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BARIX
FOR CAMPUS
INTERCOM PAGING
SECURITY SYSTEMS
07-2010

TECHNOLOGY FROM BARIX: CAMPUS PAGING, INTERCOM, AND SECURITY SYSTEMS.

College and university campuses have varying needs for emergency paging, intercom, and building-access systems, depending on factors such as existing communication and security infrastructure. The ability to broadcast announcements, allow two-way communication, and remotely control access among different lecture halls, residence halls, or buildings is often required to maintain a safe and secure campus environment.

Campuses that already use such systems seek ways to improve them, while others plan to implement new systems. Expansion or creation of security systems can entail custom or proprietary hardware and applications that may not work together. Another factor of system implementation or expansion is cost.

Barix offers a complete range of IP-connected devices for security applications that can be deployed in various tiers on university campuses, either as a new system or as ancillary equipment to improve existing paging and security systems.

Utilizing open standards and protocols on existing campus network infrastructure, this approach is ideal for budget-conscious organizations that need an affordable, high performance system that is quickly and easily implemented.

A Barix-based system allows campuses to achieve the following:

- **Paging.** Enable campus-wide or building-wide paging over existing PA systems.
- **Intercom.** A campus-wide intercom system offers more direct emergency communication by installing two-way communication devices in each room.
- **Security Control.** Automated security from door monitoring up to and including campus-wide lock-down can be accomplished for critical emergency situations.

This paper introduces Barix's scalable three-tier approach to emergency messaging and security, including overviews of three prebuilt Barix systems that incorporate the three-tier approach:

- **Barix ABCL Paging**
- **Barix ABCL ICGraph**
- **Barix ABCL SIP**

THREE-TIER APPROACH

Paging

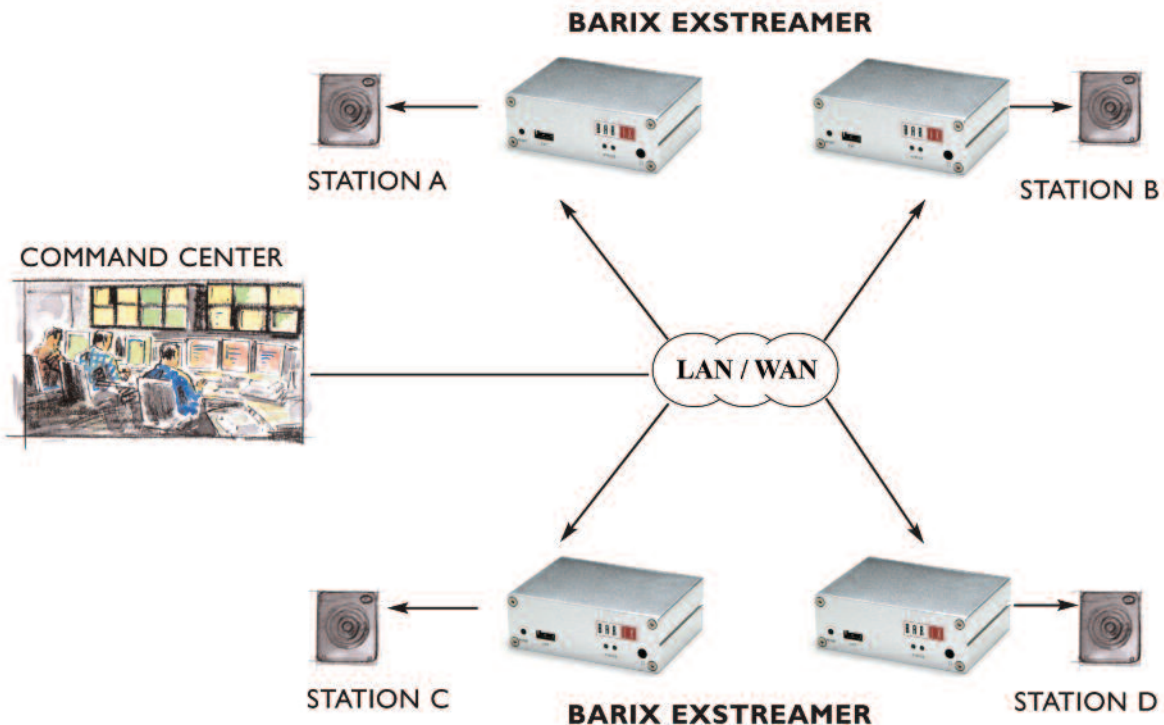
The first tier is campus-wide paging using Barix Annunicom intercom devices and Exstreamer audio decoders to enable building-wide or campus-wide paging over existing PA systems. One or multiple Annunicom devices, integrated as centralized wall intercoms or “senders”, can communicate with Exstreamer decoders or “receivers” at each campus building over the IP network. The Exstreamer receivers at each building connect to a PA system to broadcast emergency messages received from an Annunicom device.

Messages can be broadcast to one receiving device, or to pre-configured “groups” of devices, or to all receiving devices for point-to-

multipoint campus-wide paging. No central server or intelligence is needed, making the system very cost effective, scalable, easy to deploy and manageable.

For first-tier paging systems, each Annunicom and Exstreamer device runs with the standard Annunicom firmware installed. The devices can be shipped with the firmware pre-installed, or this firmware is freely available via download from the Barix website.

This is the simplest form of messaging or emergency paging Barix provides, working practically “off-the-shelf” with minimal configuration.



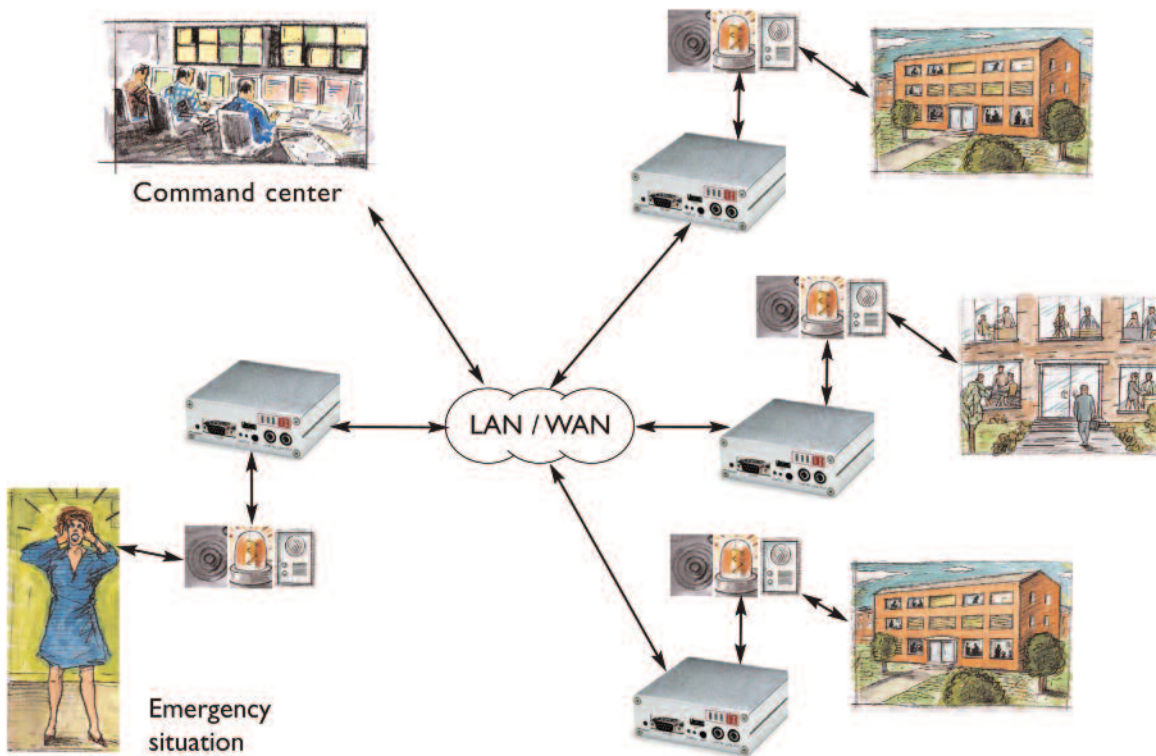
PA System

Intercom

The second tier is campus-wide intercom using Annunicom two-way intercom devices in each room of a building. As with the paging system described above, each Annunicom device can run with standard Annunicom firmware installed. Exstreamer devices can be installed in locations that do not require two-way communication.

Each Annunicom device can also be used to control external hardware such as an electric door strike or alarm, described in the next section.

In the university setting for example, each Annunicom can interface with a wall panel containing a loudspeaker, microphone, call button(s), and perhaps a keyboard. The “central” device in the security office can communicate over the IP network with one or multiple devices installed in classrooms, or a classroom could communicate directly with the security office or even with other classrooms or buildings, depending on the configuration.

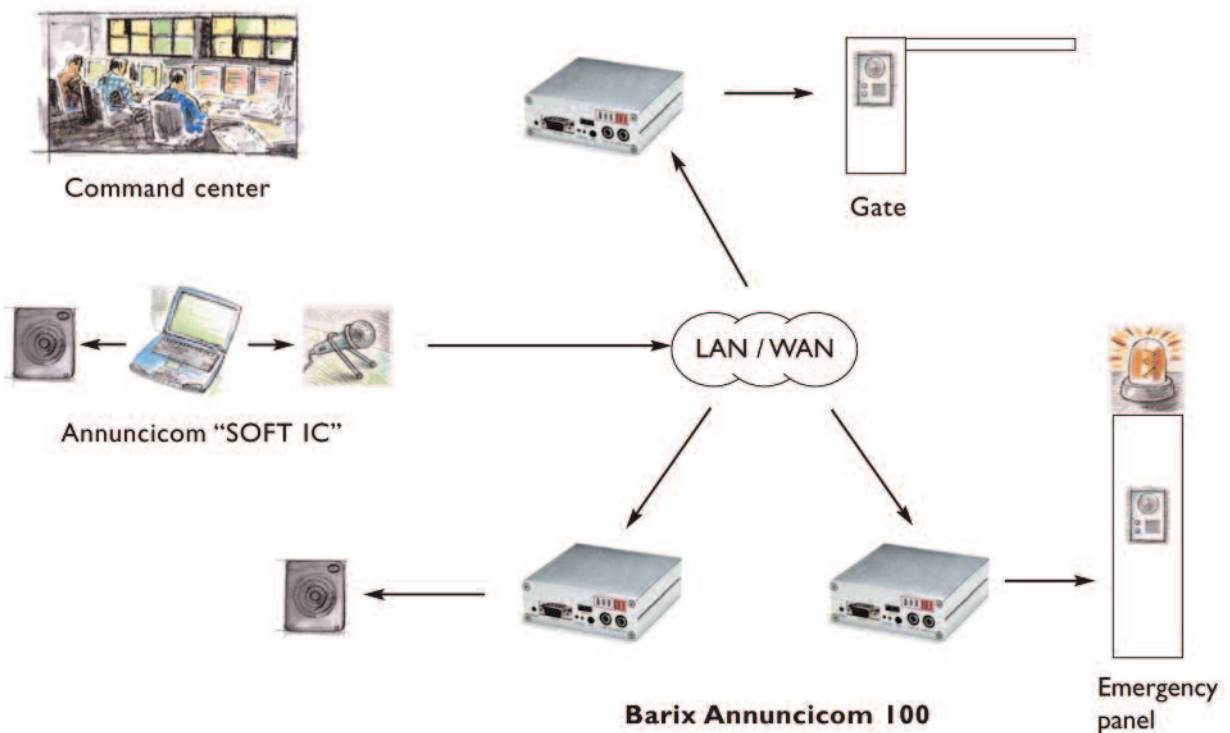


Intercom with emergency notification

Security Control

The third tier is campus security control, ranging from controlling a single electric door strike up to a full campus-wide lock-down. Annunicom (and many Exstreamer) devices provide relay outputs and support firmware that allows them to communicate with peripheral hardware attached to the device, such as a card reader or an electric door strike or a control panel with speaker and buttons.

Alternatively, a Barix Barionet automation device can be used to control such peripheral hardware. The Barionet device can communicate with other Barix devices to activate door strikes, provide door monitoring and alarming, and authorize entry. Barix IP controllers are compatible with many common card access control readers available on the market today. The Barionet is also useful for controlling lighting or ventilation or other industrial devices.



Paging, Intercom, and Security System

PREBUILT PACKAGES

This section introduces three solutions incorporating the three-tiers of paging, intercom, and security control.

BCL (Barix Control Language) is a simple interpreted high-level language similar to BASIC programming language. Compiled as firmware, it is used to customize the behavior of Barix devices. There are prebuilt Audio BCL (ABCL) firmware packages designed to support paging, intercom, and security systems, three of which are described below.

Barix ABCL PAGING with the Annunicom PSI 6 Master Paging Station

Used in conjunction with the Annunicom PSI 6 master paging station device and the Barix IP protocol (BARP), this is a fully functional solution for building intercom and paging systems over IP-based networks. The clients are Annunicom or Exstreamer devices running Barix ABCL Paging firmware. With ABCL Paging, Barix devices can be easily configured and become part of the intercom/paging system in a few minutes.

Built for master/client architecture, the ABCL Paging firmware application can be configured to run either as a master (called Paging Master and installed on the PSI 6 master paging station), or as client (called Paging Client and installed on Annunicom or other devices). The communication between the master and the client components of the intercom/paging system is implemented using the Barix IP protocol (BARP).

The Paging Master station can control the Paging Client's mode of operation, send broadcast paging messages to any client, and activate their relays to drive different peripherals. Multiple masters can be configured within a system.

The Paging Client stations are typically used as door intercom stations or paging stations with optional background music playback. They can also be configured to initiate an intercom connection with up to two master stations.

Paging Master Features:

- Full or half duplex mode of operation.
- Hands-free mode for sending paging messages and half duplex communication.
- Up to 112 available keys (with two 48 keys extensions).
- Configurable audio messages priority Intercom (call in to master) .
- Caller ID display.
- Configurable ring tones per client.
- 4 configurable single target buttons.
- 2 fixed groups (addressing up to 128 clients each).
- Paging up to 132 devices (128 in group + 4 independent single targets).
- 1 dynamic group.
- Configurable unattended mode timeout.
- Configurable call reject mode (for multi-master environment).
- Recordable unattended mode message.
- Recordable custom message.
- Control of local and clients volume.
- Client Background music (BGM) channel control.
- 10/100 Megabit Ethernet connection supports static or automatic network configuration (BOOTP, DHCP, IPzator).

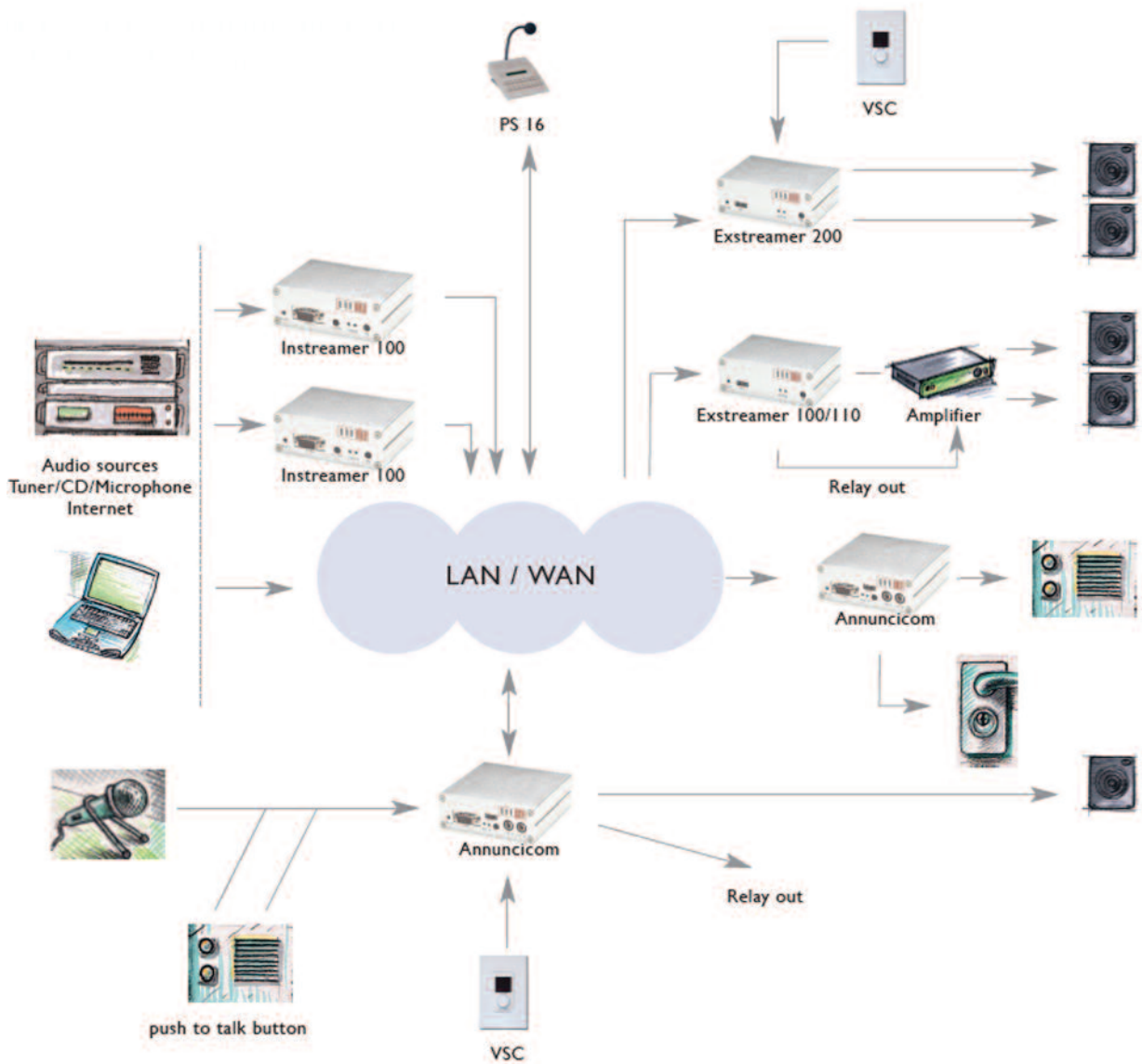
Paging Client Features:

- Full or half duplex mode of operation.
- Single or multi-master mode.
- Playing paging messages.
- Intercom to master.
- Background music playback in mp3 format.
- Supports the HAI Volume Source Control unit and IR remote control.
- Background music (BGM) playback and control.
- AI PHONE door panels support.
- 10/100 Megabit Ethernet connection supports static or automatic network configuration (BOOTP, DHCP, Ipzator).

SUPPORTED HARDWARE:

The ABCL Paging solution is designed to run on the following Barix devices:

- **Annunicom PSI6 Paging Station** – While it is possible to use the Annunicom PSI6 as a client, with its 112 available keys (16 available, others on separate 48 keys extension(s), and two line LCD display is the perfect device to be run as a Paging Master station.
- **Annunicom 200** – Used as a client. Provides mono BGM, intercom, door relay control and paging endpoint functionality. The available two wire interface allows the device to use the AI PHONE door stations in half duplex mode.
- **Annunicom 100** – Used as a client. Provides mono BGM, intercom, door relay control and paging endpoint functionality.
- **Exstreamer 100** – Used as a client. Provides stereo BGM, door relay control, and paging endpoint functionality.
- **Exstreamer 110** – Used as a client. Provides stereo BGM, door relay control, paging endpoint functionality. In addition, it has 2 lines LCD display and an IR port for remote control*.
- **Exstreamer 200** – Used as client. Provides stereo BGM, door relay control, paging endpoint functionality. In addition, it has 2x2.5 W amplified speaker output and an IR port for remote control*.
- **Instreamer 100** – Used only to input background music into the system.
- **IP Audio Module IPAM 100 and IPAM 100 Carrier Board** are also supported.



Barix ABCL PAGING system with the Barix Annunicom PSI 6 Master Paging Station

ABCL BARP PAGING WITH ICGRAPH PC-BASED APPLICATION.

This master/client paging system works with customizable master paging software called ICGraph running on a PC. The clients are Annunicom or Exstreamer devices running ABCL BARP Paging firmware.

ICGraph is an extremely flexible Java-based PC software GUI application that communicates with Barix audio products to provide remote control and monitoring. Together with the ABCL BARP Paging firmware, ICGraph supports robust audio paging and control solutions.

All networked Barix devices can be detected and monitored (current status and network status) with the status displayed on the ICGraph interface. One or multiple Barix client devices can be selected for live paging, and a short audio or voice track can be set as a pre-roll to indicate a page is beginning.

Barix Instreamer devices can be used to stream background music into the system. Background music channels can be set remotely from the ICGraph interface or locally over a BarixVSC (Volume Source Control) interface panel connected to a Barix client device.

ICGraph Features:

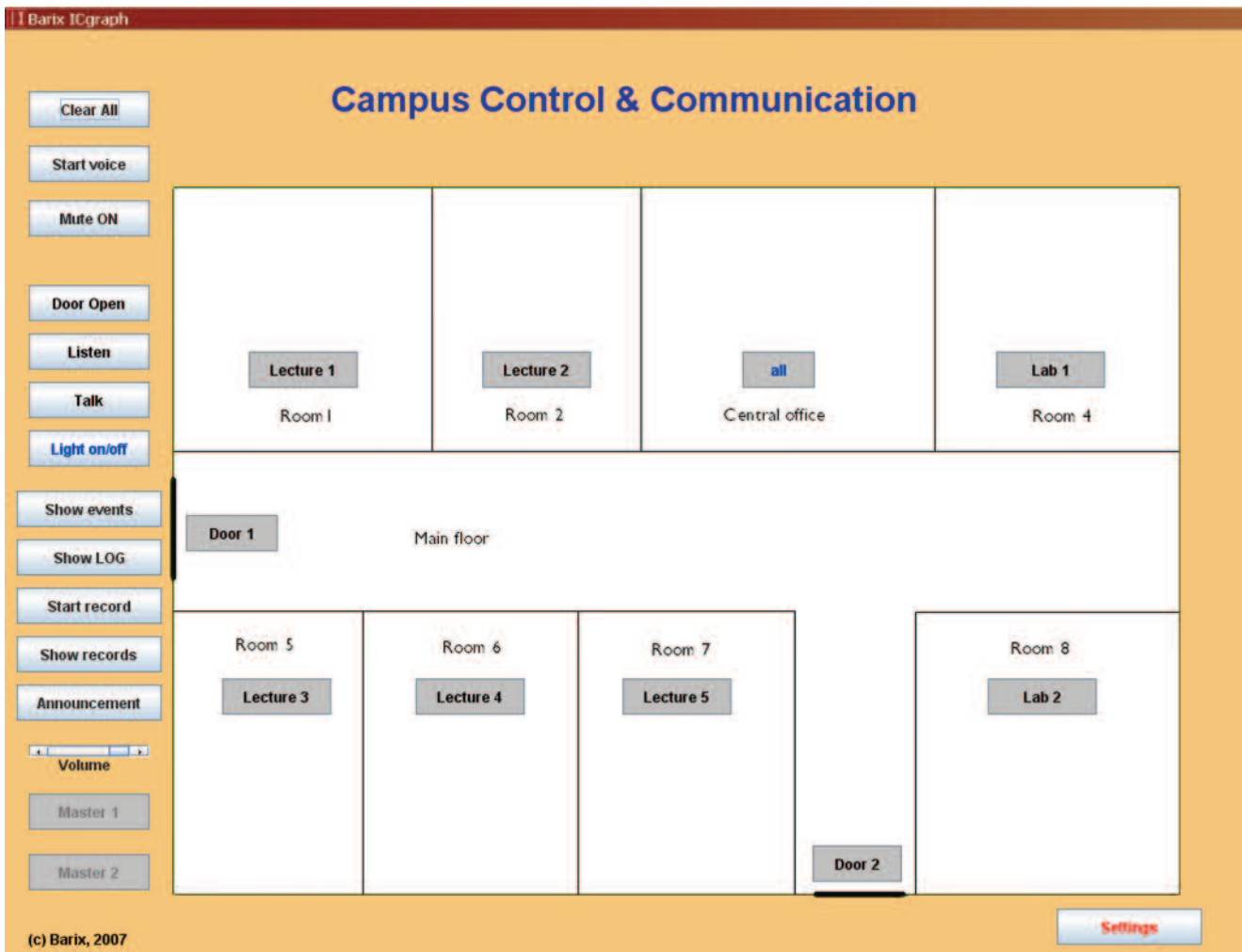
- Configurable, customizable user interface.
- Unlimited points or targets.
- Full-duplex communication with Annunicom (ABCL BARP Paging firmware).
- Half-duplex communication with Annunicom (standard firmware).
- Unidirectional announcements to Exstreamer / Annunicom / IP Audio Module.
- Multi-master functionality, multiple ICGraph masters can exchange status information.
- Audio recording for incoming and outgoing communication.
- Send audio message to one client, selected clients, predefined groups or to all clients.
- Switching relay on the remote Annunicom or Barionet, e.g. to open the door etc.
- Able to execute local commands/start applications on local PC, e.g. open browser.
- Selective-Ring sound notification for incoming requests with visual notification.
- Visible notification for incoming audio streams and selected (active) communications.
- Send any UDP commands (manually or periodically) to other Barix devices (e.g. Barionet).
- Displays status messages / reports from Barix devices.
- Logging functionality.

SUPPORTED HARDWARE:

The ICGraph master client application is designed to run on a PC (master station) and on the following Barix devices:

- **Annunicom 200** – Used as a client. Provides mono BGM, intercom, door relay control and paging endpoint functionality. The available two wire interface allows the device to use the AI PHONE door stations in half duplex mode.
- **Annunicom 100** – Used as a client. Provides mono BGM, intercom, door relay control and paging endpoint functionality.
- **Exstreamer 100** – Used as a client. Provides stereo BGM, door relay control, and paging endpoint functionality.
- **Exstreamer 110** – Used as a client. Provides stereo BGM, door relay control, paging endpoint functionality. In addition, it has 2 lines LCD display and an IR port for remote control*.
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- **Instreamer 100** – Used only to input background music into the system.
- **IPAM 100 and IPAM 100 Carrier Board** are also supported.

**The built in IR receiver of Exstreamer 110/200 devices is not accessible from BCL ABCL applications (like ABCL Paging) can use the BARIX external IR dongle, or the IR receiver of the Volume Source Control unit.*



Sample ICGraph Interface

ABCL SIP CLIENT

Compatible with VOIP phone networks, this customizable system allows Barix devices to seamlessly integrate with VOIP phone and PBX systems. The SIP (Session Initiation Protocol) Client application allows Barix devices to support a standard “telephone fashion” voice over IP communication, using the SIP application-layer protocol.

Along with basic SIP call dialog features, additional features have been added like a special API command support, background music, audio rebroadcasting, and special DTMF commands. Door intercom functionality (call initiation by Annunicom), single station call from phone or PA, and from PA to groups from standard SIP phones or PBX is possible. Even the Barionet, a Barix device with no audio interfaces, can be used to integrate and control devices from a SIP phone.

The ABCL SIP Client application can be configured to work either as a peer to peer with no server required, for example from one Annunicom to another, or more commonly with a standard SIP-based PBX such as Asterisk or Cisco Call Manager. In this case, the Annunicom devices place calls with the PBX as any phone would if a button is pressed, and the device can also be “called” from the phone system. Activation of the device's relay/door strike is done via a code typically punched in on the connected phone, via proper configuration on the PBX server.

Features:

- SIP (RFC 3261) compliant architecture.
- Configurable destination number to call for every input contact.
- Configurable call “pick up”/“hang off” timeout interval.
- Configurable “call on level” feature.
- Configurable “peer to peer” or “proxy based” connections.
- Configurable SIP and audio RTP ports.
- uLaw/aLaw 8kHz audio.
- Audio rebroadcasting.
- DTMF door open key sequence.
- Special DTMF commands.
- Serial, UDP, TCP or CGI control interface.
- Idle background music (BGM).
- Friendly WEB based configuration.
- 10/100 Mbit Ethernet connection supports static IP or automatic network configuration (BOOTP, DHCP, Ipzator).
- Configurable Syslog debugging.
- Tested with Asterisk 1.4.29 and OpenSER 1.3.2 SIP Proxy/Registrar (PBX) Servers.

SUPPORTED HARDWARE:

The SIP solution is designed to run on the following Barix devices:

- **Annunicom 200** – Used as a client. Provides mono BGM, intercom, door relay control and paging endpoint functionality. The available two wire interface allows the device to use the AI PHONE door stations in half duplex mode.
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While these prebuilt ABCL packages are ready to use, it is also possible to customize them further or even build entirely new ABCL solutions. The use of open standards and protocols lets Barix hardware and applications function on their own or integrated with existing technology, at affordable prices.

Barix devices are reliable, not susceptible to viruses or other tampering. They work in the background with low power needs, no maintenance, updates or cooling requirements – The devices are the same technology that other campuses, broadcasters, military and commercial users worldwide rely upon. Whether in Antarctica, America, or Zurich, audio-over-IP devices from Barix work reliably, without maintenance, day after day, year after year.

Conclusion

Whether seeking to create a new campus-wide paging/intercom/security system or to expand existing systems, Barix technology solutions provide affordable scalability and reliable functionality.

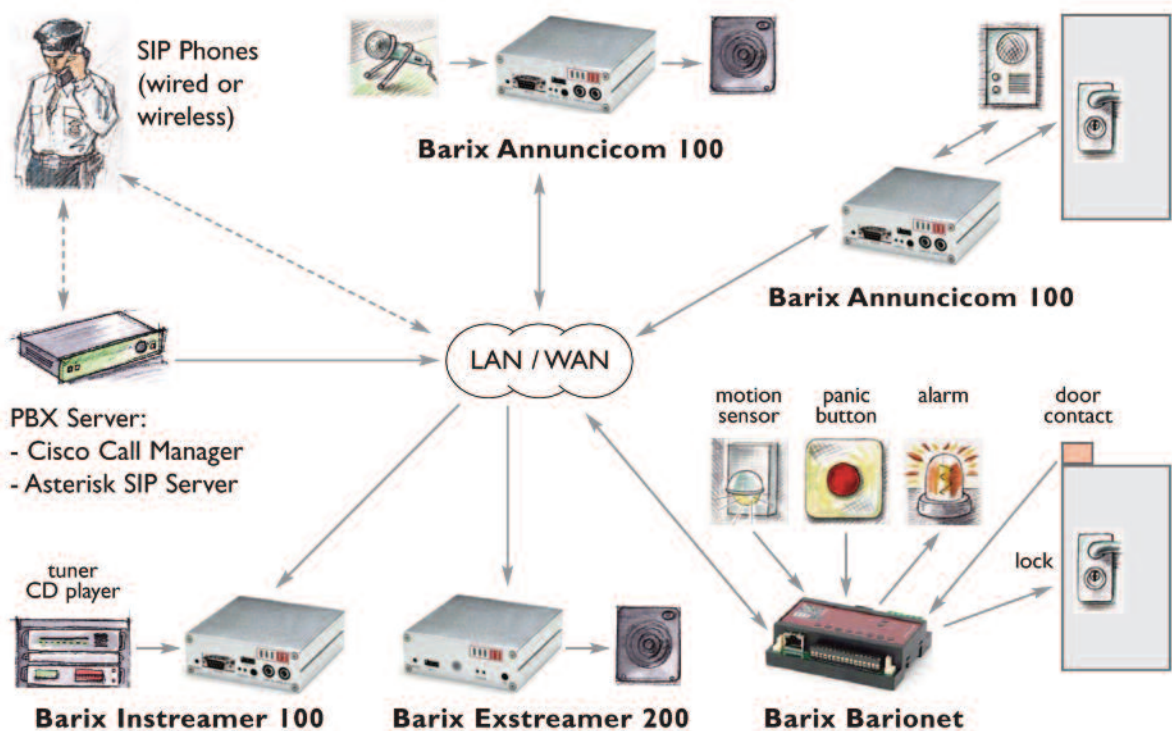
Contact information

More information can be found at

www.barix.com.

Questions can be directed to :

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Intercom, Paging and Control using SIP Phone



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