	Date	Documents	Version	Author
BARIX	23/06/09	Barix Annuncicom Firmware for Crestron	01.01.00	Giacomo Trovato

BARIX ANNUNCICOM FIRMWARE FOR CRESTRON

Introduction

The Annuncicom 100-CS is a custom audio over IP intercom solution developed collaboratively between Crestron and Barix, to enable easy integration of audio into residential control applications. The Barix Annuncicom 100-CS enables streaming IP intercom communication between Crestron Isys i/O™ WiFi touch panels, and also provides seamless integration with Crestron IADS analog intercom systems. What Crestron devices supported, what Barix? The Annuncicom 100-CS is a Barix Annuncicom 100 with a special firmware loaded that communicates with Crestron control systems for analog audio and digital IP intercom applications, delivering point-to-point distribution of full-duplex audio between TPMC-8X, TPMC-8T and TPMC-8L touch panels. Barix Audio over IP technology also enables integration of new digital IP intercom solutions with existing IADS analog intercom systems, providing a flexible, cost-effective digital upgrade path. Connect one or more Barix Annuncicoms to a C2N-IADS30x24 to enable seamless intercom communication between a digital Crestron touch panel and an analog Isys® touch panel.

1 - Software details

The software provides a full duplex audio gateway between the analog input/output of the Annuncicom hardware and a device sending and receiving audio via a UDP socket.

The used audio format is plain UDP, little endian PCM (low byte first) 16bit, 22.05kHz sample rate. UDP frames will always contain full samples (even number of bytes). No RTP framing will be used in this application.

The application sending audio to the Annuncicom can send any number of samples in each UDP frame as long as the UDP frame size is kept below 1400 bytes, however, it is suggested to send between 10ms and 20ms of audio samples per block. The ABCL firmware will send 600 Bytes (300 samples, ~13.6ms) per UDP block.

A UDP responder is provided to allow discovery of the device. When a UDP block with the content “c=65535” (any additional bytes will be ignored) is received, the device answers with a message containing an Identifier, the IP, MAC Address, Software Version and a configurable Location Name. Details are specified below. The answer is always sent from the local UDP port the discovery has been received on to the source address/port of the discovery block via unicast.

A TCP control port is provided to control the Audio Streaming as well as I/O on the device. Only one connection is possible to this control port. The used protocol is ASCII based and detailed below.

2 - Discovery Protocol

- The discovery protocol uses the fixed port number 12301.
- The only block the device responds to is a block starting with “c=65535”. all other blocks are ignored.
- The discovery listener opens multicast address **239.53.19.71.** Broadcast, unicast and Multicast blocks are answered.
- The answer is built up as following: fields are separated by comma and of variable length. After the last field, a <CR> is sent for convenience. The fields sent are:
- Magic: a 6 byte string “ANNBAR”
- IP: The IP Address of the device, in standard notation
- MAC: The MAC Address of the device with colon separators
- Type: The device type as a string
- Version: The software version of the ABCL application
- Location: The location string (configured) in quotes (may contain comma and space)
- Example of a device answer (<CR> stands for character 0x0d hex)

ANNBAR,192.168.1.109,00:08:E1:00:88:E4,Annuncicom-100,1.0,”Main door”<CR>

3 - Audio Ports and Format

- The Audio format is fixed to raw PCM 16bit samples, signed, little endian (intel format, low byte first).
- The used sample rate is fixed 22.05kHz.
- The UDP receiver for audio is listening at port 3030
- Every UDP block sent and received must contain full samples.
- It is suggested (though not required) that every block contains the same number of samples.
- The Annuncicom sends 300 Samples (600Bytes) per block which corresponds to about 13.6ms time.
- The Annuncicom listens for audio on port 3030. It does not filter the incoming blocks by IP address, anything sent to this port is considered valid audio and played out.
- The Annuncicom starts by building up a jitter buffer of roughly 40ms (900 samples) before it begins playback.
- The Annuncicom will only send audio out when instructed by a command via the

TCP port. It will stop sending audio when it either recieves a stop command or the TCP control connection is terminated or lost. The target address can be a broadcast or multicast address and is set by the commands.

4 - TCP Control Port

- The TCP control port is available at port number 12302.
- Command sent to the port must be terminated with a <CR> (0x0d)
- Unknown and malformed commands will be ignored
- The device sends unsolicited status updates via the TCP control port whenever I/O state and audio streaming state changes happen. When the connection is opened, the controlling device should issue a “Q” command to initate a full status update.
- The following commands are supported (controller->Annuncicom):
    - S<ip>,<port><CR>
      This command instructs the Annuncicom to stream audio to the specified IP address and port number. The address may be a Multicast or the Broadcast address (or any Unicast address).
      The device will stream until it receives either an “empty” stream command (S<CR>) or the TCP control connection is dropped.
      A change in the streaming state, typically triggered by the “S” command, will initate the transmission of an “S” message (see 5.6.3).
    - R<nr>,<val><CR>
      This command activates local outputs (relays) available on the device. <nr> is the relay number, counting from 1 (one relay available on the Annuncicom-100, 8 relays on the Annuncicom-1000). Commands for unknown/unimplemented outputs are ignored.
      <val> is either 0,1, or a T followed by a value of 1..65535. A value of 0 deactivates the relay, a value of 1 activates the relay permanently, and a value of 1..65535 activates the relay for the given time (in ms). If the relay is already active, the time will be extended by the time value. If a command with value 0 or 1 is received, a current timed command will be terminated. Example – switching relay one on for 1 second:
      R1,T1000<CR>
    - Q<CR>
      The “Q”uery command is sent by the host to enquire the state of all available inputs and outputs. It is typically sent once after the connection is initialized, but can be sent at any time. The device will send automatic updates with any I/O change, so polling via this command is not necessary.
    - P<val><CR>
      The “P”oll command can be used to check if the line is still available. The command (including a possible parameter) will be returned “as is”

by the device.

- A<val><CR>

  The “A” command set the audio input channel, a value of 0 select the “mic.” input, a value of 1 select the “line” input.

- G<in><val><CR>

  The “G” command set the gain for the input channel. If “in” is 0, the gain is set for the “mic.” input channel, if “in” is 1, the gain is set for the “line” input channel. The “val” field set a gain value included in the interval between 0(min) and 15(max).

- V<val><CR>

  The “V” command set the output volume. The “val” field set a volume value between 0 and 19, in 5% increments, starting from 0 (0%) to 20 (100%) .

- The following messages are sent from the Annuncicom to the Host on status changes or when requested from the host using the “Q” command. The “Q” command triggers the device to report ALL states of inputs, outputs and the audio interface.

  - I<nr>,<val><CR>
    The “I” message reports back the state of inputs on the device (2 on Annuncicom-100, 8 on Annuncicom-1000). the value is typically 0 or 1, but on the Annuncicom-1000, with wire supervision enabled, may also be -1 or -2 for a wire short or wire break condition.
    As a response to the “Q” command, all input states are reported, and any change on any input will then reported by a corresponding message.

  4. R<nr>,<val><CR>
     The “R” message reports back the actual state of the relays (outputs) of the device (1 on Annuncicom-100, 8 on Annuncicom-1000). The value is 0 or 1 for inactive and active. As a response to the “Q” command, all relay states are reported. Any change (due to commands sent from the host or the end of a timed command) will then be reported via R messages.

  - **S<state>,<ip>,<port><CR>**
    The “S” message reports back the actual state of the audio encoder. A state of “0” means idle/closed, not streaming. A state of “1” means streaming, and only in case the state is 1 the additional parameters are valid. The IP address and port parameters, when provided with status “1”, refer to the actual target the device is sending the stream to.

- The following message is sent from the Annuncicom to the Host when requested from the host using the “P” command:

  - P<val><CR>
    The P message is sent as a respond to an incoming P message (returned “as is”).