arrows with respect to the runway within the dial.
Air Traffic Controllers are able to select the runway-in-use (or operation) and the ATC display will highlight the appropriate runway-in-use accordingly.
Alert thresholds can be configured for specific values of weather parameters such as wind speed, crosswind, tailwind, cloud height, and runway visual range. If a specific alert threshold is exceeded, the parameter on the ATC display will show up highlighted in red, blink, etc. depending on user preference.

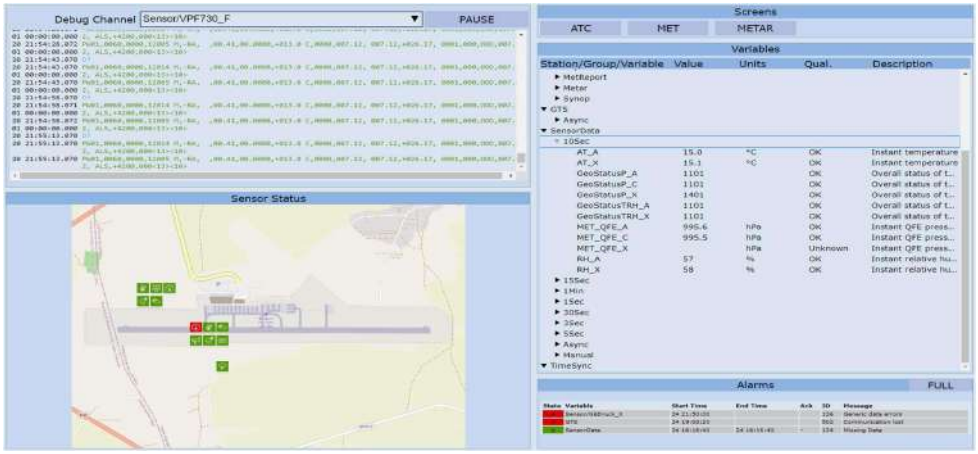
Night mode version of the software air traffic controller display for wind speed and direction. Tailwind and crosswind components are shown in text below the 360- degree wind direction dial. In the example above, runway 23 is experiencing a 4.1 knot tailwind with a 0.5 knot crosswind originating from the left.

Meteorological Observer

The Meteorological Observer (Observer) profile provides a very detailed view of all AWOS meteorological parameters to support the generation of METAR, SPECI and local reports. These displays typically contain more information than the ATC profile display (e.g. sensor information from each sensor at each airport location) and may also include map-based remote sensing information from lightning detection sensors, etc. (See Figure below).

Meteorological observers are provided with METAR, SPECI and local report templates that can operate in manual, semi-automatic or automatic mode. In manual mode, the Observer is responsible for generating and disseminating these reports. The sensor data will automatically fill in

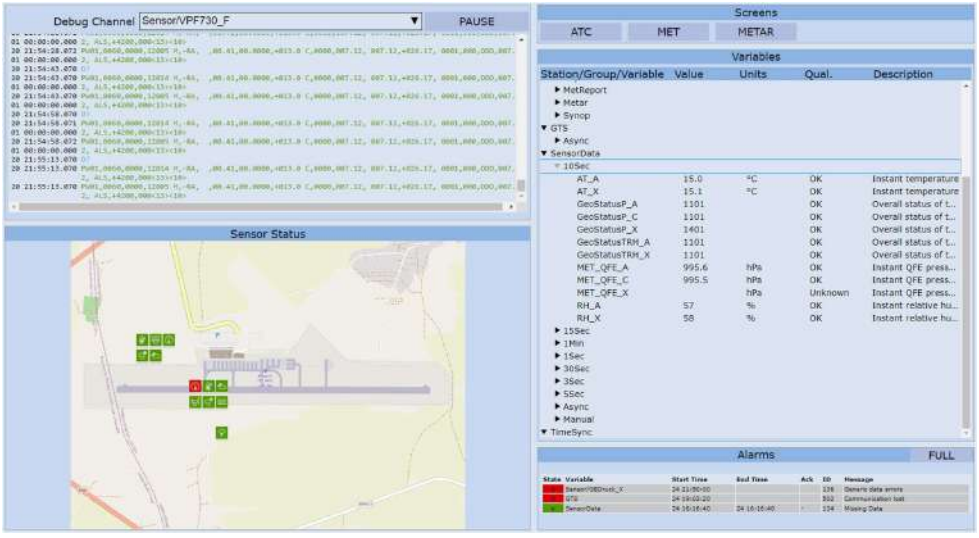
the report template, but the Observer can edit the fields in the report (such as current weather, cloud type, amount of clouds, etc.) and must manually spread them.
In semi-automatic at the right times. In fully automatic mode, no human intervention is required. Reports are automatically generated and disseminated without interaction and / or presence of an Observer. Automatic mode, the sensor data will automatically fill the report template and the Observer can modify the fields in the report.



Meteorological (MET) Observer Profile display in day mode showing typical AWOS weather parameters with a lightning detection sensor map-based display.

Maintenance

The maintenance dashboard provides users with an immediate visual assessment of the state of the AWOS system and its components. Maintenance personnel can investigate issues and are provided with details down to the Lowest Replaceable Unit (LRU) level by clicking on sensors and components within the AWOS layout diagram (see Figure below).



Maintenance profile view in day mode showing the state of each field data collection unit, sensor, LRU, interface, and Data Processing Unit (DPU; e.g. server) within the installed AWOS.

Data Quality Checks

The software has a comprehensive set of data quality checks that are continuously active within the system. The results of the data quality checks are used to validate data and create information for fault detection and maintenance. Data quality checks will include checks for missing sensor data, checking the results of the sensor built-in tests for data validation, checks for communications errors, and checks for sufficient data for valid averaging, validation of data by checking ranges, trends, logical comparisons, and discontinuities. These data quality checks will be in addition to those data checks performed by the sensors themselves. If the process for a given reportable measurement does not have adequate valid sensor inputs, that measurement is reported missing.

Logs and Data Export

The software has possibilities to record basically every event and all data that is ingested, generated, or disseminated by the system in log files. Logging can be turned on and off by users. All essential parameters are logged by default (as required by ICAO, for at least 30 days), additional logging can be turned on if for some reason more parameters should be logged. Users have access to at least the following types of archive/log files:

- Sensor Log Files – raw data
- Report Log Files – METAR and SPECI reports, COR, RVR, MET Report, etc.
- Maintenance Log Files – Alarms and warnings generated by BITs, data quality checks, and continuous system monitoring
- Communication Log Files – all messages sent out and any that are “ingested” in
- Alert Log Files – the text messages when User defined alerts are met
- Customer Created Logs – custom data sets created by the customer

Users are able to select any (single or multiple) measurement parameter and have the Software create a CSV file containing only those selected elements.

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ADSH COMMUNICATION EQUIPMENT

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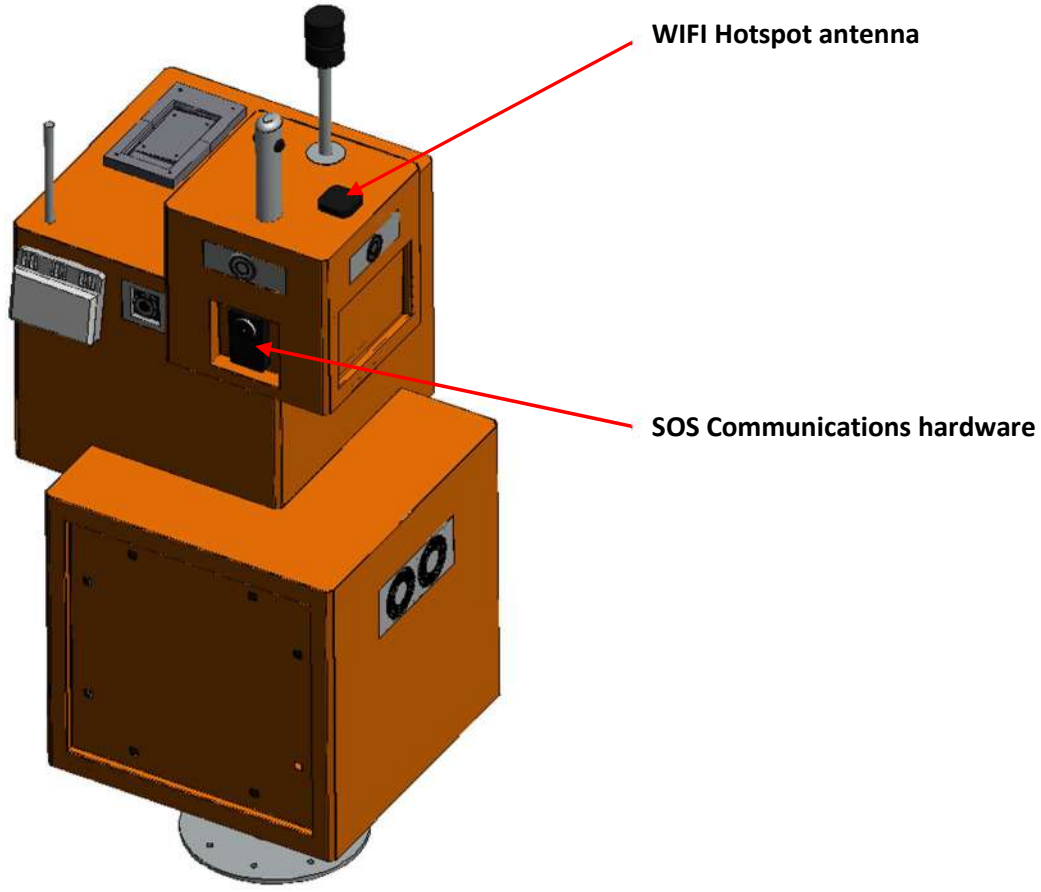
Introduction

The disruption of essential communications is one of the most widely shared characteristics in many accidents and / or disasters. Whether partial or complete, the failure of telecommunications infrastructure can also lead to preventable loss of life and property damage, causing delays and errors in emergency response and disaster relief efforts.

Solutions

ADSH has an audio-video terminal with backlit keyboard and camera that can be used in case of need by authorized users and / or by citizens in case of emergency. Thanks to the satellite connection, this function is indispensable in cases of maxi emergency or in case of breakdowns in the terrestrial communication systems.

There is also a procedure that allows (in case of hardware failure) already authorized users and / or citizens who need help, to use the ADSH VoIP resource.



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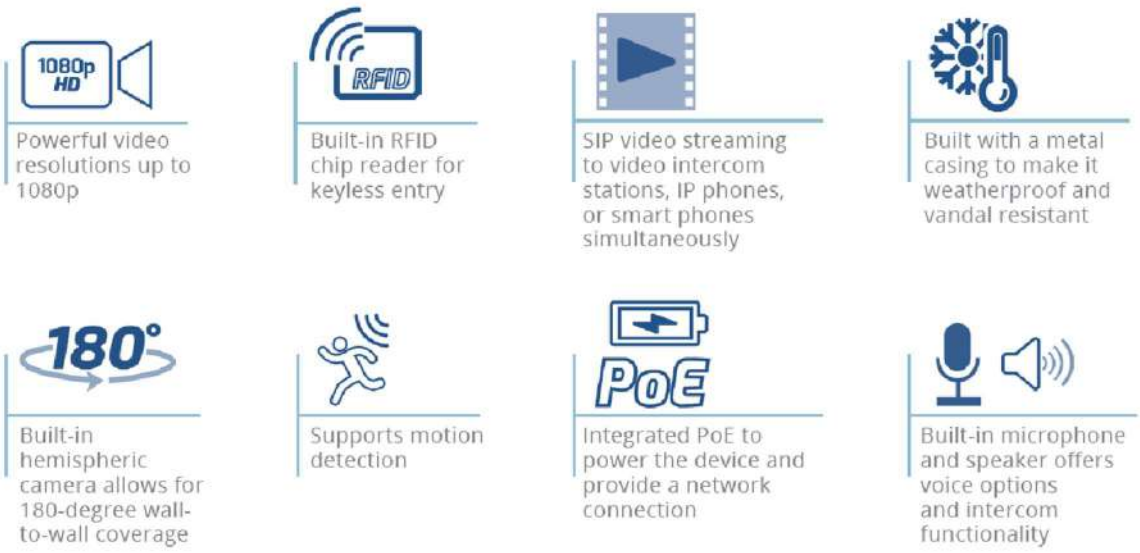
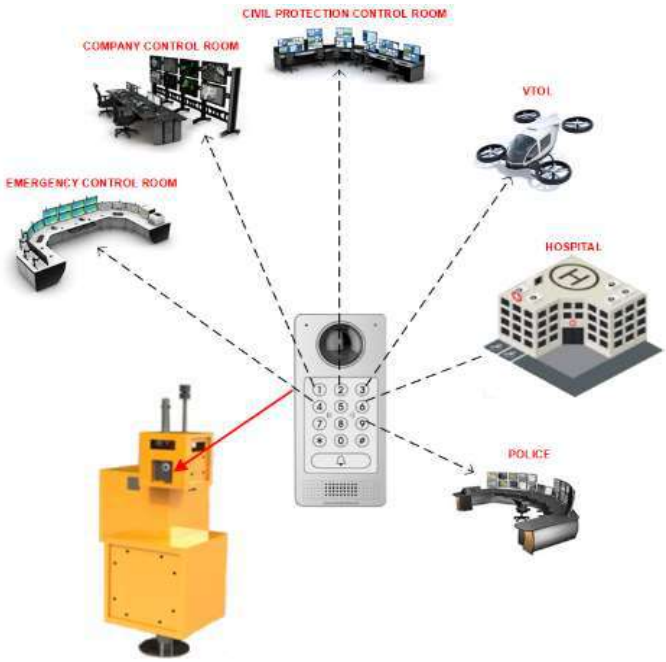


ADSH's video communications device offers 180 degree video viewing angle for wall-to-wall coverage, has an integrated RFID chip reader for secure keyless entry, includes a built-in microphone and speaker to support intercom functionality.

Powered by an advanced image sensor processor (ISP) and state-of-the-art imaging algorithms, the device offers 1080p FHD video resolutions and delivers outstanding performance with HTTP API for third-party retraining. It features SIP / VoIP technology with 2-way audio and video streaming feeds loaded directly to smartphones, SIP endpoints and management software.



Configuration example.
you can pre-set predefined numbers for direct calls to different organizations and more.

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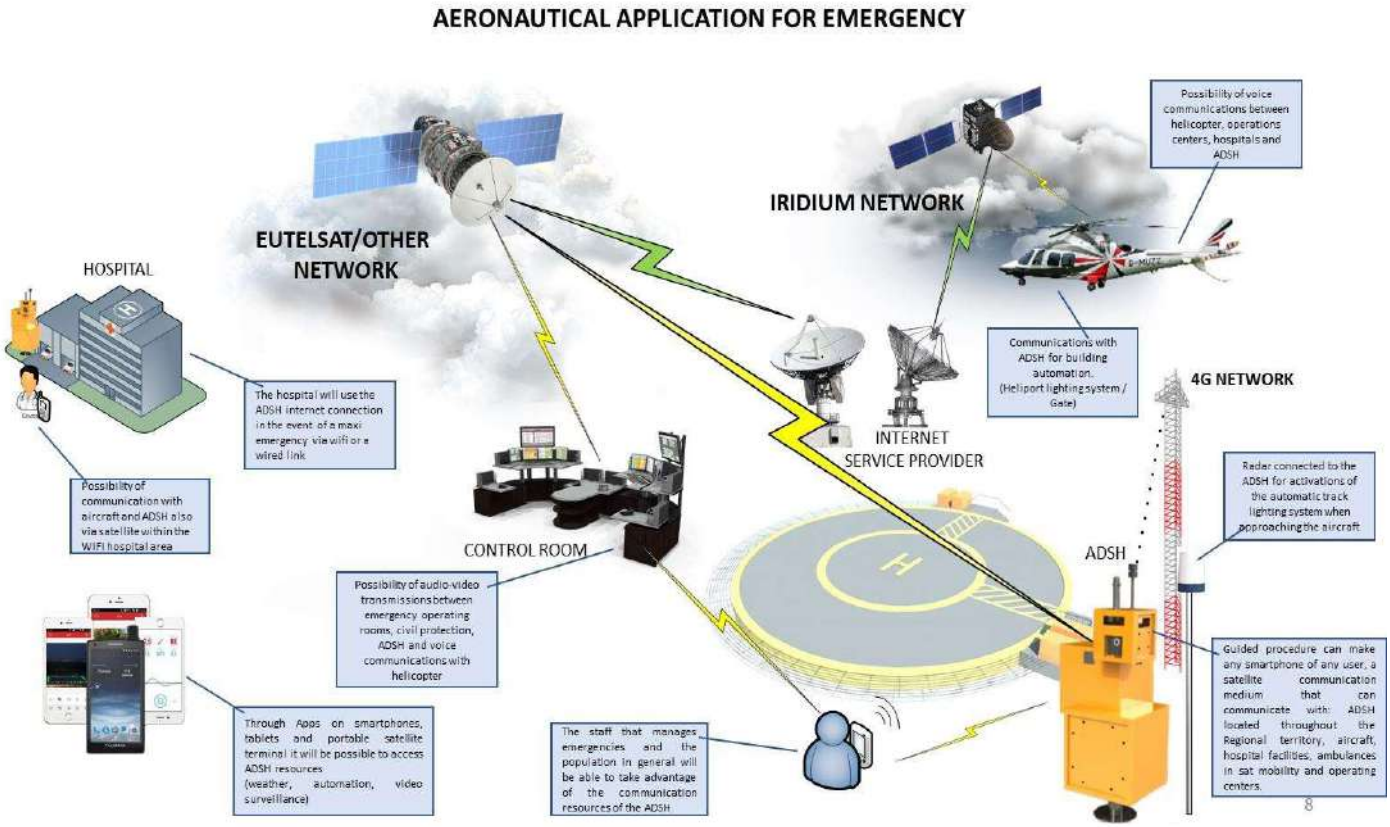
Use cases.



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CONTROL ROOM

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A Control Room or Operation Control Center is a duly built and protected place, within which control and assistance functions are performed for aircraft, land vehicles, flight operators, law enforcement and emergency management operators.
The Control Rooms designed by OilChain Inc have a variety of high-performance software and hardware that are, at the same time, easy to use by operators.
These structures are operational 24 hours a day and ensure the coordination of all interventions from the moment of the event to the activation of the response; it is essential that they must make use of advanced technological solutions that guarantee control of the airspace and infrastructure; in addition, manage the appropriate procedures in case of receiving warnings and / or emergency calls.
The Control Rooms must have dedicated radio, telephone and satellite communication systems essential for the overall management of the service.

Control Room Basic Functionalities

Management of fleet parameters, communications and satellite geolocation.

An operations center for aeronautical use manages data, geolocation and communication etween aircraft through three main systems:

Skytrac, Honeywell SkyConnect and Flightcell

These systems differ in small aspects and use "Iridium" as a satellite carrier. The functionalities allow to establish Air-To-Ground communications and vice versa.

- satellite voice, text messages and e-mails;
- international selection;
- fast call and fast email;
- NVIS options available;

Main activities of the Control Rooms with flight operators.

- general coordination of operational activities relating to the bases;
- reference point and coordination of operational issues;
- monitoring and support to crews in the transfer operations to helicopters from maintenance centers to operational bases;
- planning and coordination of the interventions necessary to maintain helicopter operations (CAMO / Maintenance / Flight Operations coordination);
- monitoring of helicopter approach operations and involvement of pilots on shift / Base contact persons / Area Managers for solutions to any operational problems (delays, etc.);
- management of security issues for off-site helicopters (for example activation of surveillance agencies, etc.), coordinate any crew logistics;
- ERP (Emergency Response Plan) management of the company.

As part of their assignment, the flight dispatchers also prepare the daily briefing (which they eventually update throughout the day if necessary) and the NOTANs, which are then all distributed to the various Operating Bases.
Furthermore, the Operations Centers immediately inform managers with a pre-established form indicating:

- reception time for flight requests;
- brands of aircraft in operation;
- composition of the crews;
- base;
- take-off time;
- target / destination;
- details on the type / operation requested.

The form is sent via e-mail or SMS and is registered in the information systems.
Flight Dispatchers also produce a post-flight analysis of each mission and prepare reports as requested by customers.
The operators collaborate with the CAMO coordinator and have access to a computerized maintenance management system that records and tracks the airworthiness of vehicles. The Maintenance Engineers are in direct contact with the operators and regularly inform the Flight Dispacher about the availability of the vehicles.

Procedures of the Operations Centers.

The Flight Follower monitors the position of the aircraft and verifies that the aircraft maintains the way points; in the event that the helicopter:

- It does not follow the predetermined route
- It does not maintain the planned arrival times at the various check-points / way-points.

If he is unable to contact the vehicle, he follows the established procedure in accordance with the ERP.

The personnel in charge, at this point, consult the ERP flowchart, which is the one in use for the management of emergencies / crisis situations.

The processes used for the operational control of flights in an emergency are compatible with all operational procedures that have been established by the air traffic control agencies. This compatibility is necessary to avoid conflicts and ensure an effective exchange of information between the operator and any of the agencies and / or customers.

During an operational emergency situation, the procedures are designed not to conflict with ATC procedures, such as separation regulations, controller instructions, assigned minimum flight altitudes or other restrictions imposed by regulatory bodies.

During an emergency, however, the Pilot in Command (PIC) can exercise his authority and take the necessary measures in the interest of passenger safety and the safety of aircraft.

Personnel qualifications

All the staff in service at the Control Rooms are made up of highly qualified professionals selected and trained exclusively to carry out tasks related to the active support of mission critical operations. Flight operators must follow a training program, approved by the authorities, which ensures that control personnel are capable of performing all assignment functions for operational control in accordance with applicable specifications and, at a minimum:

- initial qualification;
- periodic training.

Before being assigned to control duties, operators must demonstrate knowledge and / or competence in the appropriate operational control subjects including:

- basic requirements;
- operators are required to possess the necessary knowledge, skills and resources to implement and supervise the numerous systems and processes necessary to support.

For this reason, they also possess attributes that characterize the particular category of operators;

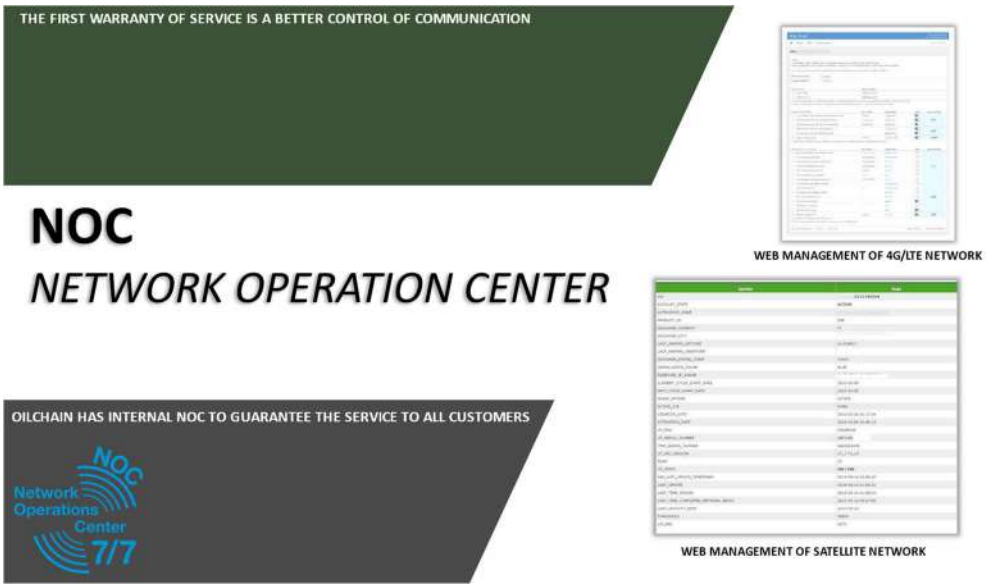
- decision-making and management skills of processes and controls including:
- development of policies and procedures;
- training in company policies and procedures;

- ability to perform;
- manipulation of information and data reporting, analytical skills;
- ability to respond to systems in a state of degradation.
- other skills and abilities required are, among others;
- ability to manage systems that provide command of the conduct of flight operations;
- flight monitoring that includes the activities necessary for real operational control;
- fast and reliable communication skills;
- ability to manage ground and airborne-based systems that improve "situational awareness" and operational capacity;
- ability to manipulate weather information;
- ability to interface with the SMS to ensure compliance with company standards and compliance with regulatory requirements;
- ability to identify and analyze hazards applicable to operations;
- assessment, control and ability to process the results of the Risk Analysis.

Operators and technicians will have the knowledge of all IT applications to control the multiplicity of services made available by ADSH.

Some tools used by the operators in the Control Room are:

- Control and management of all satellite, 4G / 5G and wired telecommunications connections through the NOC (Network Operation Center);



- Live monitoring of all Helipads / Vertiports with remote control functions;

  The Control Room operators have centralization software that allows the continuous and constant vision of all the infrastructures at the same time through the ADSH systems that are installed in each site.

Furthermore, through graphic maps, to remotely control runway lighting, automatic gates etc. and to receive visual and acoustic alerts of possible faults on the systems present in the helipads, such as: faults and / or UPS reports, faults and / or reports of generators etc.

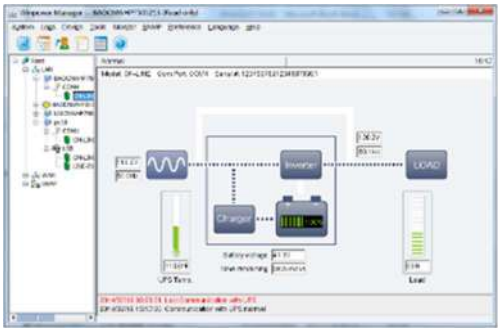
- Backup image recording and event notification;

  Most reports can be verified on video before security personnel are dispatched to the site. A number of frequent alarm conditions are included in a security event.
  As soon as one of the alarm conditions occurs, the software can automatically trigger alarms to notify operators or designated authorities.

- Control of the internal electronic devices of all ADSHs located throughout the territory;
- Control and event management of Helipads / Vertiports plants;

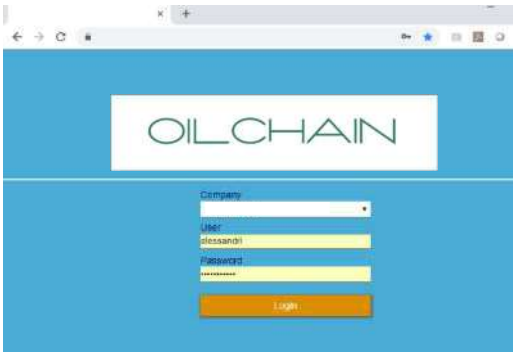
- Remote control and management of generators:

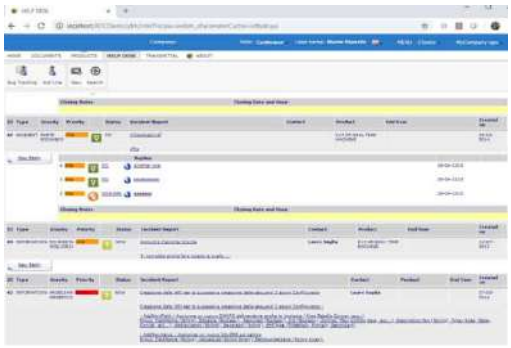
  The Control Room operators also manage the generating sets via the Internet to check the correct operation and status of its components (eg battery voltage check, fuel level check).



- UPS control:
- Maintenance ticket management:

The maintenance ticket management software is equipped with tools for tracing requests and manages, in a simplified way, product warranties and maintenance interventions. The software allows you to monitor and improve the efficiency of internal management processes, product quality and service profitability.





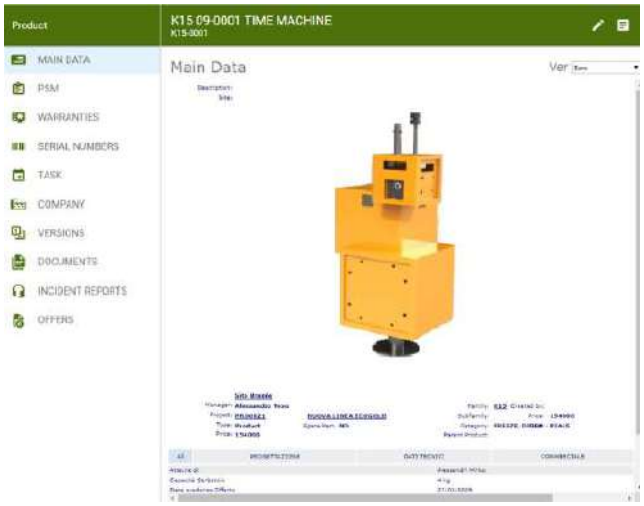
The registry contains in a structured and easily traceable way all contact information, collaborators and related activities.
The assignment, management and resolution of tickets takes place following flows configured on your needs that may involve multiple departments or company areas, partners and suppliers.
The software allows you to plan activities also on-site, verifying the availability of technicians and physical resources needed through integrated and shared planners and agendas. Through specific tools it is possible to create and maintain types of Service Level Agreements (SLAs) signed by customers with classification rules and details of the contractual aspects and services included. This makes it possible to monitor the active and deliverable service levels by the customer service and to easily manage maintenance contract renewal activities through contract scheduling and dynamic generation tools and

sending renewal contracts.

Access to the system and details of the pages visited are automatically logged in the personal data. Specifically, the administration tools allow you to create information boards within which to group and organize in thematic areas content and documents related to the after-sales management of services such as

FAQs, videos, tutorials and manuals.

For each item registered in the software, which can be ADSH or other components belonging to the infrastructures, it is possible to attach manuals, procedures, photos and certificates.



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DIRECT VTOL TO VERTIPORT COMMUNICATION

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Introduction

Both aircraft and infrastructures currently have telecommunications means but the interaction between them is very poor.

Today, satellite equipment certified for avionic use and data traffic are very expensive and peak speeds are around 650Kbps.

The best-selling on-board devices are Skytrac, Honeywell SkyConnect and Flightcell use Iridium (low data rate) and 4G for faster data connectivity; unfortunately the latter is not always available and network congestion may also occur.

Solution

Being experts in telecommunications also on wireless connectivity, we decided to create links directly between ADSH and VTOL.

This link will use Dual-Horn MU-MIMO ground systems, able to develop a very wide and long-distance coverage towards the landing / take-off areas and microstrip antennas created ad hoc with re-irradiation lobe specially designed and conceived to connect to the Access Point directly connected to the ADSH.

It should be noted that the microstrip antennas will not use new on-board hardware and therefore will not require certification procedures.

The antenna can modify the irradiation solid in order to obtain the best configuration between gain and useful width of the radiating beam.

The three-dimensional graphs show a typical configuration of the antenna system: the irradiation lobe, extending mainly towards one direction (in this case the one outside the control cabin) and the adhesive-antenna-wall sandwich of the cabin, which represents the rigid support of the 'antenna.

The whole antenna system is connected to the power supply device (i.e. tablet) by means of a coaxial cable and a capacitive coupling patch with the antenna inside the tablet. The coupling and the stability of the connection is guaranteed by a system that makes the patch and antenna of the tablet integral, as an additional adhesive support or a suitably shaped tablet holder.

The proposal is meant to be as a Wi-Fi direct link sending by radar tracking, further development is on course to implement new applications.

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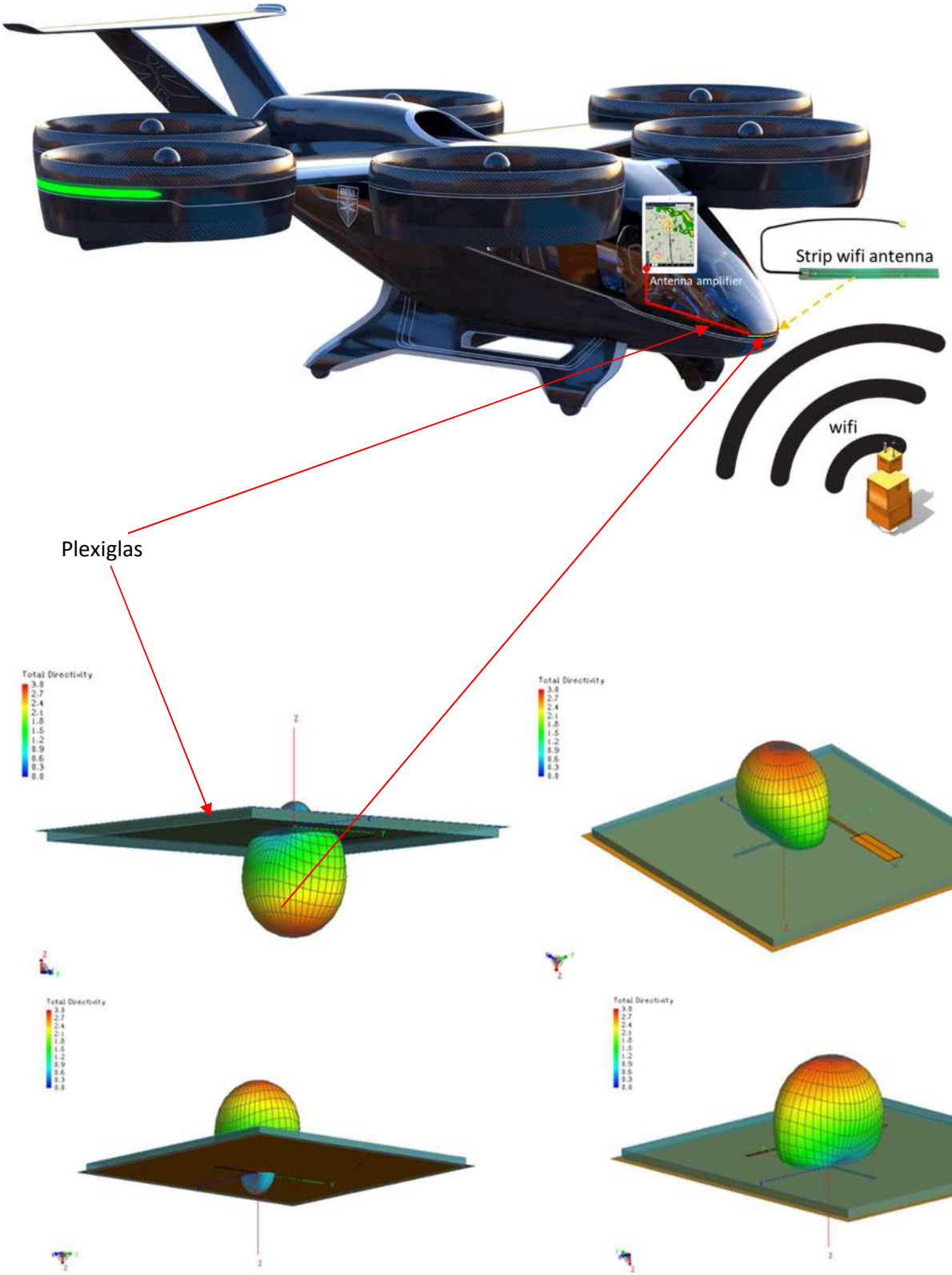

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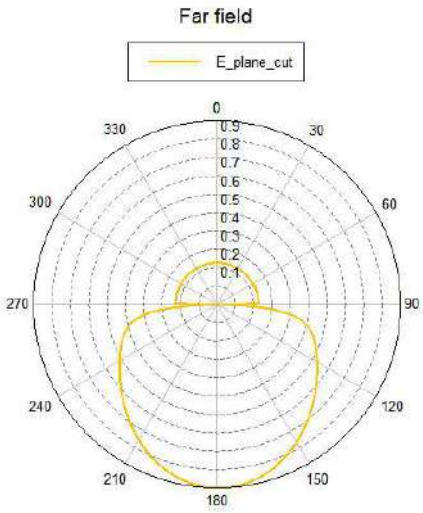
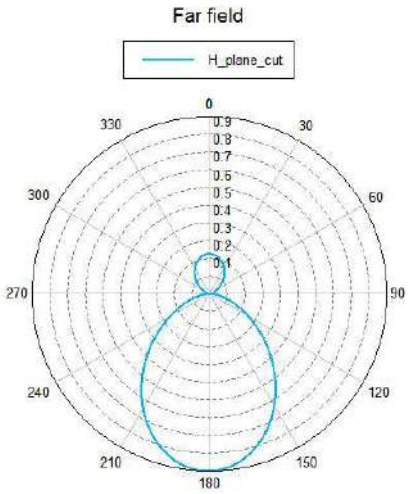
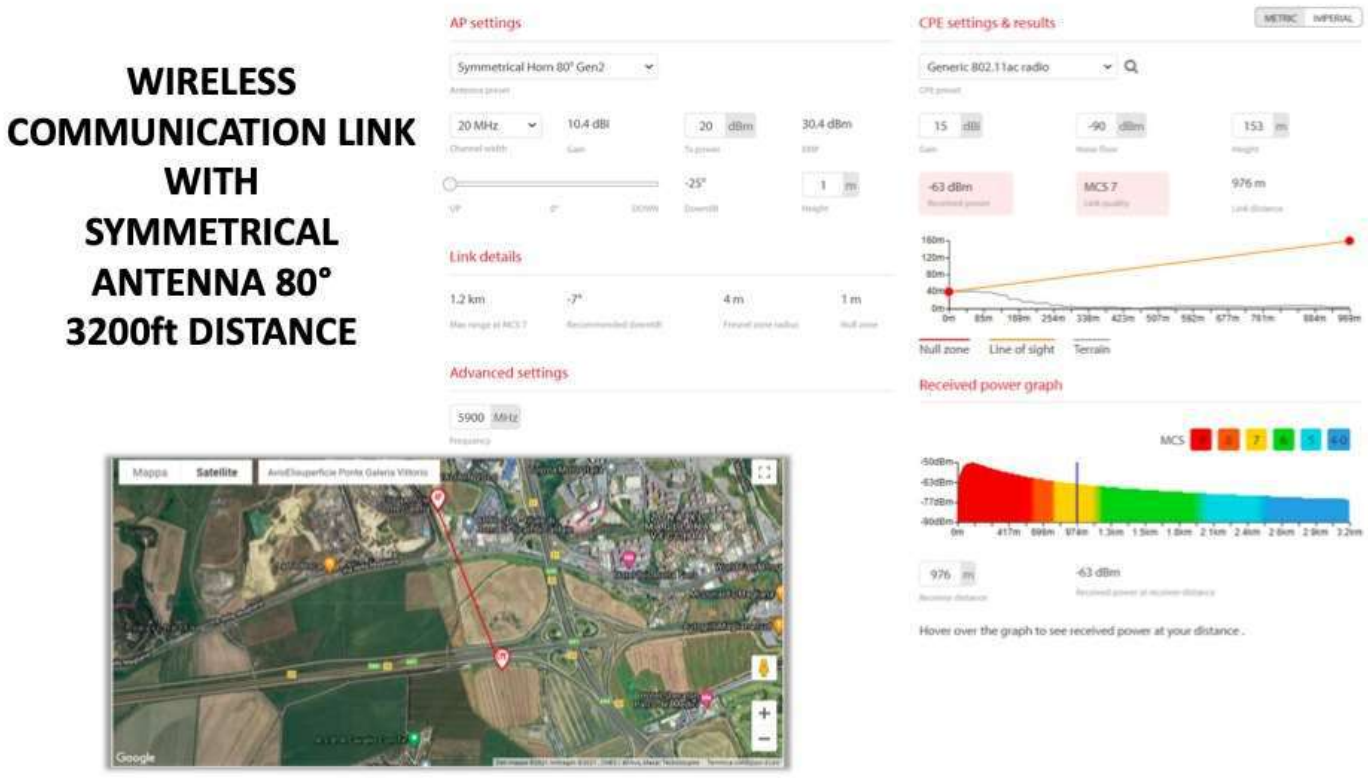




Use cases



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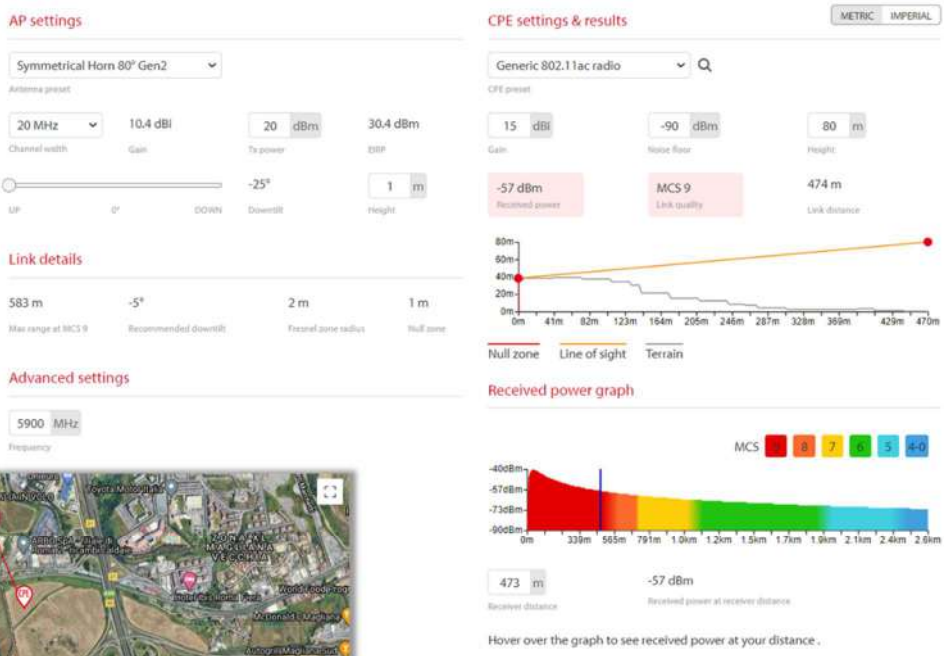
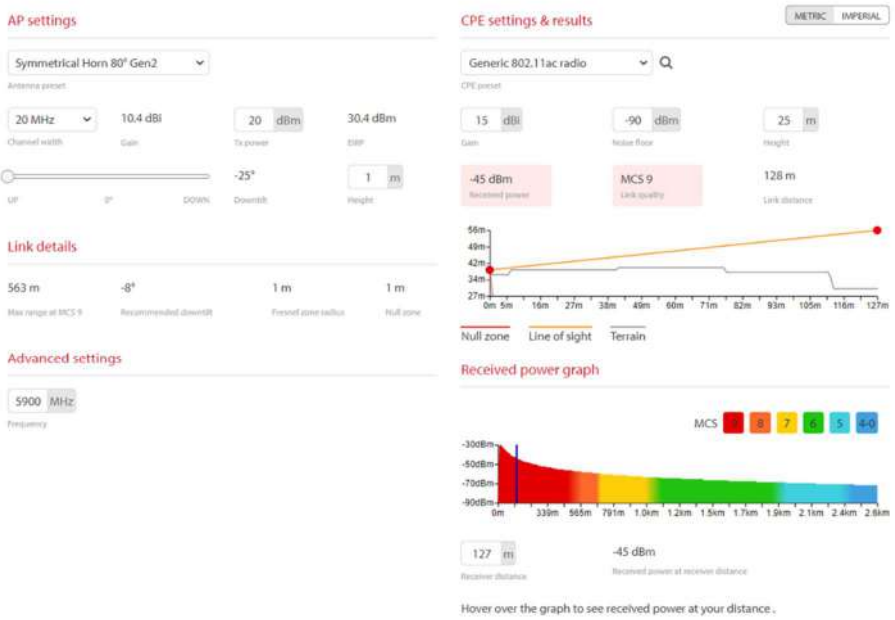
WIRELESS COMMUNICATION LINK WITH SYMMETRICAL ANTENNA 80° 1600ft DISTANCE



WIRELESS COMMUNICATION LINK WITH SYMMETRICAL ANTENNA 80° 400ft DISTANCE



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Use cases

Waiting for the very Next Scenario in Wi-Fi Communication

The **U.S. Federal Communications Commission** has recently authorized the opening of 6 GHz Band to **Wi-Fi 6E** for Other Unlicensed Uses.
Thanks to this new standard there will be more radio spectrum, less congestion, greater immunity to interference, greater range and lower latency. Using this new standard, **taking advantage of the ADSH grid spread over a territory**, it is possible to create a stable and secure **Mesh-like Network**.

Some advantages are:

- A **rapid connection for EFB** that provides exchange of data between Dispatchers and Pilots.
- A quick connection with the vertiport to receive data concerning the site's **usability**.
- In case of poor or null visibility it would be possible to connect to the ADSH on vertiport **with very low latency (few msecs)**, to receive assistance from the radar with tracking support with hybrid camera vision.
- VTOLs will have an **additional** means of communication.
- Currently costs for hardware and satellite communication channels for VTOL aircrafts are very expensive. The data traffic generated between VTOLs and infrastructures for video streaming, real-time flight traffic, meteorological data and others will be increasingly high. **In UAM a mesh-like network using ADSHs will allow significant economic savings.**

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FACILITIES MANAGEMENT FUNCTIONALITY

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Introduction

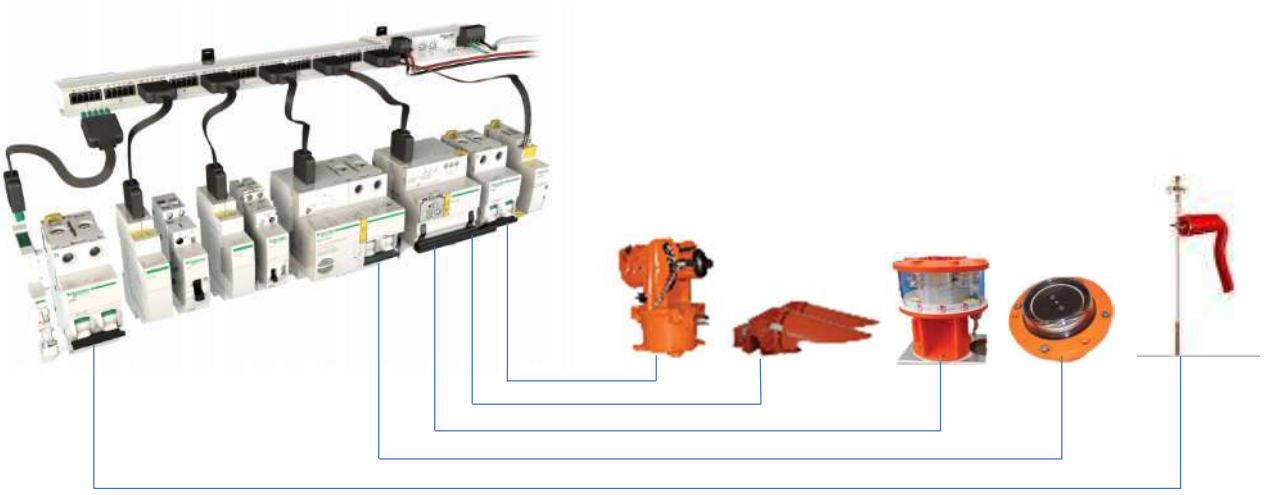
ADSH solution has redesigned the management concept of the fundamental systems present on the Helipads/Vertiports.

Some of these are:Helipad Lighting Systems

- Fire System
- Generator
- UPS
- Control power supply
- Other

Solution

For the management of the previous points, ADSH has a motorized electrical panel and data acquisition and control modules (DA&C) based on Ethernet. The main electrical panel, which also manages the lighting of the helipad, has an IP module for controlling and supervising all the motorized magneto thermic switches. It is installed in module 3 and has many advantages, such as:
Optimization of energy consumption, allowing for greater energy efficiency Collecting, viewing and analyzing data from energy meters for individually monitored / controlled circuits across multiple distribution panels.
The automation, programming and control of remote equipment to optimize energy consumption and reduce operating costs.
Instant, accurate and detailed alerts in the event of a power failure.
The simplicity of upgrading existing installations for remote monitoring and control.
Possibility of combining an Ethernet version with Modbus slaves, such as monitoring the entire electrical panel for managing the fire-fighting system, allowing all the necessary inputs on large installations.



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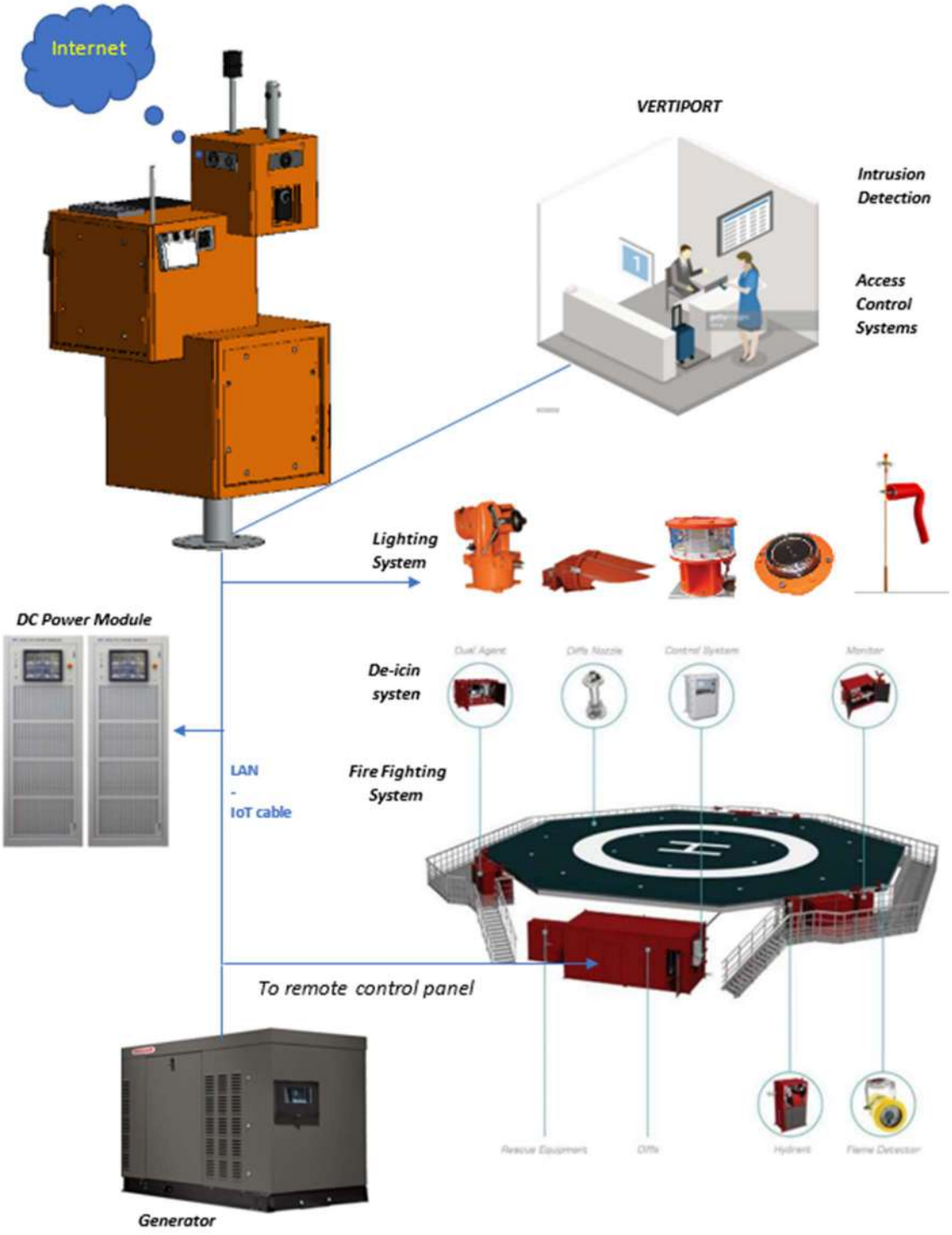
Smartlink permanently monitors every single switch and if one of them is switched to "off", it forwards the type of failure via email to the control room.

If the cause is of a transitory nature, the operators will be able to switch the switch involved to "on" and consequently restore the service to normal (Helipad lighting, Fire systems, etc).



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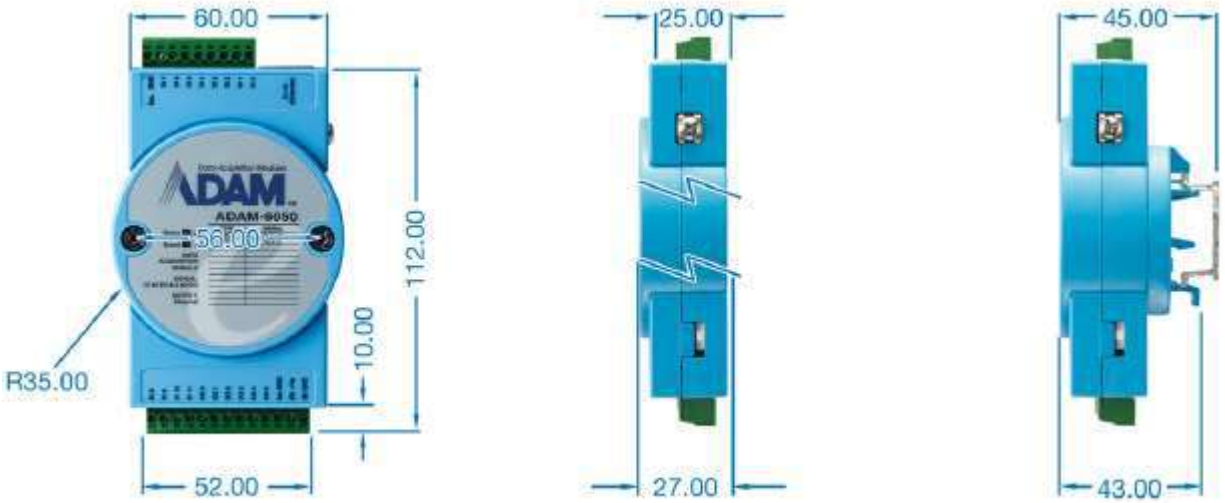
The data acquisition and control module (DA&C) based on Ethernet is Advantech's ADAM 6000 that provides I / O, data acquisition and networking capabilities in a single module, enabling you to create a cost-effective distributed control and monitoring solution for a wide variety of applications. Through a standard Ethernet network, the ADAM-6000 modules can retrieve I / O values from sensors and publish them as real-time I / O values to network nodes via LAN, intranet or the Internet. With Ethernet-enabled technology, the ADAM-6000 modules allow you to create an affordable DA&C system for helipads / slopes, automation, environmental monitoring, facility management and e-manufacturing applications.

The ADAM 6000 works with both Genetec and Mylestone software platforms and allows to signal, through its alarmable inputs, warnings to the control room and automation function to activate the systems present on the helipads / vertiports (helipad lighting systems, motorized gates, electrical door and other).

This device is installed in parallel with other I / O devices to increase safety in receiving events and for activating systems remotely.



Specifications

- Communication: 10/100BASE-T Ethernet
- Supported protocols: MQTT, SNMP, Modbus/TCP, TCP/IP, UDP, HTTP, ICMP,
- DHCP, and ARP
- Supports P2P and GCL (see Section 6.7 and Chapter 8)

Digital Input

- Channels: 12
- Dry contact:
  - Logic level 0: Close to GND
  - Logic level 1: Open
- Wet contact:
  - Logic level 0: 0~3 VDC
  - Logic level 1: 10~30 VDC
- Supports 3-kHz counter input (32-bit with overflow flag)

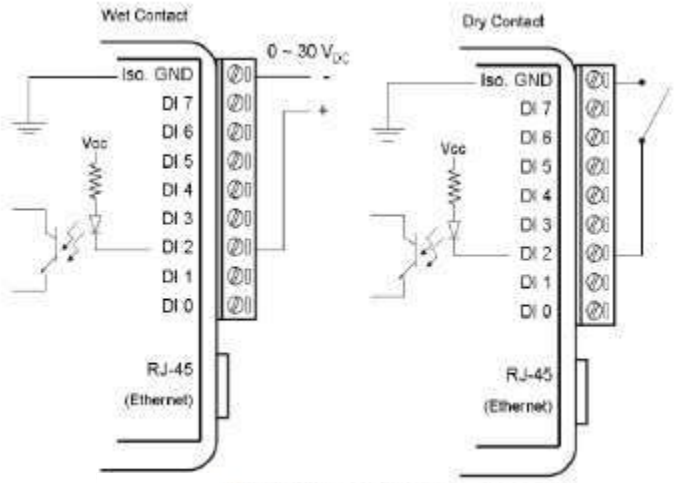
- Frequency input range: 0.2~3 kHz
- Supports inverted digital input status

Digital Output

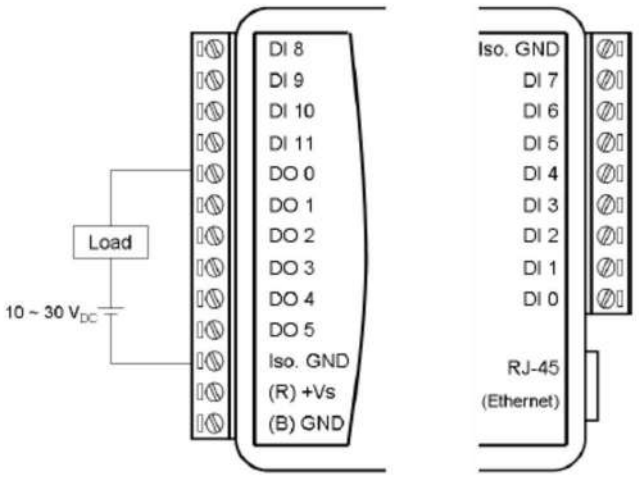
- Channels: 6
- Sink type: Open collector to 30 V, 100 mA (max. load)
- Supports 5-kHz pulse output
- Supports high-to-low and low-to-high delay output
- Leakage current: 200 µA (max.) (D version)

General

- Built-in watchdog timer
- Isolation protection: 2000 VDC
- Power input: Unregulated 10~30 VDC
- Power consumption: 2 W (max.) @ 24 VDC
- Power reversal protection
- Operating humidity: 20~95% RH (non-condensing)
- Storage humidity: 0~95% RH (non-condensing)
- Operating temperature: -20~70°C (D version: -40~70°C)
- Storage temperatur e: -30~80°C (D version: -40~85°C)



ADAM-6050 Digital Input Wiring



ADAM-6050 Digital Output Wiring

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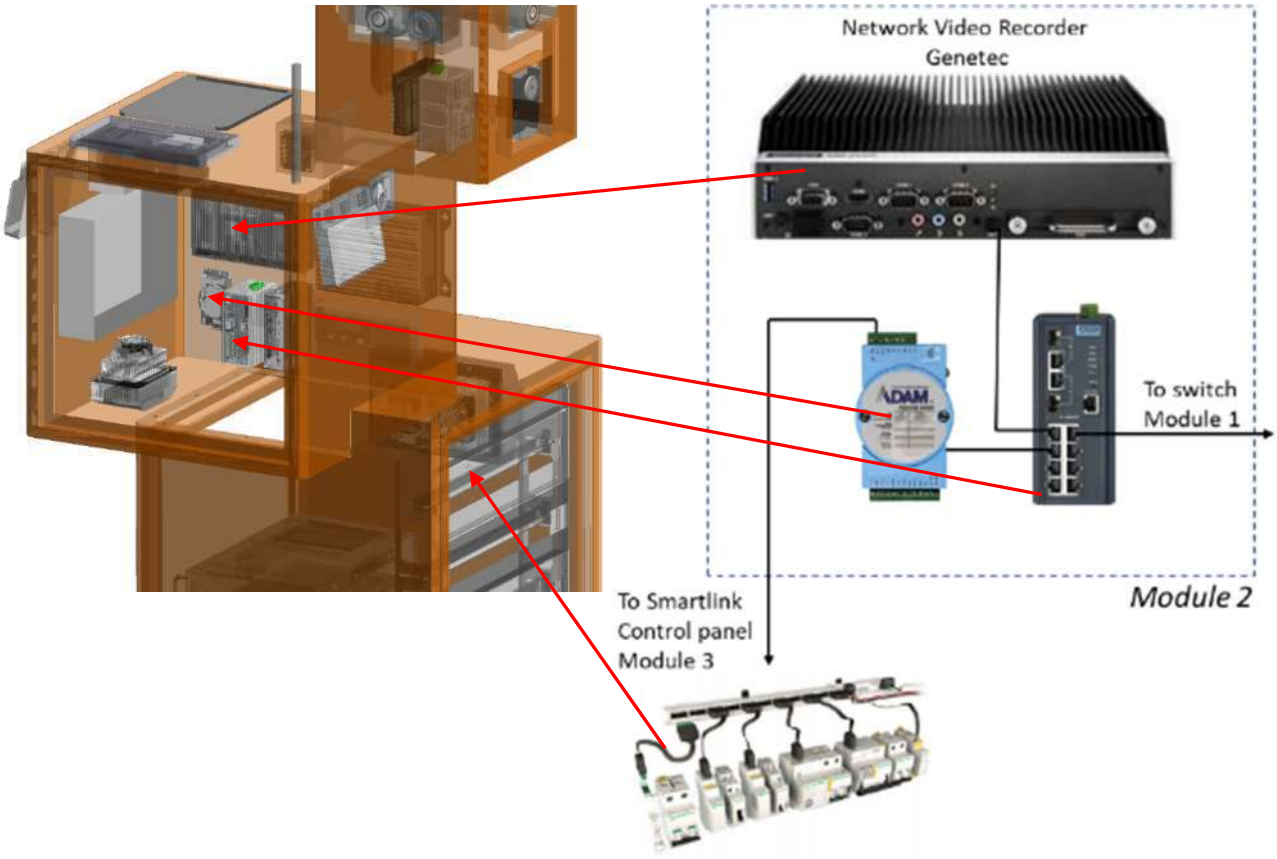
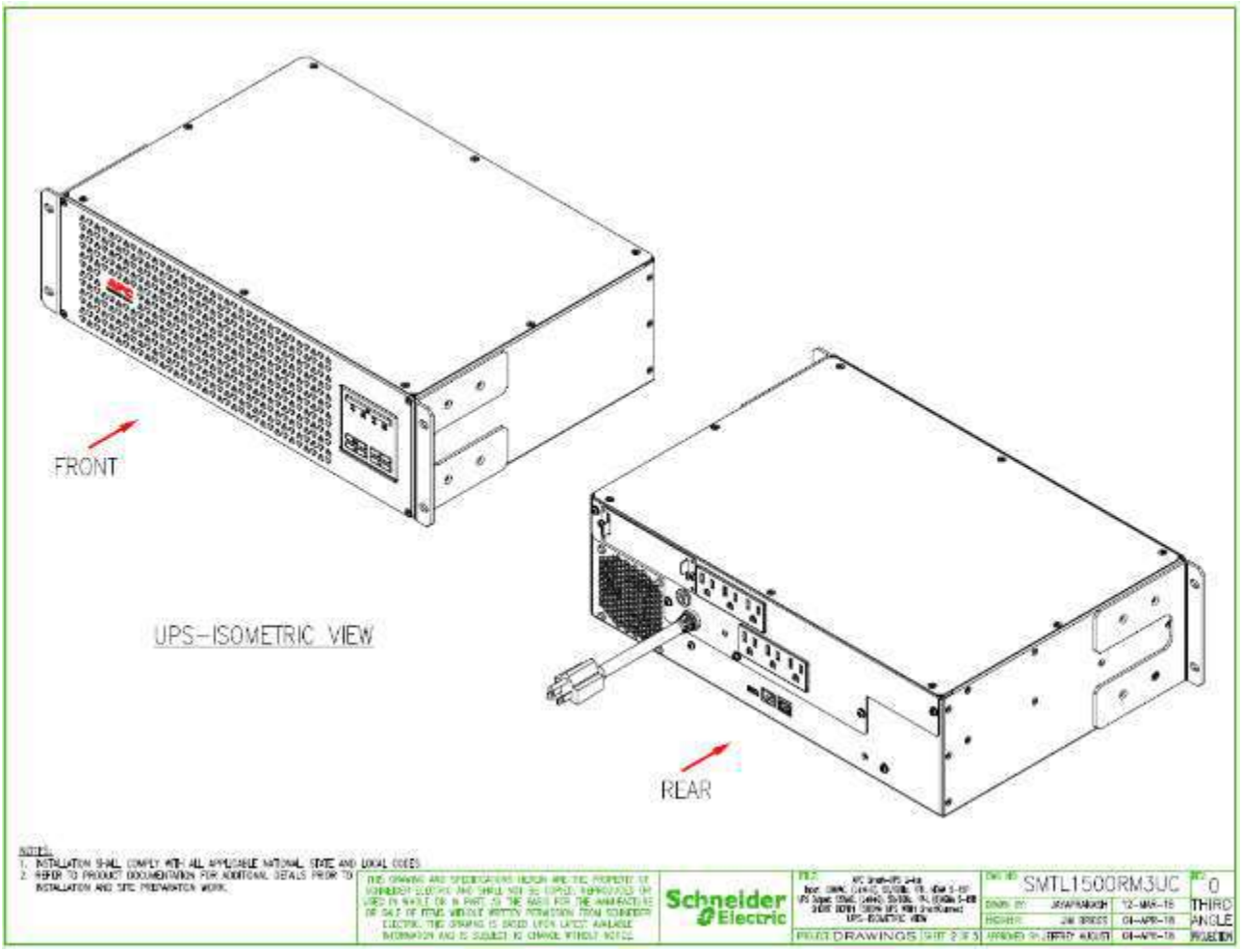


Systems can be controlled in several ways.
Directly from the web interfaces of the smartlink or through the Genetec or Milestone management software

Uninterruptible Power Supply "Li-ion Battery"

ADSH inside (module 3) has two UPS, the first for the management of all electronic devices, the second dedicated to the track lighting system which now have low absorption thanks to the use of LED lamps.

Li-ion battery technology has evolved to the point that it is currently a financially viable solution for new applications and is safe in larger applications such as electric vehicles and data center UPS. UPS lithium-ion batteries are smaller, lighter, recharge faster, and last at least twice as long as lead-acid batteries, which are currently the most popular energy storage technology. Lithium-ion technology is arguably the most environmentally friendly and surprisingly the one with the lowest total cost of ownership, despite the higher initial purchase costs.

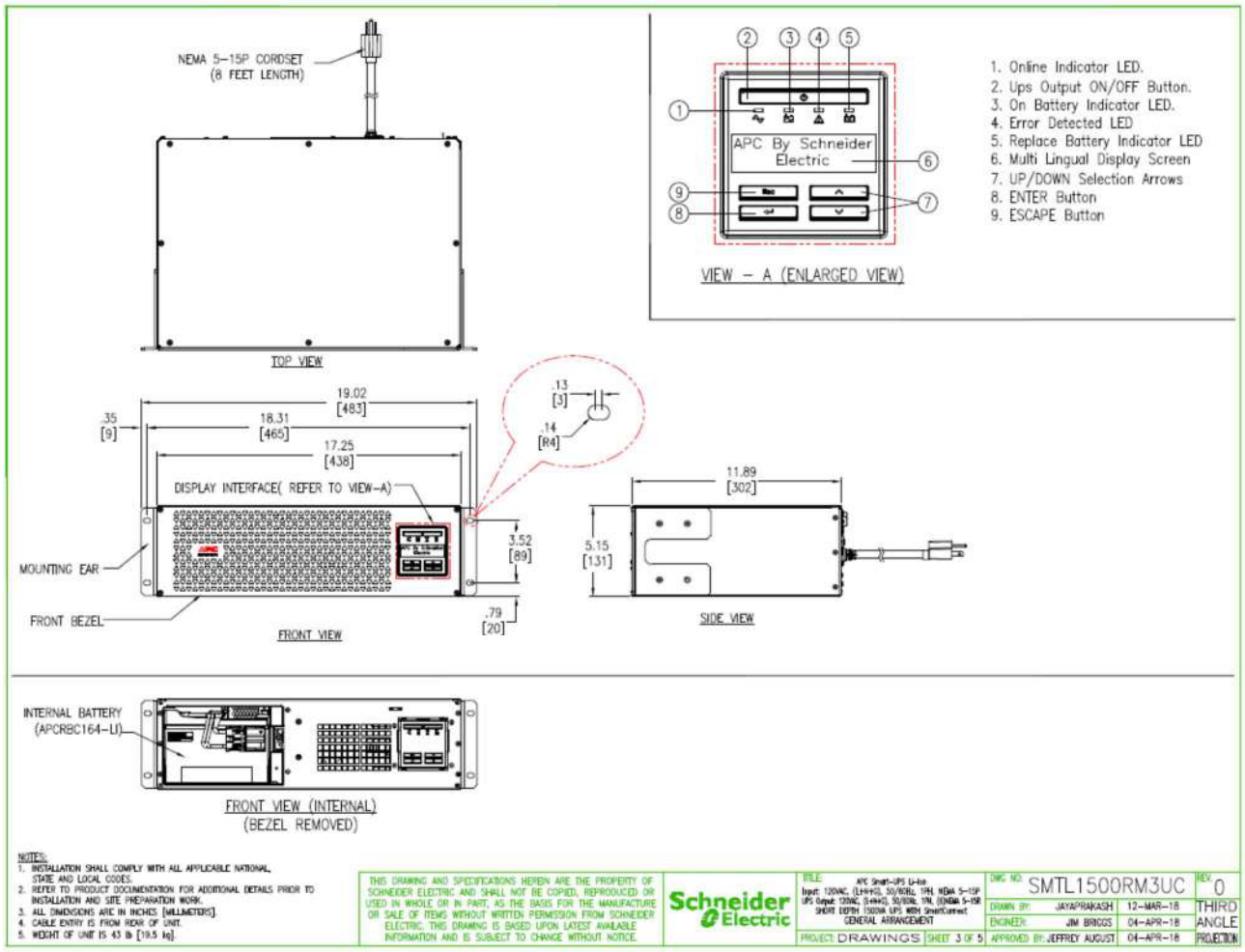


Smart-UPS™ with lithium-ion batteries saves up to 47% in Total Cost of Ownership (TCO) over the lifetime of the UPS. Battery life is increased 2X. Reduced maintenance cost and improved battery performance in temperatures up to 104°F. UPS management options include Powerchute™ Business Edition, APC SmartConnect, Network Management Cards and EcoStruxure IT. The additional benefit of a 12-inch short-depth chassis allows this UPS to be installed in any 4-post rack and most wall-mount racks.

APC is an industry standard in network and server UPS Lithium-Ion battery provides twice the services life of the lead-acid batteries typically used in (Uninterruptible Power Supplies) UPS.

Intelligent battery management system Li-ion batteries are monitored at an individual cell level to manage voltage and temperatures of the set of cells. This helps the Li-ion batteries to provide a higher level of safety.

High-efficiency green mode Achieves up to 97% percent efficiency, which minimizes utility and cooling costs without compromising performance or reliability.



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Smart-UPS Features & Benefits

Availability

Automatic restart of loads after UPS shutdown
Automatically starts up the connected equipment upon the return of utility power.
Automatic self-test
Periodic battery self-test ensures early detection of a battery that needs to be replaced.
Temperature-compensated battery charging
Prolongs battery life by regulating the charge voltage according to battery temperature.
Power conditioning
Protects connected loads from surges, spikes, lightning, and other power disturbances.
Intelligent battery management
Maximizes battery performance, life, and reliability through intelligent, precision charging.
Disconnected battery notification
Warns when a battery is not available to provide backup power.
Boost and Trim Automatic Voltage Regulation (AVR)
Gives higher application availability by correcting low and high voltage conditions without using the battery (not available on all models).

Manageability

Network manageable
Provides remote power management of the UPS over the network.
Serial connectivity
Provides management of the UPS via a serial port.
USB connectivity
Provides management of the UPS via a USB port (not available on all models).
Audible alarms
Provides notification of changing utility power and UPS conditions.
LED status indicators
Quickly understand unit and power status with visual indicators.

Marketing features

Avoids costly power problems by keeping your IT equipment and data safe and available
Network grade power conditioning protects from damaging surges and disruptive noise. Solid state automatic voltage regulation boosts low input voltage up to 30% and trims high voltage up to 12% without battery operation. Reliable battery back-up capacity to power through outages or gracefully shutdown systems
Peace of mind that comes with full equipment compatibility and reliability of a leader

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Provides pure sine wave output which is recommended by server manufacturers using active power factor corrected (PFC) power supplies. Safety agency tested and approved means that you can deploy Smart-UPS with confidence that they meet or exceed the industry's most rigorous standards.

Low operating and maintenance costs with high efficiency, proven reliability and intelligent battery management

Patented green operating mode achieves efficiencies over 97%. Smart-ups was the first network UPS to be Energy Star certified. Intelligent battery management, pioneered by APC, maximizes battery performance and life through intelligent, precision temperature compensated charging. Dynamic battery replacement date indicator and automatic self tests insure battery reliability and warn in advance of needing replacement. Convenient, easy to connect, hot-swappable battery modules provide battery replacement without powering down. Designed and manufactured by APC for over 23 years, Smart-UPS is the world's most trusted network UPS with over 25 million units sold.

Smarter productivity with ability to tailor to your specific application needs

Intuitive LCD interface provides clear information with the ability to configure the UPS locally with easy to use navigation keys. Over 15 different programmable settings including switched outlet group control allow for application specific settings, thresholds and notifications.

Save time with easy and convenient remote accessibility

Network manageable via serial, USB or optional ethernet. Includes Powerchute® Business Edition Software for convenient monitoring and control, safe operating system shutdown and innovative energy management capabilities.

Safety

Safety-agency approved

Ensures the product has been tested and approved to work safely with the connected service provider equipment and within the specified environment.

Adaptability

Adjustable voltage sensitivity

Provides the ability to adapt the UPS for optimal performance in specific power environments or generator applications.

Adjustable voltage-transfer points

Maximizes useful battery life by widening the input voltage window or tightening the output voltage regulation.

Serviceability

Battery failure notification

Provides early-warning fault analysis on batteries enabling timely preventive maintenance

Hot-swappable batteries

Ensures clean, uninterrupted power to protected equipment while batteries are being replaced

User-replaceable batteries

Increases availability by allowing a trained user to perform upgrades and replacements of the batteries reducing Mean Time to Repair (MTTR)

Predictive failure notification

Provides early-warning fault analysis ensuring proactive component replacement.

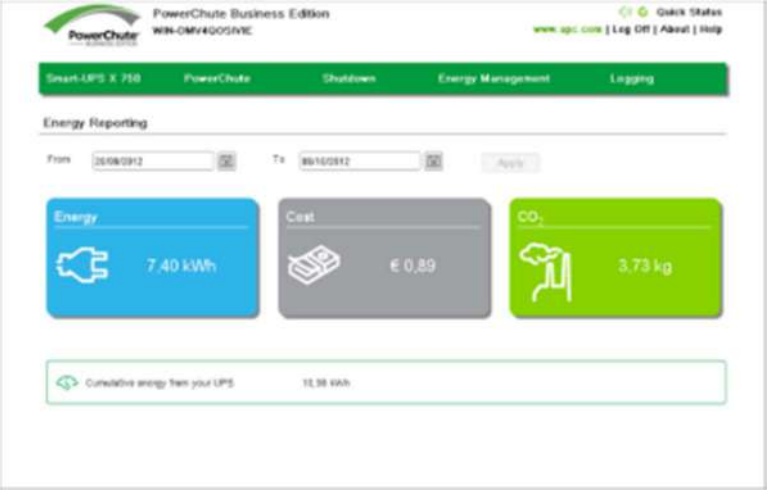
Resettable circuit breakers

Enables a quick recovery from overload events.

PowerChute Business

PowerChute Business Edition software provides UPS management, safe system shutdown and innovative energy reporting capabilities Energy usage, cost and CO 2 reporting provides a greater understanding of the energy consumed by IT equipment enabling improved energy efficiency Advanced analysis features help to identify the causes of potential power related problems before they occur ensuring the health of your protected equipment.

- •Graceful system shutdown
- •Outlet aware shutdown
- •Scheduled shutdowns
- •Fault notifications
- •Secure SNMP v1 & v3 support
- •SNMP for Windows & Linux
- •Centralized management via SNMP
- •Energy usage reporting
- •Energy costing
- •CO 2 emissions monitoring
- •Data and event logging



Energy Reporting Energy

usage, cost and CO 2 reporting of protected IT equipment enables improved energy understanding and greater efficiency.

The ability to update energy costs as they change increases reporting accuracy.

- Fact based understanding of energy usage.
- Associated energy cost reporting of protected equipment.
- Environmental impact monitoring of CO 2 emissions.

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Monitor Multiple Smart UPS

Manage unlimited number of Smart UPS using SNMP over the network with any 3 rd party Network Management System (NMS)

Protection	
Operating System Shutdown	Helps to prevent data corruption by performing graceful, unattended operating system shutdown in the event of an extended power outage. Option to run command files for application shutdown if required.
Advanced Scheduled Shutdown and Reboot*	Customize schedules to turn off different outlet groups for event driven or scheduled shutdowns. Shut down & reboot different outlet group combinations for different schedules.
Load Shedding*	Turn off select outlet groups in a pre-determined sequence to shed less critical equipment and conserve runtime.
Sequenced Shutdown and Restart*	Configure outlet groups to shut down and turn on in a pre-determined order.
Outlet Group Control*	Turn on/off, reboot or shut down select outlet groups to save dispatching technicians to remote locations.
Energy Management	
Energy Usage Reporting	Fact-based reporting of the energy usage of your protected equipment.
Energy Costing	Understand the cost of powering your protected equipment.
CO_2 Emissions Reporting	Monitor the environmental impact of powering your protected equipment.
Configurable Energy Costs	Update energy costs as they change to ensure your energy cost reports are completely accurate
Manageability	
Multiple Smart-UPS Management	View and monitor multiple Smart-UPS using the SNMP protocol on any 3rd party Network Management System (NMS)
Recommended Actions	Intelligent alarm descriptions coupled with recommended resolutions reduces the need for training and time to repair.
Initial Set-Up Wizard*	Enables ease of configuration so that IT equipment is protected as quickly as possible.
Smart Battery Management*	Battery replacement date and Replacement Battery Cartridge number available via software user interface with seamless link to order required RBC's online.
Compatibility	
Enterprise management system compatible	Make device information available to your preferred enterprise management system by forwarding SNMP traps (events) across SNMPv1 and SNMPv3 using the PowerNet MIB
System Event Log Integration	Writes events to Windows operating system event logs