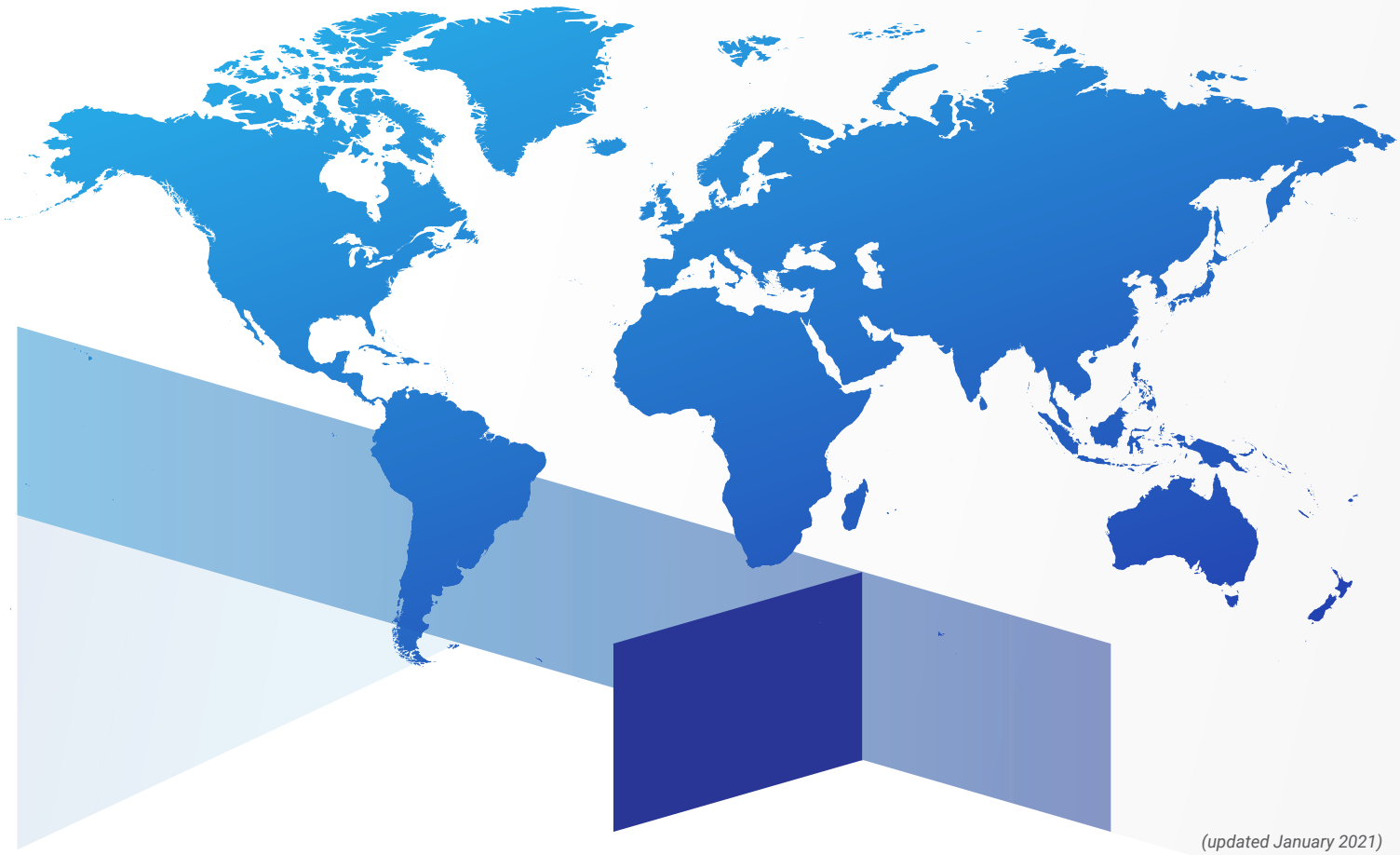
ENGLISH

SITTI

Integrated Solutions
for Air Traffic Control
and Operations Rooms

The voice that guides you.
Always.®

SITTI in the World



(updated January 2021)

AFRICA	EUROPE	AMERICA	MIDDLE EAST	ASIA	OCEANIA
Algeria	Italy	Argentina	Armenia	Afghanistan	Australia
Botswana	Austria	Bolivia	Azerbaijan	Bangladesh	New Zealand
Burkina Faso	Belarus	Brazil	Georgia	Cambodia	Papua New Guinea
Cameroon	Belgium	Canada	Iraq	China	Solomon Islands
Chad	Bulgaria	Chile	Jordan	India	Tonga
Congo Brazzaville	Croatia	Colombia	Oman	Indonesia	Vanuatu
Dem.Rep. of Congo	Cyprus	Costa Rica	Qatar	Japan	
Djibouti	Czech Republic	Ecuador	Saudi Arabia	Malaysia	
Egypt	Denmark	French Guyana	Syria	Maldives	
Equatorial Guinea	France	Honduras	Turkey	Myanmar	
Eritrea	Germany	Mexico	UAE	Pakistan	
Ethiopia	Greece	Peru	Yemen	Philippines	
Ghana	Lithuania	Sint Maarten		Singapore	
Guinea Bissau	Luxembourg	Suriname		South Korea	
Guinea Conacry	Kosovo	Trinidad & Tobago		Sri Lanka	
Kenya	Malta	USA		Taiwan	
Lybia	Netherlands	Venezuela		Thailand	
Mauritania	Norway			Uzbekistan	
Morocco	Poland			Vietnam	
Mozambique	Portugal				
Niger	Romania				
Nigeria	Russia				
North Sudan	Spain				
Rwanda	Sweden				
Senegal	UK				
Somalia	Ukraine				
South Africa					
Swaziland					
Tanzania					
Tunisia					
Zambia					
Zimbabwe					

// Future Proof Solutions

SITTI has got extensive experience in the field of integrated radio and telephone communications in complex networks. Continued research and development, in conjunction with close attention to the changing requirements in Air Traffic Control (ATC), Control Room Management and Strategic and Emergency Service (SES) applications, make SITTI a worldwide reference point and market leader in these fields.

Established in 1946, SITTI is a system supplier and integrator providing comprehensive solutions in the fields of Civil and Military Aviation communications and strategic services, such as ANSPs, Fire Brigades, Search & Rescue, Railways, Police, Air Defence, Control and Command Centres, as well as commercial organisations requiring secure, reliable and controlled communications.

The worldwide recognised high reliability of SITTI system solutions is the best "product" we can supply our customers with, together with the excellent professional support deserved by each and every installation. A dedicated team of experts is assigned to each customer in order to implement the best solution to his needs.

The company offers a large integrated product portfolio including Voice Communication Switching systems (VCS), with large capability of interfacing lines and links of different kinds, ergonomic workstations for tower and radar environments, for both civil and military applications. Ancillary equipment and services (such as VoIP gateways, remote and mobile towers facilities, advanced security and control features, time reference systems, etc.) allow SITTI to present itself as a complete solution provider.

Full membership in international standardisation workgroups, attention to the evolving Customer needs, commitment to the development and implementation of the most advanced technological and operational capabilities, extensive integration features, are the strength points of SITTI. Integration of operational functions at all levels is the driving factor in the development and continuous improvement of the services offered to our users.

The MULTIFONO® Voice Communication System platform is the company core product, fully integrating the most advanced communication technology with user friendliness at operator level. Standards compliance, flexibility, modularity, scalability, security, high quality, fault tolerant architecture are the main characteristics of this VCS solution that offers the most efficient and technologically advanced solution to today's ATC and Command Centres.

- **Voice and Data communications** with very high quality, extreme reliability, most advanced technology.
- **Air Traffic Control (ATC), Operations Rooms,** Strategic Emergency Services (such as fire brigade, search & rescue, police, ambulance, rail and transport management centres, defence and crisis centres).
- **Full compliance** to international standards from ICAO, EUROCAE, EUROCONTROL.
- **Quality certification** by both civil and military organisations.
- **Significant** research and development (R&D) investment.
- **Turn-key** and network integrated system design and installation.
- **System support** and customer assistance by qualified skilled staff as well as remote connection capabilities for maintenance and configuration purposes.
- **Ergonomic workstations** offering safe, efficient and comfortable access to devices and services.
- **Integration** of ancillary and third party devices to cope with demanding environments.

SITTI. YOUR SOLUTION PROVIDER

Our products

VOICE COMMUNICATION SYSTEMS (VCS)
VOIP GATEWAYS
RECORDING SYSTEMS
INTEGRATED SOLUTIONS
TOWER APPLICATIONS
ATC CONSOLES
DIGITAL CLOCK SYSTEMS

Company profile

Your Solution Provider

SITTI is a private company developing integrated solutions and manufacturing communication systems for mission and safety critical operations, wherever secure, reliable and controlled communication is required. The long-term market leading position of SITTI worldwide is the best guarantee for customers looking for standard (yet customisable) solutions for civil and military Air Traffic Control (ATC) and Strategic Services.

Since 75 years SITTI is a world primary system supplier and integrator of operational and technical solutions for Civil and Military agencies and organisations, air traffic control centres, military strategic and tactical command centres, railways and harbour traffic management, public services, emergency control centres, operations rooms.

The worldwide recognised high reliability of the supplied solutions, their full standards compliance and customisation options are the best "products" we can offer to our customers, together with the high professional support devoted to each and every installation, for better operators' situational awareness.

SITTI is today present in most countries in the world with a very large base of installed systems and services. The high level of scalability and modularity of SITTI solutions and the large integration capabilities allow our products to fulfil operational, technical and support requirements for all ATC needs, ranging from small air field towers to large ACC centres.

THE VOICE THAT GUIDES YOU. ALWAYS.®

Our expertise

Today's applications require different communication technologies to be integrated into one solution to meet the requirements for highly flexible usages. SITTI has got extensive experience and expertise in the integration of analogue, digital, VOIP radio and telephone communications equipments and networks, thus making it a primary reference point worldwide, widely confirmed by its successful presence and growth in the evolving Voice Communication Systems (VCS) market.

Innovating solutions, new operators features, integration of user services, technologies and functionalities into a common platform are the main focus of SITTI's Research and Development activities. This is the basis of our win-win approach for the mutual success of SITTI and our customers, especially in mission and safety critical applications.

SITTI is full member of the major international committees and working groups for the standardisation of technical and operational procedures and interfaces. They are aimed at providing customers with future-proof solutions, capable of positively responding to the most demanding challenges, dealing with both standard and legacy radio and telephone devices and protocols, including VoIP, according to ED137 standard.

Operational and technical training, on site Customer assistance, qualified skilled personnel and remote maintenance connection facilities provide our customers with outstanding long term system support.

ALWAYS ONE STEP AHEAD.

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The primary choice for quality Voice & Data Communications

SITTI's top performance Voice Communication System is the MULTIFONO® platform which fully integrates the most recent technologies, combined with great userfriendliness at operator level and exceptional reliability.

This VCS system family fully complies with the latest international standards by ICAO, EUROCONTROL and EUROCAE. Transportable field deployable solutions for military applications are also available.

Design, implementation and evolution of SITTI systems worldwide are constantly led by the willingness of improving our targets: reliability, performance, cutting-edge technology and user-friendliness, to provide Customers with systems capable of coping with demanding and challenging performance environments.

Ancillary products, such as ergonomic Operational Consoles, Protocol Gateways, Time Reference systems, complete the offer to our Customers, thus making SITTI a total solution provider.

THE VOICE THAT GUIDES YOU. ALWAYS.®

// Why Choosing SITTI?

- World primary system supplier for Civil and Military, agencies and organisations
- Full compliance to International Standards
- Function integration and customised solutions
- Extensive experience in integrated radio and telephone communications
- Significant Research & Development investments
- On site Customer assistance
- Remote connection capabilities for verification and maintenance purposes
- Ergonomic design for comfortable and safe service
- Network integration

// Applications

- Air Traffic Control (ATC)
- Strategic and Emergency Services (SES)
- Scalable Air Field Towers, Approach and ACC Centres
- Fire Brigade Departments
- Railways Management
- Defence and Crisis Control Centres
- Commercial and Strategic Operational Centres

Overview

Success through innovation

SITTI unquestionable technological leadership in the field of Voice Communication Systems since its foundation in 1946 is the result of the great attention that the company pays to the needs of Customers. These are handed over to the R&D department, where highly skilled engineers translate them into technical solutions.

Customers is always assigned a team of experts in different areas, in charge of dealing with all aspects that may be of interest for the client. In particular, a dedicated Program Manager follows the entire life cycle of the solutions and products being supplied, with the proactive collaboration of the quality assurance department, to ensure that the devices and services provided to the customer always respect the high quality standards that are deserved to air traffic control and the management of operations rooms.

Voice Communication Solutions

Voice Communication Systems (VCS) are a vital infrastructure in the field of Air Traffic Control and Strategic Emergency Services (SES). They provide operators with a large variety of functions that allow them to access all communication assets from their Controller Working Positions (CWP), regardless of the protocols and interfaces used for reaching radio and telephone links and lines of any kind.

The current technological trend is the exploitation of the large benefits coming from the use of VoIP in the field of air traffic management. In this respect, EUROCAE issued the ED137 document aiming at the standardization of the use of VoIP (Voice over IP) in air traffic control communications. SITTI proactively contributed to the development of such document and is fully compliant with its provisions.

The use of IP allows ANSPs and military bodies to dramatically reduce the network infrastructure and associated maintenance costs. Cyber-security (i.e. the possibility that messages are intercepted or modified by attackers) is properly dealt with by SITTI through appropriate security means aiming at the integrity and confidentiality of information.

Remarkable is the capability of SITTI to also offer ED137 gateways for connecting non-IP radios, telephones and VCSs. Recorders are also part of SITTI offer.

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All-in-one Touch Screen

Reliable, configurable and user-friendly Human Machine Interface (HMI) devices provide Controllers with all information and services to facilitate safe and efficient operations in their arena of responsibility.

Based on Touch Screen technology, this high brightness Multi-Functional terminal (MTS) is fully customer configurable by means of the MULTIFONO® Management System (MMS) with controlled access to all available services, e.g. radio and telephone communication channels, Inter-Console communications, as well as security login facilities and parameters.

SITTI is also manufacturing highly ergonomic consoles for optimised and customisable access to the offered technology, in line with environmental requirements and operational conditions.

Operational Features

Applications available as standard features in the SITTI VCS Human Machine Interface (HMI) provide Operators with facilities that contribute in making their role more efficient and the service safer. These include (but are not limited to):

- **Short Time Recording** - Operators can record and playback recent conversations (about one hour storage capability). All conversations are recorded with GPS time stamping.
- **Embedded Directory** (Address Book) - Highly configurable in terms of pages and tags. It allows quick access to called parties identifiers (numbers and/or addresses) for easy dialling.
- **Short Messages Exchange (SME)** - Controllers can send/receive operational information to/from other VCS users and other host equipment (CPDLC messaging, Radar commands, etc.). All messages are tracked and stored.
- **Acoustic Level Adjustment** - To improve situational awareness through better understanding of received voice.
- **Conference, Transfer, Pick-up, Monitor** functions
- **Climax**, **BSS** (Best Signal Selection), **Delay Compensation**, **Audio Compression**
- CWP are equipped with light weight, noise cancelling headset and professional handset units, high performance loudspeakers and triple socket connector panels with device detection capabilities.

Supervision

SITTI VCS systems are complex devices that can be configured to properly deal with Customer needs and local requirements. The MMS supervision software has been developed to make it easy and error-free to define all system operational parameters. MMS provides **configuration, alarm reporting, event logging and maintenance** features from a single application, through very intuitive and self-explaining windows, where appropriate descriptive text and images help the user to accomplish his tasks in the most comfortable and secure way.

...wherever secure, reliable and controlled communication is required

// SITTI VCS

Applications
Civil Aviation
Military Applications
Air Defence Operational Centres
Navy/Cost-Guard Control Rooms
Fire Brigades
Police
Railways Control Rooms
Civil Protection and Emergency Control Centres
Commercial Organizations

MULTIFONO® M800IP®

Voice Management Solution

M800IP® MULTIFONO® Voice Communication System (VCS) is SITTI's state of the art, top level, most integrated **Voice Over IP (VoIP) VCS system**. It fully meets any Air Traffic Control and Operations Rooms requirements by integrating the most advanced IP features and technologies, combining easy configuration and maintenance procedures with user-friendliness of operators' HMIs (Human Machine Interface).

Interface units, protocols and user requirements have been increasingly more and more demanding over the time. SITTI's M800IP® system integrates them smoothly and seamlessly to the end user, who can fully exploit its power and flexibility to fulfil any technical and functional needs. The support of multiple functional roles and operational scenarios is among the many strenght points of M800IP®.

...wherever secure, reliable and controlled VoIP communication is required

Today's systems applications need different communication technologies to be integrated into one solution to meet the operational requirements for Safety and Mission Critical services. MULTIFONO® M800IP® is the result of the extensive experience and expertise accumulated by SITTI throughout its long-term presence on the ATC market, combined with the company's contribution to International Standardisation Committees and Working Groups. SITTI also assumed an important active role within WG67 – the EUROCAE working group that issued the ED136, ED137, ED138 recommendations and requirements for the standardization of VoIP technology in the Air Traffic Control (ATC) field.

Reliability and Integration

M800IP® is fully VoIP ED137 compliant, as testified by several successful interoperability tests attended by the company and by the large number of systems already in-service around the globe (please note that the world first ever VoIP VCS commissioned by ICAO in 2009 was a SITTI MULTIFONO®). VoIP, digital, analogue and other legacy non-IP interfaces are natively integrated, thus providing the end user with an **all-in-one communication solution**, seamlessly capable of dealing with many different interfaces and protocols.

The system Open Architectural design, ensures a high level of modularity, scalability and process distribution, thus offering an unparalleled reliability ratio of 99.9999%. MULTIFONO® Continuity-of-Service is guaranteed by its System Star Architecture and Distributed Subunits, combined with the Duplicated and Parallel Processing Operations, that ensure fault tolerant functions without single-point-of-failure.

All these features make SITTI's M800IP® the best choice for strategic Civil and Military Missions with Safety Critical Communication requirements.

Operational seamless expandability and full configurability, by means of local and remote Supervision facilities, provide the flexibility to handle with any Customers' needs: from small Airfield Control Towers to big Area Control Centres (ACC) – with hundreds of Controller Working Positions (CWP), Radio equipment and Telephone lines – without affecting the system performances. All this grants the Customers with the best level of flexibility, to face any requirements change or new needs, with an enviable investment return.

Customers currently using legacy technologies, but wanting to take the advantages of VoIP, can keep their current equipment in service and just introduce the appropriate SITTI's Gateways. Such units allow for legacy Radios and Telephone connections to be smoothly interfaced to the M800IP® VCS through any WAN/MPLS Network, according to the ED137 VOIP requirements, granting the compliance with ED136 and ED138 recommendations.

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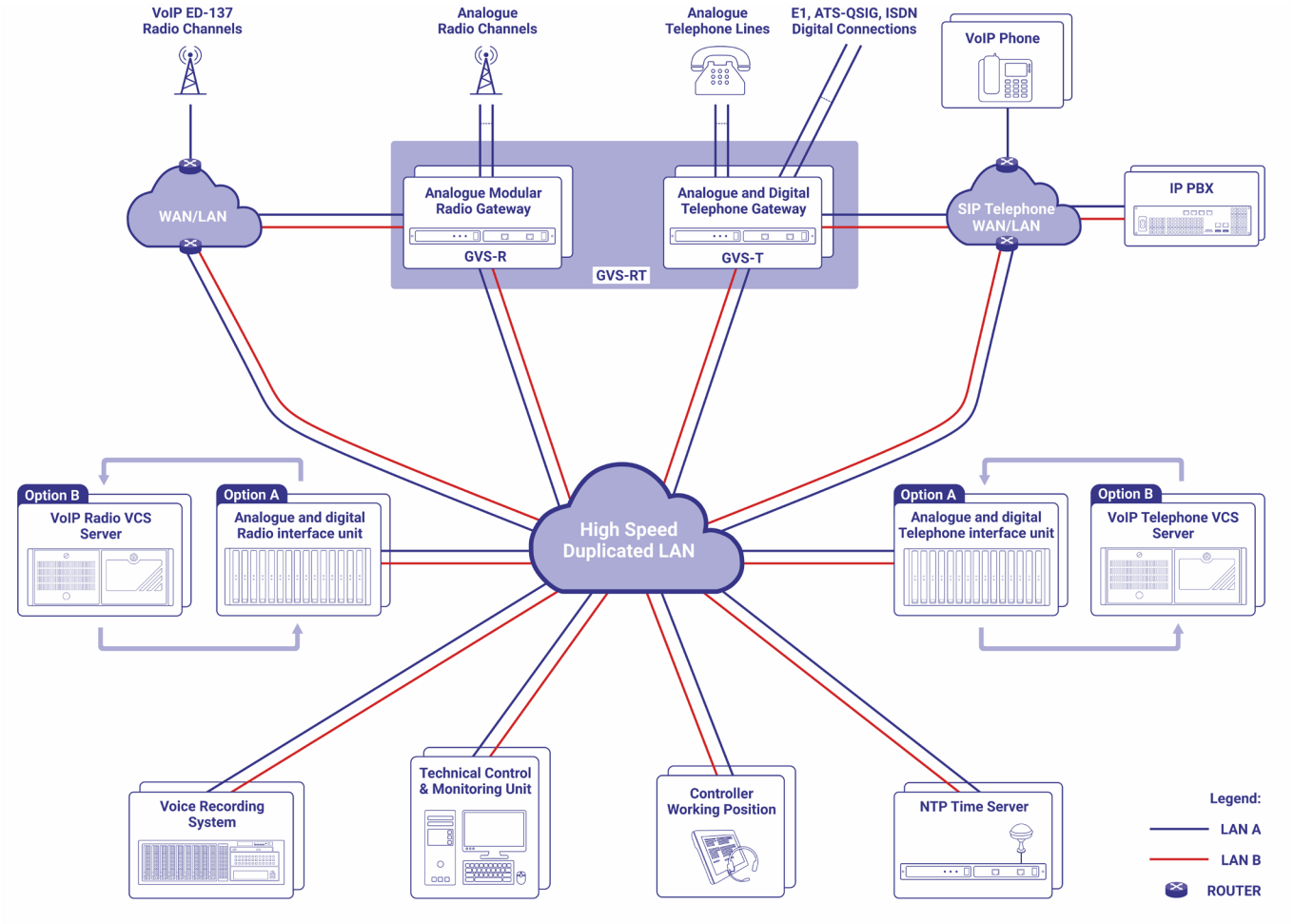

System Distributed Architecture

The design of SITTI's M800IP® VCS solution takes full advantage from the huge experience and expertise accumulated by SITTI during its long and successful presence in the ATC market all over the world. M800IP® is characterized by an extremely high level of flexibility and by an outstanding quality of the performances, supported by its innovative architecture allowing easy addition of new features and connections at any time, without impact on running operations.

M800IP® is a full IP technologically advanced VCS, providing users with top level usability, high performances, enviable reliability, strong security and efficient scalability. These qualities are further strengthened by the capability of the system to interface any kind/model of Radio equipment and Telephone lines, whatever technology involved – from modern VoIP to Legacy Analogue/TDM. SITTI modular Gateways units give the final user seamless access to any communication links, providing the Operators with the most user-friendliness HMIs and granting the system Administrators the most comfortable Configurability and Maintainability processes.

M800IP® represents the de-facto reference point for any Voice Communication System that must meet the strict requirements of ANSPs (*Air Navigation Service Providers*) and Military Air Forces applications, worldwide.

With its Duplicated and Parallel-Processing Operations, Star Architecture and Distributed Subunits, MULTIFONO® M800IP® guarantees the absence of any single-point-of-failure, providing uninterruptable service and fault tolerant operations. The system distributed intelligence and independent units, cooperate to prevent failures, which could jeopardize the behaviour of any part of the system. VoIP Data and Voice packets are distributed through independent, over-redundant and duplicated high speed LAN networks.

SITTI designed different deliverable solutions to fulfil the needs of any Customers in the most suitable way. **MULTIFONO® M800IP® can be provided with two architecture configurations** that both permit to manage the same types of Radio and Telephone connections:

- **M800IP® Server**
  Based on COTS Multiple-Servers Architecture

- **M800IP® Distributed Cards**
  Utilizing Multi-Redundant Blades

M800IP® Server

The MULTIFONO® M800IP® Server provides Customers with the same outstanding features and capabilities of any other SITTI's MULTIFONO® model. It integrates the most advanced IP features and technological solutions, allowing the same deployment concepts, permitting geographical distribution of the Operative Positions (CWPs) and of the VCS resources, guaranteeing the most enhanced Safety and Security level.

The Architecture

M800IP® Server is implemented with software applications running on COTS (*Commercial Off-The-Shelf*) hardware provided by SITTI or acquired directly by the Customer under SITTI recommendations.

All system components – CWPs (Controller Working Positions), Radio and Telephone Gateways, etc. – are connected to a Duplicated, Fast-Recovery and Over-Redundant High-Speed Network by dual independent Ethernet cables (Copper or Fiber, depending on the System requirements) in "star" configuration. The System LAN/WAN Network makes use of duplicated Switches that are geographically distributable to allow any deployment scenario required by the Customer.

The core of the VCS can be split onto different machines, physically installable at different sites, thus dramatically improving the system reliability and availability figures. This outstanding deployment flexibility, capable of distributing the intelligence over a large network, allows for many different architectural solutions that include Duplicated (or even Multiple) configurations of the following units & functions:

- **Radio Servers** – Logical component handling Radio connections.
- **Telephone Servers** – Logical component handling Telephone connections.
- **Radio-Telephone Servers** – Logical component handling both Radio and Telephone connections.
- **Radio and Telephone Gateways** – Devices converting Analogue and any Non-VoIP Radio and Telephone connections to VoIP, and vice versa.
- **Controller Working Positions CWP** – HMI (Human Machine Interface) Operative Positions equipment permitting Operators to interact with the system to access local and remote resources.

Multiple Redundancy capability

M800IP® Radio and Telephone servers can be provided with different hardware organisations: from simple duplication of the All-in-One Server to a Multi Redundant arrangement.

The simplest solution foresees the installation of all software applications on two physical machines configured in redundant mode. On the other hand, Radio and Telephone servers can be installed on different machines, each configured with its own backup unit that can be placed nearby, or in a different room/building, or even at another remote location.

For both configurations, in case of failure, the second unit will take over seamlessly for the users. No disruption will be felt on the ongoing communications and the service will not be affected.

All the units belonging to SITTI's M800IP® are connected to the same IP network, so permitting their physical positioning at different sites, regardless the distances involved. Regional or National Installations are therefore allowed, as well as geo-redundant configurations, without detriment to the overall system performances. In case of unavailability of a site, another one will be able to take over, seamlessly.

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Radio and Telephone Servers

The VoIP communications of MULTIFONO® M800IP® are managed by the Radio and the Telephone servers (whichever architectural solution is being used), through the Duplicated and High Performance LAN/WAN connecting all components of the VCS.

Radio Servers are used to manage VoIP connections to both local and remote radio stations, directly – through appropriate Routers – and/or by means of SITTI's Radio Gateways in case Legacy equipment would be present.

VoIP Radios can handle a limited number of simultaneous accesses from different VCSs and their CWPs. In order to limit the quantity of active sessions, regardless of the number of CWPs belonging to the VCS, the Radio Server opens a single session to any radio. A unicast link is opened towards each radio equipment (one-to-one session), while communications towards internal VCS CWPs are handled via Multicast addressing (one-to-many session).

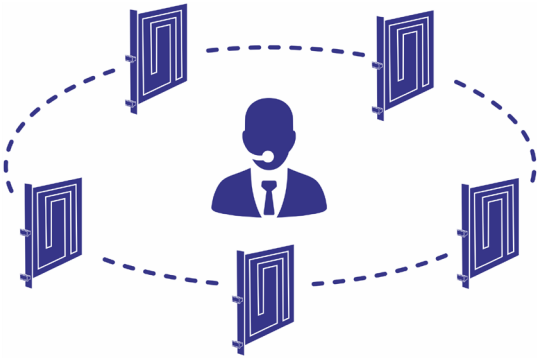
This approach (fully compliant with EUROCAE ED-137 provisions) preserves the sessions handling capacity on the radios while saving bandwidth and associated costs, without reducing the capability of many CWPs to access any connected radio.

Telephone Servers are devoted to providing M800IP® with IP telephony communications and proxy facilities. These encompass the management of the calls originating from or directed to local Controller Working Positions as well as from/to other telephone resources, also including other VCSs.

M800IP® Distributed Cards

The same features and performance offered by the M800IP® Server architecture can be obtained by means of the M800IP® Distributed Cards architecture. This latter is characterized by the use of distributed intelligent blades housed in racks and sub-racks.

The use of distributed cards gives the Customer the same features obtainable by means of the Server architecture, allowing operators to access all communication assets from their Controller Working Positions (CWP), regardless of the protocols and interfaces used for reaching radio and telephone links and lines of any kind.



Gateways

For all those situations where the Customers must make legacy non-VoIP (analogue or digital) radio or telephone connections live together with modern VoIP links and lines, SITTI can provide appropriate Gateways. These convert the "old" environment to the new one, thus allowing Customers and operators to take benefit from the advantages of the VoIP technology.

All the data and voice conversions are carried out in full accordance with the requirements, the performances and the timings recommended by the EUROCAE ED136, ED137 standards, thus permitting communications to comply with the ED138 specifications for VoIP communications in the Air Traffic Control field.

GVS-R Radio Gateways

Radio Gateways have been designed by SITTI to convert legacy equipment/connectivity to the VoIP technology, according to the ED-137 standard. This permits their management by any VoIP VCS complying with the ED-137 standard, as if they were VoIP native radios.

GVS-R Radio Gateways can be installed locally, close to the VCS, or remotely, where non-VoIP radios are installed, according to the Customer needs. These gateways are in fact stand-alone units capable of interfacing legacy radios to any standard ED-137 device.

SITTI's Radio Gateways are made of a configurable number of independent cards, each capable of handling up to 4 simultaneous sessions to the same radio from different VCSs and relevant CWPs. Each GVS-R card is equipped with a duplicated ED137 VoIP connectivity (for redundancy) to the WAN Network.

GVS-R cards are independent from each other, but can be configured in a M+N redundancy pool: M active cards are backed-up by N standby cards that take over in case of failure of any of the active ones.

G729 Audio Compression, Delay Compensation management, Signal Quality evaluation (to allow the BSS – Best Signal Selection – feature at the VCSs sites) are among the numerous facilities/applications configurable on the GVS-R equipment.

SITTI has also delivered GVS-R solutions to be used the "other way round", with the aim of providing VoIP-to-Analogue conversion to-and-from Legacy VCSs.

GVS-T Telephone Gateways

SITTI applied the same concepts developed for legacy Radios to legacy Telephone connections, too. Following this same approach, GVS-T Telephone Gateways are made of stand-alone units capable of interfacing non-VoIP connections to standard ED-137 devices.

Depending on the configuration required, GVS-T is capable of handling FXS, FXO, LB, 4 wires E/M, MFC-R2, MFC-no.5, E1, nx64Kb/s, QSIG, ISDN, etc. converting them to the ED137 VoIP protocols.

Recording

The ED-137 standard also defines how to deal with legal recording, when IP for transporting data and voice in the ATM/ATC field is required.

Taking advantage from the long experience acquired, SITTI has complemented its offer by developing the VRS800S Recording and Playback System. Fully compliant with the ED137 recommendations, the system is perfectly aligned with the criteria that have driven the development of the M800IP® VCS, including Security and Redundancy features that make VRS800S the best choice when it comes to complete and integrate the package of equipment for the Customers.

When a Recording System is not required or already exists, MULTIFONO® M800IP® is provided with embedded ED137 VoIP Recording applications and Analogue and Digital interfaces towards non-VoIP legal recorders.

SITTI's M800IP® grants a true and faithful provision of the audio signals being presented at each source. The quality of the audio is not interfered – degraded or in any way manipulated – by the VCS before of its delivered to the Recorder.

Hereinafter a list of MULTIFONO® M800IP® Recording capabilities:

- VoIP standard recording according to ED-137
- E1 digital streams
- Analogue connections
- Individual or integrated radio/telephone audio

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// M800IP® in short

- Future-oriented, top performing VCS solution
- EUROCAE ED137 full standard compliance
- SNMP configuration and alarm reporting
- Independent & cooperative building blocks
- 24/7 Operational Service, 365 days a year
- Non-Blocking with Very High System Performance
- Duplicated, independent, parallel operations
- Fault tolerant operations
- No Single Point of Failure (SPOF)
- Voice distributing within the system using RTP protocol
- Parallel routing of voice packets on duplicated LANs
- Seamless expandability without affecting ongoing operations
- Bandwidth optimisation with intelligent unicast and multicast audio distribution (patented)
- Radio & Telephone Gateways for legacy non-IP links
- Scalability from small Air Field Control Towers to large ACC Centres and Operational Control Rooms
- VoIP linked CWPs in “star” configuration
- CWP access to Telephone lines & Radio frequencies through analogue, digital and VoIP interfaces
- Access to radios, telephones and CWPs belonging to remote VCS systems via VoIP/digital links or analogue interfaces
- Embedded Intercom facilities between local and remote CWPs
- Support of standard and legacy protocols
- Controlled Resource Sharing
- Software upgrade by direct upload, without manual intervention and without affecting operations of other parts of the system
- “Black” and “Red” Military applications

// M800IP® Technical details

Telephone Digital Interfaces

VOIP according to EUROCAE ED137 standard
QSIG, ATS-QSIG
ISDN Primary + Basic Rate
MFC
E1, nx64

Telephone Analogue Interfaces

FXS/FXO
2/4 wires in-band + E&M
Local Battery (LB)
Central Battery (CB)
PABX / PSTN / PBX
MFC R2 + no.5 (analogue)
DTMF
Satellite

Radio Management

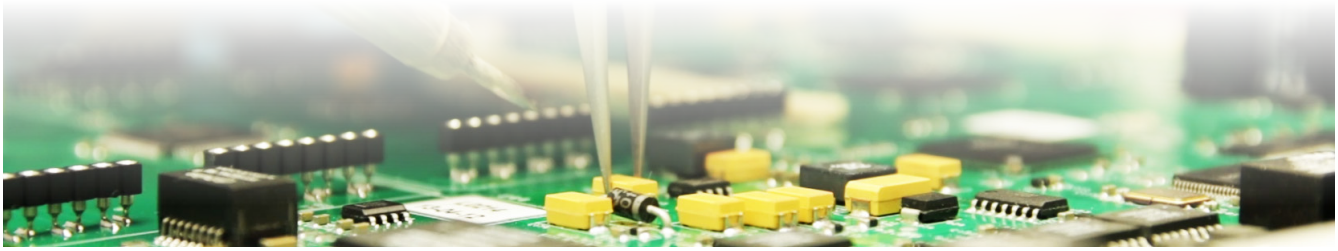
Best Signal Selection (BSS)
Multi-Site Voting
Delay compensation
Echo suppression
Automatic new radio search in case of failure
Legacy protocols from different radio manufacturers
SNMP radio management

Radio Interfaces

VOIP according to EUROCAE ED137
4 wires standard E&M analogue links
E1, Nx64, ATS-QSIG digital links
In Band Signalling (IBS)
Phantom Signalling

Recording

Analogue, digital and VOIP recording
Synchronous playback



VoIP Gateway

Legacy and Remote

When legacy analogue and/or digital radios are installed at remote sites, they shall be capable of being accessed by a plurality of operators (resource sharing) through an EUROCAE ED137 standard VOIP (Voice Over IP) WAN MPLS network. Moreover, different kinds of telephone networks may have to be interfaced to allow non-VOIP calls to be interconnected to VOIP ones and vice versa.

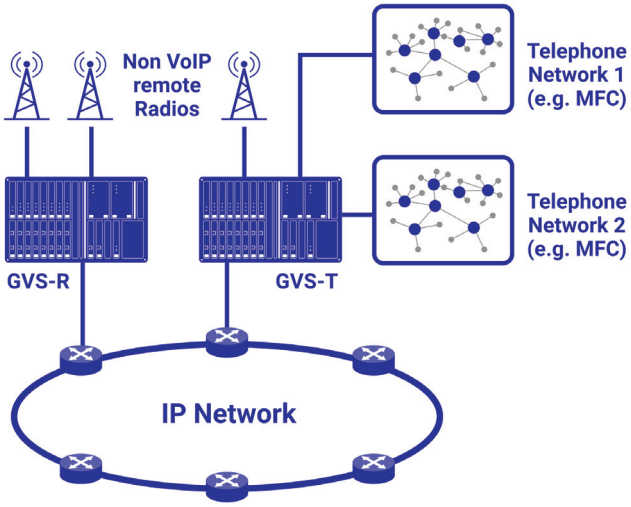
Gateway Voice Systems (GVS) are the answer by SITTI to provide Customers with a powerful and cost-effective solution to solve their legacy analogue and/or digital connection problems, by converting audio and data to the latest VoIP standards and technology.

The overall scenario may be complicated by the fact that remote radios and telephone lines may be old fashioned and/or from different vendors. Another situation is the other way round, when the current system is TDM based, while ED137 radios are to be connected.

THE SOLUTION IS SITTI GVS

- Remote radios of any kind can be connected to a standard IP network by means of SITTI **GVS-R** gateway devices that take care of all required settings and possible legacy protocols towards the radios themselves. They convert data and audio signals into the EUROCAE ED137 standard VOIP protocol and vice versa.
- Any kind of telephone lines (FXS, FXO, 4 wires E/M, MFC, E1, ISDN, etc) can be connected to SITTI **GVS-T** gateway devices, thus allowing VOIP and non-VOIP networks to co-exist.
- Radio and Telephone GVS interfaces can be housed in the same physical drawer, thus integrating radio and telephone functions and reducing costs (**GVS-RT**).

SITTI VoIP Gateway
VoIP Distributed Architecture & Devices



Thanks to their modularity, GVS devices can be customized to cope with small radio sites up to large radio installations with tens of co-located radios through a number of possible interfaces (4 wires standard E&M analogue, E1, Nx64, QSIG digital, etc.). The same applies on the telephone side, where multiple co-existing connections to different telephone networks are provided as a standard option.

The interface to the IP WAN network is duplicated for reliability reasons. As foreseen by the EUROCAE ED137 standard, GVS devices can be simultaneously accessed by a number of VCS systems, thus guaranteeing access to the same resources by operators at different sites at the same time. Satellite connections are also envisaged.

According to the number of connections to be interfaced, GVS devices can be delivered in subracks of 1 or 3 or 6 units height. New cards can be added at any time, without disrupting ongoing communications.

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GVS devices include facilities to automatically look for other radios with the same characteristics in case of failure of the one being used. This automatic search procedure allows VCS operators to continue their work without suffering of service disruption, even in case of total radio failure. Best Signal Selection (BSS), audio compression and delay compensation are standard features provided by GVS devices.

Each of the modules that make up the GVS gateway works in stand-alone mode and regardless of the others, thus guaranteeing full independency and the provision of **hot swap facilities** between cards, and assuring an uninterrupted service.

Configuration and maintenance are achieved via SNMP through the same MMS software platform that is also usedM for the SITTI VCS. Customers can autonomously define GVS configuration parameters and collect their status over a regional or national WAN.

// GVS in Short

- Voice Over IP (VOIP) technology
- EUROCAE ED137 standard compliance
- IP connection to remote radio sites
- IP connection to telephone networks of different kinds
- Multiple simultaneous access from different sites
- Complete management of legacy protocols
- Radio and telephone interfaces in the same physical device
- Open Architecture, In-Operation Expandability
- Duplicated connection to IP WAN
- Automatic failed radio replacement
- Best Signal Selection
- Audio compression
- Delay compensation
- Non blocking configuration
- Satellite connection
- Very high reliability (99.9999%)

GVS-R VOIP Gateway - RADIO

GVS-T VOIP Gateway - TELEPHONE

GVS-RT VOIP Gateway - RADIO/TELEPHONE

// GVS Technical Information

Basic Characteristics

VOIP Digital Technology
EUROCAE ED137 standard
No single point of failure
Drawers of different size (1U, 3U, 6U units height)
Power: 230/110 VAC – 24-28 VDC – Internal/External
Very high reliability (99.9999%)

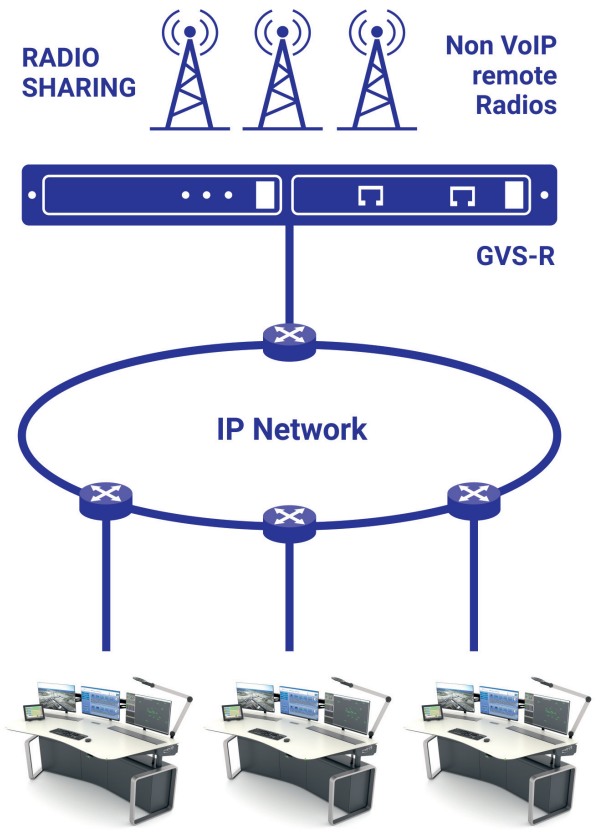
Standard Features

VOIP according to EUROCAE ED137
Multiple connections from remote VCSs
Automatic failed radio replacement
Telephone interfaces (FXS, FXO, 4wE/M, ISDN, QSIG, MFC, E1, etc)
Best Signal Selection
Audio compression
Satellite connection

Radio Interface

4 wires standard E&M analogue links
Digital links (e.g. E1)
In Band Signalling (IBS)
Legacy protocols from a variety of different radio manufacturers

// SITTI VoIP Gateway
VoIP Distributed Architecture & Devices



Recorder VRS800S

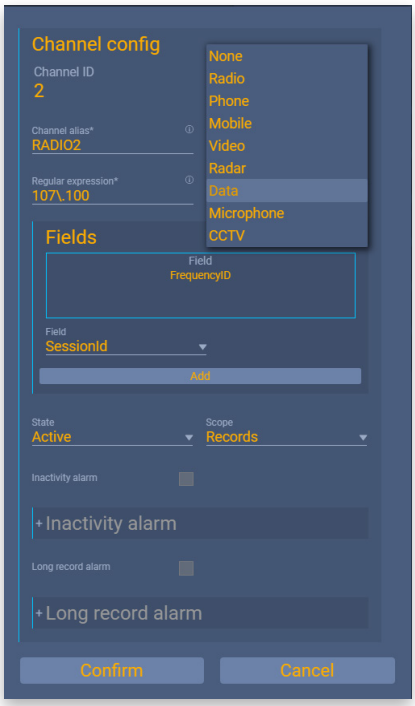
Recording Solutions

SITTI VRS800S is a flexible recording and replay system which can adapt to many different fields of activity.

It is primarily designed for Air Traffic Control recording, but the openness of its architecture makes it a perfect solution for call recording in fire brigades, police and any call centres.

With **scalability** in mind, it was designed so that the recording infrastructure can easily be expanded, by adding new Recorders to the infrastructure or new input channels to existing Recorders.

The intrinsic **flexibility** that the system benefits from the use of a non-relational database greatly simplifies the implementation and the integration of new interfaces to customer-specific data sources.



The use of a web-based client for the **evaluation and the replay** of recorded data reduces to a minimum the administration and the maintenance of client workstations.

All SITTI designs comply with the requirements of the International Aviation Organizations Organism (ICAO) Annex 11 and 13, EUROCONTROL, as well as EUROCAE ED-111.

SITTI co-operates with these Institutes participating in the continued workshops for the new standard developments.

All SITTI production and associated activities are carried out in accordance with the recommendations, control and regulations applicable for **ISO9001:2015, ISO 14001:2015 and ISO 27001:2013**.

Architecture

SITTI **VRS800S** is designed as a modular system centred around a main Recorder application interconnected with a number of external source data acquisition applications (SAI). The SAIs are specialized for the dialog with data sources, the formatting and the transfer to the Recorder of the various types of received data, for example analogue and TDM audio, ED-137, RTP, etc.

Being independent applications, the SAIs can be located on the same server as the Recorder application, on separate platforms, or on specialized SITTI Blade Boards. An advantage is that when required, SAIs can be located closer to data sources in the network infrastructure, or even in another location.

The Recorder is designed as an open and multiplatform application. It works on Microsoft Windows 10, or Windows Server, as well as on Linux, and it relies on state-of-the-art design principles and well-established standards.

The application is based on a core component and a set of loadable modules which are dedicated to specific tasks, for example the reception of SAI data, the storage of the records, database interfaces and the services to be provided to 3rd parties, for example for the replay.

Relying on "NoSQL" database technology, which is more flexible than traditional relational databases, makes the Recorder very open to virtually any kind of customer metadata, from simple key-value pairs to complex data structures from different sources with different sets of metadata.

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With reliability, robustness and availability in mind, **SITTI VRS800S** was designed to accommodate many redundancy and load sharing strategies. The system is designed to work continuously, with minimal downtime.

Evaluation and replay of the records are carried out using a **Web-Based Graphical User Interface** which is provided by the Recorder as a service. There is no need of a dedicated application on client computers, Users can connect to any Recorder through the network and using their web browser and login credentials.

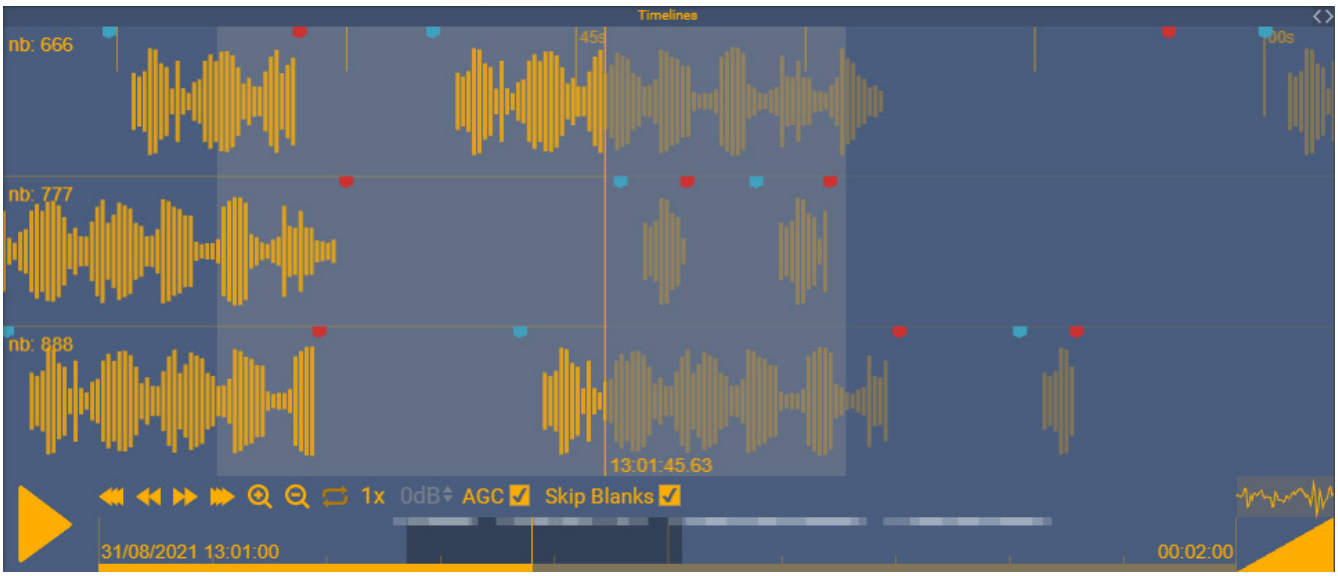
// Interfaces

- Analogue with VAD/VOX
- Ambient noise recording
- E1 2MB links
- VoIP ED137; RTP; SIP
- Synchronized replay with 3rd parties (ATM Radars, Emergency replay systems, etc.)
- Time Synchronization (NTP, Master Clock, etc.)
- Replay / Configuration / Evaluation via LAN or WEBGUI

// Features & Key Points

- Flexible User Management with different password policies
- Personalized Dashboards & Themes by user
- ++ 1000 channels recording per platform
- Alarm & Monitoring (SNMP v1, v2c, v3)
- Playback Speed Control with no voice alteration
- AGC / Manual Gain
- Statistics
- Impound data
- Automatic Backup Archiving on removable media and NAS
- Encryption (SSL/TLS)
- Export
- Very low CPU usage
- Live play
- Search Criteria (time, duration, channel, metadata, etc.)
- Emails
- LDAP
- Virtual channels

VRS800S, YOUR TURN KEY RECORDING SOLUTION.



MTF800 Integrated Information System

Air Traffic Control working positions (CWP) are often overcrowded with monitors and ancillary equipment that make the work of controllers cumbersome and prone to confusion and error. In many cases, controllers have to deal with many different applications, each requiring its own display and interaction system:

- VCS
- Interconsole Messaging
- Meteo Information
- Electronic Strips
- Video Cameras
- AFTN/AMHS
- Runway Lights
- Recorders
- Device Status Indications
- Flight Management
- … et cetera …

Flexibility in the integration of third party applications (see table at the end of this leaflet) permits the Customer to include a large variety of functions into so-called management desktops that simplify the access and use of the required system features, by also providing integrated user credentials logging.

MTF800 Integrated Information System is a hardware/software platform for Airports of any size or Remote Towers which concentrates different data sources into one integrated product with the aim of reducing the number of objects on the operative desks, and whereas increasing the operator's situational awareness while attending to their duties.

MTF800 Management Software Application is capable of handling proprietary and third-party legacy systems, implementing compact, user-friendly and highly configurable HMI layouts.

Information on the working position can be arranged in configurable desktops, each dealing with different management aspects, according to the Customer's needs.

- Significant reduction of devices on operator's console
- Concentration and focus on information in a compact HMI
- Unlimited number of independent management desktops
- Configurable and User-definable applications
- Controlled access and different security levels
- Reduction of errors occurrence
- Easy to maintain
- Adaptable to evolving needs
- Remote configuration features

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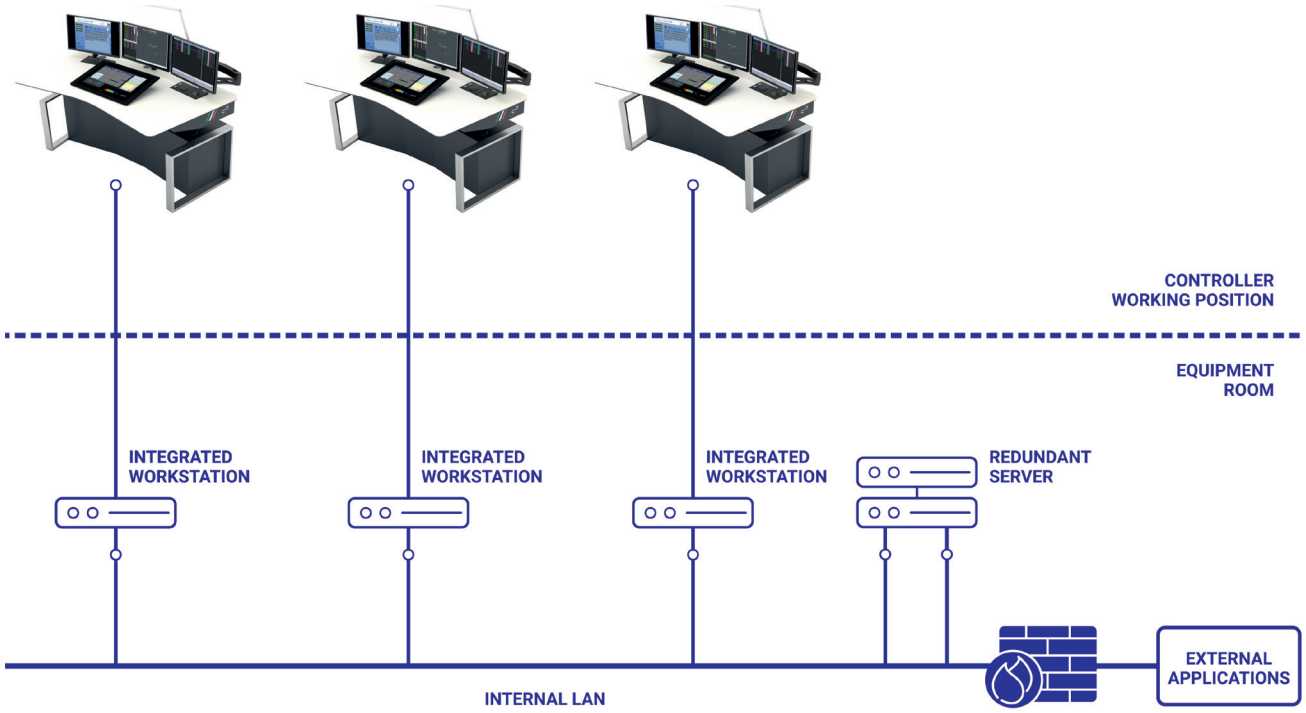
The main benefits of MTF800 can be summarized as follows:

- Significant reduction of devices on operator's console
- Concentration of information
- Various data sources collected by one (redundant) server
- Controllers' focus on significant information only
- Reduction of errors occurrence
- Function specific management desktops
- Controlled access to applications
- Remote configurability via SNMP

The resulting working position is a hardware and software combination, where different information sources and relevant display monitors are integrated to provide controllers with positions that are:

- Compact
- Configurable
- Adaptable to evolving needs
- Easy to maintain
- With minimal use of cables and devices

CONCEPTUAL SYSTEM ARCHITECTURE



INTEGRATION SOLUTIONS

Type	Solution
Remote Access	Monitor and Control external applications from MTF800 Workstations using standard Remote Access Protocol (RDP, VNC).
Web Access	Monitor and Control external applications from MTF800 Workstations using standard Web Protocol HTML5.
Protocol based	The external application gives access to its data via standard or legacy protocol. SITTI can develop a front-end application collecting data to be presented on MTF800 terminals.

Consoles

Controller Working Position

Leveraging on its large experience accumulated in decades of successful presence on the market, SITTI is offering its customers a number of solutions for helping them choosing the best solution for their operative consoles.

Besides its world leading position in the study and development of standard technical solutions for integrated Voice Communication Systems, SITTI developed several series of console products to cope with the needs and requirements of operators and controllers on a continuous daily use basis.

The user at the core

Operators and controllers sitting all day at their desks with a heavy and critical workload must be given the best working solution possible. It is not just a matter of comfortable sitting places, but all aspects related to work environment shall be taken into consideration, such as:

- Ergonomy and comfort
- Seating adjustment
- Non-toxic fire-extinguishing materials and paints
- Easy access to communication instrumentation
- Free line-of-sight view over controlled areas
- Reduced “head-up” and “head-down” movements
- Handy placement of displays
- Correct body posture
- Reduced fatigue for arms and legs
- Space optimization

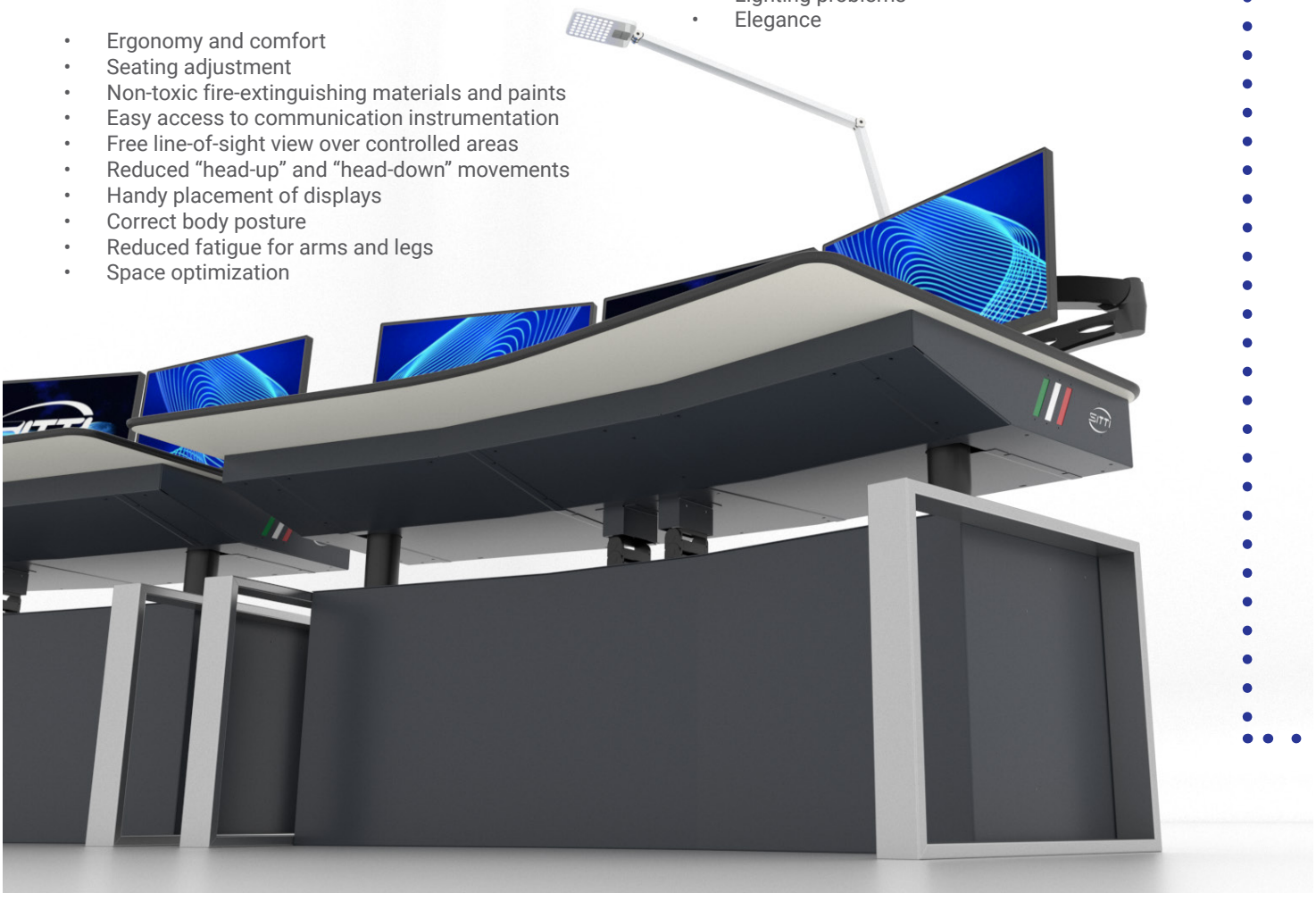
Inside the console

In many cases, consoles are also used to accomodate equipment and devices inside them, in order to make the working place clean and clear and to enhance safety and security. Therefore, further characteristics shall also be considered:

- Adequate internal space
- Reduction of visible/accessible devices to minimum
- Maintenance activities without service interruption
- Air flow and conditioning
- Locking system to prevent unauthorised access
- Power supplies
- Removable access panels

Last but not least, a special attention has been paid by SITTI to allow its consoles adapting to very different environments and use cases, ranging from small airport towers and control centres to large Air Traffic Control radar and procedural centres:

- Easy transportation and mounting
- Flexibility
- Modularity
- Curve spaces and uneven surfaces
- Lighting problems
- Elegance



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SITTI solutions

Putting all these requirements together, SITTI consoles are designed with high consideration for the operator's comfort and fatigue related factors, in order to provide him/her with the best, efficient and effective access to equipment and services. Research, use of suitable materials, installation criteria form the basis of the design of our consoles for long term daily use.

ATC Controllers and Control Centre Operators are tasked with a heavy and high responsibility workload, and as such they deserve an ergonomic and easy-to-use environment that makes it easy and comfortable to access all communication equipment and their ancillary services. In line with these requirements, SITTI design criteria take into consideration all related aspects, such seating adjustment, optimisation of viewing angles, noise isolation and ventilation, choice of materials, touch and feel aspects, as well as the correct positioning of communication devices (keyboards, connector panels, loudspeaker, etc.).

- SITTI longstanding presence in the ATC and Control Room markets allowed us to deeply understand the needs that may arise in different operational applications. Small towers, as an example, may have access limitations and/or limited infrastructural facilities. In addition, operators in a tower require a clear view on the airfield ground with sun light protection, while ACC controllers usually work in bigger rooms with different needs.

- Limited space availability (especially in small towers and emergency service centres) makes it important to fruitfully exploit all available space inside a console, for housing equipment of different size and shape. This may also require proper ventilation and air conditioning, while keeping noise to the minimum level possible.

- Logistics is another significant aspect to pay attention to: transportation, installation, maintenance issues. The modularity that characterized SITTI consoles allows them to be easily transported everywhere in the world and quickly installed wherever needed, even inside buildings with narrow stairs and limited physical access possibilities.

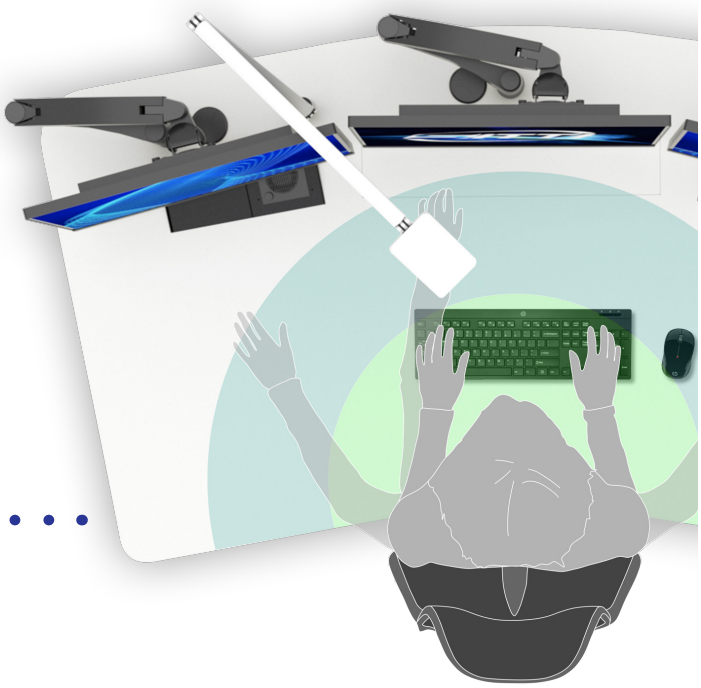
Main common characteristics

SITTI developed several series of consoles to best respond to customer needs. Regardless of the intended usage of the consoles and their size and shape, all products are characterized by the same quality and design features that make them be appreciated in all fields they will be used for.

The more valuable characteristics that are common to all console series are:

- Special attention to avoidance of any sharp edges and corners
- Non-flammable materials and paints
- Non-toxic materials and paints
- Stable structure
- Adjustable feet to stabilize the working plane
- No obstacles to the user when moving the chair
- Self-supporting aluminium skeleton
- Internal space equipped with 19 inches racks (or special frames, according to customer needs)
- Footboard covered with black rubber surface
- High abrasion resistance
- Washable surfaces
- Antistatic working surface
- Stainless nuts, bolts, washers, screws, etc.
- Easy assembly
- User-definable colours

All this results in a higher efficiency of the operators who will get the best from the touch and feel approach of the console design by SITTI. Tailor-made solutions are possible to cope with specific customer requirements, thanks to SITTI internal specialized workshop.



Customer Services

The Customer at the core

SITTI is selling equipment to customers all over the world. Besides the exceptional product quality, SITTI is also providing additional services to ease their introduction and implementation, following the most effective processes to reduce costs and increase efficiency and delivery speed.

From order to operations

The great news of the signature of a new contract is just the starting point of a structured process that will be allowing operators to use a new technologically advanced system. Such process goes through the following steps.

- Before a system is delivered to the customer, a deep and detailed analysis of the installation environment is needed. This is the "Site Survey", done by qualified personnel, whose report is used to define optimal equipment positioning and to analyze possible solutions to problems that may be found on site. In case of replacement of an existing equipment, transition aspects shall be carefully discussed, especially when devices to be replaced are third party ones.

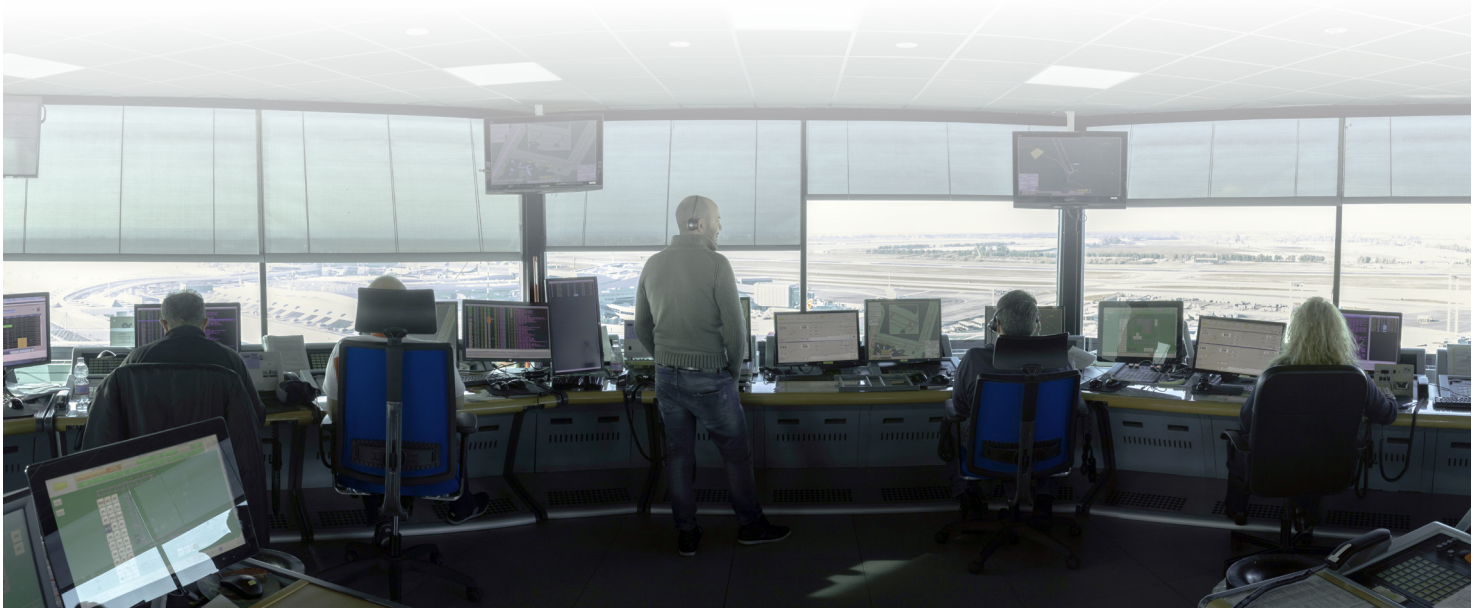
- FAT (Factory Acceptance Test) is a fundamental milestone at which the customer may have hands on his own system to preliminarily verify all functions in a simulated environment. This is normally done at our premises under the supervision of the SITTI Program Manager commissioned to the customer. Upon positive acceptance, the system is ready for delivery.

- System installation includes cabling, consoles positioning, connections to switchboards, and all tests required to ensure the system can properly operate and comply to the customer requirements and needs. This is completed by setting-up activities that are aimed at configuring all system parameters for hardware and software modules.

- SAT (Site Acceptance Test) is the final acceptance stage of a supply, during which the system is tested against all possible functionalities, in accordance with the local environmental real conditions.

- Once SAT is positively performed, the Switchover phase starts, according to previous agreements. This is carried out following a detailed transition plan possibly also including assisted operations.

Site survey, installation and in general all on site activities are carried out by SITTI staff or by highly qualified local partner companies that have been properly trained by SITTI, before getting their license to operate. The SITTI Program Manager is always available at all stages to provide any kind of information about the supplied system, and he may be directly contacted at any time.



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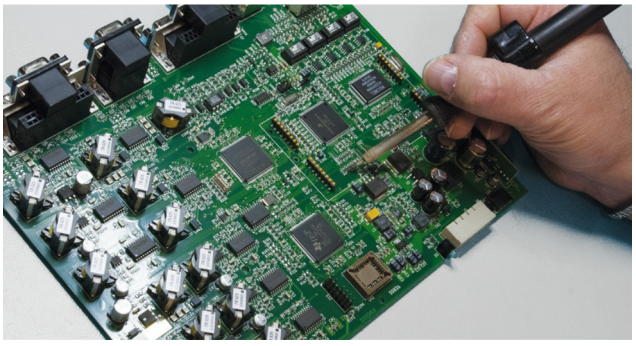
Guarantee and support

As a default, SITTI is guaranteeing its systems for 2 years, but extensions can be agreed. During the guarantee period, corrective maintenance is provided to the customer free of charge; this includes hardware modules repair and software bug fixing.

Upon request, preventive maintenance can also be provided. In this case, on a periodic basis, SITTI personnel visits the site where the system is installed and performs an ordered list of tests to verify the system is performing as expected and to detect possible degradations, before malfunctions or errors become evident.

Other support options include:

- Telephone support
- Toll free number 24/7/365
- Predetermined response times according to problem severity
- Dedicated email address *serviceandsupport@sitti.it*



Training

Last, but not least, a special mention shall be given to the training SITTI can offer to its customers. High skilled personnel with long experience lead the courses aiming at providing the trainees with all information about the equipment and its ancillary devices.

Dedicated training facilities are available at SITTI headquarters with specialized rooms and materials. On request, training can be carried out on site to reduce travel costs. As a standard package, training courses at SITTI include manuals, consumables, transportation, local sightseeing information, and (if required) pocket money.

Different kinds of courses are on offer:

- **Technical Training** - The purpose of Technical Training courses is to provide all necessary guidelines to the technical team that will be working with SITTI devices. The course is specially focused on the description of the system architecture and functions, its management and setting-up, not forgetting related maintenance procedures.
- **Operational Training** - The target of Operational Training is to teach Radio and Telephone operators the correct use of the VCS Controller Working Positions.
- **Train-to-Trainer Training** - This type of courses is aimed at providing a support guide for trainers designated to instruct the technical team that will be working on the solutions provided by SITTI. The course focuses on the procedures to manage, control and maintain the system.
- **E-Training** - Remote connection via Internet to SITTI trainers allow Customers to benefit of training courses without bearing the costs of expensive travels.

Integrated Solutions
for Air Traffic Control
and Operations Rooms

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ENVIRONMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

INFORMATION SECURITY MANAGEMENT SYSTEM DNV·GL ISO/IEC 27001