ASTRO System Manager applications

CommunicationsFirst

ASTRO System Manager Applications
Main Features Documentation
Data Sheets Collection

ASTRO-Emergency & P.A. for Metro and Railways Sector

Emergency & PA/VA Public Address and Voice Announcement EN54-16 Systems for Metro and Railways Applications

ASTRO-PA/GA System EN54-16:2008 Certified

Digital IP PA/GA Public Address and General Alarm Certified System for Industrial Safety Applications

ASTRO SOS/INFO Emergency and Information System

SOS/INFO VoIP Intercom Server and System Manager for Public Information & Emergency Communications

ASTRO INTERCOM for Industrial Communication

Digital VoIP Intercom Server for Industrial Call and Communication System Management

ASTRO Web Service for Third Party Integration

Web Service Interface for information exchanging and interactions between ASTRO System Manager and third-party external systems

ASTRO Client for Configuration and Maintenance

Desktop Client with Graphical User Interface Manager for Diagnostic, Configuration and Maintenance of the System Activity

S.A.R.A. Automatic Broadcasting System

On board & on land Automatic Broadcasting System for Announcements on Metro, Trams, Buses and Train

EMERGENCY & P.A. for METRO and RAILWAYS Sector

Emergency & PA/VA Public Address and Voice Announcement EN54-16 Systems for Metro and Railways Applications

201408 rel.201510 - v.201906

Safety and information are the key-points of the Subway / Railway services:

- ***Safety of the passengers through a reliable Station Emergency Call System***
- ***Information to the passengers through a reliable Public Address / Voice Announcement System***
- ***Fast and secure communication of the personnel through a reliable emergency communication even under extreme emergency conditions.***

1 – Scope of systems

The current document describes the architecture relevant to the industrial communication and Public Address / Voice Announcement (PA/VA) system designed for meeting the functional specifications in the subway / railway applications:

- ***"Tunnel Emergency Call"*** for handling the emergency call activated by the personnel along the subway tunnels
- ***"Station Emergency Call"*** for handling the emergency and information calls activated by the passengers in the subway stations
- ***"Lift Emergency Call"*** for handling the emergency and information calls activated by the users when they are in the lifts
- ***"PA / VA"*** for handling the live announcements as well the automatic messages in selective mode, group call and all call either in each station and on all the subway stations (designed according to the **EN 54-16** norms)

Typically, the Service telephone system for handling the office telephone traffic will be supplied by others through the digital IPBX.
Typically, the office telephone system is used for handling the civil indoor telephone sets; when required, FITRE can supply the industrial digital VoIP standard SIP telephone sets, assembled in weatherproof IP66 aluminium housing.
FITRE solution is based on the VoIP standard SIP architecture suitable to be connected directly to the LAN (existing and/or even supplied by others); none dedicated or proprietary network required.
In the FITRE's architecture, it is foreseen one redundant main control system located in the Main Control Station; as option, the architecture allows also the one control system to be installed in each subway station (hierarchic architecture).
Thanks to the full open architecture, FITRE guarantees the maximum level of modularity, flexibility as well the maximum level of availability and reliability of the systems.
In particular, the architecture allows the possibility to expand the system in terms of quantity of emergency call stations or loudspeakers in each station and/or even adding a subway station (complete with all the relevant communication systems) without the necessity to add or modify the already installed equipment.
Each subway station is a "digital node" of the whole system controlled by the central call manager but also capable to operate in stand-alone way in case of fault on the LAN.
The core of the modular digital system is based on ASTRO Call Manger unit (developed and designed totally in Fitre Italy) configured with powerful and easy-to-use software tools in terms of diagnostic and configuration facilities.
In fact, ASTRO is a powerful digital platform designed for handling the industrial communication, fully configurable and based on open standard in order to allow the integration of future functions, the interoperability with third party systems as well to guarantee the maximum level of flexibility in order to meet the customer's specifications.

2 – General Architecture

The main central control centre is based on ASTRO Call Manager units configured for handling the industrial communications services available in each subway stations.

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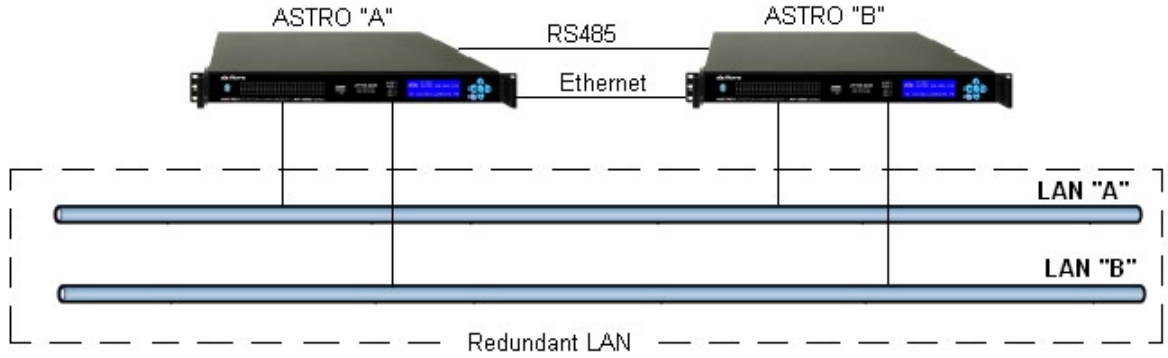
2.1 – Control Centre – Redundant Central ASTRO Call Manager

In order to guarantee the maximum level of reliability and availability of the system, the architecture is based on the ASTRO Call Manager in full redundant configuration.
So, in the main control centre there are two ASTRO units in cluster configuration.
Each ASTRO unit is connected to the LAN through the integrated Ethernet RJ45 interface.
In addition, the two units are interconnected through a dedicated point-to-point Ethernet RJ45 interface used in order to guarantee the data upgrading between the two units.
Also the redundancy of the point-to-point Ethernet connection, the two ASTRO units are also connected through a serial RS485 port.
Thanks to the direct connection between the units, each ASTRO is always a copy of the other one; so, in case of failure on Astro1, then Astro2 becomes automatically the manager of the whole system without any functional limitation; the user doesn't feel any effect of the fault.
Even during the swapping between the two units, the established conversations remain on.
The fault event is reported to the operator console as "general alarm" information and, simultaneously to the client configured with the easy-to-use GUI.
In addition, ASTRO is configured also with the Web-Service standard in order to communicate with the external supervision systems (supplied by other) and typically designed for handling all the systems of the subway.
The supervision operator will handle the diagnostic information relevant to ASTRO system through the supervision system GUI interface. In addition, the supervisor operator, through the supervision GUI interface, can activate the services and functions on ASRO system; the operator will use the digital VoIP telephone for handling the voice communication services.



2.2 – Subway Stations – Local ASTRO Call Manager

In order to guarantee to manage all the functions in each subway station even in case of fault on the LAN (no connection with the main centre), FITRE architecture allows to install one ASTRO unit in each railway/subway station.
In order to manage this type of architecture, FITRE has developed the "hierarchic management" software that operates among all the ASTRO units installed in each subway station as well in the main subway control centre.
Each digital VoIP station and/or amplifier is handled automatically by the level that is closer to the VoIP unit itself.
In normal conditions, the central redundant ASTRO units handles all the emergency calls and/or PA/VA announcements, independently by the location where the user has originated the call.
The central ASTRO unit, on the basis of the configuration, will addresses the call to the proper Operator Console(s), located in the subway station or in the centre or either in the station and in the centre or, through the trunk-SIP, to the telephone user /operator of the IPBX (out of our scope of supply).
In addition, the Centre ASTRO unit is configured with the client diagnostic software for checking all the digital units of the system, including the "speech-test" of the VoIP digital emergency telephone sets.
In fact, ASTRO, on the basis of the configurable timing schedule, sends automatically an audio signal to the integrated loudspeaker of the emergency telephone set and it reads back the same signal through the microphone of the telephone itself.
Thanks to this useful diagnostic software tool, it is possible to get a real status of the station including the audio path relevant to each emergency telephone set.

In addition, the ASTRO station is configured for recording automatically all the conversations as well the PA/VA announcements.
In case of failure on the LAN, then ASTRO station becomes automatically the call manager of the emergency and PA/VA as well the diagnostic and voice recording services.
When the connection between the station and the centre is on again, then the two ASTRO units (station and centre) provide automatically to perform the alignment of their data-base.
Thanks to this architecture, it is possible to guarantee the maximum level of reliability and availability of the system in any condition even during a fault; in fact:

- Redundant ASTRO at Centre: in case of failure on Astro1, then Astro2 becomes automatically the manager of the whole system without any functional limitation; the users and the operators don't feel any effect of the fault. When the second unit come back on line, the two units provide automatically to perform the alignment of the data-base
- Fault of LAN (no connection among the centre and one or more subway stations): Station Astro becomes automatically the call manager of the emergency and PA/VA as well the diagnostic and voice recording services. When the connection between the subway station(s) and the centre is on again, then the two ASTRO units (stations and centre) provide automatically to perform the alignment of the data-base.

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2.3 – Diagnostic

All the diagnostic information as well all the information relevant to the calls are transmitted to the external supervision system through Web-Service standard software.
Thanks to this architecture, the supervisor operator can handle all the call and the PA/VA and diagnostic services using the GUI graphic interface developed on the supervision system.
In fact, through the Web-Service, ASTRO sends to the supervision system all the information relevant to the incoming emergency calls, to the diagnostic status and so on.
At the same time, the supervisor operator can activate requests and/or commands to Astro in order to activate the emergency, PA/VA and diagnostic functions.
The operators, using the TONO-VoIP operator consoles, can establish audio communications with the emergency telephone sets. The operator console reports to the operator also a general alarm fault information just in order to inform the operator that there is a fault in the system; all the details about the occurred fault are available on the client/server diagnostic and, through Web-Service, on the supervision system.
The diagnostic client/server is configured also with VNC in order to offer the possibility of using any customer's PC for accessing to the diagnostic information even by remote.
Thanks to the standard software tools, the supervision system is always updated about the ASTRO system status either in terms of calls and of diagnostic information.

2.4 – Audio Functions

In order to have the audio conversations and the PA/VA announcements the users and the operator will use the digital VoIP telephone sets and interfaces.
Each digital TASVOIP emergency telephone set is equipped with the relevant PoE Ethernet RJ45 interface; in addition, each telephone set is equipped with local power supply input (from 22 up to 57 VDC / 3 W max.); the two power supply sources can be connected simultaneously to the telephone set.
Each TONO-VoIP Operator console is equipped with telephone keypad, handset, integrated microphone and loudspeaker for hands-set conversation as well for PA announcements, display for visualising the incoming calls and general information as well with eight programmable function keys.
ASTRO can be configured for recording automatically the conversations; it is possible to configure the system for recording only the wished types of conversations (for example only the emergency conversations) or any type of them, including the conversations among all the operators of the system (if necessary).
Through the TONO-VoIP operator console, the operators can establish the voice conversations with the calling users as well with the other operator(s).
All the digital telephone sets installed in the subway stations are based on the digital TASVoIP standard SIP sets.
ASTRO client is configured for handling the search and play functions, too.

2.5 – Automatic Voice Alarm Functions

In each subway station we have considered the integration of the PA/VA system in order to broadcast voice announcement and the broadcasting of the recorded messages on the several loudspeaker zones in the subway station.
In each station, it is possible to configure the ASTRO unit in order to handle up to 8 external ON/OFF contacts for broadcasting automatically the relevant messages.
It is possible to increase the quantity of the contact inputs just adding the I/O modules (modularity 8 inputs).
In any case, the ON/OFF inputs are fully independent by their location on the LAN; this means that ASTRO can activate the automatic message broadcasting in one zone of one subway station even if the contact is activated in another subway station.
In addition, each operator can activate the message manually through the keypad of the TONO-VoIP operator consoles.

2.6 – TONO-VoIP Station digital Operator Console

ASTRO centre typically handles all the emergency, PA and diagnostic services; in case of LAN fault, the Astro station will handle the same service limited to the relevant subway station only.
The station operator can handle the emergency calls using the digital TONO-VoIP Operator Console.
Thanks to the maximum level of modularity of ASTRO, it is possible to configure the station TONO-VoIP console for handling several and different services, for example:

- to become yet another impromptu operator *or*
- address always the incoming emergency calls to the station operator(s) and after a programmable time-out to re-address the incoming call directly to the centre operator(s) *or*
- activate / deactivate the ringing service on the station operator console, *and so on.*

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The system is fully configurable and it is designed for meeting the customer's functional requirements.
In any case, in order to guarantee the maximum level for safety, all the activation /deactivation functions configured in each TONO-VoIP Operator Console can be done by the maintenance operator using the configuration client software avoiding the risk of side effects in case of wrong activation made by non-authorized personnel.

2.7 – Emergency Telephone Call set

2.7.1 – TASVoIP-95x Station Digital Emergency Telephone Call set (ground railway/subway station)

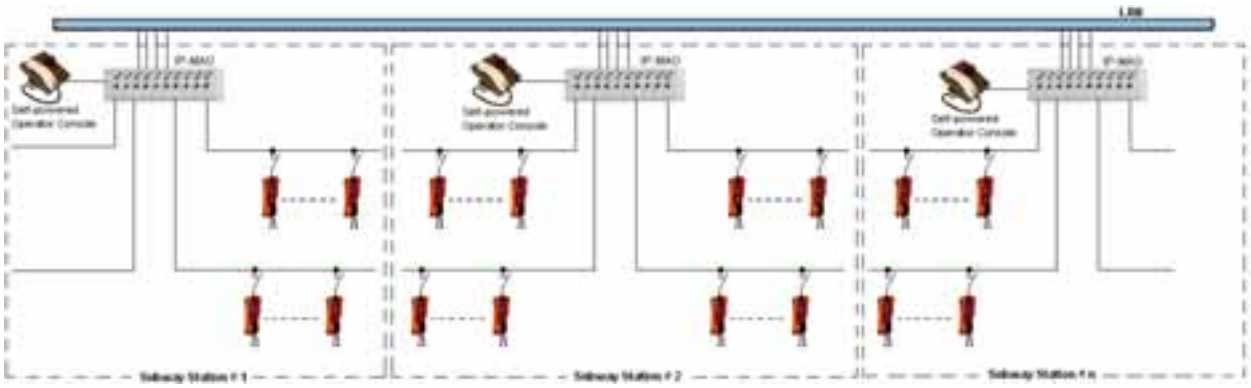
The emergency digital IP telephone set is assembled on a flush mounting weatherproof aluminium plate suitable to be installed on your mechanic infrastructure. The telephone is available with one or two call buttons (typically: "SOS" and "INFO").
The TASVoIP emergency telephone set can be installed either in the station and in the lifts as well in the tunnels and/or along the subway line.
The digital VoIP telephone set is also available for wall mounting installation (TASVoIP-xM) equipped with one or two call buttons. This family of sets is available even with full telephone keypad.
In any case all the digital telephone sets can be installed in the same system. In order to optimise the spares and the maintenance of the system, all the VoIP digital models use the same electronic circuit, reducing at the minimum the training time.

2.7.2 – Self-powered Tunnel Emergency Telephone Call set

On the basis of FITRE's experience in the Italian subway installation, the communication along the subway rail line is a critical point because in case of fire and/or other ambient disaster it is necessary to switch off all the power sources. This means that there is a black-out of the communication systems just when the personnel need them.
Even considering the installation of the full redundant LAN, switching-off the equipment installed in the tunnels, all the VoIP emergency stations are out of service.
In order to avoid the total black-out, it is possible to install the self-powered telephone sets. The self-powered telephone set don't require any kind of power supply; all the telephones are connected in parallel on the same two wires cable.
Each self-powered emergency telephone is equipped with its hook: when the handset is hung-up, the telephone is disconnected by the line; in any case the emergency telephone is used only by the personnel for calling the station operator.
In FITRE architecture, the self-powered technology is fully integrated in the digital architecture.
In normal operative conditions, the self-powered telephones are connected to the relevant VoIP digital interface; so, in case the personnel active the call through the self-powered generator available on each telephone, ASTRO addresses the incoming to the configured operator (he could be the station or centre operator or both the operators; this is fully configurable).
The identification of the incoming emergency call is limited to the "trunk" on which the initiating emergency telephone is connected. Typically, each station handles:

- half of the tunnel (right side) in one direction
- half of the tunnel (right side) in the opposite direction
- half of the tunnel (left side) in one direction
- half of the tunnel (left side) in the opposite direction

so, the operator can recognise up to four different locations from which the emergency call is coming.
Each trunk is controlled by the relevant IP-MAG digital interface with diagnostic facility. In case of fault of one IP-MAG unit the relevant trunk line coming from the tunnel is automatically swapped to the Station Extreme Emergency Self-Powered Operator Console while all the other trunks are not affected by the fault and the users can communicate with the operator through the LAN.
Even in case of complete switch-off of all the IP-MAG units and/or of the complete system (including the local ASTRO), all the trunks coming from the tunnels are connected in parallel on the Station Extreme Emergency Self-Powered Operator Console.
Now, all the communications between the personnel in the tunnel and the station self-powered operator console can be established without any source of power supply.
In any case, the personnel in the tunnel operates always in the same way independently by the status of the system; if the system is not affected by faults the communication will be handled as a standard VoIP digital call addressing the call itself to any of the operator of the whole system. In case of fault, the communication will be handled by the station operator through the self-powered Extreme Emergency Console.
The maximum distance between two self-powered telephone (or console) is 6-8 km. depending of the size of the copper cable (typically, we recommend two twisted wires 1,5 mm^2 each).



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2.7.3 – TASVOICE-164 On-Board Digital Emergency Telephone Call set (EN50155 – Class T3 certified)

The on-board application requires equipment specifically designed for such type of installation where, in addition to the typical robustness and reliability of the emergency station, it is necessary to provide the full compliant to the railway EN50155 standards.

In the on-board application, the space is very often limited; for this reason, FITRE has designed a very compact solution suitable for flush-mounting installation practically in every available space of the wagon.

In order to meet the on-board applications, FITRE has designed the TASVOICE-164 Emergency station based on the state of the art digital IP standard SIP protocol (M12 connector) as well on the previous RS485 serial line for transporting the custom protocol (D-Sub connector).

The TASVOICE-164 Emergency station is already equipped with the analog audio output for managing the external Inductor-Loop device for impaired person.

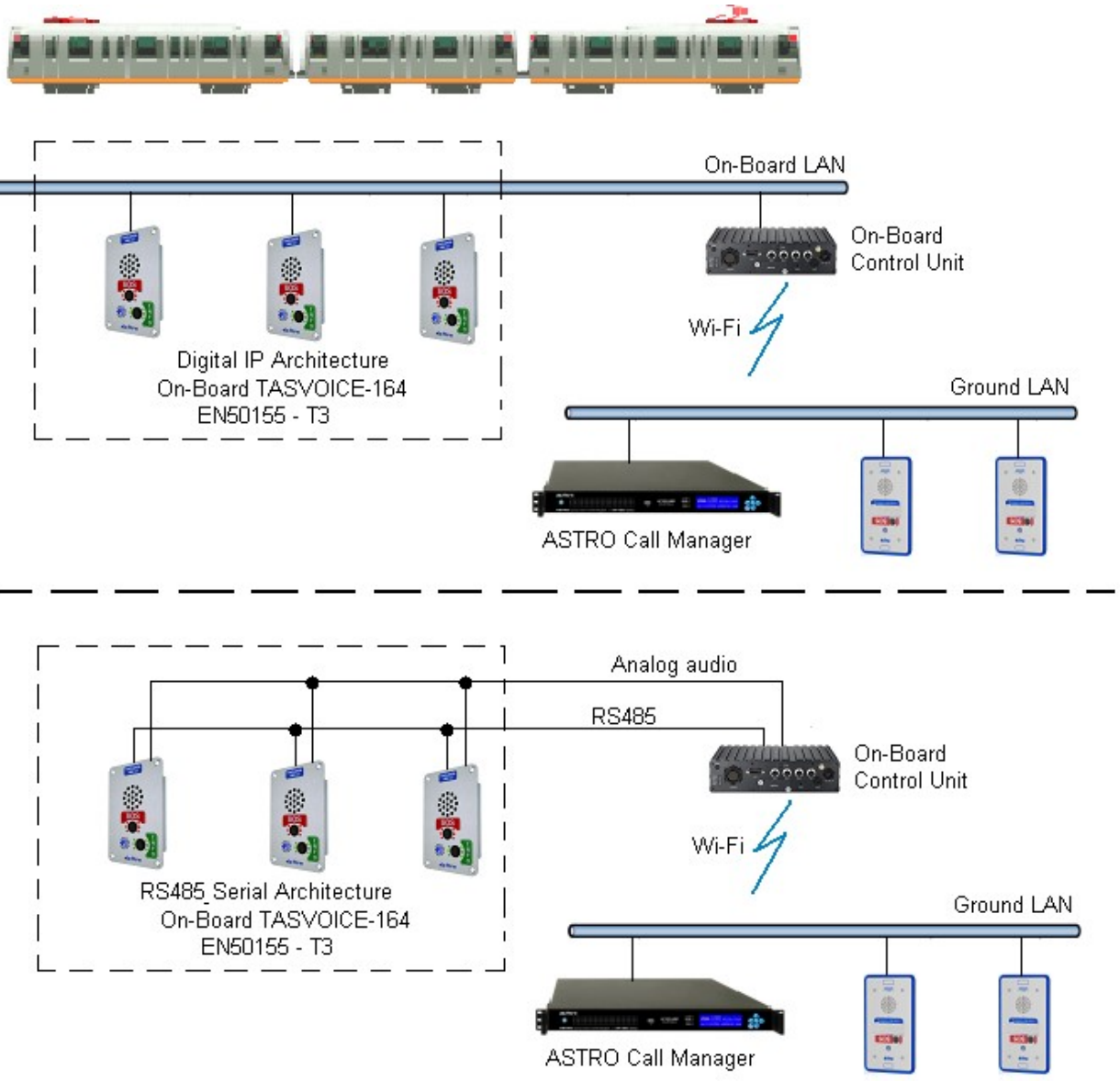
Thanks to the double standard interfaces support, the TAVOICE-164 on-board Emergency station can be connected also in an existing on-board Emergency Communication system. When the RS485 interface is required, the customer has to provide all the detailed information relevant to the protocol for data transferring over the serial line.

The RS485 interface is used for data transferring while the analog audio communication is managed over a dedicated one pair telephone copper cable.

Either the RS485 data and the analog audio signal are managed by the dedicated on-board control unit (typically already existing or supplied by others).

When the digital IP interface is required, then the TASVOICE-164 will be connected directly to the on-board LAN and to the relevant digital IP control unit that manages also the ground/on-board digital Wi-Fi interface in order to guarantee the direct VoIP communication between on-board and ground and vice-versa.

Thank to this architecture, either the on-board and the ground Emergency Call stations are integrated in the same network and the ground ASTRO Call Manager unit can manage the emergency calls as well the diagnostic information relevant to all the Emergency Call stations (on-board and ground).



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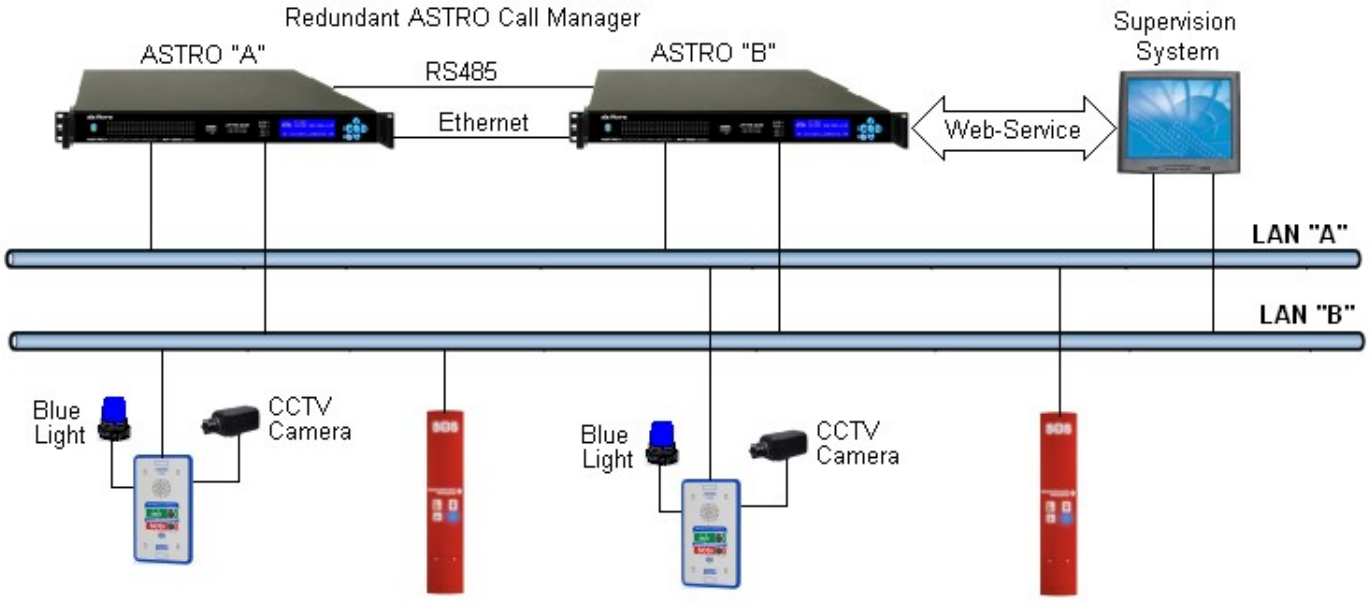
2.8 – TASVoIP-95x Station Emergency Telephone Call set associated to the CCTV camera

Very often, the emergency call has to activate also the CCTV camera located near to the emergency telephone.
Then the operator can visualise the scenario during the call activity and during the conversation; in addition, both video and audio files will be recorded in order to allow to the supervisor the possibility for searching and playing the event.
In this case, it is possible to configure the TASVoIP-95x with one additional electronic board configured with one audio analog output to be connected to the input of the digital camera (supplied by other).
Thanks to this architecture, the emergency call system is fully independent by the CCTV system manufacturer.
In fact, when the user presses the emergency call button, ASTRO handles the audio event and, simultaneously, through the web-Service, this information is transmitted to the supervision system.
The supervision system activates the video server in order to switch-on the CCTV camera(s) installed near to the emergency telephone set from which the emergency call has been activated.
The video server will record the images and the audio relevant to the initiating emergency call.
At the end of the conversation, ASTRO sends this information to the supervision system in order to reset the video server where the audio and the video files are now available.
In addition, each digital telephone set can be also equipped with I/O piggy-back configured for handling local ON/OFF inputs and outputs; for example, the station can control a tamper contact and/or an external signalling lamp (***Blue Light Emergency station***). ASTRO is configured for handling the ON/OFF alarm event, too and, through the Web-Service standard, to report the information to the supervision system.
When required, FITRE can supply the assembled "Totem" typically to be installed in the common areas of the subway stations (mezzanine) on which the emergency call station, the CCTV camera (normally supplied by other), the fibre optic converter as well the audio mixer are assembled. The "totem" are configured with two microphones and two call buttons installed on different distance from ground in order to offer the possibility for accessing to the emergency calls to persons with disabilities.



2.9 – Public Address (PA)

ASTRO Call Manager is designed for managing also the PA (PAVA / PAGA) functions according to the **EN54-16 norms**.
Typically, in each subway/railway station there are 3-4 loudspeaker zones: platform "right" – platform "left" – mezzanine – technical area. In some case, it is necessary to provide the PA functions also in the "tunnels".
In order to meet the customer's requirement, in each subway station it is necessary to install one amplification cabinet assembled with all the necessary digital power amplifiers.
Each amplifier is equipped with the relevant IP-DAD (Digital Audio Decoder) interface; thanks to this architecture, each amplifier is an IP address of the LAN.
So, it is possible to dial a single amplifier as well a group of amplifiers or all the amplifiers in the same railway/subway stations as well in all the stations of the railway/subway line.
ASTRO Call Manager system is fully modular and there is not a real limit in terms of quantity of zones and power amplifiers.
Thanks to this flexible architecture, the operators (independently by their location in the subway) can activate any combination for broadcasting announcement and messages on the subway stations:

- selective call in the subway station: one selected zone on one selected subway station
- group call: a group of zones on one selected subway station
- all call: all the zones on one selected subway station
- station group call: all the zones on a group of subway stations
- station all call: all the zones on all the subway stations
- group zones: all the zones "x" on a group of subway stations
- all zones: all the zones "x" on all the subway stations

The operator(s) can broadcast the PA live announcements through the digital TONO-VoIP/8 console; the same console already used for managing the Emergency Calls.

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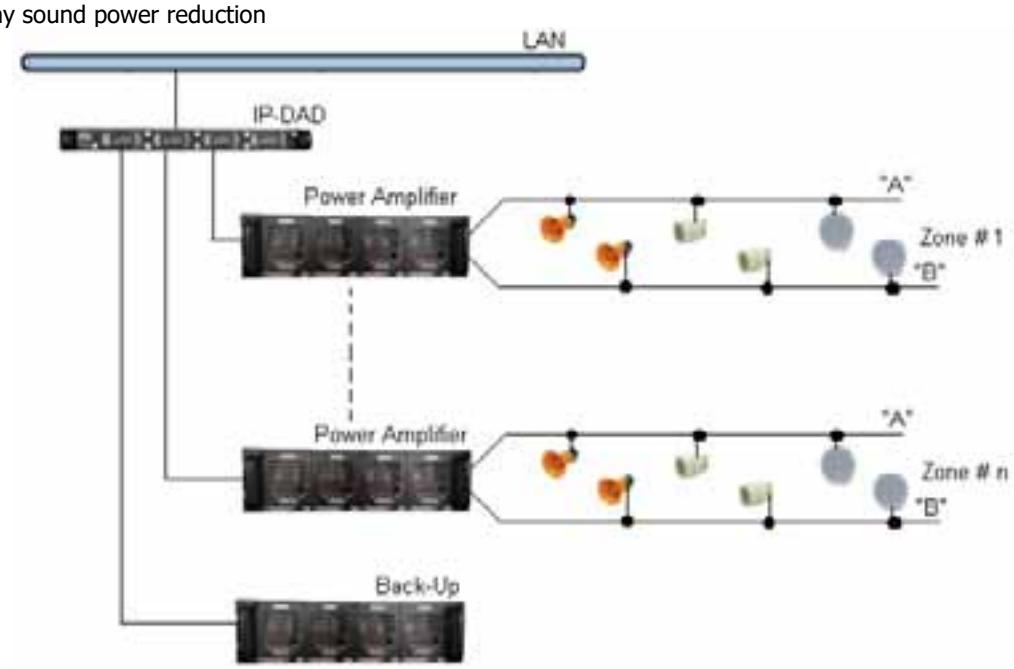
On the basis of the customer's specifications, it is possible to configure the limits and the functions to be assigned to each operator console; for example, the station operator can access to the PA functions just only inside his station and the central operator can access to all the stations, and so on.
When required, the station amplification cabinet can be configured for handling also the alarm inputs activated by external systems in order to broadcast automatically the recorded messages.
Thanks to the digital VoIP architecture there is not any limitation due to the geographical location of the system resources; each unit is a node of the LAN and any unit can access to all the common functions according to the configuration.

2.9.1 – Public Address (PA) – Power amplifier units and diagnostic

Each amplification zone is configured with the relevant sound power amplifications. This is calculated according to the quantity and the power of the installed loudspeakers.
According to the EN54-16 norms, the architecture has to consider the redundancy of the loudspeaker lines (lops) in each zone.
This means that each power amplifier is equipped with two output lines (named "A" and "B"); in case of short or open circuit on one of the two loops, the system provides automatically to disconnect this loop from the output of the amplifier; so, the total amplifier output power is still available on the other loop.
Thanks to this architecture, it is possible to guarantee the broadcasting of the voice on the zone even if the sound power is reduced (- 3 dB) because the half of the quantity of the loudspeakers is active (only on loop).
The fault event is visualised on the operator console and, through the standard Web-Service software, to the supervision system.
In addition, each power amplifier is equipped with an integrated power supply (input 230 VAC) and with the 100V line transformer as well with the diagnostic circuit in order to detect the internal faults.
In case of internal fault, ASTRO activates automatically the swapping with the back-up amplifier (N+1 redundancy); so, there is not any sound power black-out.
According to the EN54-16 norms, each amplification cabinet is configured with the N+1 redundancy relevant to the power amplifiers and to the IP-DAD controller; so, in each cabinet, in case of fault:

- of one loudspeaker loop, the sound is reduced –3 dB just limited to the zone where the fault has occurred
- of one amplifier in one amplification cabinet, the system activates automatically the change-over with the back-up amplifier without any sound power reduction



2.9.2 – Public Address (PA) – Microphone for ambient noise detection

Typically, the ambient noise in the subway/railway stations is a critical factor to be considered in order to guarantee the intelligibility of the announcements.
In fact, it is not possible to predict the ambient noise level in a railway/subway station due to a combination of events (incoming/outgoing of one or more trains, few or many passengers and so on).
Assuming to keep the same output volume of the amplifiers, the wide variation of ambient noise level influences the intelligibility of the announcements.
In order to prevent this negative effect, FITRE has developed the intelligent noise detection system.
In order to avoid the risk of broadcasting announcements during an increasing phase of the ambient noise, ASTRO architecture foreseen the installation of one intelligent microphone per each amplifier/zone in order to detect in real time the ambient noise.
So, on the basis of the measured noise, ASTRO provides automatically to increase/decrease the relevant zone amplifier output volume.
The automatic noise level detection is based on one ambient microphone detector per each zone (amplifier). The automatic circuit is based on ***FITRE exclusive algorithm suitable for discriminating the noise from the announcement itself (live message)*** and for adjusting automatically the output volume of the amplifier unit(s) used for handling the loudspeakers installed in that specific zone.

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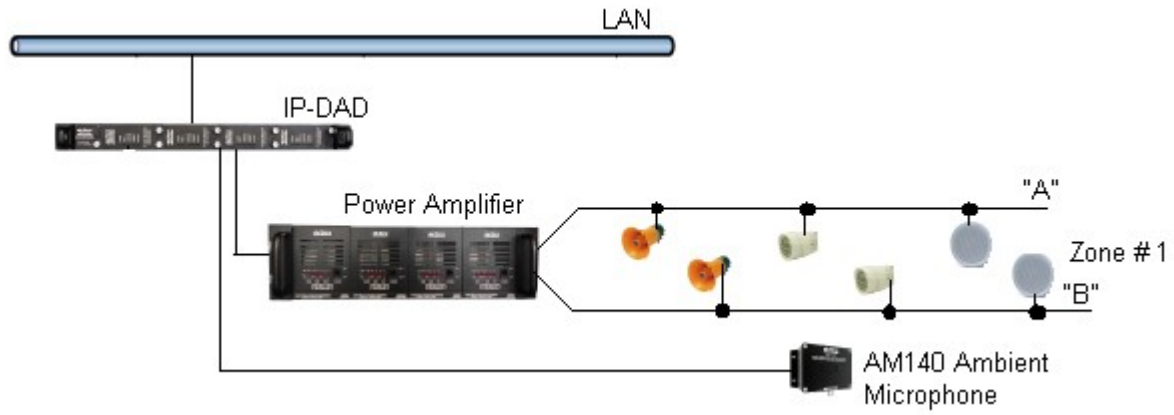

2.9.3 – Public Address (PA) – Interface with the existing PAVA system

When the ASTRO system has to be interfaced with an existing PA/VA system, each ASTRO (station or centre) can be configured with an analog audio output in order to send audio announcements and recorded messages toward the existing PAVA system that will handle this audio input as an additional audio source.
On the basis of the existing PAVA system specification, FITRE technical department is available for evaluating and discussing the logic interface for handling the selection of the zones.
In addition, it is also possible to configure ASTRO with one or more analog audio inputs in order to receive the announcements and messages generated by the existing PAVA system. Also in this case, FITRE technical department is available for discussing and evaluating the proper logic interface in or4der to handle the zone(s) selection.

3 – ASTRO System Call Manager

ASTRO System Call Manager is fully digital unit based on IP standard SIP technology.
The unit is fully configurable in order to meet the customer's specifications mainly for managing:

- the hierarchy levels among all the ASTRO units installed in the centre and in each subway station
- the emergency calls activated by the personnel along the rails (tunnels)
- the emergency calls activated by the passengers (subway stations)
- the calls activated by any operator of the system (including the conference and the all call on all the operator consoles)
- the emergency calls activated by the passengers on the lifts
- the diagnostic information relevant to each digital unit; in particular, the digital TONO-VoIP Operator Consoles, the digital TASVoIP emergency call stations and PA devices (amplifiers, loudspeaker loops, IP-DAD, and so on)
- the diagnostic software package includes also the VNC client/server. So, the maintenance personnel can access to the diagnostic functions even through an own PC
- the recording of all the conversations among the operators and the passengers
- the recording of the PA voice announcements
- the silent listening
- the Web-Service standard as interface with your supervision system
- the Trunk-SIP standard as interface with the IPBX telephone exchange (supplied by other)

3.1 – ASTRO Web Service

The *World Wide Web Consortium (W3C)* defines a **Web Service** as *"a software system developed in order to support the interoperability among several computers operating on the same network"*.
As main characteristic, a Web-Service offers a software interface, described in a format that is automatically processable, like, for example, the *WSDL (Web Services Description Language).* Using this interface, other systems can interact with the Web Service itself activating the operations described into the interface trough proper *"messages"* (transported through the HTTP protocol and formatted according to the XML standard).
In order to guarantee the maximum level of flexibility and openness of ASTRO system, Fitre has adopted the Web Service standard in order to perform the communication between ASTRO System Manager and the third-party external supervisor systems.
In fact, thanks to the Web Service using, ASTRO guarantees the information exchanging and the interactions with external third-party.
Typically, the *SNMP (Simple Network Management Protocol)* provides the information management based on *"requests"* and on *"notifications"* between two systems but without a real interaction.
The Web Service offers the possibility to send and to execute commands, to transmit diagnostic information, and so on. The Web Service offers the possibility in order to get the complete control of the ASTRO activities; so, an external third-party supervisor (or SCADA or other) system can control ASTRO activities.
Web Service is the most modern and versatile software tool in order to guarantee the real interoperability between different systems.
ASTRO Web Service uses the model based on *SOAP/WSDL*.
ASTRO Web Service interfaces are exposed through WSDL documents (a type of XML). WSDL stands for Web Services Description Language. WSDL interfaces have URLs and can be retrieved on the net.
Subsequent message exchange is in SOAP protocol, another type of XML document.

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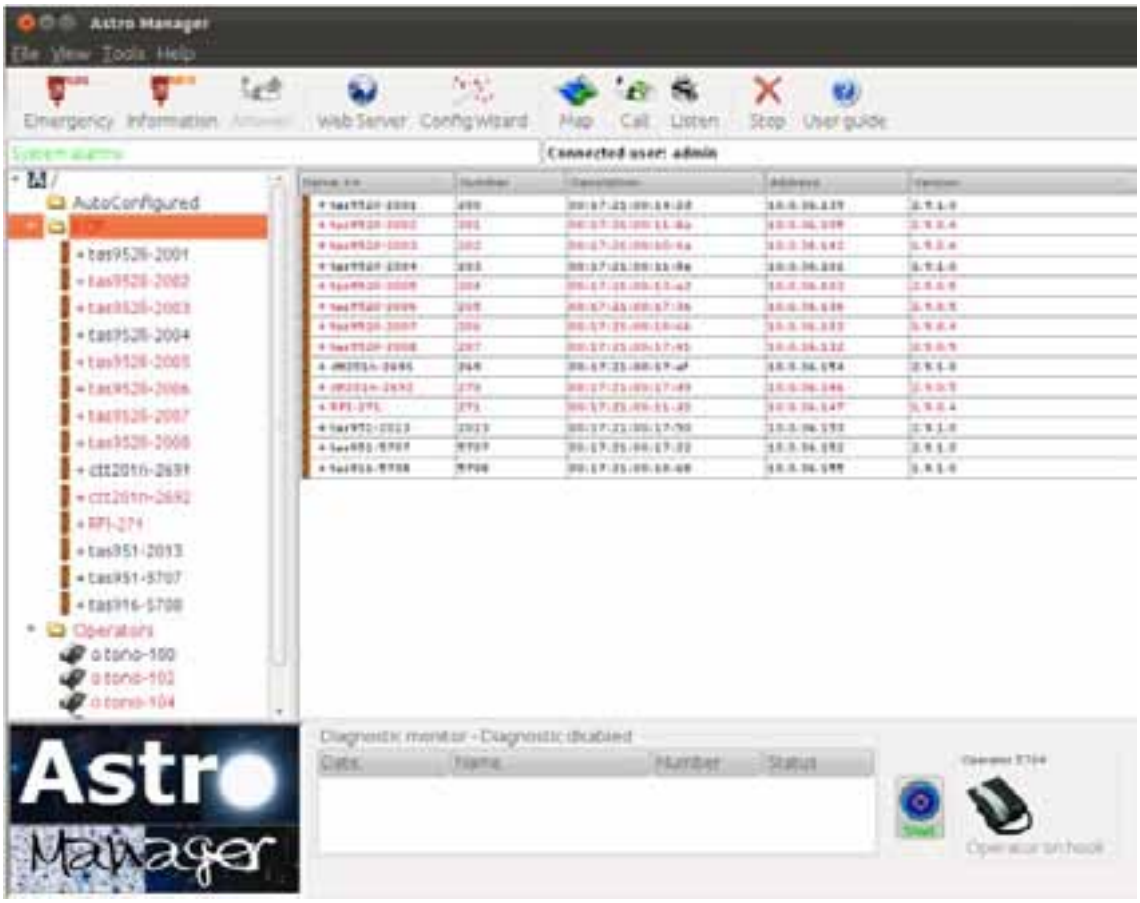
3.2 – ASTRO Call Manager Diagnostic GUI interface

There are three possible ways (each password protected) to enter the Astro Manager application:

- Dedicated PC
- Access with keyboard, mouse and monitor directly attached to Astro
- Remote access with open source VNC software

Main screen



Main menu and tool bar – Creation from scratch

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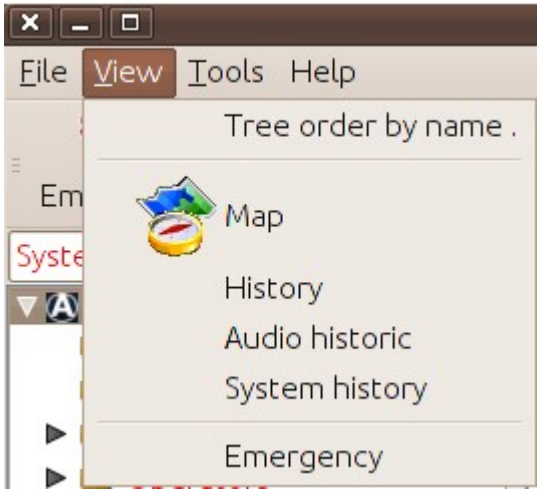
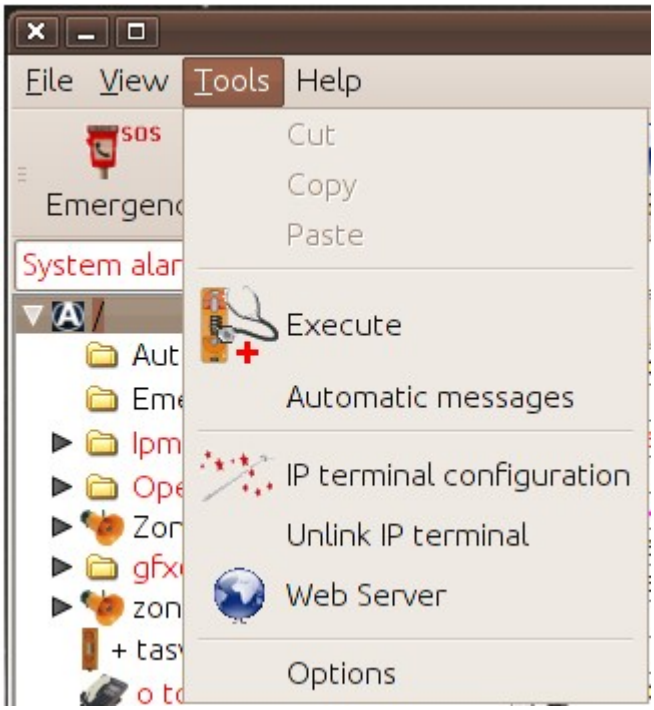
View



Tools



Creation with wizard

Enables automatic set-up of a terminal that is presented to the system. The command operates with the terminals that are located under the folder of 'auto-configured' type and on the folders of type GFX. All the trained VoIP terminals that are connected to a network where Astro is DHCP server are automatically moved to the 'auto-configured' folder. The Astro system also features self-provisioning, which allows automatic set-up of all the terminals without the need for manual configuration by the wizard

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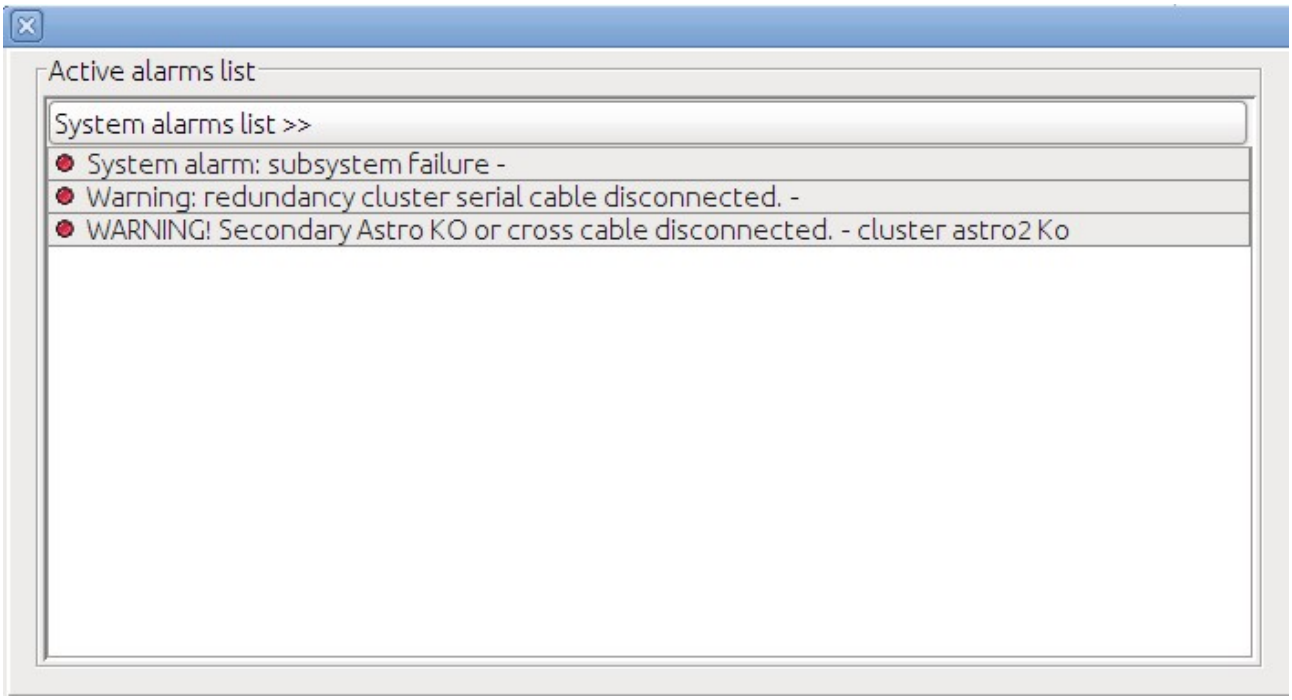
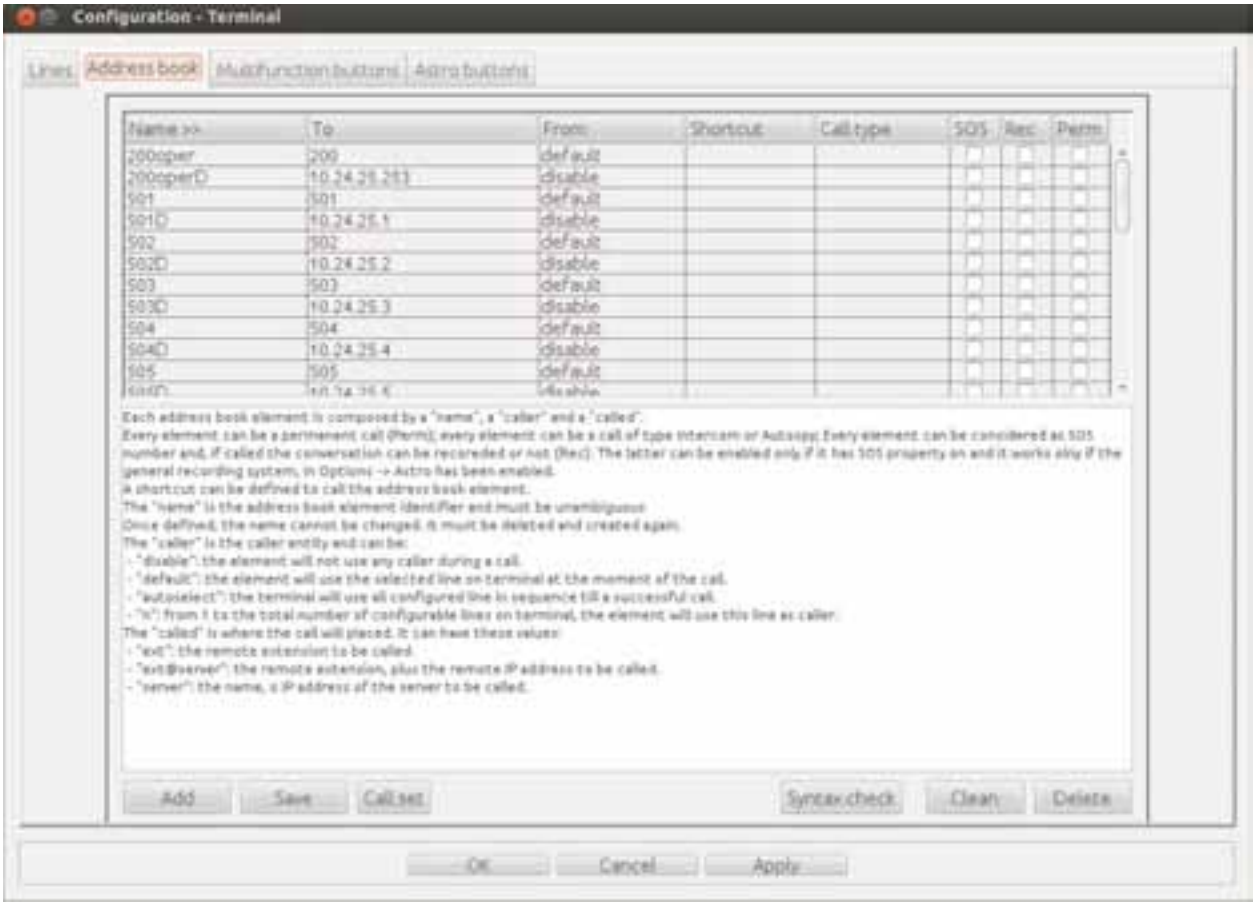
System Status

- ***Audio Alarms***: they are all the system alarms generated by the Astro software
- ***External alarms***: they are all the system alarms generated by Astro hardware and elements external to Astro



Global address book



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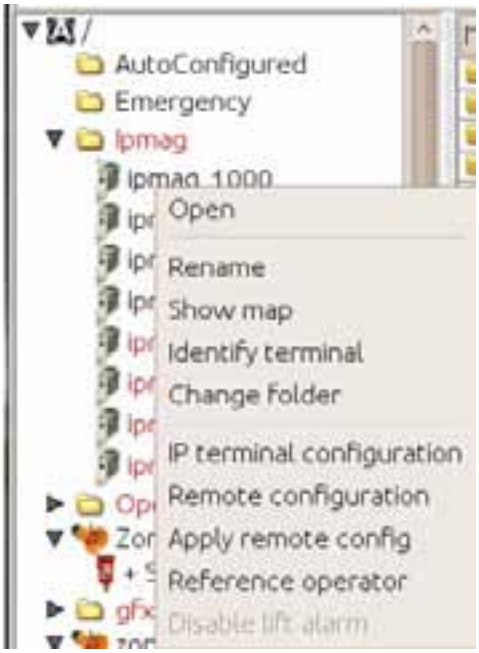
Phone tree management

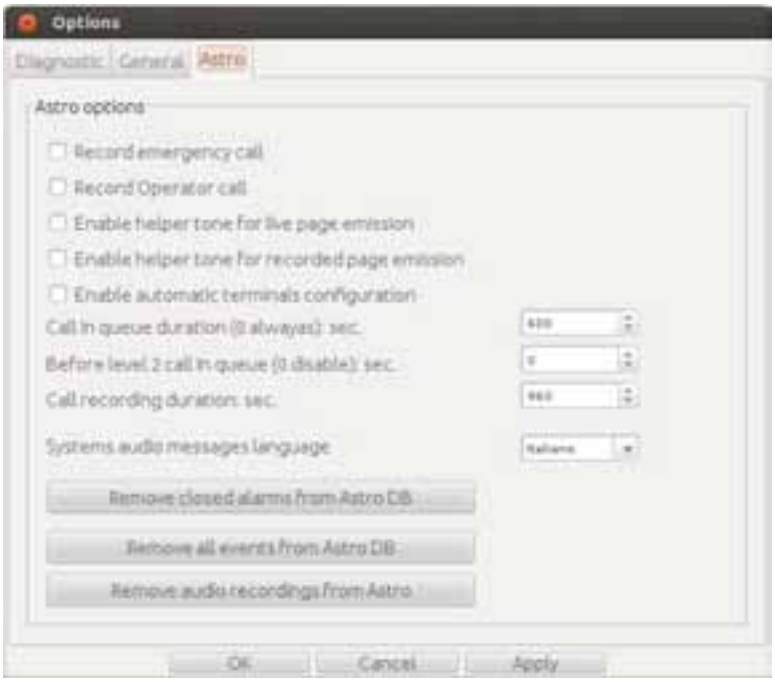
- ***Selection of a group of terminals***

Open the contextual windows of the drop down commands



Setting-up Options

- Set-up of the automatic diagnostics of the system, including:
  - the check for connection and recording
  - the ***Speech Tests*** on the complete audio chain of the intercom station (handset, speakerphone, external speakers, and related microphones)
  - the Updating of parameters
- Put the system off at pre-set times. This feature is useful for instance if it is provided that the facility where the emergency terminals are installed stops the service at night (for instance a subway). In this case it is possible to stop the emergency call activity in the period when the service is not manned.
- Enable or disable audio recordings of emergency calls.
- enable or disable audio recordings of calls made from an Operator Station
- Program the duration of a call in the queue.



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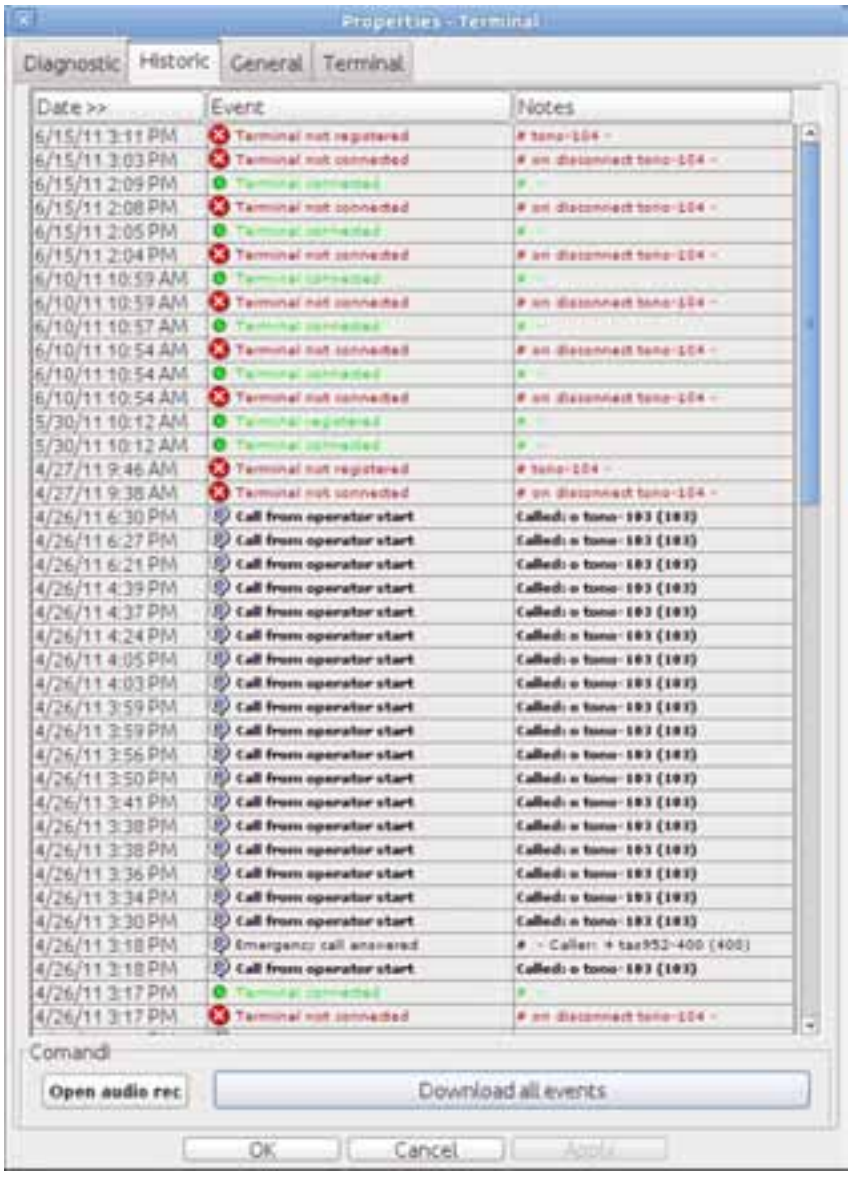
Diagnostic monitor

Programming of the tests planned by the automatic diagnostics function: each row of the table corresponds to a test on a phone with the relevant data and status (diagnostic) information

Setting-up automatic messsages

The set-up of the automatic messages can reconfigure audio comfort messages associated with each queue and global comfort messages

History



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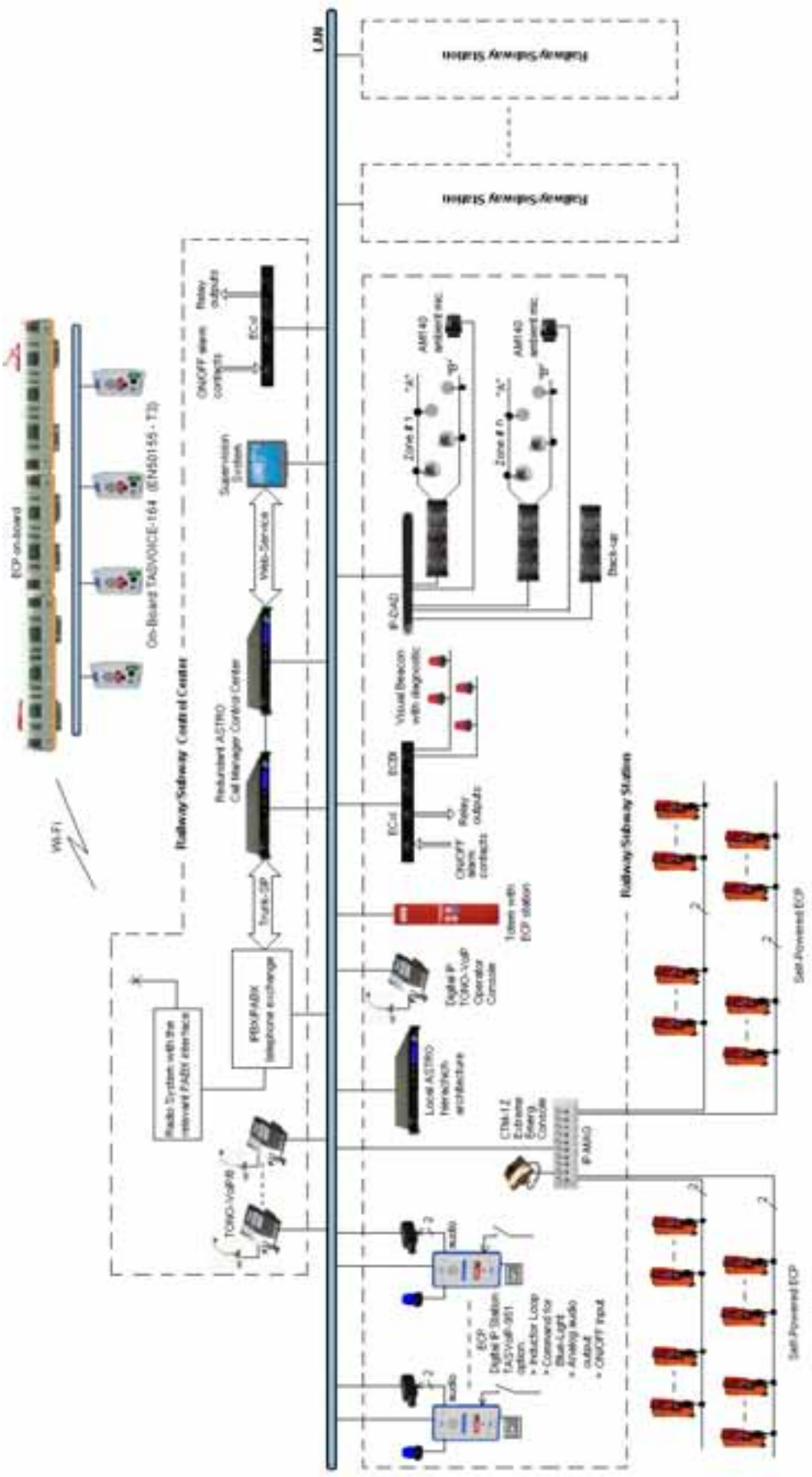
4 – Typical Block Diagram Drawing



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ASTRO-PA/GA System
EN54-16:2008 Certified

Digital IP PA/GA Public Address and General Alarm Certified System for Industrial Safety Applications

01 rel.201612 - v.201906

ASTRO-PAGA – Digital IP Public Address & General Alarm SYSTEM for INDUSTRIAL SAFETY APPLICATIONS

- ***Stand-alone, High Availability full redundant A&B system architecture via LAN connection***
- ***EN54-16 certified***
- ***Modular, scalable and high reliable system based on distributed master/slave and master/master distributed architecture with hierarchic managing***
- ***Single of Point of Failure managing***
- ***Installation cost saving thanks to the IP network: the power amplifiers are located where the loudspeakers & visual beacons are required***
- ***Simple and easy-to-use ASTRO/Client GUI interface in order to configure the system as well to handle the diagnostic information. ASTRO/Client software can be installed on a dedicated unit or fully integrated into the ASTRO Call Manager unit or it can be accessed by any customer's PC via VNC (Virtual Network Computing)***
- ***Redundant LAN connection (C-ring) among the digital devices assembled in each cabinet***
- ***Ring Network Management software integrated in ASTRO Call Manager***
- ***Fully digital IP Access Panels and intercom stations based on the state of the art VoIP technology with standard SIP and FastPA streaming protocol configured with echo and ambient noise canceller***
- ***Powerful digital noise cancelling algorithm developed on the basis of Fitre's long experience in heavy industrial plants in order to guarantee to communicate in hands-free and real full-duplex mode even if the ambient noise level is more than 100 dB.***
- ***Modular and flexible construction in 19" rack cabinets for easy and speed access to any part of the system***
- ***Each device is equipped with the relevant integrated Ethernet 10/100 interface suitable to be connected to any existing LAN avoiding the use of dedicated connections and/or digital networks***
- ***Integrated PBX features for selective calls, group calls and all call of the intercom stations with possibility for interfacing ASTRO Call Manager system to any existing PABX and/or Telecom network (PSTN) through Trunk-SIP and FXS/FXO interfaces***
- ***Configurable Priority Levels handling***
- ***Emergency & Intercom calls handling with 100% of simultaneous conversations***
- ***Remote diagnostic capability***
- ***Remote maintenance and software up/down-load capability through Internet (LAN)***
- ***Powerful Alarm event handling capability in order to broadcast alarm tone/messages linked to the active alarm contact(s). The alarm/tone /message are stored in the static memory of ASTRO server unit. The user can easily record the live voice messages***
- ***Loudspeaker line impedance monitoring***
- ***Visual beacon line monitoring***
- ***Speech test diagnostic for checking the full audio path***
- ***Emergency microphone for broadcasting alarm messages even in case of dramatic fault of the main system manage***
- ***Automatic E-MAIL and/or SMS notification in the event of failure***

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ASTRO-PAGA System: the state of the art Digital IP Public Address and General Alarm EN54-16 Certified Systems with LAN architecture – GENERAL System overview

ASTRO/PAGA system is designed for broadcasting alarm tones, pre-recorded messages, emergency and standard live voice messages to single or group or all areas of the plant. In areas where the ambient noise is high, ASTRO-PAGA system handles the visual beacons, too.
ASTRO-PAGA is based on modular, flexible and reliable architecture with cost effect benefits. Each device of the system is equipped with the relevant integrated Ethernet interface in order to guarantee the maximum level of the modularity and scalability. Thanks to the digital architecture, it is possible to remote any part of the system, including the booster amplifiers, in order to cut the costs of the cabling.
The maintenance personnel, using the GUI user interface can configure the system and he can also access to the diagnostic information in easy and fast way even from remote site via Ethernet/Internet connection.
ASTRO-PAGA system operates with the standard SIP and FastPA streaming protocol (***audio voice bandwidth: 8 KHz***).
Avoiding any proprietary solution, the customer benefits of the wide range of standard applications saving time and money for developing proprietary special equipment.
ASTRO-PAGA has been developed in order to solve the high quality, reliability, availability and safety requirements in ***on&offshore oil & gas, petrochemical, transport and, generally, in all the applications where the safety is the most important point of the project***.
In order to reduce at the minimum, the power consumption and to increase the MTBF value, all the amplifiers are Class-D type.

Each amplifier is directly connected to the redundant LAN via the relevant IP-DAD module, equipped with integrated Ethernet interface. Thanks to this, the zones modularity is the single amplifier and there is not a real limit in terms of zones/amplifiers to be configured in the plant.
Each access panel and/or intercom station are available for indoor and outdoor installation, including the weatherproof and explosion-proof ATEX certified Zone1 types.

ASTRO-PAGA system is designed for handling the alarm events as well the priority levels of the communication: voice live messages, recorded alarm tones/messages, telephone user voice messages, external audio files and/or signals.
Thanks to the open and standard architecture, ASTRO-PAGA system can be interfaced with external systems (for example, Scada, DCS, F&G, PABX and so on) using standard software interfaces TCP/IP, Web service, SIP-trunk through the LAN.
ASTRO-PAGA system can be configured as stand-alone unit and in ***full duplicated architecture (Systems "A" and "B"***): in case of fault of Astro1 then Astro2 becomes automatically the manager of the whole system without any limitation in terms of functionality.
All the digital devices assembled inside the cabinet are connected through the ***redundant network LAN (C-Ring)***

ASTRO Call Manager Unit – Technical Specifications

LAN/WAN connection	➢ n. 2 - 10/100/1000 BaseT Ethernet RJ45 (expandable up to 4) – IP static address or DHCP ➢ VLAN on-board
Power supply unit	Low power consumption 24 VDC /max. 30 W
Memory	64 Gbyte Static Mass storage of which about 40 Gbyte are available for recording the alarm tones/messages and the conversations
Communication protocol	Standard SIP
Remote configuration capability	➢ Web server ➢ Download of the configuration files ➢ Upgrading through TFTP, HTTP ➢ Access by password
Software interface with external supervisor systems	Web-Service
Real time diagnostic facility	ASTRO/Client (for handling the Diagnostic / Maintenance / Configuration services) even via VNC
PABX and/or PSTN interface	Through GFX unit(s)
IPBX interface	Through Trunk-SIP protocol
PA and PAGA audio interface	Through IP-DAD unit(s) and ECxI I/O module(s) for handling the alarm inputs/outputs as well the visual beacons and the relevant diagnostic
Operating temperature	-5° to +60°C
MTBF	112.000 hours @ 25°C
Dimensions/Weight	19" 1U rack (D. 300 mm.) / 4,1 kg.

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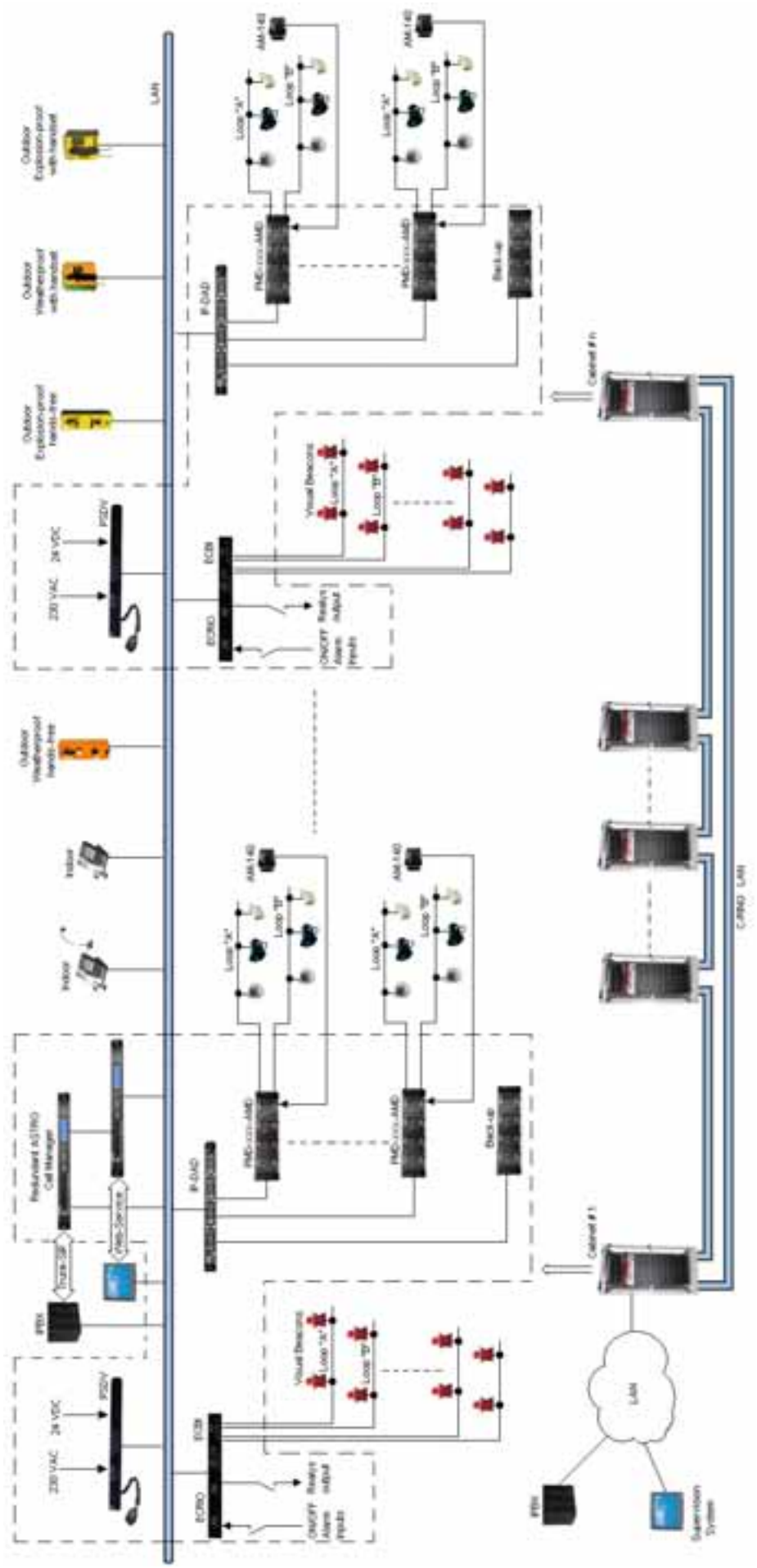

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System Functionality

ASTRO-PAGA & Intercom system handles the emergency events broadcasting the proper alarm tones/messages in order to allow the safe evacuation and the paging of the personnel.

One or more operators, through a digital and/or analog access panels /intercom stations, can initiate manually an alarm tone/message.
In addition, external systems (like F&G, DCS, Emergency Shutdown System) can activate the automatic broadcasting of alarm tone/messages.
When the telephone interface is required, then any telephone user can access to the loudspeakers net in order to broadcast voice live messages and/or to call any station of the PAGA system (according to the configuration).

Each area/zone of the plant is handled by one or more power amplifiers with automatic change-over with the back-up power amplifier (n+1 redundancy); it is possible to configure the system even with 1+1 as well n+x redundancy.

Thanks to the digital LAN architecture, each amplifier and/or group of amplifiers used for handling the same zone are a node of the LAN. Each node is addressable by any of the two ASTRO-PAGA duplicated systems. So, even in case of fault of one of the two systems, the second one can handles all the addresses of the devices connected on the LAN (stations, amplifiers, alarm inputs). As result of this, the user has not any functional limitation and there is not any loose of sound power in any zone. Assuming that in each area there are several loudspeakers handled by system "A" and several loudspeakers handles by system "B", even in case of fault on one system, in that area both group of loudspeakers ("A" and "B") operate, broadcasting the alarm tones/messages and/or live messages.

Each access panel (station) supports the voice announcement and the alarm initiating. On the basis of the configuration, the operator can activate the alarm tone and/or pre-recorded message to be broadcast in one or in a group of zones as well in all zones.
Each VoIP digital station is equipped the integrated microphone and loudspeaker for hands-free full-duplex conversations and voice announcements as well with the display for visualising the status of the stations and of the system. The access panels and intercom station are available also with the handset.

Each VoIP digital station is a node of the LAN and it isn't directly connected to any of the two ASTRO-PAGA systems. Thanks to this architecture, the digital VoIP stations can be installed in any location (even geographically remote from the plant) just over the LAN connection. There is not need of a dedicated cable (with length limitation) between the station and the cabinets where the systems are assembled.

ASTRO-PAGA system handles the priority levels according to the configuration; there is not a real limitation in terms of quantity of levels and logical rules for activating the alarm tones/messages as well the zone combinations where it is necessary to broadcast the alarm tone/messages.

ASTRO-PAGA system supports a wide range of interfaces with external telephone PABX, digital IPBX or audio sources.
According to the configuration, ASTRO-PAGA will handle the proper priority level considering the audio interfaces and the relevant audio channels as well the alarm ON/OFF inputs and/or alarm events received through TCP/IP protocols and/or serial connections with external systems.

ASTRO-PAGA system is designed for handling simultaneously the broadcasting of different audio signal into different loudspeakers zones.

In order to avoid any acoustic feed-back (larsen effect) risk, ASTRO-PAGA can be configured for delaying the live message broadcasting.

As option, ASTRO-PAGA supports also the ambient microphone units in order to detect the ambient noise level and to adjust automatically and in real-time the output of the relevant amplifier. Thanks to the exclusive FITRE algorithm, ASTRO discriminates the voice announcement by the ambient noise level; so, during the announcements, ASTRO adjusts the audio output of the amplifiers just and only according to the noise level variation.

ASTRO-PAGA system can be used for handling the intercom service, too. In this case, the stations are equipped with the standard telephone keypad and the user can dial any subscriber number or a limited quantity of subscriber numbers of the system (according to the configuration).

Each digital device of the system (including the stations and the IP-DAD digital audio interfaces are equipped with an extensive software diagnostic tool, capable for detecting the fault even on the microphone and loudspeaker device (speech-test).
The diagnostic tool of ASTRO-PAGA includes the test of each power amplifier, the test of each field loudspeaker loop as well of each visual beacon loop.

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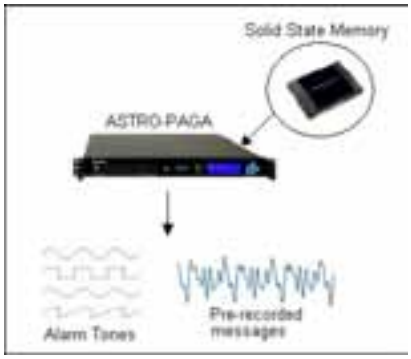
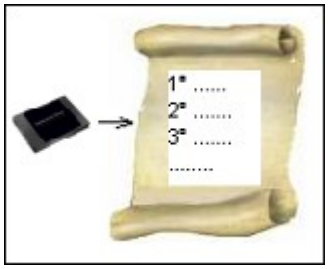
MAIN SYSTEM FEATURES



Alarm tones/pre-recorded messages configuration

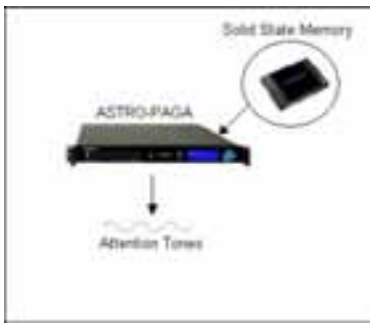
all the alarm tones and pre-recorded messages are recorded into the memory of ASTRO-PAGA system. There is not limitation in terms of quantity and length of the messages. The alarm tones/messages are imported as .wave and/or mp3 files through a very simple and powerful graphic interface (ASTRO-Manager). So, the customer can program own messages even in own local language as well he can program own special tone independently by the manufacturer tone generator and/or list of messages.

ASTRO-PAGA system can handle any combination of alarm inputs triggering, linking any alarm tone/message to the alarm event in order to broadcast it in the programmed zone, group of zones or in all the zones.



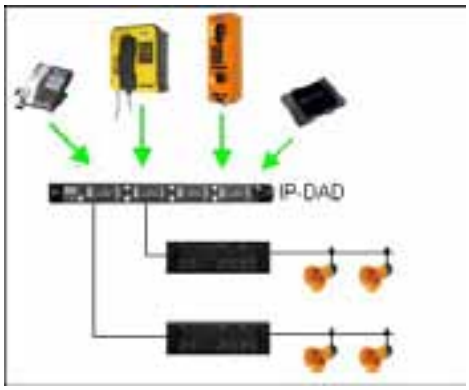
Priority handling

ASTRO-PAGA system handle all the priority levels among alarm inputs and audio sources. The priority level list is fully programmable and reconfigured even onsite.



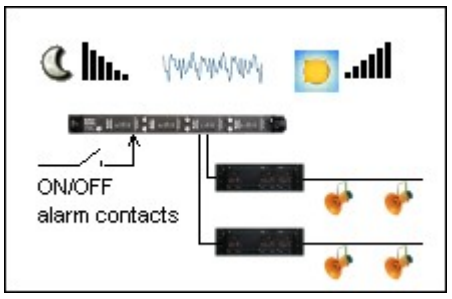
Attention-tones

Also the attention/warning tones are stored into the memory of ASTRO-PAGA system and they can be imported as .wave and/or mp3 files. In order to help the immediate understanding of the message, the customer can link a type of attention-tone to any pre-recorded and/or live message.



Loudspeaker zones

ASTRO-PAGA system can broadcast any type of alarm tone/message as well of live voice message into a single zone, into a group of zones and into all the loudspeaker zones according to the programmable level priority list.



Programmable audio level

The user can configure the audio output level of each alarm tone and/or alarm message. This feature can be programmed as automatic event handling (for example, output level reduction during the night time).

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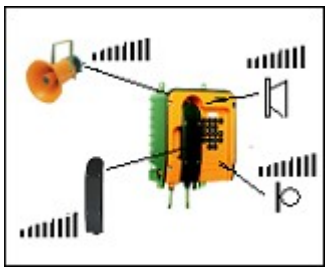
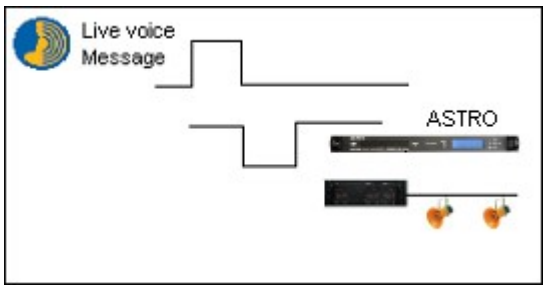


Audio characteristics

ASTRO-PAGA system is a real full digital VoIP system with high capability in terms of control of the audio signals.
Mainly, each digital VoIP station cab be configured in order to adjust by remote the integrated microphone and loudspeaker levels as well the audio output for handling an external amplified loudspeaker, connected to the station itself in order to boost the audio signal when the station is installed in noisy area.



Acoustic feed-back facility

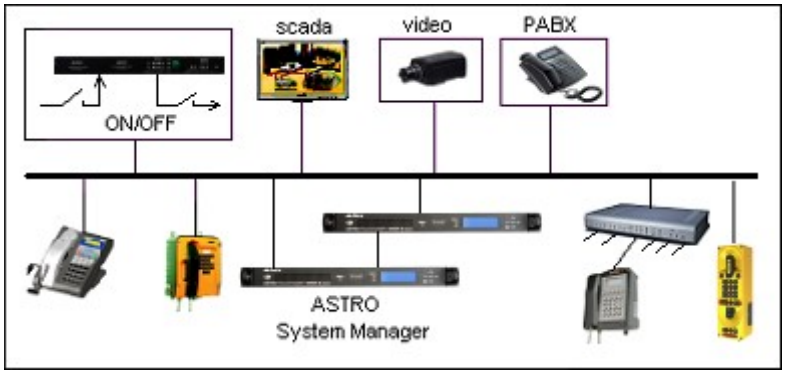
In order to avoid any acoustic feed-back (larsen effect) risk, ASTRO-PAGA can be configured for delaying the live message broadcasting.

Power Amplifiers

ASTRO-PAGA system can operate with different types of power amplifiers with different output power values: 125 – 250 and 500 W. Each of these power amplifiers is equipped with own diagnostic circuit relevant to the amplifier itself as well to the controlled loudspeaker loop. The diagnostic circuit is designed for detecting the following fault events:

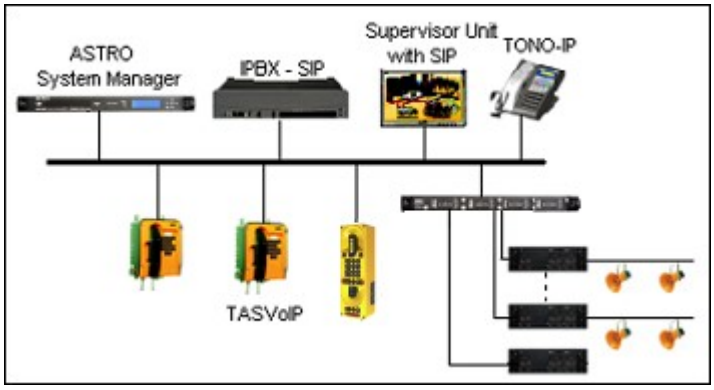
- output over-load
- output short-circuit
- over-temperature
- variation of the impedance value of the loudspeaker loop

Each power amplifier is equipped with own integrated power supply: input 230 VAC and 24 VDC. According to the application specification, the system can be configured for handling the change-over with one back-up amplifier: one back-up unit per each zone or one back-up unit per each system "A" and "B".
In case of fault of one of the service power amplifiers then ASTRO-PAGA system activates automatically the swapping with the back-up amplifier, signalling the fault event to the operator(s) and to the maintenance terminal.



Network Connectivity

Each ASTRO-PAGA system is equipped with two 10/100/1000 BaseT Ethernet RJ45 with UTP cable – IP static address or DHCP and VLAN board.
Typically, one Ethernet RJ45 is used for connecting ASTRO-PAGA to the LAN; the second port is used when the full duplicated architecture is required.
All the digital devices (stations, IP-DAD audio interface for handling the power amplifiers, GFX for handling the interface with the telephone PABX) are equipped with the Ethernet RJ45 interface. So, each of them is just a node of the LAN with own IP address and there is not any limitation in terms of quantity of the devices and their location in the plant and/or in any other location.



Redundancy

- Each VoIP digital station can be registered on several different VoIP system manager
- The power amplifiers are configured in N+1 mode with the relevant back-up unit (one per zone or one per system).
- The IP-DAD digital audio decoder interfaces are configured in N+1 mode with the relevant back-up unit (one per zone or one per system).

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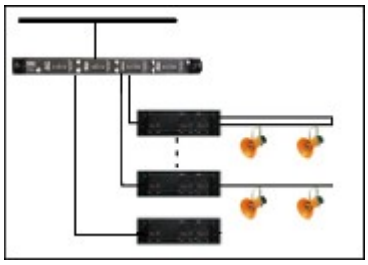
System Duplication

ASTRO-PAGA system can be configured as full duplicated system: System "A" and System "B". Each of the two systems are based on the ASTRO unit with redundant power supply and redundant hard-disk.
In this architecture, the ASTRO units operate in cluster mode: Astro1 and Astro2. Typically, Astro1 is the primary node and Astro2 is the hot back-up unit, configured exactly in the same way as Astro1.
In case of fault of Astro1, then Astro2 becomes automatically the primary node signalling the fault event to the operator(s) and to the maintenance terminal (High-Availability-Cluster)
The two Astro units are connected through a direct Ethernet link using the DRBD (Distributed Replicated Block Device) in order to activate the automatic reconstruction of the data, including all the variations (RAID1 like)
The cluster status can be checked by the operator through a standard Web-Server connection.
Thanks to this architecture, one ASTRO unit can handle all the resources of the whole PAGA system, including all the stations, all the IP-DAD audio interfaces (all the power amplifiers) and all the loudspeakers.
Even in case of fault of one of the two ASTRO units, *there is not any audio power reduction!*

Diagnostic

Each digital device and power amplifier and loudspeaker loop are continuously controlled by ASTRO-Manager diagnostic and maintenance and configuration software.
In particular, ASTRO-Manager can check the status of the audio path of each digital and/or station sending an audio test tone on the loudspeaker of the station and checking the audio level detected by the microphone of the station itself.

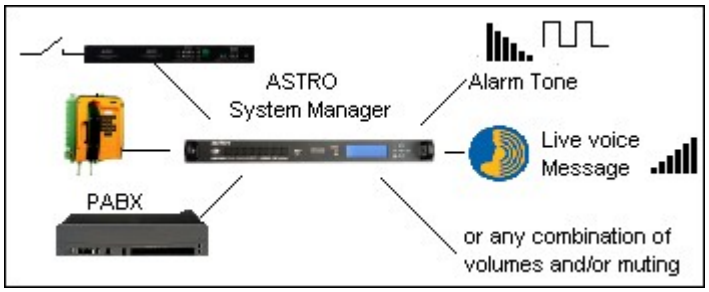


Loudspeaker loop Monitoring

ASTRO-PAGA system is designed for monitoring the integrity of the loudspeaker loops in order to verify the total impedance value, the short-circuit and open-circuit condition. The fault event is signalled automatically on the operator console(s) and on the maintenance terminal.
The fault event can be detected by frequency over the two wires of the loudspeakers or by additional cable (physical loop connection).

Voice Audio Recording

ASTRO-PAGA system can be configured in order to record automatically the conversations between the operator and the field users as well the live messages originated from the telephone or from the radio or from any audio sources.
In addition, the main operator can also be configured in order to listen the audio message originated by the telephone or radio users and get the permission for broadcasting the messages.
Through ASTRO-Manager the operator can search and play the recorded conversations and/or messages.



Alarm Attenuation

ASTRO-PAGA can be configured for handling several broadcasting modes when an alarm is active: muting of the message is in progress, level attenuation of the alarm tone, and so on.

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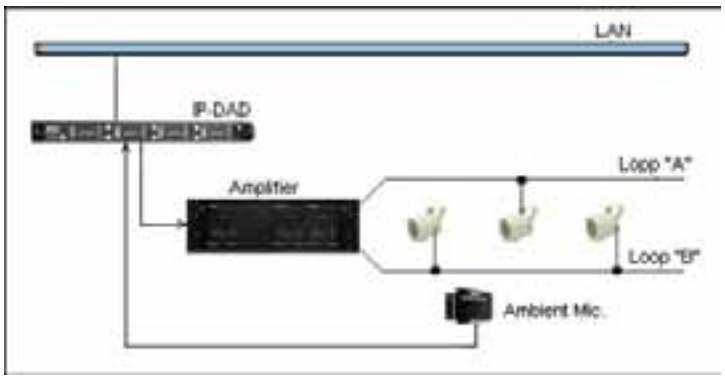
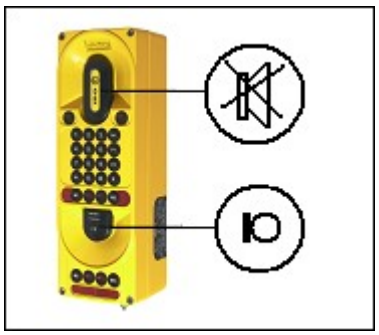


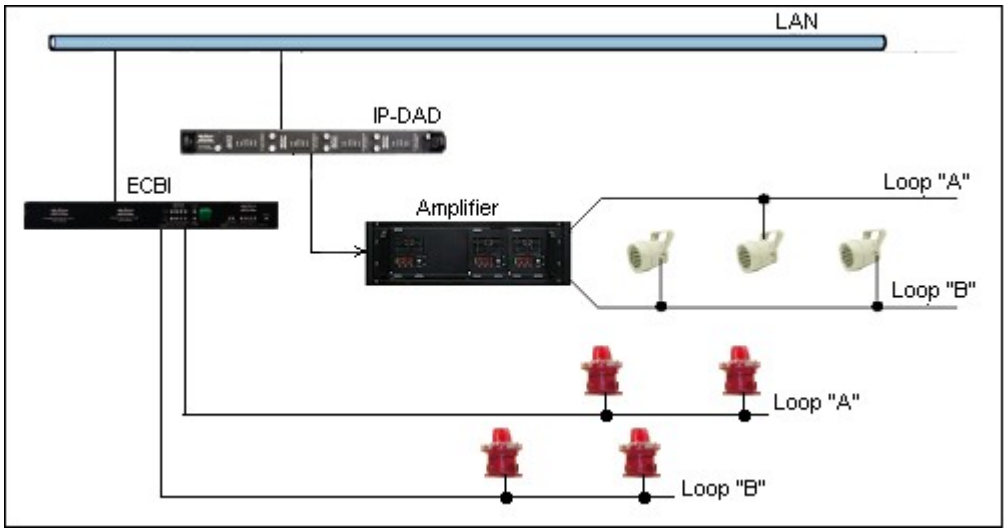
Automatic Volume Adjustment

ASTRO can be configured for adjusting automatically the output volume according to the ambient noise level detected by the ambient microphone.
The automatic noise level detection is based on one ambient microphone per each amplifier (zone). Thanks to the exclusive FITRE algorithm, ASTRO discriminates the voice announcement by the ambient noise level; so, during the announcements, ASTRO adjusts automatically the audio output of the amplifiers just and only according to the noise level variation.



Audio Ambient Listening

The operator can activate the "silent listening" mode on each station in order to detect the ambient noise and/or, in public areas, to listen a risk situation.



Visual Beacons

ASTRO-PAGA system is designed for handling the switching ON/OFF of the visual beacons, to be installed in areas where the ambient noise is very high.
The visual signalling increases the personnel attention when an alarm tone/message must be broadcast.

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MAIN SYSTEM DEVICES/COMPONENTS

ASTRO-PAGA is a digital modular system suitable for standard 19" rack assembly.

ASTRO Call Manager configured with software certified EN54-16, designed for managing all the communication functions either in terms of PAGA and Emergency and Intercom functions. ASTRO is designed on the basis of the stare of the art industrial PC platform equipped with solid state memory and low power consumption in order to guarantee the maximum level of reliability and availability of the system.

PSDV: intelligent distribution and visualisation unit designed for managing the power voltages inputs, for visualising the status of the system as well the integrated emergency microphone.

IP-DAD: intelligent digital audio decoder for managing the Class-D power amplifiers as well the ambient noise microphones. The IP-DAD boards are assembled in the standard 19" rack, each of them can be configurable up to 4 IP-DAD modules. ASTRO-PAGA system is designed for managing as many as necessary IP-DAD racks/modules and there is not a real limitation in terms of quantity.

PMD-xxx-AMC modular Class-D power amplifiers (modularity: 125 W – 250 W and 500 W). The PMD- AMD series amplifiers are assembled in the standard 19" rack, each of them can be configurable up to 4 PMD-125 or 250 W and up to 2 PMD-500 W. ASTRO-PAGA system is designed for managing as many as necessary PMD-AMD series racks/amplifiers and there is not a real limitation in terms of quantity.

ECxI: intelligent I/O interface. The ECxI rack is fully configurable with the relevant I/O interfaces: ECBI and ECRI. Each ECxI rack can be configured with max. 3 mixed I/O interfaces. ASTRO-PAGA system is designed for managing as many as necessary ECxI series racks/I-O modules and there is not a real limitation in terms of quantity

- ***ECBI*** interface (to be assembled in the ECxI rack): equipped with n. 4 channels for feeding and managing the diagnostic of the relevant visual beacon line connections. Each line connection can be configured as single line (two wires) or loop (4 wires). On each line the beacons are connected to the output of the ECBI interface. The ECBI interface is designed for checking the line status and for reporting the fault vents (short or open or ground leakage) to ASTRO Call Manager and, through the standard Web-Service software to the external supervision system.
- ***ECRI*** interface (to be assembled in the ECxI rack): equipped with n. 8 digital ON/OFF inputs for managing the external alarm events and with n. 8 output relays for activating external devices and/or for reporting to the external supervision systems the status information.

ASTRO is designed for managing also ***additional communication services / functions***; so, in the same PAGA system it is possible to integrate the intercom as well the emergency calls management under the ASTRO's control.
Thanks to this flexible architecture, one ASTRO manages several communication functions avoiding the additional cost for dedicated servers (one per each function/system).

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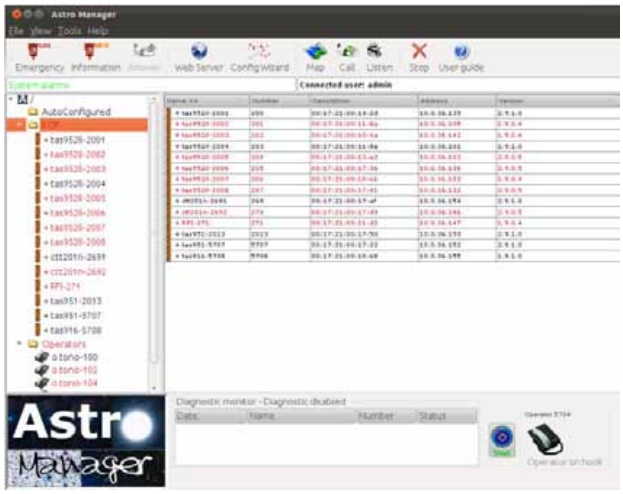
ASTRO Call Manager Diagnostic GUI interface

There are three possible ways (each password protected) to enter the Astro Manager application:

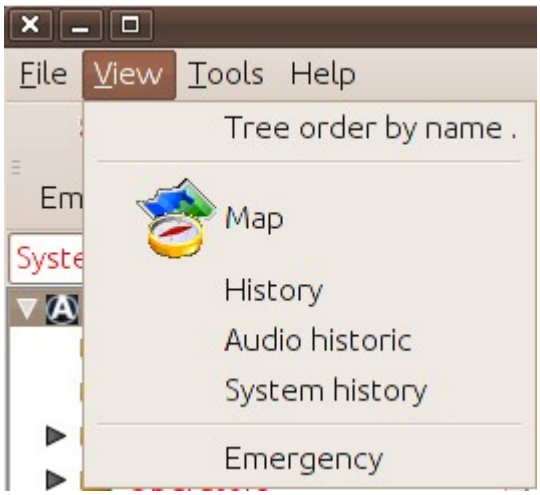
- Dedicated PC
- Access with keyboard, mouse and monitor directly attached to Astro
- Remote access with open source VNC software

Main screen

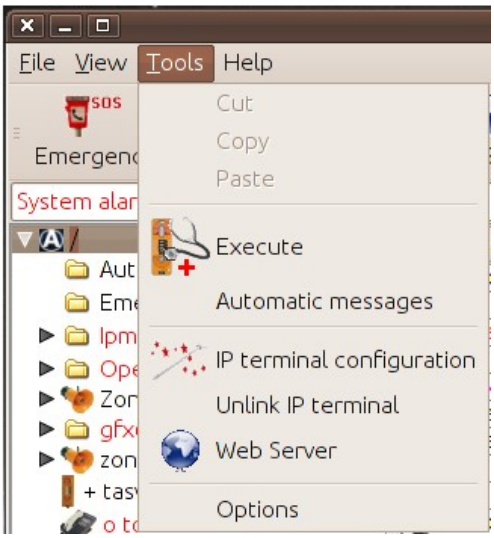


Main menu and tool bar – Creation from scratch

View



Tools



Creation with wizard

Enables automatic set-up of a terminal that is presented to the system. The command operates with the terminals that are located under the folder of 'auto-configured' type and on the folders of type GFX. All the trained VoIP terminals that are connected to a network where Astro is DHCP server are automatically moved to the 'auto-configured' folder. The Astro system also features self-provisioning, which allows automatic set-up of all the terminals without the need for manual configuration by the wizard.

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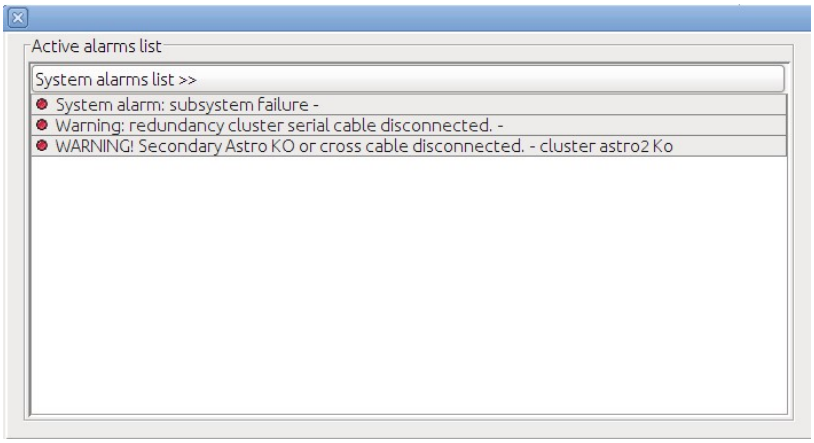
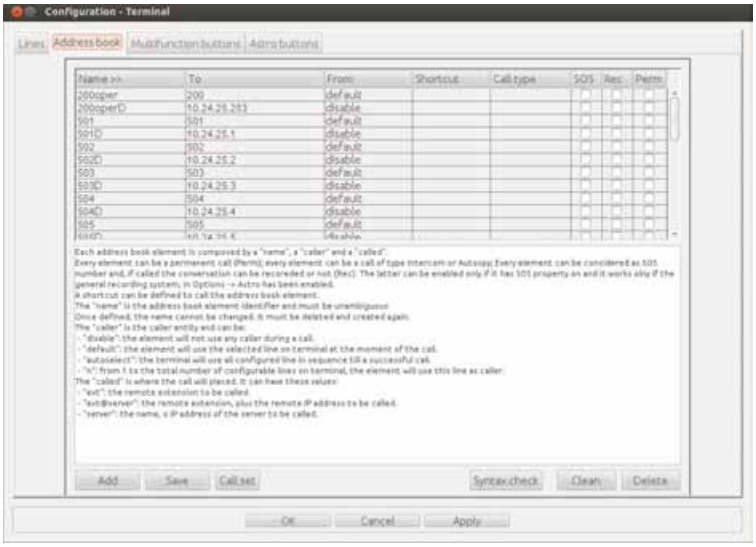


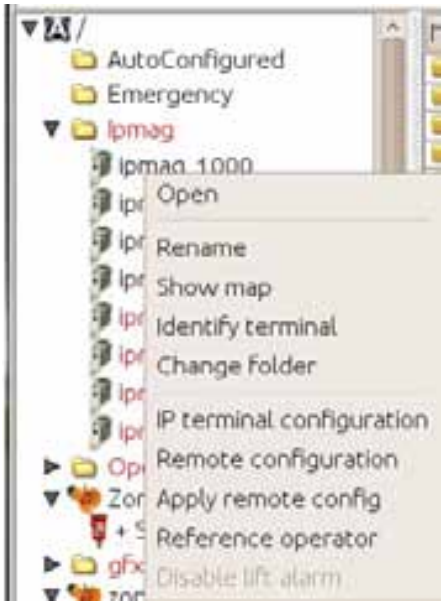
System Status

- ***Audio Alarms***: they are all the system alarms generated by the Astro software
- ***External alarms***: they are all the system alarms generated by Astro hardware and elements external to Astro

Global address book



Phone tree management



Selection of a group of terminals
Open the contextual windows of the drop-down commands

Diagnostic monitor

Programming of the tests planned by the automatic diagnostics function: each row of the table corresponds to a test on a phone with the relevant data and status (diagnostic) information

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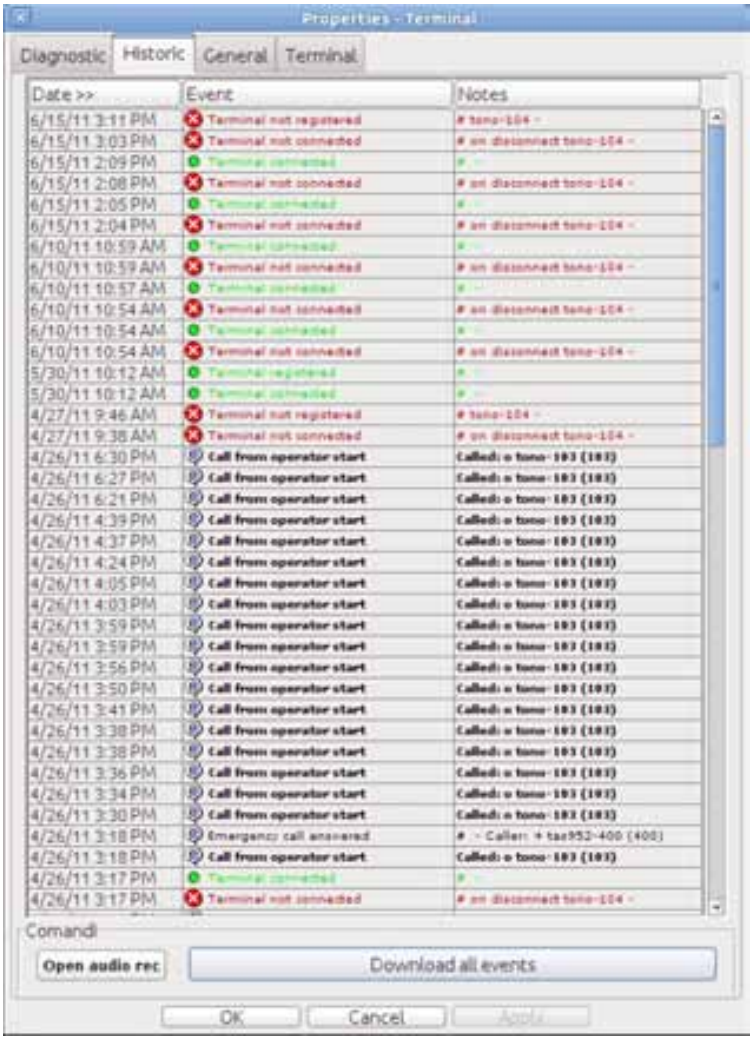
Setting up Automatic messages

The set-up of the automatic messages can reconfigure audio comfort messages associated with each queue and global comfort messages

Setting up Options

- Set-up of the automatic diagnostics of the system, including:
  - the check for connection and recording
  - the ***Speech Tests*** on the complete audio chain of the intercom station (handset, speakerphone, external speakers, and related microphones)
  - the Updating of parameters
- Put the system off at pre-set times. This feature is useful for instance if it is provided that the facility where the emergency terminals are installed stops the service at night (for instance a subway). In this case it is possible to stop the emergency call activity in the period when the service is not manned.
- Enable or disable audio recordings of emergency calls.
- enable or disable audio recordings of calls made from an Operator Station
- Program the duration of a call in the queue.



History

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ASTRO SOS/INFO Emergency and Information System

SOS/INFO VoIP Intercom Server and System Manager for Public Information & Emergency Communications

rel.201612 - v.201906

ASTRO SOS/INFO EMERGENCY CALL SYSTEM: INDUSTRIAL RELIABILITY MADE FLEXIBLE

ASTRO SOS/INFO is a state-of-the-art VoIP Intercom System which allows to build reliable and highly scalable Public Emergency Communication Systems fulfilling the most demanding requirements found in transit applications like Railway, Metro and Highway transportation networks.

At the heart of ASTRO SOS/INFO Emergency Communication Systems, the **ASTRO System Manager** is a highly reliable, industrial-grade server capable of managing a wide range of intercom stations in different technologies as well as to interface other security and supervision systems to provide an integrated response to emergency events.

HIGHLIGHTS

- Multi-functional server unit providing Emergency Calls management as well as Intercom, PA, PAGA or PAVA services
- Deployable in stand-alone configuration or in fully redundant, hot-spare configuration
- Use friendly Astro Manager Graphical User Interface for system configuration and operation, running either directly on the Astro System Manager server or on one or more dedicated workstations
- Compact form factor suitable for desktop as well as 19" rack mounting (1U height)
- Enhanced Digital Acoustic Feedback Suppression (anti-Larsen) and Digital Noise Canceling features allow full-duplex, hands-free communication even in extremely noisy environments
- Configurable Call Priority Levels and handling of multiple Call Queues
- Real-time system monitoring and automatic audio chain testing to provide timely information about the health of emergency help points and of the other components of the system
- Remote diagnostics, maintenance and software update through the IP network
- Open to integration with other systems (CCTV, PABX, Fire&Gas,…) and toward an higher-level Management System by means of standard protocols (SIP, Web Services, SNMP) and I/Os
- Optional CCTV integration allows to coordinate Emergency Call and CCTV infrastructure (e.g. with automatic camera selection) and to synchronize video and audio recording
- Optional alarm event handling capability to manage an I/O module in the cabinet or in each station to detect alarm events (door contact, extinguisher contact) as well to activate local devices (camera, visual beacon, electrical lock…)
- Optional PA function integration to broadcast alarm tones and messages linked to specific events. Tones and messages are stored in the non-volatile memory of the server and can be easily customized by authorized operators
- Optional automatic recording of the emergency conversations and alarm events

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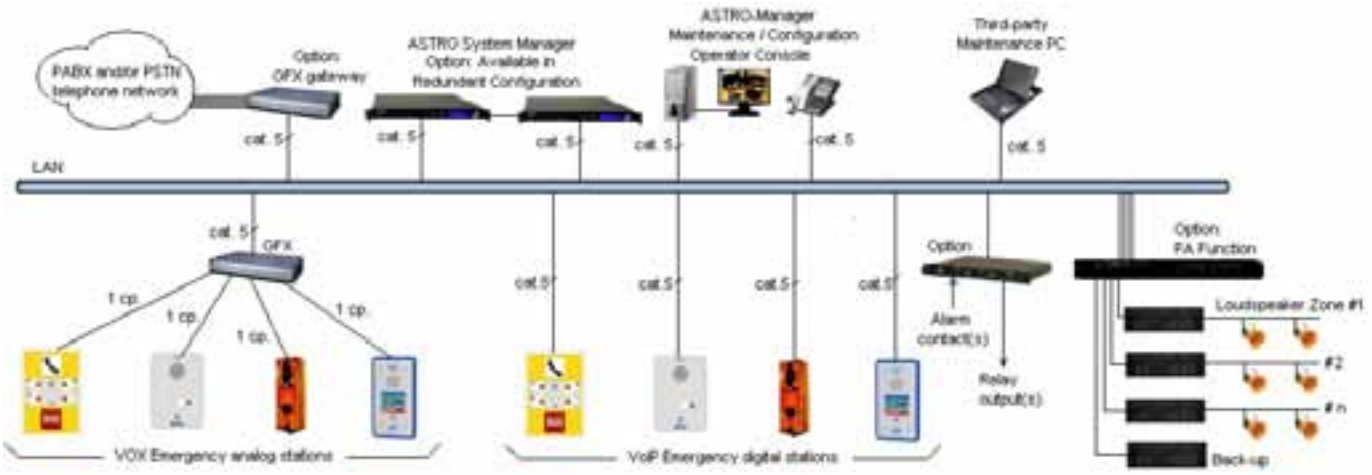
PRODUCT DESCRIPTION

ASTRO System Manager is a compact 1U server unit suitable for desk or rack mounting, supporting the full range of features provided by the ASTRO Emergency Communication Systems. Featuring an energy efficient, solid state design for increased reliability, it can be deployed in stand-alone configuration (one single unit) for the simpler applications, or in full redundant configuration (with a second unit in hot spare mode) when maximum system availability is required. A display with navigation keys provides basic on-the-unit interaction, while a comprehensive configuration and management interface (Astro Manager GUI) can be run running either directly on the server itself or on one or more local or remote workstations. The basic network connectivity is provided by two Gigabit Ethernet ports capable of redundant operation, while local or remote serial ports and digital I/Os are available for integration with external systems.

ASTRO System Manager is capable to control all the components of an Astro Emergency Communication System, from the native FITRE VoIP terminals to a full range of communication terminals based on analog, digital or even sound-powered technologies. Thanks to the flexibility of its architecture, it allows to implement any application-specific communication model (Hot Line, Selective Call, Group Call, Page&Talk, CallBack…) as well as Paging Systems with a practically unlimited number of zones. Moreover, full integration with third party Supervising Systems is provided by means of Web Service and SNMP protocols, which allows to control the behavior of the System and the real-time reporting of any anomaly found by the advanced diagnostic and health monitoring services provided by the unit.

ASTRO System Manager supports a set of advanced features specifically developed for transit applications, like Silent Audio Monitoring for remote environmental control, Automatic Recording of emergency calls and events, a sophisticated Announcement Scheduler to dispatch pre-recorded messages and real-time Automatic Volume Adjustment to compensate environment noise variations even during the announcement diffusion.

Astro SOS/INFO Emergency System - Block Diagram



TECHNICAL SPECIFICATIONS

Power	wide range 19-36 VDC input (nominal 24VDC), 1.25 A typical, 4A max screw-secured power connector
Mass Memory	64 GB embedded Static Mass storage + 64GB swappable SSD (rear slot) about 40 GB available for alarm tones/messages and conversation recording
Call processing capability	more than 1000 registered terminals / 400 concurrent calls
Network Interface	2x 10/100/1000 BaseT(X) standard Ethernet RJ45
PABX/PSTN interface	via GFX gateway units
IP-PBX interface	Trunk-SIP
Supervisor System Interface	Web-Service or SNMP
Configuration, Maintenance and Diagnostics	local or remote Astro Manager clients and/or through the Supervisor System Interface
Time synchronization	NTP / SNTP
Environmental	Temperature: 0 ÷ 60 °C (Operating), -20 ÷ 80 °C (Storage) Relative Humidity: 10-95%, non-condensing
MTBF	112.000 hours @ 25°C
Dimensions/Weight	435(W) x 300(D) x 44(H) mm (19" rack 1U, mounting hardware provided) / 4,1 kg.

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ASTRO MANAGER GUI

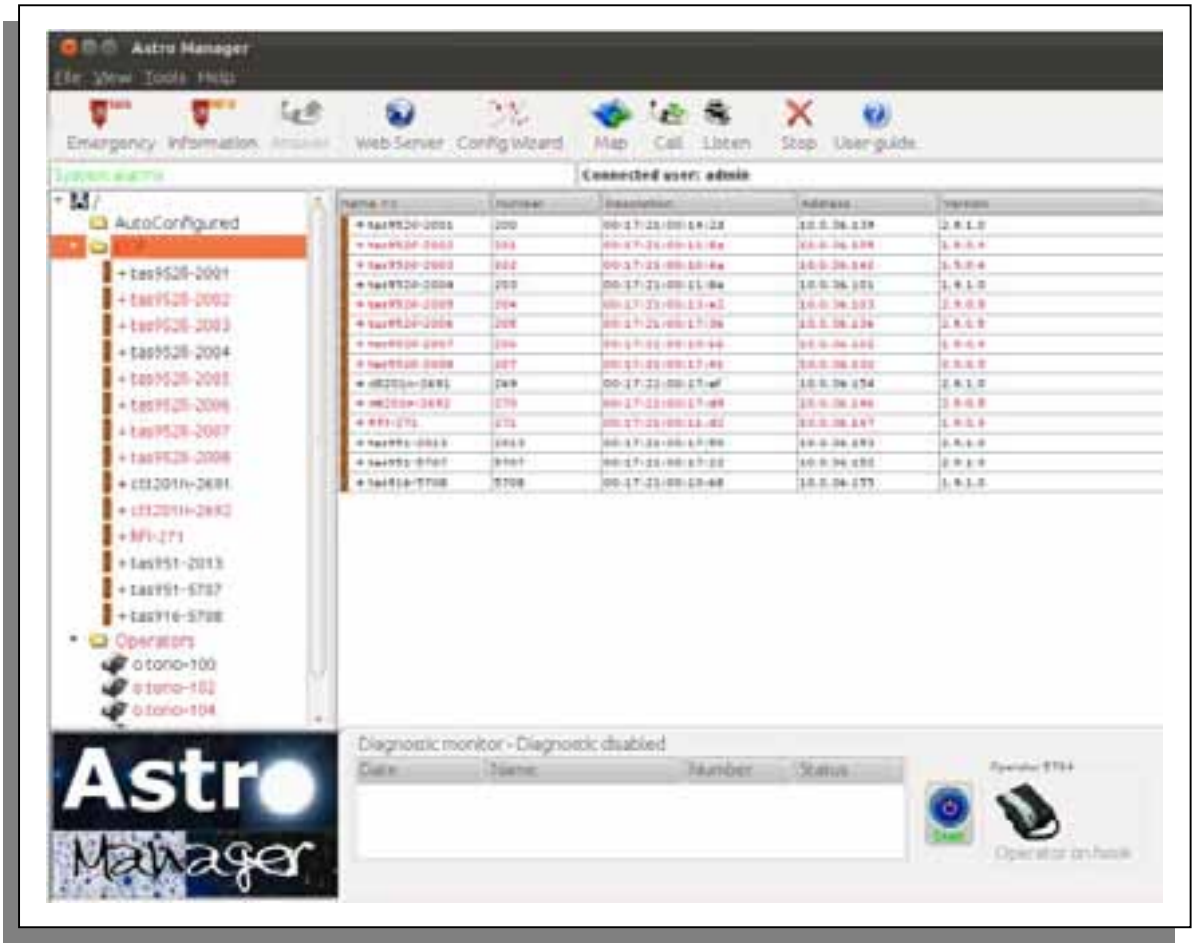
The **Astro Manager** client application allows for an easy and immediate configuration, operation and maintenance of the ASTRO SOS/INFO Emergency Communication System.
Astro Manager can be accessed either locally (by means of monitor, keyboard and mouse directly attached to the Astro server) or remotely, by means of a "VNC" connection to the server (single user scenario) or by running the Astro Manager application on one or more connected PCs or workstations (multi user scenario); it supports user authentication and up to 5 different level of permissions, allowing the access to the system by operators with different skill and responsibilities.
Astro Manager can be used to configure, maintain and operate the Astro Emergency Communication system, including:

Configuration and Maintenance

- remotely configure and monitor each emergency call station and the other system components
- backup and restore the configuration of a single emergency call station, of a group of stations or of the entire system
- check the health status of each emergency call station, including periodical automatic individual speech test to assess the efficiency of both microphone and speaker
- overview the system operation, managing alarm events, diagnostic information and activity logs
- access logs of alarm events and diagnostic information relevant to each component of the system

Operation

- answer and handle all the emergency calls, managing the call transfer service to the operator consoles or to external destinations (PABX, PSTN, GSM, and so on)
- manage the emergency call recording and access the database of recorded calls
- broadcast voice messages in live or scheduled mode, with automatic or manual handling of the output volume of the messages
- activate silent audio monitoring on selected call stations (microphone is activated to allow the operator to monitor the ambient audio, without any visual activity indication on the station itself)
- manage the alarm events coming from the emergency stations or external systems (e.g. Fire & Gas)



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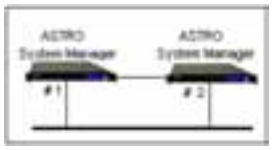
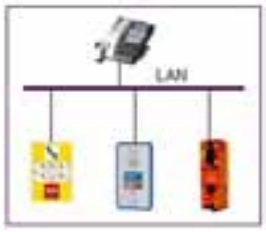
FEATURES OVERVIEW



FULL SERVER REDUNDANCY - Two ASTRO units can be deployed in *"High-Availability-Cluster" (HA)* configuration in order to provide service continuity even in the case of fault of one serve unit.
The two ASTRO units are configured as **main (**Astro1) and **backup** (Astro2) server: during normal operation, the main server manages the system, while the backup silently monitors system activity; in case of failure of the main server, the backup unit automatically takes the control of the system with no service disruption (including the ongoing and queued calls and call recording) and maintains it until the main server functionality is restored. Once the main server is ready, it automatically synchronizes its database with the backup server in order to take back the control transparently.
When in the main node some data are changed, these modifications are automatically applied on the second unit in real time mode. In case one node fails, when it comes back operative, it is able to download automatically the last data from the unit in operation. In order to duplicate the data, DRBD uses TCP/IP on a standard network interface.



VOIP CALL STATIONS CONFIGURATION - VOIP emergency call stations establish a point-to-point connection with ASTRO System Manager through the IP network. Typically, the digital stations are configured in automatic mode (auto provisioning), or may be individually configured by means of Astro Manager GUI or directly through the embedded web configuration pages.

ANALOG CALL STATIONS CONFIGURATION - Analog emergency call stations are connected to Astro through a FITRE GFX gateway. They can be remotely configured by means of Astro Manager GUI

VOIP CALL STATIONS DIAGNOSTICS - FITRE VoIP stations establish a continuous connection with ASTRO server through the network; if this connection fails, a fault event is automatically raised. Moreover, all VoIP stations automatically execute a periodical self-diagnostic test, including a full "speech test" which assesses the health of the whole audio chain (microphone, loudspeaker and internal amplifier): in case a fault is found, a fault alarm is immediately raised to the Astro System Manager.
VOIP stations may also report their status to a third-party network management through standard SNMP protocol

ANALOG CALL STATIONS DIAGNOSTICS – The health status of analog call stations can be automatically verified by ASTRO via the Automatic Polling Diagnostic procedure, which cyclically calls each device in order to assess its functionality; the same test can also be manually initiated by the operator over one or more specific stations. Several tests can be performed by the diagnostic procedure:

- Reachability (proper answer when ASTRO calls the Emergency call station)
- Access to the programming and to the identification code of the emergency station
- Remote dialing: the emergency station dials automatically the stored telephone number on ASTRO's command, that checks the proper execution of the command
- Check of the data, stored into the emergency station memory in comparison with the data stored into the ASTRO's configuration database
- Speech Test, assessing the health of the whole audio chain in each emergency station (microphone, internal amplifier and loudspeaker).

If one or more test fail than ASTRO generates a "warning" alert, and a second check session is automatically scheduled at the end of the polling cycle to confirm the fault state.

OPERATOR CONSOLE: the operator handles all the communications and the services using the TONO VOIP console (audio functions) and Astro Manager terminal (configuration and diagnostic functions). Each TONO VOIP console is equipped with a jack to connect a headset for hands-free communication and can be equipped with a PTT (Push To Talk) button for Public Address functions.
By means of the TONO VOIP console, the operator can:

- Select the incoming emergency calls to answer from the queue
- Put the active conversation on-hold or transfer it to another operator or to an external destination
- Broadcast pre-recorded or live messages on a selected station, a group of stations or to all the stations
- Activate the microphone of a selected emergency station (ambient listening function)

By means of the Astro Manager terminal, the operator can:

- Manage incoming calls and call queues
- Use the handset/headset of TONO VOIP console for the conversation and the GUI of Astro Manager to control the call

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- Manage the audio and video-recording of the call (each emergency station can be linked to one or more CCTV camera) and access to real-time or recorded video[1]
- Supervise the diagnostic functions relevant to the emergency system
- Activate the ambient listening "Silent listening" on selected emergency stations
- Activate the call on a single or group of stations in order to broadcast recorded voice message over the loudspeakers integrated into the emergency stations themselves
- Program the audio output volume on the basis of a time table (e.g. night and day)

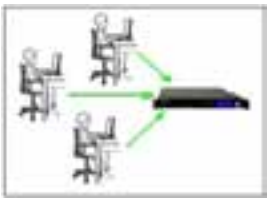
EMERGENCY CALL HANDLING - ASTRO supports full-duplex communication between field emergency stations and the operator(s) in the control room.
Each emergency station is equipped with microphone and loudspeaker for hands-free conversation, one or more call buttons and a status LED. When the user presses the emergency call button:

- The station places a call to the programmed destination and provides the user with a feedback that the call has been initiated, both visual (blinking status LED) and audio (ringing tone or pre-recorded voice message). Any subsequent activation of the call button has no effect over the ongoing call.
- While the call is queued waiting for an operator to answer, ASTRO can be programmed to cyclically provide a comfort voice message to the caller; moreover, if a maximum queue time is set and it is reached by the call, ASTRO can provide a call termination message and cancel the call automatically. All timers and messages are freely configurable by the system administrator.
- When the operator answers to the call, the microphone of the emergency call station is activated allowing the full-duplex hands-free conversation and the status LED switches to steady-on status.
- If the operator puts on-hold the call, the status LED of the call station starts to blink and a waiting message can be provided to the caller.
- Only the operator can terminate the conversation. When the operator clears the call, the status LED as well as the audio path of the emergency station are switched-off automatically, and the emergency station is ready for a new call.
- The operator can enable/disable each emergency station. When the emergency station is disabled, pushing the call button has no effect

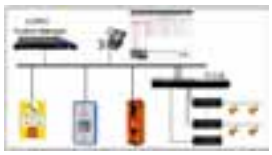
CALLS RECORDING - Through the Astro Manager application, the operator can activate the recording of emergency calls, either manually (on call per call basis) or automatically (on all the conversations). All the start/stop recording events are stored into ASTRO database.

- Call recording management includes:
- Configure automatic or manual call recording
- Examine the event list to locate the audio file linked to each emergency call station
- Search the database to locate recordings basing on date / hour / station identifier / event type
- Listen or download the audio recording files
- Backup of the recording database with all the related events

The TONO VOIP console can also be configured in order to manage calls coming from external SP servers (different from ASTRO) so that these calls can be recorded as well. In this case, call events and audio stream between the TONO VOIP console and the external system are automatically transferred in real time to ASTRO through a dedicated channel, so that events and conversation can be recorded.



MULTIPLE OPERATORS AND QUEUES – Multiple operators/call queues can be defined and all the operators can operate simultaneously on shared or dedicated call queues.



PA/PAGA OPTION - As an option, the operators can activate the broadcasting of live or pre-recorded messages through the loudspeakers of the emergency stations as well through additional amplifiers and loudspeakers.
Each emergency station is configured with an analog audio output in order to connect one or more external amplified loudspeakers. The output volume can be adjusted automatically or manually by the operator. On the basis of ASTRO configuration, the operator can select the single emergency station, a group of stations or even all the stations of the system, to broadcast the messages over the external amplified loudspeakers.
Additional amplifiers can be interfaced by means of the IP-DAD modules in order to create paging zones independent by the emergency call stations.

EVENTS LOGGING – ASTRO can log any operational, diagnostic and alarm event related to each emergency station and to the other components of the system in non-volatile memory, for subsequent query and analysis by authorized operators. The logged information includes:

- New station connection events
- Station configuration events
- Station fault or connection events
- Operator console fault or connection events
- Call events (from origin to termination)
- Diagnostic session start and stop
- Recording events
- Alarm events and acknowledgements
- Astro server faults and redundancy events
- External events

[1] Subject to availability of integration with the specific CCTV system

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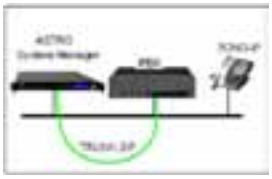
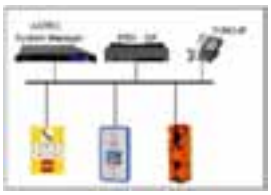
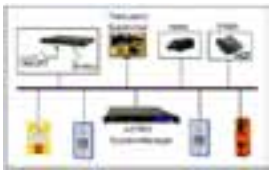
Each event includes all the relevant information related to it in order to allow a precise analysis of system's behavior, especially useful for emergency call systems.
Some events can raise alarms which may require an active acknowledgment by the operator in order to be cleared, or be automatically cleared by the system when clearing events occur; actions to be performed by ASTRO or external systems may be linked to these Alarm status changes.



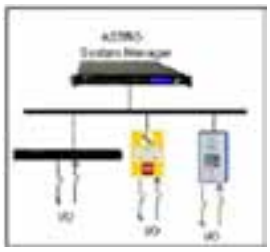
NATIVE VOIP INTERFACE TO PRIVATE AND PUNBLIC EXCHANGES – Standard TRUNK SIP protocol can be used to interface ASTRO System Manager with a VOIP private telephone exchange (IP-PBX) or a VOIP Telephone Provider



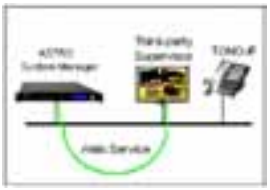
STATION REGISTRATION REDUNDANCY - FITRE VoIP stations can register themselves to more than one ASTRO or even to third party SIP servers[2], and a connection policy can be configured in order to prioritize these connections.
When the user presses the call button, the station checks the status of the available SIP servers and it selects automatically the one with the highest priority. In case none of the configured servers is available to handle the emergency call, then the station can activate a direct call (without any SIP server) to a FITRE Operator Console (TONO VOIP), configured to manage this special call.



INTEGRATION WITH EXTERNAL SYSTEMS - ASTRO can be interfaced with external systems by means of LAN protocols, serial interfaces and digital I/Os; possible integrations are:
- GA General Alarm systems (e.g. Fire & Gas)
- CCTV systems
- SCADA and supervisor systems
- other communication systems: PABX/IP-PBX, PSTN
- Public Address systems

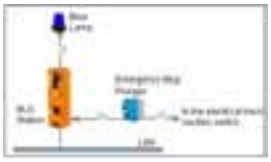


EXTERNAL ALARMS HANDLING - Through the ECRIO I/O units it is possible to collect events generated by an external system (for example, Fire & Gas system), in order to have ASTRO perform actions in response to these events, like the automatic message broadcasting to a specific station or group of stations.
Moreover, in each VoIP emergency station it is possible to install an I/O module in order to collect ON/OFF local alarm contacts (extinguisher contact, anti-tamper contact, door-open contact, ...) as well as to activate external devices (CCTV camera, electric lock, visual beacons, ...)



INTERFACE TO SUPERVISING SISTEMS – ASTRO provides a comprehensive reporting and control interface towards higher level Management Systems by means of standard Web Service protocol. Through this interface, a 3rd party Management System can receive events and alarms generated by the ASTRO systems and, at a certain extent, control its behavior.
The IP call stations may also report their status directly to a Supervising Management System by means of SNMP protocol

Silent Listening – As standard function for Transport application, the system can be configured to manage "silent listening" from all the Emergency Stations, allowing the operator to place a special call to any station to silently listen the ambient noise. During a silent listening call, the Emergency Station activates only the microphone, while loudspeaker and status LED remain switched off.



Blue Light Function – ASTRO System Manager supports the "Emergency Stop Plunger" (ESP) safety equipment, typically installed along the rail tunnels associated with dedicated Emergency Stations named "Blue Light Station" (BLS). Each BLS is equipped with an additional I/O board designed to manage an external ON/OFF local contact activated by the ESP button or key. When the user activates the ESP device, the BLS automatically set up a direct call to the operator(s) while switching on the Blue Light lamp at the same time. Lamp behaviour can be configured to reflect the status of the call, for example:
- Blinking before the conversation and steady on during the conversation
- Off before the conversation and steady on or blinking during the conversation

[2] In case the call is managed by a third-party SIP server, some of the special call management functions could be unavailable

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ASTRO INTERCOM for Industrial Communication

Digital VoIP Intercom Server for Industrial Call and Communication System Management

201406 rel.201612 - v.201906

19" – 1U ASTRO Call Manager Intercom: the state-of-the-art Digital VoIP Intercom System with LAN architecture

- **Fully digital Client/Server architecture based on the state-of-the-art VoIP technology with standard SIP protocol**
- **Several possible configurations: Stand-alone, distributed intelligence trough Ethernet connection, fully duplicated systems with LAN connection**
- **Ethernet RJ45 interface**
- **24 VDC low power consumption power supply (<30 W)**
- **integrated mass storage devices, of which 64 Gbyte used available for recording messages / alarm tones and the recording of the conversations**
- **Fully digital intercom stations based on the state-of-the-art VoIP technology with standard SIP protocol**
- **Optional simple and easy-to-use ASTRO/Client with GUI in order to configure the system as well to handle the diagnostic information. ASTRO/Client software can be installed on a dedicated unit or fully integrated into the ASTRO Call Manager hardware or it can be accessed by any customer's PC via VNC (Virtual Network Computing)**
- **Modular and flexible construction with 19" rack unit for easy and speed access to any part of the system**
- **Integrated PBX features for selective calls, group calls and all call of the intercom stations with possibility for interfacing ASTRO Call Manager Intercom system to any existing PABX and/or Telecom network (PSTN)**
- **Digital Acoustic Feedback Eliminator**
- **Powerful digital noise cancelling algorithm developed on the basis of Fitre's long experience in heavy industrial plants**
- **Thanks to the Fitre Noise Reduction Algorithm, the intercom user can communicate in hands-free and real full-duplex mode even if the ambient noise level is more than 100 dB.**
- **Handling capability: 100% of simultaneous conversations**
- **Configurable Priority Levels handling**
- **Emergency calls handling**
- **Remote diagnostic capability**
- **Remote maintenance and software up/down-load capability trough Internet (LAN)**
- **Optional alarm event handling capability in order to broadcast alarm tone/messages linked to the active alarm contact(s). The alarm/tone /message are stored in the digital memory of ASTRO server unit. The user can easily record own voice messages**
- **Cost saving for cabling layout – ASTRO/Intercom system unit and stations and amplifiers can be connected to the existing LAN avoiding the cost for installing a dedicated copper network**

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ASTRO Call Manager / Intercom – GENERAL SYSTEM OVERVIEW

ASTRO Call Manager Intercom is based on modular, flexible and reliable digital VoIP architecture with cost effect benefits. Each components of the system is a standard "brick" for building the communication system according to the customer's requirements. Thanks to the digital architecture, it is possible to remote any part of the system, including the booster amplifiers, in order to cut the costs of the cabling layout.

The maintenance personnel, using the GUI user interface can configure the system and they can also access to the diagnostic information in easy and fast way even from remote site via Ethernet/Internet connection.

Thanks to the digital architecture ASTRO Call Manager Intercom system is just a communication platform allowing expansions and upgrading in terms of hardware and software features.

ASTRO Call Manager Intercom has been developed in order to solve the high quality, reliability, availability and modularity requirements in steel plant and any heavy industrial applications.

Thanks to the own high-level safety digital architecture, ASTRO Call Manager Intercom system is the proper solution in all the applications where the reliability, modularity and excellent intelligibility of the voice is the most important point as in steel plant, petrol-chemical plants and all the installations where the reliability and functionality is a must.

ASTRO Call Manager Intercom is designed for handling the intercom communications among the users in selective mode, group call and all call.

As option, ASTRO Call Manager Intercom can be configured for handling the PA/GA features, too. In this case, ASTRO/PAGA is designed according to the EN54-16 norms for handling the selective loudspeaker zone call, the loudspeaker group zone calls and the loudspeaker all call of the plant, in addition to the intercom features.

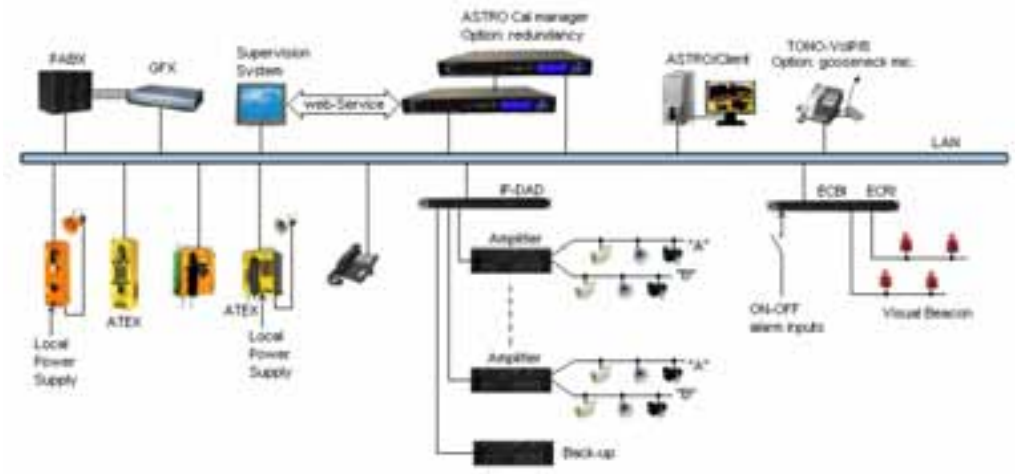
Thanks to the digital architecture, each amplifier or group of amplifiers can be configured as a node of the LAN and they can be installed in any location of the plant in order to reduce the cost of the cabling layout.

ASTRO Call Manager Intercom is designed for handling also the diagnostic functions. In fact, each digital intercom station is a node of the LAN and ASTRO Call Manager Intercom can detect automatically the proper connection of the digital station.

In addition, as option, an ASTRO Call Manager /Manager operator console is available for helping the maintenance engineer in own activity.

The ASTRO Call Manager operator console includes the keypad, monitor and mouse as well a digital VoIP station for voice communication; as option, touchscreen monitor is available, too.

Typical Block Diagram drawing



Technical Specifications

LAN/WAN connection	➢ n. 2 10/100/1000 BaseT Ethernet RJ45 (expandable up to 4) – IP static address or DHCP ➢ VLAN on-board
Power supply unit	19 to 36 VDC low power consumption (max. 30 W)
Display	Visualisation of the status and main diagnostic information
Memory	64 Gbyte Static mass storage (about 40 GByte free for recording the alarm tones/messages as well the conversations)
Communication protocol	Standard SIP
Remote configuration capability	➢ Web server ➢ Download of the configuration files ➢ Upgrading trough TFTP, HTTP ➢ Access by password
Software interface with external supervisor systems	Web-Service
Real time diagnostic facility	ASTRO / Client (for handling the Diagnostic / Maintenance / Configuration services) even via VNC
PABX and/or PSTN interface	Through GFX unit(s)
IPBX interface	Through Trunk-SIP protocol
PA and PAGA interface	Through IP-DAD unit(s) and ECxI I/O module(s) for handling the alarm inputs & visual beacons
Operating temperature	-5° to +60°C
MTBF	112.000 hours @ 25°C
Dimensions/Weight	19" 1U rack (depth: 300 mm.) / 4,1 kg.

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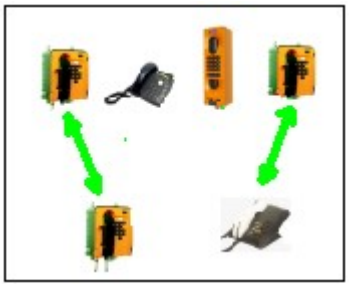
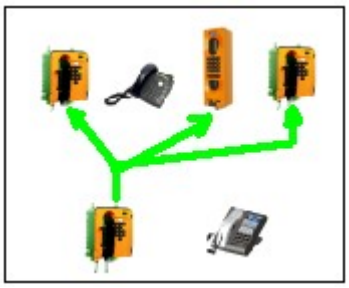
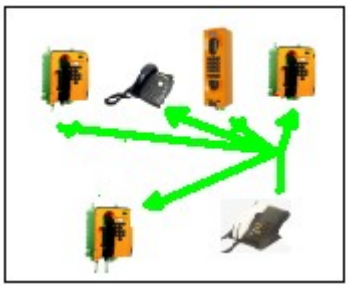
Functions



Selective call – Each intercom station can be configured in order to call any other subscriber of the system. It is possible to configure ASTRO Call Manager Intercom in order to limit the dialling to a restricted quantity of the stations.
Thanks to this feature, it is possible to split the plant in several independent "working islands".
It is possible to configure the system in order to allow communications among programmed stations of different working islands.

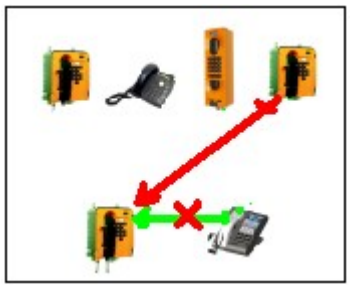


Group call – Each intercom station can be configured in order to activate the loudspeakers of a group of stations. Each user can select the wished group of stations for broadcasting own live voice message. This means that it is not necessary to program a prefixed group of stations, like in the analog systems, where each group of station must be assigned to a rigid call number and each changing requires a new programming of the system.
The group call can be configured with two possible operation modes:
- Group call excluding the busy stations (already engaged in other conversations)
- Group call including the busy stations, with automatic reset of the active calls.



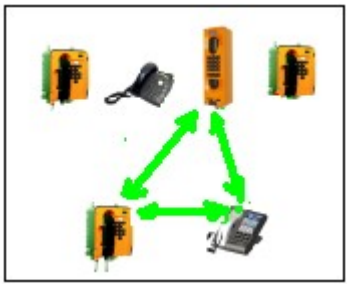
All call – Each intercom station can be configured in order to activate the loudspeakers of all the stations, simultaneously for broadcasting own live voice message.
The all call can be configured with two possible operation modes:
- All call excluding the busy stations (already engaged in other conversations)
- All call including the busy stations, with automatic reset of the active calls

When the system is configured with several independent "working islands", then each working island has own all call extension number. In addition, it is possible to configure the system with one "general all call" extension number (all call of all the working islands, simultaneously).



Selective call with priority – Each intercom station can be configured in order to activate the priority right when the called station is in busy condition.
When the user with priority facility calls a busy station, then he can select one of following actions:
- don't use any priority right cancelling own call toward the busy station
- send a warning tone (hurry-up signal) to the busy station in order to ask for the conversation with the called user
- force the reset of the existing conversation in order to establish automatically the conversation with the called user
- set an automatic conference with the two users already in conversation

The three alternative operation modes are programmed in the called stations.
The priority facility is activated by the calling user through password (numeric code, dialled using the keypad of the station itself).



Conference – Each intercom station can dial sequentially several subscriber numbers in order to include in conference the wished stations. All the users can speak in conference mode. There is not any limit in terms of quantity of stations in conference.

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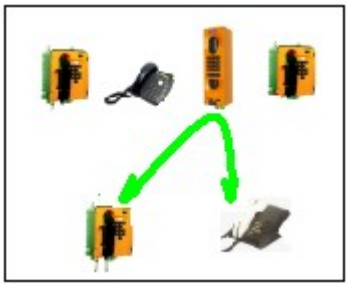
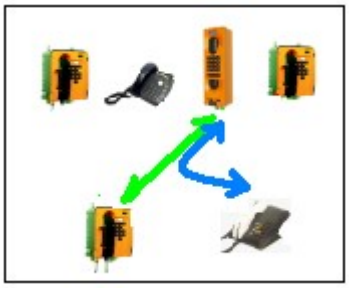
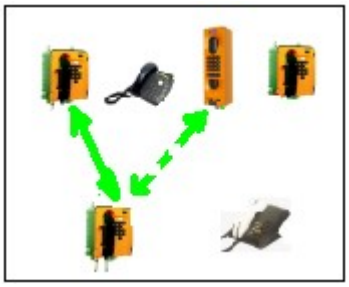


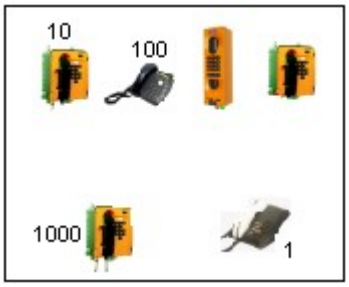
Call transfer – Each user can activate the transferring of the incoming calls addressed to own station towards another intercom station. The user must dial a code for activating/deactivating the function.



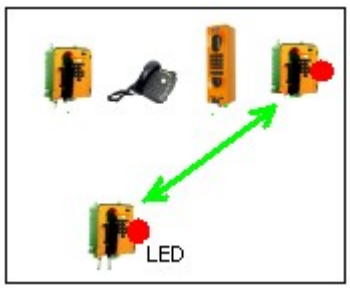
Call forward – Each user can forward a call to another station. During the conversation, the user can dial the extension number of another station (plus the code command) in order to forward own call to another user.



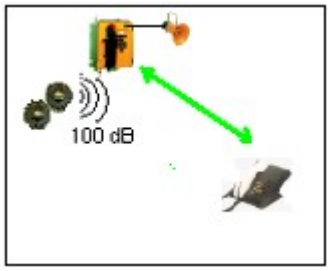
Camp on busy station - The caller can camp-on to a busy extension for a period of 15 seconds, after which the call will automatically be cancelled. However, if the called extension becomes free within this time, the connection is established automatically with a new warning tone to both parties



Free numbering – ASTRO Call Manager Intercom is fully digital system and it can be fully configurable in order to use any numbering (for example, in order to define the first digit as identification of the area).
Each station is identified by own IP address. This means that each station can be connected in any location of the LAN keeping own identifier number avoiding to reprogram the system in terms of numbering. When the digital station is connected to the switch it's registered automatically into the digital ASTRO Call Manager system with own subscriber number (IP address)



Line status visualisation – Each digital station is equipped with LED in order to visualise the status of the connection. The LED is switched-on when the call is incoming, when the station is in communication during the selective call, the group call and the all call.



Real full-duplex conversation even in very noisy ambient – Each digital station is equipped with integrated microphone and loudspeaker in order to allow an hands-free full-duplex conversation. Thanks to the native VoIP digital architecture, Fitre guarantees the real full-duplex conversation even when the two users are speaking in hands-free mode. The digital station is equipped with a state-of-the-art echo-eliminator and with an exclusive noise reduction algorithm developed in order to allow an excellent hands-free conversation in ambient where the noise level is more than 100 dB.
In addition, the stations can be equipped with handset.

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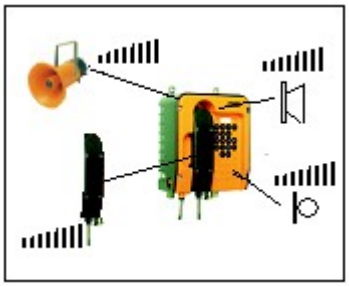
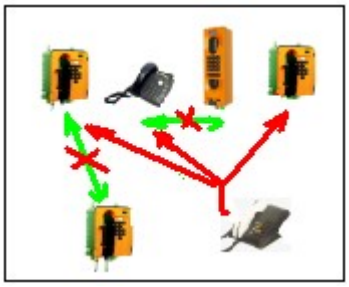


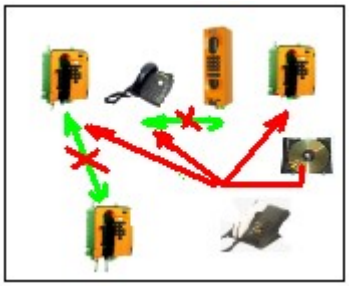
Independent volume adjusting – Each digital station is equipped with several audio channels; each of them cab be configured in independent mode according to the ambient noise level:

- Hands-free microphone channel
- Hands-free loudspeaker channel
- Handset channel
- Output channel for handling an external amplified loudspeaker
- Input channel for handling an external microphone

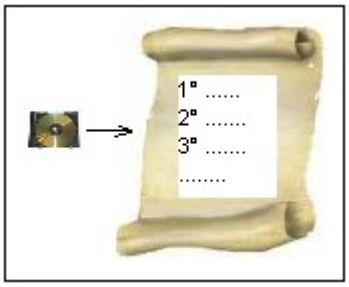
Typically, the external loudspeaker is used when the ambient noise level is very high and it is necessary to have high audio output power. When the station receives the call, it activates automatically the external loudspeaker; when the user lifts the handset or press the hands-free mode key, the external loudspeaker is disconnected automatically.
The external loudspeaker is activated in group and all calls, too.



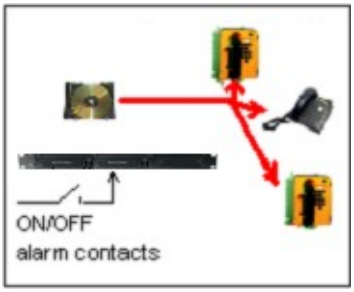
Emergency call: the user broadcast own live voice message – Each intercom station can be configured in order to activate an emergency call. The emergency call activates automatically and simultaneously the loudspeakers of all the stations configured for receiving the emergency call.
The emergency call resets any active conversation for allowing the emergency live message to be broadcast on the integrated as well on the external loudspeakers of the stations.
ASTRO Call Manager can be configured for broadcasting automatically a special warning tone for signalling the incoming emergency call.



Emergency call: automatic broadcasting of an emergency pre-recorded tone/message – Each intercom station can be configured in order to activate an emergency call with pre-recorded tone/message. The emergency call activates automatically and simultaneously the loudspeakers of all the stations configured for receiving the emergency call.
The emergency call resets any active conversation for allowing the emergency live message to be broadcast on the integrated as well on the external loudspeakers of the stations.
The user can record the emergency tones and messages with/without the warning tone



Priority handling – ASTRO Call Manager Intercom is fully configurable in order to handle the priority levels assigned to the several call types: single, group, all-call, emergency, alarm, and so on.



OPTION – Alarm call: automatic broadcasting of an emergency pre-recorded tone/message – As option, ASTRO Call Manager Intercom can be configured with an additional IP-DAD & I/O piggy-back unit for handling external ON/OFF alarm contacts (for example, alarm events activate by the F&G system). ASTRO, detecting the alarm event actives automatically the broadcasting of the pre-recorded alarm tone/message on all the loudspeakers of the stations, configured for receiving the alarm tone/message.
The user can record the emergency tones and messages with/without the warning tone.

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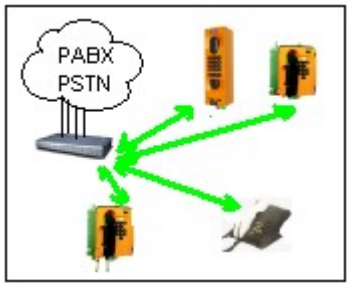
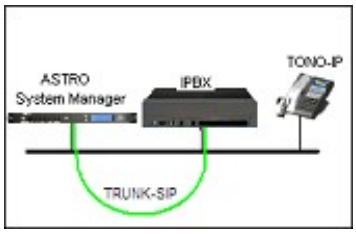
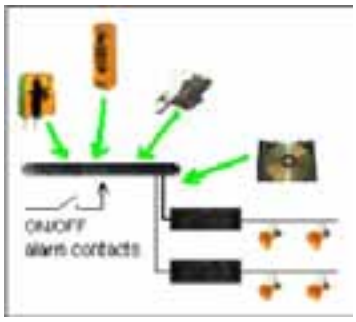


OPTION – Interface with external PABX or PSTN systems – As option, ASTRO Call Manager Intercom can be configured with an additional GFX unit for handling the communications with the existing PABX and/or with the National telephone net by using the standard analog ACB subscribers' ports of the PABX as well the analog PSTN trunks of the national PPTT.
Thanks to the GFX unit, ASTRO Call Manager Intercom can be configured in order to allow to all or to a limited intercom stations to access to the telephone subscribers of the PABX as well to the external trunk PSTN lines. In addition, it is possible to configure ASTRO Call Manager Intercom in order to allow to the telephone users to access to the intercom stations and/or loudspeakers.



OPTION – Interface with external digital IPBX systems – As option, ASTRO Call Manager Intercom can be configured with TRUNK-SIP protocol in order to allow a direct interface with an external digital telephone exchange (IPBX). A SIP trunk is a service for using Voice-over-IP (VoIP) in order to establish communications between two different networks by using the same connection as the Internet connection.
On the basis of the IPBX and ASTRO configuration, IPBX users and ASTRO users can communicate without limitations.



OPTION – Public Address function – ASTRO Call Manager Intercom system can be configured for handling one or several loudspeakers zone for paging and/or for broadcasting messages/tones in areas where only the loudspeaker are available.
Each loudspeaker zone is handled by one IP-DAD in order to be a node of the LAN.
Thanks to this architecture, each amplifier can be installed in any location of the LAN saving the cost of long connections between the amplifier and the loudspeakers.

OPTION – ASTRO/Client Diagnostic/Maintenance/Configuration unit – The Maintenance operator handles all the diagnostic information of the system itself as well of the stations and IP units. ASTRO/Client can be configured for handling automatically the diagnostic sessions as well receiving a specific command by the operator. Each industrial VoIP station can execute the "speech test" in order to check the acoustic chain, including the microphone and loudspeaker units, too. ASTRO/Client is designed for recording all the diagnostic events and for configuring the IP units trough the Web-server, the operator can access to the Web-server trough own internet browser. It is possible to handle the log of the calls as well the statistics of the telephone traffic and/or record the voice communications.

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Web-Server interface

Both ASTRO Call Manager server and all Fitre VoIP stations are equipped with own web server; so, each browser can access to the web server in order to activate the monitor, the configuration, the maintenance and the diagnostic of any Fitre VoIP terminal.

ASTRO Web-Server interface: ASTRO Web Server offers the possibility for monitoring and configuring the system on the low level. ASTRO Web Server is a very useful software tool especially when there is not ASTRO/Client. Typically, the configurations execute on the client level are enough. In any case, some functions are controlled by Web Server only; for example, the maintenance tool used for handling the audio recording of the conversations.

GFX Web-Server interface: the GFX unit is the Fitre's ATA standard. The GFX unit is equipped with own configuration Web Server. As in ASTRO, this Web Server is very useful when there is not the ASTRO Manager for handling the configuration and the diagnostic services.

TASVoIP Fitre Terminals Web-Server: TASVoIP is the name of the family full digital terminals (station, devices) manufactured by Fitre. The Fitre's range of digital products can be resumed as:

- Hands-free full-duplex weatherproof telephone and/or intercom set (TASxxx series)
- Weatherproof telephone and/or intercom set equipped with handset (TAS2000 series)
- Industrial desk-top Operator console (TONO series)
- Audio Decoder (IP-DAD series)

Each of these devices is equipped with own Web Server having a common matrix. On the basis of the specific characteristics of each of the device series, the system shows parameters and/or different pages. Even in this case, the Web Server is very useful when there is not the ASTRO/Client for handling the configuration and the diagnostic services.

Proprieties of the terminal: The operator can access to the main functions using a contextual full-shot graphic window. Selecting one telephone, the operator receives all the characteristics of the terminal itself

Through this window it is possible to access to the Diagnostic tab in order to visualise the status of the selected terminal

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***History**: in this page it is possible to see all the events relevant to the specific terminal.*

***Audio History**: searching and visualisation of the audio recording (conversation between the operator and the filed user).*

***Audio play**: play of the recorded conversations relevant to the specific station. Searching by identification code, event date/time.*

***Recorded Alarm tones/messages**: handling of the alarm tones/messages in order to cancel, add and/or modify a recorded tone/message into the ASTRO memor*

***Map:** When active, the operator can access to the graphic map in order to place the icon relevant to any terminal.*

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ASTRO Web Service for Third Party Integration

Web Service Interface for information exchanging and interactions between ASTRO System Manager and third-party external systems

rel.201103 - v.201906

Web-Service Definition

The *World Wide Web Consortium (W3C)* defines a **Web Service** as *"a software system developed in order to support the interoperability among several computers operating on the same network"*.
As main characteristic, a Web-Service offers a software interface, described in a format that is automatically processable, like, for example, the *WSDL (Web Services Description Language).* Using this interface, other systems can interact with the Web Service itself activating the operations described into the interface trough proper *"messages"* (transported through the HTTP protocol and formatted according to the XML standard).

Web Services advantages

- The Web Services allow the interoperability among several software applications as well on several hardware/software platforms
- They use a textual data format; so, the software engineers can use the text data format in very easy and comprehensible mode (excluding the binary data transfer)
- Typically, because the Web Services are based on HTTP protocol, they don't require to modify the security rules used as firewall filter
- They are very simple to use and they can be combined each other in order to get "integrated" and "complex" services (independently by the supplier and by the location where they are available)
- They allow to re-use already developed applications
- Till the interface stays constant, then the modifications applied to the services stay transparent
- The Web-Services can publish their functions and they can exchange data with the rest of the world
- All the information is exchanged through the "open" protocols

ASTRO Web Service

In order to guarantee the maximum level of flexibility and openness of ASTRO system, Fitre has adopted the Web Service standard in order to perform the communication between ASTRO System Manager and the third-party external supervisor systems.
In fact, thanks to the Web Service using, ASTRO guarantees the information exchanging and the interactions with external third-party.
Typically, the *SNMP (Simple Network Management Protocol)* provides the information management based on *"requests"* and on *"notifications"* between two systems but without a real interaction.
The Web Service offers the possibility to send and to execute commands, to transmit diagnostic information, and so on. The Web Service offers the possibility in order to get the complete control of the ASTRO activities; so, an external third-party supervisor (or SCADA or other) system can control ASTRO activities.
Web Service is the most modern and versatile software tool in order to guarantee the real interoperability between different systems.
ASTRO Web Service uses the model based on *SOAP/WSDL*.
ASTRO Web Service interfaces are exposed through WSDL documents (a type of XML). WSDL stands for Web Services Description Language. WSDL interfaces have URLs and can be retrieved on the net.
Subsequent message exchange is in SOAP protocol, another type of XML document.

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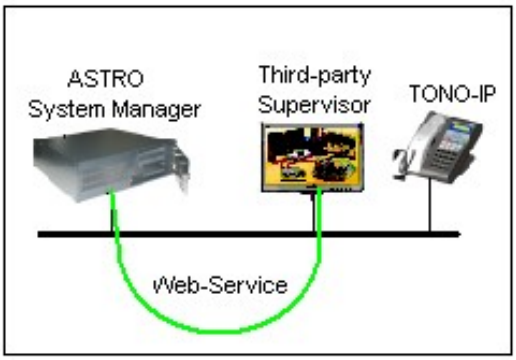

Implementation

ASTRO Web Services are written starting from Java classes. Java utilities create a WSDL file based on the Java code in the web service. The WSDL is exposed on the net. Parties interested in using the web service create a client based on the WSDL. The client can use the preferred programming
language because interface is published in WSDL and messages are exchanged in SOAP format.
There are two ASTRO Web Service interfaces:

- AstroWebService
- AstroWsOperator

Each Web Service exports 2 xml files:

1. one is the wdsl file: contains the main interface with the declarations of messages and operations
2. one is the xsd file: contains the description of complex types used

Main operations

Follows a description of the operations exported by services.
Operations details and data structures are described into javadoc documents.
There are two web service interfaces:

- AstroWebService: is the main Astro Web Service interface
  - AstroWsOperator: is the call-center operator's interface; is the interface of an operator's telephone

AstroWSOperator operations

SpyDial	Call a telephone in listen-only mode (silent mode)
Answer	Answer an incoming emergency call queued on Astro.
HangUp	Hang-up an incoming emergency call
StartHold	put an emergency call in hold state
StopHold	restore a held call from hold state

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AstroWebService operations:

getTelephoneList	To get telephone data list. With this method a client can get all phones data configured into Astro system
getFolderList	To get folder data list. With this method a client can get all folders configured into Astro. A folder is a logical container for telephones
getActiveAlarmList	To get active alarm list. With this method a client can get active alarms related to all phones.
getHistoricalAlarmList	To get historical alarms. With this method a client can get all historical alarms related to phones.
ExecuteDiagnostic	To execute diagnostic test on one phone
getCallDetailRecord	To query and retrieve information about calls returning call reports CDR *(Call Detail Record)*
GetCallData	Retrieve call recording data *(Call Rec Data)* from a CDR
subscribe4Notifications	A client can subscribe to receive notifications from the server with *getNotification* operation
getNotification	A client can get notifications from the server after it has called *subscribe4Notifications* operation
unsubscribe4Notifications	A client can unsubscribe for notifications
GetAnnounceList	Return all recorded announces imported into Astro system
MakeAnnounceFromFile	Make an announce from a file over an audio zone list
AbortAnnounce	Abort an announce
sendEmergencyEvent	Send an external emergency event to generate an automatic emergency announce and an emergency alarm. When an event is sent, Astro looks for a matching configuration *(emergency announce)* on the server in order to generate an announce on some audio zones. The matching operation is based also on optional input parameters *objectClass* and *objectId*.
RedirectEmergencyCall	Redirect a queued emergency call to an external number
AcquireAlarm	Acquire an alarm
getCurrentEmergencyCallList	Returns a list of current emergency call data. This operation is to be called during initialization time, before calling *getNotification* method
GetVersion	Returns Astro Web Service interface version
disableQueueOperators	Use this operation to disable queue operators: until timeout expires operators' phone are disabled, so they don't ring when queue is called

Notifications

Notification is a complex type described into xsd schema file.
Notification can contain data about changes into Astro system.
Notification data can be about:

- phone call state; this is "*callInfo*" topic
- diagnostic state change; this is "*alarm*" topic
- changes into Astro configuration; this is "*configChange*" topic
- phone configuration change
- folder configuration change

A client can subscribe to receive notifications from the server with subscribe4Notifications operation.
A client can subscribe only for the topics it is interested in.
Then a client can receive notifications with getNotification operation.
The notifications will be sent in *"comet"* style: a technology that keeps the client/server role, requiring to the client a very close polling in order to receive the notifications. For this reason, the mechanism on client side must be implemented as independent *"thread"*.

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ASTRO System Manager alarm list

The table below describes main alarm types and a description. Alarms are grouped by type (*alm_type* field of Alarm type) and subtype (identifier held into *alm_id* field).

alm_type	***field alm_id** field*	***Description***
AVARIA		VoIP device is in breakdown state: it can't communicate with Astro
AVARIA	NOT_REGISTERED	VoIP device not sip registered
AVARIA	NOT_CONNECTED	VoIP device not connected to Astro System Manager
FAULT_		Telephone is in breakdown state: diagnostic test has failed
FAULT_	IRRAGGI	Device not reachable by Astro System Manager
FAULT_	GUASTO_	Diagnostic test has found a fault
FAULT_	GUASTO_AUTO	VoIP device has detected a fault during self-diagnosis
CRC_KO		VOX analog telephone is not configured correctly: its internal memories are not configured
CRC_KO	CRC_KO_	Failed test over VOX analog telephone memories
CRC_KO	CRC_WAR	VOX analog telephone memories need an update
SETUP		VoIP device has an incomplete configuration
SETUP	NO_MAC	Incomplete configuration: missing link to VoIP device
SYS_KO		Important Astro System Manager component is not working as expected
SYS_KO	ASTR_KO	Astro System Manager PBX function out of order
SYS_KO	ASTRO1KO	When the redundant configuration is active, Astro2 twin has become primary node, when astro1 node of cluster doesn't work
SYS_KO	ASTRO2KO	When the redundant configuration is active, a fault on Astro2 of cluster has been detected
SYS_KO	VIDEOKO	Connection to video system is down
EXT_KO		External fault: an external system, for example video system has communicated an alarm
EXT_KO	ARMADIO	A rack or emergency shelf has been opened or extinguisher has been removed
AUX_FAULT		Auxiliary fault: an audio device connected to VoIP device is in breakdown state
AUX_FAULT	FAULT_AMPLILINEA	Fault at audio amplifier or line loudspeaker
EMERGENCY		VoIP device has signalled an emergency event coming form an emergency device (for example a Fire&Gas detector)
EMERGENCY	FIREGAS	Emergency signal from Fire&Gas device
AUX_INPUT		Auxiliary input: an auxiliary input device connected to VoIP device has generated an alarm)
AUX_INPUT	TAMPER	Emergency signal: tamper opened

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ASTRO Client for Configuration and Maintenance

Desktop Client with Graphical User Interface Manager for Diagnostic, Configuration and Maintenance of the System Activity

201408 rel.201611 – v.201906

ASTRO Manager – Desk-top Client
Diagnostic & Maintenance GUI interface

Astro Manager is a client operator station that allows to control a set of remote terminals.

Astro Manager supervises Public Address Voice Alarms, Emergency and Intercom calls activity.

There are three possible ways (each password protected) to enter the Astro Manager application:

- Remote access with open source VNC software
- Access with keyboard, mouse and monitor directly connected to Astro
- Dedicated PC; when supplied by Fitre the unit includes the color monitor (typically 19”), keypad and mouse as well as the PC (the following picture is an example of the HW assembly kit supplied by Fitre)

ASTRO is fully HW and SW Operating System independent.

- Emergency Calls
- Diagnostic Data
- Historical Data
- Alarm Events
- Configuration
- Different user access levels each with password protection

ASTRO Manager Client Terminal unit: typical HW configuration

ASTRO Manager Client unit is designed for managing all the diagnostic and configuration information related to the IP units installed in the plant as well as to control the system through its the GUI (Graphical User Interface) of ASTRO Manager itself.

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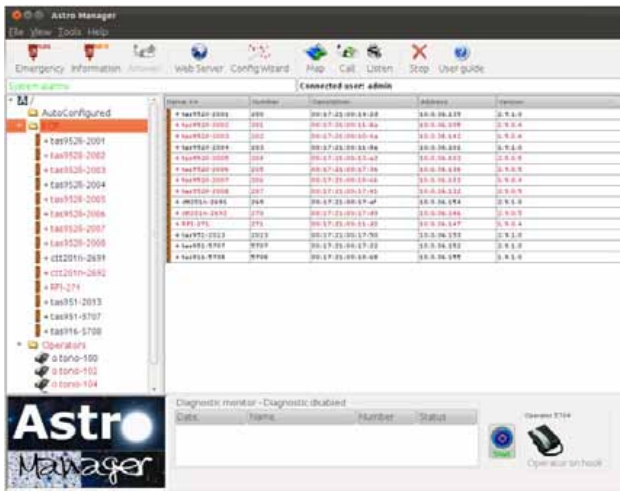
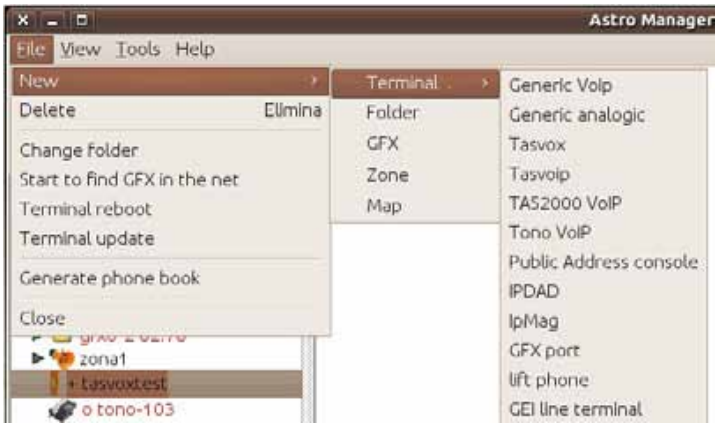
The Maintenance Operator can access to all the Diagnostic and Configuration facilities in order to have a clear and fast information about the system status (as listed in the following example and figures).

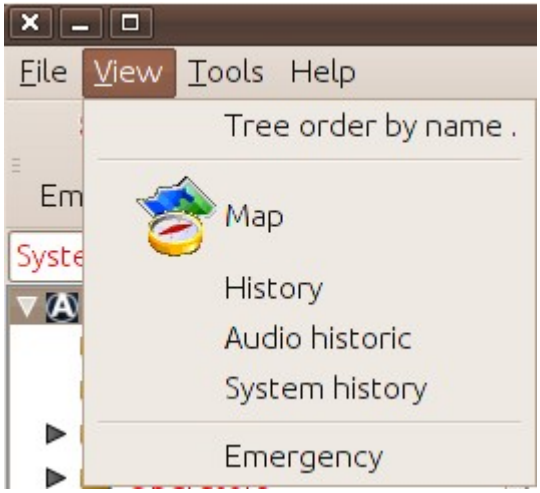
Main screen



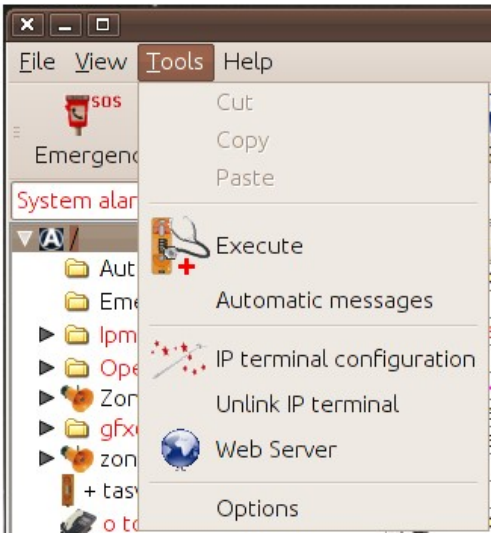
Main menu and tool bar – Creation from scratch



View



Tools



Creation with wizard

Enables automatic set-up of a terminal that is presented to the system. The command operates with the terminals that are located under the folder of 'auto-configured' type and on the folders of type GFX. All the trained VoIP terminals that are connected to a network where Astro is DHCP server are automatically moved to the 'auto-configured' folder. The Astro system also features self-provisioning, which allows automatic set-up of all the terminals without the need for manual configuration by the wizard.

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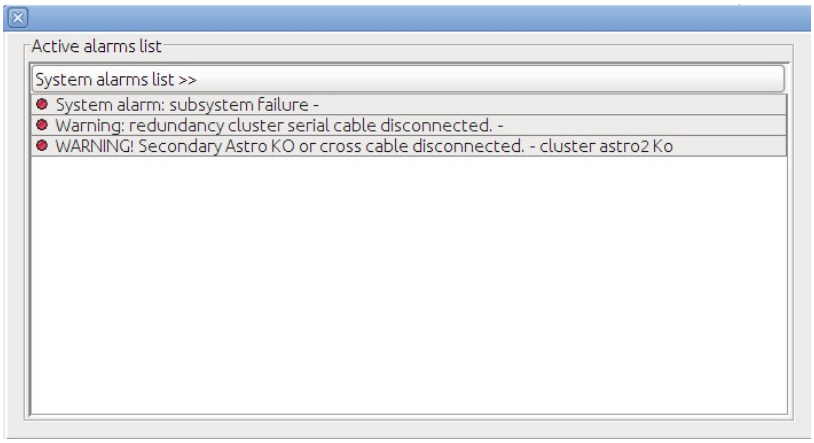
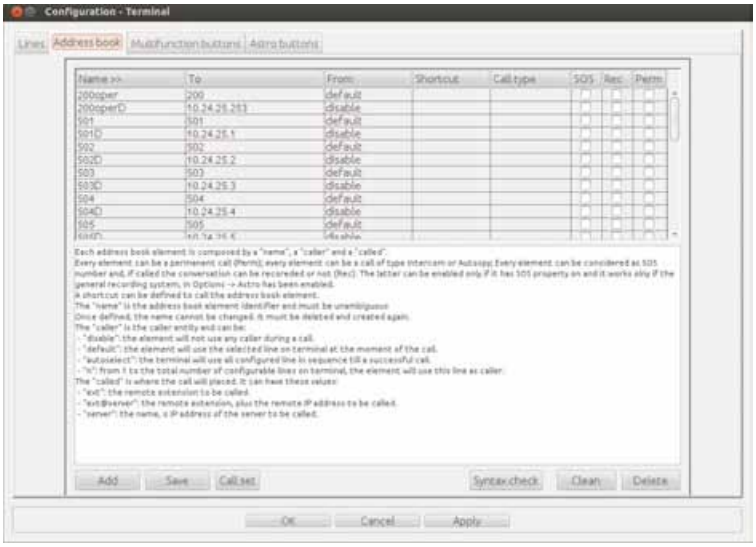


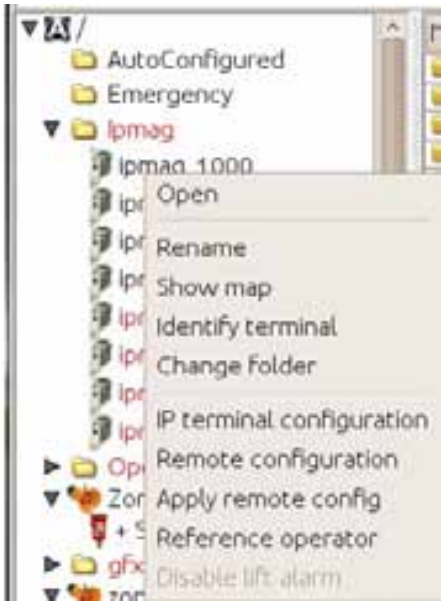
System Status

- ***Audio Alarms***: they are all the system alarms generated by the Astro software
- ***External alarms***: they are all the system alarms generated by Astro hardware and elements external to Astro

Global address book



Phone tree management



Selection of a group of terminals
Open the contextual windows of the drop-down commands

Diagnostic monitor

Programming of the tests planned by the automatic diagnostics function: each row of the table corresponds to a test on a phone with the relevant data and status (diagnostic) information

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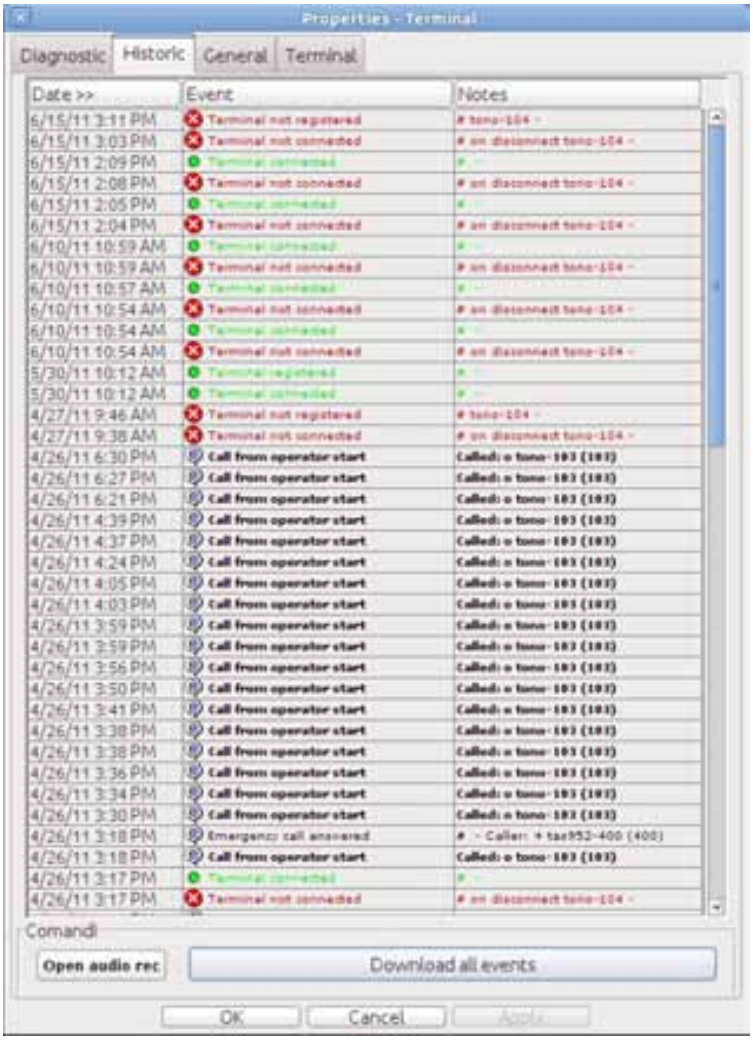
Setting up automatic messages

The set-up of the automatic messages can reconfigure audio comfort messages associated with each queue and global comfort messages

Setting up Options

- Set-up of the automatic diagnostics of the system, including:
  - the check for connection and recording
  - the ***Speech Tests*** on the complete audio chain of the intercom station (handset, speakerphone, external speakers, and related microphones)
  - the Updating of parameters
- Put the system off at pre-set times. This feature is useful for instance if it is provided that the facility where the emergency terminals are installed stops the service at night (for instance a subway). In this case it is possible to stop the emergency call activity in the period when the service is not manned.
- Enable or disable audio recordings of emergency calls.
- Enable or disable audio recordings of calls made from an Operator Station
- Program the duration of a call in the queue.



History

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S.A.R.A.

Broadcasting System

Virtual machine System for Automatically Broadcasting the Recorded Announcements onboard the vehicles (trams, buses or trains) and at the surface stops, the train stations and the underground stations

The system has been initially developped for application on the public transport infrastructure of ATM, the Tramway Company of Milan (Italy).

The system broadcasts the recorded announcements on:

- ❖ **all the surface trams and buses,**
- ❖ **all the underground metro trains,**

through a complete and powerful set of applications.

- Calendars management (creation, deletion, modification, etc.)
- Scheduling and overlap events management (calendar, announcements, etc.)
- Announcements management (recording, deletion, modification, etc.)
- Announcement creation through TTS (Text-To-Speech), microphone and files (.mp3, .wav)
- Filters management
- Historic log events management
- Listening of the broadcasting announcement on the selected destination
- Announcement scheduling management (play, stand-by, stop, etc.)
- Alarm events management
- Priority levels management among all the possible sources and operators
- Import/export of the audio files
- Automatic audio equalization among all the different audio sources

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more about FITRE

Fitre is a manufacturer with an enviable experience in the industrial telecommunications sector, found in a very complete and wide range of products, offering the most advanced technical solutions for communications in Transports and Heavy Industries as Petrochemical, Power and Industrial Plants and other harsh environments. That is proven by countless worldwide installations.

Strongly focussed to provide real added value and creative problem solving solutions to its Customers, **Fitre** often is partner with leading manufacturers to supply state-of-the-art products on the whole product range.

With its own Hardware and Software Laboratories, **Fitre** develops systems and equipments based on the most up to date communications technologies, both analogue than VoIP, and corresponding the most stringent certification standards.

It has to be particularly highlighted the Emergency Systems with centralised diagnostic, designed for applications in Oil & Gas Plants, Railway Stations, Tunnels and on board trains, certified according to EN50155 & EN54-16 rules.

The heart of these systems is **"Astro System Manager"**, a perfect integrated digital IP system, modular and flexible for optimally managing the communication services for all these applications.

With the own specific and distinguishing flexibility, each system may be configured meeting all the Customer's specifications, even developing special functions.

Astro is designed for operating as a stand-alone system and has a modern IP based digital scalable architecture, either in software and in hardware, so that it offers the maximum level of flexibility and modularity and it can be expanded just adding software functions and/or hardware modules.

A common platform for managing both Intercom, Emergency and Public Address functions: thanks to this fully exploitable system setting, **Astro** is the perfect solution to fulfil every communications demands.

Everything is designed for meeting the high sophisticated demand in terms of safety and reliability, proposing redundant as well hierarchic architectures.

If that were not enough, **Fitre** guarantees the maximum level of flexibility and integration of the system respect to the functional point of view, configuring the **"Astro System Call Manager"** according to the Customer's specifications and providing the interfaces with the external systems (also supplied by others) through appropriate standard software tools. The operator has a real-time control of the system status and he can manage even by remote, through a standard Internet connection.

Even in case of long distance connections between the LAN switch and the intercom/telephone stations, **Fitre** supports own Customers offering **ReteMatic**®, the state-of-the-art technology based on two only wires connection, for transporting either the power supply voltage and the digital SIP protocols.

To satisfy all needs, **Fitre** manufactures a very wide range of station types: flush mounting, wall mounting and desk stations, weatherproof and vandal-proof, also with the required customized keys.

Look online at the main certifications of our Quality System and our products

highlight

IF-PowerDrill

The most advanced Intercom and PAGA System for exploration Drilling Rigs

ASTRO PAGA

Public Address & General Alarm EN 54-16 Certification

TASVoIP-952

Digital Emergency/Info Call Telephone Point

TASVOICE 164/2

SOS Emergency call point for on board Railway applications

Explosion-proof VoIP Telephone and Intercom Stations

ATEX certified for Zone 1, either with handset or hands-free, fully suitable for the Oil & Gas world

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