

IP-COM System

Minelec Ltd.

IP-COM System

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1.0 Introduction

The wide adoption of IP communications has resulted in a requirement for a cost effective integrated communication platform for Intercom, Telephone, Emergency Telephone, Public Address, Monitoring and CCTV. This paper describes the Minelec IP-COM system that provides a cost effective, open standard and scalable IP platform that supports numerous Minelec and 3rd party end devices.

Some enterprise users are replacing existing analog systems. In many cases the cost of replacing the old analog cabling infrastructure makes projects unfeasible, as re-cabling a network is often much more expensive than the cost of the new IP equipment and also extends the deployment times. This paper describes how the Minelec IP-COM system allows a migration path for legacy analog systems.

If the initial system design is correct IP communications has the advantage over legacy analog systems in that it allows for scalability in the system. This means that the type and number of end devices can be changed at any time without significant cost and hence reduces ongoing support and maintenance costs.

In many cases end devices such as Intercom, Emergency Telephone and CCTV are used in systems that have a safety critical requirement. Minelec Ltd. has over 35 years of experience in the design and supply of Emergency Communication system that are safety certified and this experience is reflected in the system architecture and end device specifications for the IP-COM system.

Minelec, as a company, is unique within the industry because it combines product design, manufacture and installation. This has the advantage that it is a one stop shop for customers and projects are always completed on time and in compliance with the specification. The Minelec installation department provide site surveys, procurement of materials, installation and commissioning.

2.0 Minelec IP-COM System

- The design philosophy adopted by Minelec has been to provide an open standard, IP PBX that offers complete Unified Communications features and is scalable so that it can be deployed in a range of systems and does not tie the user to one supplier, one network, or one manufacturer's devices. It is designed to be scalable, from point to point, up to call centre capability. It is designed to be capable of handling 1024 simultaneous connections as standard, but can be expanded beyond this if required.

2.1 Server

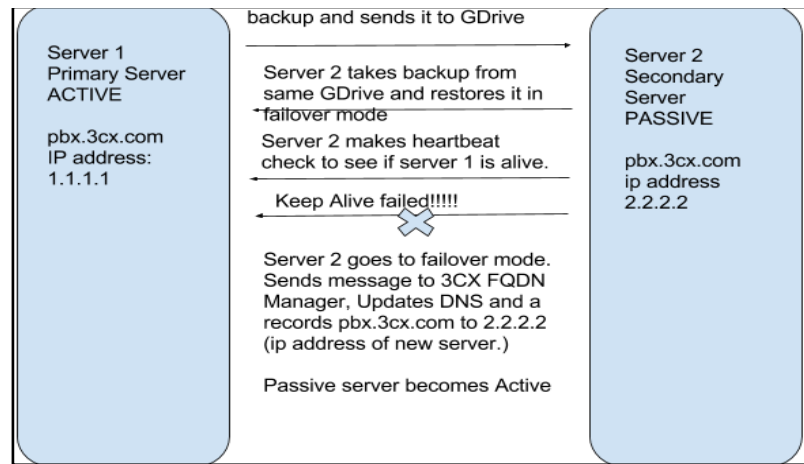
The Minelec IP PBX can be hosted on a Minelec server or on the customer's server. It is Open Standard VoIP and hosts Minelec and third party end devices. It is a complete Unified Communication solution for audio, video, signage, control and alarms with the aim of providing easy installation of end devices.

The system has been designed to allow an IP Phone/intercom to be plugged into the network or Gateway to the network and it will automatically configure them, saving countless hours of configuration time and removing the learning curve. Optional features can be enabled to leverage video on the system, for example the Minelec Intercom can be ordered with built in video camera so

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that a call centre can view the calling Intercom. VMS Interfaces can be added to allow control of separate CCTV systems allowing specified Intercoms or telephones to activate associated CCTV cameras. Video storage for Intercom cameras is provided on the server.

Most Emergency Telephone systems and Intercom systems are Safety Critical because of the liability issues when used in the public area. Minelec has traditionally operated in this market area and consequently when designing the IP COM system ensured that it provides all the required safety features. We supply fully redundant servers with automatic failover. In addition the system can have multiple head ends with geographical separation with no single point of failure. The system will propagate changes automatically between the head ends. The dual head end system is designed to be a high availability solution that will allow the settings to be shared between head ends without interference. In the event of a PBX failure the replica PBX will become active which avoids downtime and data loss.



Overview of Head End Propag

The system is designed to be secure and includes anti-hacking features. For example an alert is flagged if an IP is blacklisted because of too many requests. This happens if the web server anti-hacking module blocks an IP because of too many requests. Additionally an IP is blacklisted if an IP has reached the maximum number of failed authentication attempts. Frequently this points to a hacking attempt.

At the end devices, Emergency Telephone/Intercoms, we provide real time health monitoring and notification using multiple communication vectors. The system is fully compliant with North American Elevator Code ASME A17.1-2013.

The system logs and saves activity for up to 5 years. This is expandable through additional storage if required in the future. The system is designed to store automatic backups of all activity. In addition, there is a log viewer application that allows users to view the log files produced by the system. This software allows the logs to be filtered by log type, extension, call, tags and date.

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The system allows administrators to initiate software and firmware upgrades to devices on the system. Only authorized users are allowed access to the Management Console and system, this is achieved using password protected access. Through the Management Console, authorized users are able to update the server with any software updates as required. The system uses a Windows platform and therefore is easy to navigate and setup.

The console also has remote desktop functionality which allows the administrator to update the software on the Operator Consoles as required.

The Management Console allows administrators to fully configure the system to perform as required. Settings for specific end devices on the system can be viewed or changed by an authorized user. Field devices can also be managed at the console, allowing the administrator to control extension rules, provisioning, extension behaviour and diagnostic settings.

The Management Console contains the same functionality and features as the Operator Consoles for testing and troubleshooting purposes. This allows administrators to use the Management Console to perform any action or receive any call that the operator would be able to.

2.3 Operator Console

The Operator Console supports the use of a gooseneck microphone and speakers. There are many options available for sound input and output devices since the design uses a Windows platform for the Operator/Management Consoles. The system provides for voice recording as standard. In addition, the system supports adding an external telephone with dialing capability that can be synchronized to the computer.

The software included with the Operator Consoles provides a clear graphical user interface that allows the operator to easily navigate to any end device within its allowed call group. This layout can be fully customized by the operator and allows for complete control and navigation.

The operator has the option to turn the video feed on and off for each call. In addition, the Operator Console can establish two-way video communication within the system when the end device is equipped with an optional video camera.

As an option, the system allows the operator to view the position of originating calls on a graphical map of the building or area. These maps are usually custom, created by Minelec to suit the application for Security and Emergency applications. It is provided within the console and displays a map showing the originating location of a caller as a flashing red icon. This is done automatically when a call begins to ring at the console and does not require any interaction from the operator.

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The Operator Consoles include a phone client which is capable of displaying the first ten (10) queued callers as a minimum. The phone client displays the list of queued callers within a scrollable and resizable portion of the user interface. This allows the window to be resized to allow for greater display capacity if required.

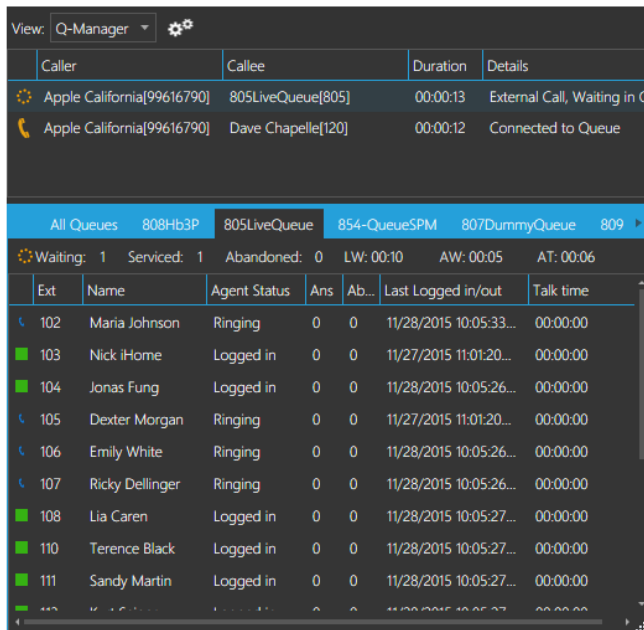


Fig 1 Typical Queued Call Display

The Operator Console also displays the last (10) completed calls as a minimum. The phone client displays the list of completed callers within a scrollable portion of the user interface. This portion is able to display all completed calls plus incoming, outgoing and missed calls. In addition to call queuing the system has priority handling capability, essential in security applications.

The Operator Console limits operational staff access to essential operational software only and is secured by password entry. The system is designed to include Windows Active Directory and allows the administrators to have full control of user privileges on all Operator Consoles. This includes limiting software and computer access, internet browsing, network access and more as required.

3.0 Intercoms

The Minelec IP Intercom was designed to provide a base model that can have optional features added or enabled to leverage its capabilities. The standard model is SIP based POE providing full duplex operation. The unit has up to 5 configurable destination addresses. It is true plug and play with auto provisioning and provides status reporting using SNMP. Each unit is able to configure itself when it is replaced in a location that has been set up previously. Once the initial configuration of the system has been performed, the settings for the device are maintained within the system and the device can be swapped out for a replacement without interaction by the service technician.

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Audio Intelligibility is an important feature on any public Intercom/Telephone system. The Minelec End Devices are designed to provide superior audio performance and provide the following :

1. Both G.711u and G.711A compression
2. Comfort Noise Fill
3. Low-delay audio packet transmission
4. Adaptive jitter buffers
5. Packet loss concealment
6. Acoustic echo cancellations
7. Background noise suppression and peak limitation

The base unit can be upgraded to allow ambient noise compensation to be enabled for use in areas that have a wide range of ambient noise.

Local call progress tones can be downloaded to the unit allowing customer preference.

The base unit is housed in a stainless steel vandal proof enclosure, although custom enclosures and labelling can be designed and manufactured by Minelec.

The End Devices are designed for use in Northern climates and are rated for -20 to + 50 deg C operation.

Optional features can be added to the base unit. The Intercom has been designed to allow an upgraded intercom with video camera to be plugged into the network in place of the base intercom and when enabled allows video and audio from that end point. The end devices support adjustable video compression. This is controlled through the Management/Operator Consoles and gives the choice of several compression options. Both H.264 and H.263 are supported along with a range of resolution and quality settings for the device's video feed. The system also supports and displays third party Video-over-IP sources and includes any supported device that has an integrated IP video source. This will allow the devices to fully integrate into the system using the SIP protocol.

The following options can also be added to the base unit:

- Two button operation for "Emergency" and "Information" use.
- Audio loop feedback testing for microphone, speaker and amplifier monitoring. The end devices are able to perform an audio loopback self-test. This test is internal to the unit and can be initiated by an Operator or Management Console. Also, the system is designed to allow authorized mobile device users to activate this test.
- If enabled the end devices are able to perform a button self-test to check for the button stuck in the enabled position. The results are reported via SNMPv2 and through web-based requests.
- Local indication of fault status. Each PAI panel includes a failure indication LED on the front panel. The LED is adjacent to supporting signage and is activated when any fault is detected on the device. This includes any internal device error as well as any connection errors to the main

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server. In addition to this, a contact output is made available on each unit to interface with external systems or displays.

- Induction loop hearing aid capable. The system allows the Operator Consoles, Management Consoles and Handheld Device to enable and disable the induction loop on the end devices remotely.
- Illuminated pushbuttons: The buttons for all End Devices are illuminated in multiple colours. We provide colour coded LED illumination to highlight button functionality (e.g. blue for information, red for emergency).

Some systems may require the use of legacy cables to reduce costs or for example when refitting in older elevators. Some new systems may require extended distance on IP cables. The Minelec POE Intercom has been designed to allow an additional optional providing IP over 4 conductor for extended distance operation, without the use of external add on modules or plug in power supplies. The intercom is simply connected to the existing cable and the cable routed to the Minelec head end equipment shelf.

4.0 Telephones

The system has been designed to allow connection of any standard SIP IP telephone. These can be simple handset telephones or Emergency Telephones.

Minelec has a long history of manufacturing and supplying Emergency Telephones and we have a wide range of rugged indoor and outdoor stainless steel vandal proof telephones designed to be wall mounted or mounted in Code Blue or Gai-Tronics stanchions. The IP-COM system has been designed to utilize this experience with the design of a new range of IP Emergency Telephones.

The IP-COM system supports the use of handheld devices and we provide client software for both iOS and Android operating systems that can be used on a variety of mobile devices.

5.0 CCTV

The system provides data or relay connections for interfacing with existing CCTV system and can be configured to control the cameras in the existing system based on connections made within the IP PBX.

6. Conclusion

The development of the IP-Com system has built on the many years of experience Minelec has in the deployment of Safety Certified Intercom, Emergency Telephone and CCTV systems. The system has advantage for small and large scale users alike and offers a migration path for legacy analog systems. It allows customers the freedom to use their own network and servers, or to install dedicated LAN or WAN. It also allows for the deployment of 3rd party SIP devices so that customers have the freedom to use end devices from their supplier of choice. Unlike many IT companies Minelec offers custom design features in both hardware and software and provides a complete turnkey package from initial design to installation and testing.

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