



Implementing a Help Point System using GAI-Tronics VoIP products



General Description

GAI-Tronics VoIP products incorporate a number of features designed to deliver a high-quality, resilient system across an IP network. This document highlights those features particularly important for implementing a Help Point or Emergency Call Point system. Full specifications and configuration options are contained in the installation guide and configuration guide.

Physical and Environmental properties

In common with most GAI-Tronics products, VoIP Help Points are designed to be rugged, vandal resistant, weather resistant to IP65, and have an operating temperature range of -20°C to + 60°C, making them perfectly suited for public use in internal and external locations.

System Approach - design for resilience / open protocols

In the GAI-Tronics approach there does not have to be a single Help Point Server. Rather than a single monolithic device, a number of discrete servers are used to provide the services required for the Help Points to operate. "Server" in this instance implies a software entity rather than a physical machine; the required servers can be anywhere on the IP network.

This approach delivers 2 key benefits:

- Ease of integration, by using standard open protocols.
- Resilience, by using multiple redundant servers

Open protocols

None of the servers or protocols used by GAI-Tronics Help Points is proprietary or in any way bespoke to GAI-Tronics. Central to this is SIP (Session Initiation Protocol, RFC3261) which has been widely adopted as the preferred protocol for VoIP. Using standard components and open protocols means that Help Points can often be integrated into an existing VoIP system with no additional equipment, with a subsequent reduction in maintenance, support, technical training and the other often hidden costs of maintaining additional equipment on a network. Using a standard SIP server can make PABX-style features such as call diversion, call forwarding, conferencing and call recording available to Help Points.

The servers that a GAI-Tronics VoIP Help Point can use are:

- SIP proxy - to route calls
- SIP registrar (frequently combined with the proxy server) - to resolve URIs to IP addresses
- DNS - to resolve domain names to IP addresses
- Syslog (over TCP) - for reporting alarms and external inputs
- SMTP - for reporting alarms via email
- STNP - to synchronise the internal clock in the Help Point
- STUN - for NAT firewall traversal
- TFTP - for downloading configuration files to Help Point

Many of these will already be available as part of the normal components on an IP network.

If any components do need to be added specifically for the Help Points, they can be readily sourced from a number of suppliers.

VoIP Telephony

Implementing a Help Point System using GAI-Tronics VoIP products

Design for Resilience

By using distributed resources, the GAI-Tronics approach reduces the possibility of a single point of failure jeopardising the operation of the whole system. For example, if the proxy server should fail, the Help Point could still send an alarm by email.

In addition, the Help Point can hold multiple addresses for each of the key servers (proxy, registrar, DNS, Syslog & email). This means that if the Help Point fails to contact the first server it will attempt to repeat the action with the second. In most cases two alternative addresses are possible, but with the SIP proxy and registrar up to 4 alternate servers can be specified with a prioritised failover sequence between them.

The Help Point can be set to automatically refresh its registration at a predetermined interval to ensure that registration is maintained at all times (or if not raise an alarm).

Audio / Speech

GAI-Tronics VoIP Help Points cope with the effects of high ambient noise by using advanced DSP and echo-cancellation algorithms designed to give clear, full duplex speech without unexpected changes in volume level. This approach is used in preference to monitoring the ambient noise level in order to adjust loudspeaker volume, which can lead to unexpected results in situations where there are likely to be abrupt changes in noise level (e.g. station platforms). GAI-Tronics' experience with on-board train communication systems has found that it is difficult to predict the appropriate level, often leading to over compensation. The advanced processor technology in GAI-Tronics' VoIP products allows us to use state of the art techniques to provide clear speech audio.

Emergency call features

As well as just having its own dial plan, any call button designated "Emergency" can have some special attributes:

- **Override** - pressing an emergency button will terminate any existing non-emergency call and start an emergency call.
- **Inhibit other buttons** - when an emergency call is in progress, any other buttons that could start a call, clear a call or dial a digit can be inhibited.
- **Activate relay and / or LED** - any LED or relay can be set to activate during an emergency call, for example to activate a beacon.

PA / Intercom modes

In addition to the standard Help Point operating mode, where a user presses a button to connect to the required end point, 3 special intercom / PA style modes are available. In these modes the "call" is initiated from the remote end and the Help Point answers automatically, allowing functions as described below:

- **Stealth** auto-answer mode, where the telephone provides no indication of the incoming call and immediately auto answers the call. The speaker is muted, and the microphone gain is enhanced. This mode allows discrete listening.
- **Intercom** auto-answer mode, where the telephone auto answers and provides normal duplex audio, preceded by an announcement tone.
- **Page** mode, where the unit auto answers and disables the microphone. The output level of the speaker is increased to its maximum level. This mode can be used to provide a public address function. If required, an internal relay can be used to activate a PA amplifier during page mode.

Call progress indication - audible and visual

Help Points emulate commonly recognised telephone-style progress tones (such as dial tone, ring tone, busy tone etc.) to inform the user about the status of the call. For example, when a call has been started but not yet answered, the user will hear ring tone. The Help Point can generate tones for 8 different call states and the tones are fully configurable.

Most SIP servers will allow calls to be diverted to an auto-attendant to give a voice indication that the call is on hold or in a queue if required.

Help Points can also incorporate up to 3 LEDs (1 as standard, 2 as factory options) to give visual status indication. Each LED is fully configurable and can be set to indicate different functions for example ringing, emergency call in progress or availability for use.

Features for the Disabled

The following features can be offered to help meet the requirements of the Disabilities Discrimination Act (DDA):

- Large, palm-operable buttons,
- High contrast print and graphics for the visually impaired,
- Braille
- Audio induction loop (see below)

VoIP Telephony

Implementing a Help Point System using GAI-Tronics VoIP products

Induction Loop

To help people with impaired hearing, Help Points incorporate an induction loop compatible with hearing aids having a "T" function. The induction loop is completely integral within the Help Point and does not require any additional installation work or a supplementary power supply.

Audio recording

Audio recording of voice calls is usually a SIP server facility, but it is often a requirement to provide lip-sync audio to video recordings. It is very difficult to achieve this by attempting to match recorded audio data with separately recorded video data. The GAI-Tronics approach is to provide a separate, isolated audio output that can be connected directly to a local IP video camera. Using this method, the camera transmits combined audio and video as a single data stream which is lip-synchronised at source and can be recorded in the normal way. A relay in the Help Point can be used to trigger the camera when a call is started.

Power Requirements

GAI-Tronics VoIP Help Points can be powered via Power over Ethernet as standard (IEEE 802.3af compliant). PoE provides ease of installation and allows the Help Points to be UPS backed as part of the network. If PoE is not available power can be provided by an external 24-48Vdc supply. Only a single supply is required per Help Point - the induction loop is powered from the same supply as the Help Point itself. Maximum power requirement is 7.5W per unit.

Self diagnostics

The Help Point can generate the following fault alarms:

- Configuration Error - when the configuration file currently in use has errors.
- Cold Reset - when the unit has reset due to a power cycle.
- Warm Reset - when the unit has reset due to an internal software command or error.
- Keypad Error - signalling that a button is permanently stuck.
- Register Fail - where the unit has failed to register with all listed proxies (and cannot make a call).

Each of these can be set to report by email and/or syslog. The text included in the syslog or email messages can be user defined.

Syslog messages

GAI-Tronics Help Points generate 2 types of syslog message:

- **Alarms** triggered by events, and
- **Call Description Records** (CDR) containing details of a completed call.

An appropriate syslog server (which in most cases will already exist on the network) can filter and process these messages to give meaningful information to system operators and administrators. Syslog servers are available that can interface to command and control systems, link to external databases, raise audible alarms etc. These provide powerful ways of tailoring management information from the Help Points for maintenance and operations.

Alarms and external inputs

In addition to alarms generated internally by fault conditions, the Help Point has 4 external auxiliary inputs that can generate alarms in the same way. These inputs can be connected to any volt-free contact and can be set to report by email and/or syslog. The text included in the syslog or email messages can be user defined.

Control relays

Each Help Point has 2 programmable isolated relays that can be set to activate external devices such as beacons, SCADA inputs or CCTV triggers. Each relay is capable of switching mains voltages if required and can be triggered by different events such as ringing, call in progress, emergency call in progress and availability for use.

VoIP Telephony

Implementing a Help Point System using GAI-Tronics VoIP products

STANDARDS COMPLIANCE

EMC	<p>EN55022:1998 + A1:2000, A2:2003 – Information technology equipment. Radio disturbance characteristics.</p> <p>EN55024:1998 + A1:2000, A2, 2003 – Information technology equipment. Immunity characteristics.</p> <p>EN 50121-4: 2000 - Railway applications, emission and immunity</p>
Safety	<p>EN60950-1:2001 + A11:2004 – Specification for information technology equipment, including electrical business equipment.</p> <p>BS6317:1992 (Clause 13.9) - Specification for simple telephones for connection to public switched telephone networks run by certain public telecommunication operators.</p> <p>EN50371:2002 - Generic standard to demonstrate the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz - 300 GHz). General public.</p>
European Directives	<p>73/23/EEC - Low Voltage Directive.</p> <p>89/336/EEC - EMC directive</p> <p>1999/5/EC – Radio Equipment & Telecommunications Terminal Equipment (R&TTE) Directive</p> <p>2002/96/EC - Waste Electrical and Electronic Equipment (WEEE) Directive</p> <p>2002/95/EC - Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)</p>

