ClearOne

TECH NOTE

PRODUCTS SUPPORTED:

Beamforming Microphone Array

CLEARONE DOCUMENT NTS-0042-001
(REVISION 1.0) May 2016

BEAMFORMING MICROPHONE ARRAY COMMUNICATION ERROR SOLUTIONS AND REVISED INSTALLATION REQUIREMENTS

OVERVIEW

Most Beamforming Microphone Array (BMA) installations require long, custom installed expansion bus (Ebus) cable runs between the CONVERGE Pro Digital Signal Processor (DSP) and the Beamforming Mic Arrays. Most installers will pull bulk cable and terminate the cable themselves. Usually the installer will report whether the installed cable passes tests from state of the art cable testers such as Fluke handheld cable testing systems.

It is important to note that the CONVERGE Pro and BMA do not utilize Ethernet protocols, though they do physically use the same specification of cable. Firmware version mismatch, Electro Magnetic Interference (EMI) and grounding issues can have a negative effect on stable Ebus communications and result in poor performance or failure of the BMA. This document outlines revised installation guidelines and how to troubleshoot for solutions to any resultant communication errors.

DIAGNOSIS

THE SYMPTOMS

- Missing post gate audio meter data in the BMA channel view in CONSOLE software
- Missing AEC functionality, even if configured properly for it
- Poor quality audio from the BMA
- Ungated mic audio, even when gating is specified for the channel

There are a few ways to confirm Ebus cable related issues. If you review device logs from the CONVERGE Pro Proxy DSPs (840T, 880T, 880TA, and 880 can all act as proxies for BMA) you may see repeated Start or Stop ProxyHandler_Task messages.

Device Log data taken from an 840T acting as Proxy shows connection losses correlated with anomalous, repeated ProxyHandler messages:

```
04/05/2001 06:49:57    START_PROXYHANDLER_TASK: SPAWNING TASK "TPROXY"
                       START_PROXYREADER_TASK: SPAWNING TASK "TPRXREAD"
04/05/2001 06:51:16    TELNET REMOTE DISCONNECTED
04/05/2001 06:51:34    TELNET ACCESS GRANTED TO 192.168.1.192:23
                       CONVERGE CONSOLE DETECTED ON 192.168.1.192:23
04/05/2001 06:55:45    TELNET REMOTE DISCONNECTED
04/05/2001 07:06:54    STOP_PROXYREADER_TASK: TASK "TPRXREAD" DELETED
                       STOP_PROXYHANDLER_TASK: TASK "TPROXY" DELETED
04/05/2001 08:00:57    START_PROXYHANDLER_TASK: SPAWNING TASK "TPROXY"
                       START_PROXYREADER_TASK: SPAWNING TASK "TPRXREAD"
04/05/2001 08:08:15    STOP_PROXYREADER_TASK: TASK "TPRXREAD" DELETED
                       STOP_PROXYHANDLER_TASK: TASK "TPROXY" DELETED
04/05/2001 08:14:55    TELNET ACCESS GRANTED TO 192.168.1.192:23
                              CONVERGE CONSOLE DETECTED ON 192.168.1.192:23
04/05/2001 08:15:36    START_PROXYHANDLER_TASK: SPAWNING TASK "TPROXY"
                       START_PROXYREADER_TASK: SPAWNING TASK "TPRXREAD"
04/05/2001 08:16:00    STOP_PROXYREADER_TASK: TASK "TPRXREAD" DELETED
                       STOP_PROXYHANDLER_TASK: TASK "TPROXY" DELETED
04/05/2001 08:16:35    TELNET REMOTE DISCONNECTED
04/05/2001 08:16:53    TELNET ACCESS GRANTED TO 192.168.1.192:23
                              CONVERGE CONSOLE DETECTED ON 192.168.1.192:23
04/05/2001 08:16:56    START_PROXYHANDLER_TASK: SPAWNING TASK "TPROXY"
                       START_PROXYREADER_TASK: SPAWNING TASK "TPRXREAD"
04/05/2001 08:17:13    STOP_PROXYREADER_TASK: TASK "TPRXREAD" DELETED
                       STOP_PROXYHANDLER_TASK: TASK "TPROXY" DELETED
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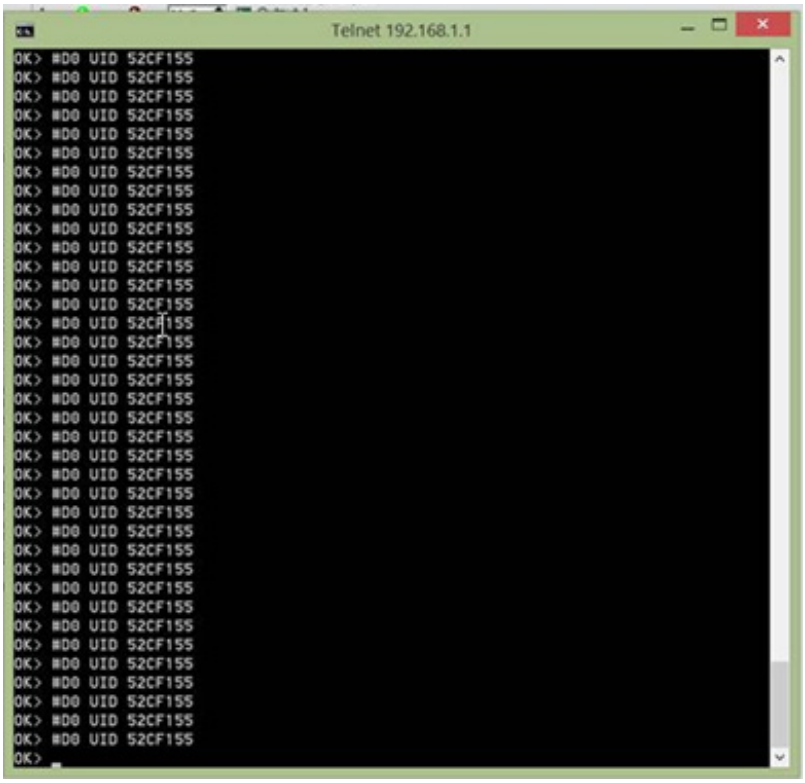
The above log was taken with a CONVERGE Pro 840T + BMA setup.

ClearOne Tech Support noticed that even though the microphone showed up in CONSOLE software and reported error free data communication, it was noted that there was no meter activity on the post gate meter of the BMA, even though the CONSOLE software post gain meter showed normal levels.

Other instances of communication failures are associated with repeated Ebus device discovery events that can be seen as a repeated broadcast of UID strings. Establish a telnet connection to a Proxy DSP and observe the connection for a few minutes. See below for an example of a BMA attached system with Ebus issues:



This cause of this failure was determined to be a Cat 6 cable terminated with Cat 5 connectors connected between the BMA and the CONVERGE Pro DSP.

THE CAUSES

- Mismatched or outdated firmware (All units should be at 4.4.0 or later)
- Signal loss / EMI on the installed Ebus cables
- Ground Loop / voltage differentials on AC ground between different units connected on the same Ebus network

REQUIREMENTS & RESOLUTION

FIRMWARE REQUIREMENTS

Firmware should be updated on the BMA before any other device. To update the BMA firmware, you must first connect to the site in CONSOLE software. You may need to correct cable or AC grounding issues before this is possible. Use an externally run premade cable if you are not certain about the installed cable.

If you can't get the CONSOLE software to recognize the BMA, try these steps:

1. Power cycle the CONVERGE Pro(s), then power cycle the BMA by unplugging PoE Power injector module or disconnecting the PoE cable.
2. Once rebooted, connect in CONSOLE software.
3. If this does not work, try the above steps again.
4. If it still does not work, default the Proxy DSP(s) the mic(s) are attached to and connect in CONSOLE software again. Be sure to have a saved site file to reload later on!
5. If you are still unable to get connected, contact tech support.

Once connected, verify firmware levels by right clicking the unit icon under Site Properties and verify the firmware is 4.4.0 or later. If it is not, open the Services menu within CONSOLE software, and then open the Firmware Loader.

Left click the browse button 

to select the firmware file. Open the *bf_mic.mdo* file and verify your mics appear in the list. If they do, left click Upload Firmware. If not, disconnect and try again.

All attached devices will reboot once the BMA firmware is done uploading. Reconnect in CONSOLE software and then perform a second firmware upload for the CONVERGE Pro DSPs. By default, the firmware loader selects the *converge.mdo* firmware so you do not have to browse for it. Test the mics again to verify the problem is resolved. If not, continue to troubleshoot.

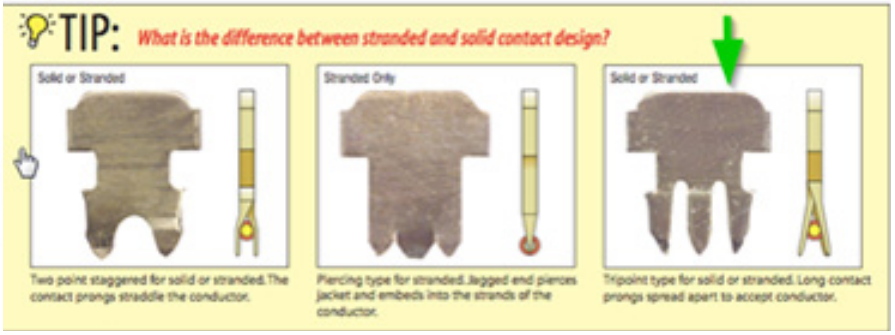
EBUS CABLE REQUIREMENTS

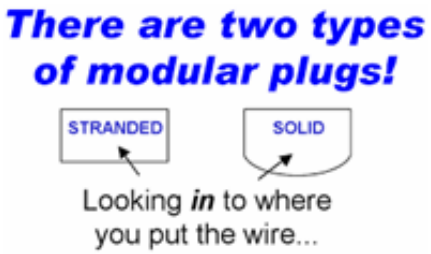
We suspect some field installed cables are not providing the signal integrity required for stable Ebus operation. Installers may not use high quality tools, cables or connectors when assembling and running Ebus cable runs. Variance between vendors, mismatched specifications on cables and connectors, signal loss due to poor construction or poor contact on the connectors, and false positive cable test results all tend to escalate support issues related to this problem. The consistent remedy in all of these cases has been to replace the installed field-created cable with factory terminated pre-made cable of Cat 6 or better. The communication issues disappear or are greatly reduced once this is done. If premade cables cannot be used because of conduit or install space limitations, installers should use high quality Cat 6 shielded cables and terminators.

Connectors are important; installers must certify they are using the correct specification and type for solid core Cat 6 when using Cat 6 cable:

CAT 6 (Left) and CAT 5 (Right) connectors are different! Use the correct connector with the correct cable.

Use connectors made for solid core cable. The contact design on the right is preferred.

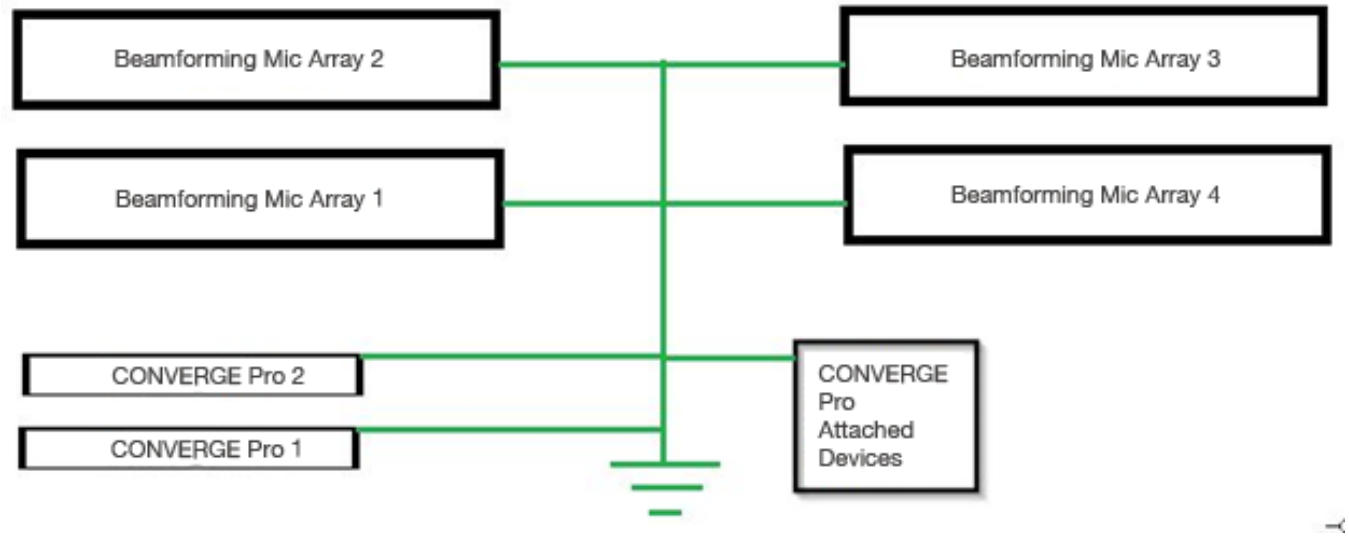




Shielded cable types must be terminated with shielded connectors and ground wires must be connected properly.

AC GROUND REQUIREMENTS

Large installations that have several rooms spread out over a large area often result in different AC circuits being used to power the BMAs, DSPs and attached peripherals. It is very common for a voltage differential to arise between the ground wires of different AC circuits in commercial buildings. This can cause Ebus communication failures.



We have found through testing that as little as 1.8 V between AC ground on any device connected on the same Ebus network can result in Ebus communication failures. All CONVERGE Pros and BMA PoE Power injector supplies must share a common ground, even if devices are distributed across different rooms.

PRE-INSTALLATION CHECKLIST FOR INSTALLERS

- All ClearOne devices connected to the same expansion bus network should be powered by the same AC circuit and a good quality AC ground should be common between all systems. An exclusive technical AC ground may be provided to all CONVERGE Pro equipment to avoid common line interference from attached non-AV equipment.
- PoE Power injector modules or third party PoE switch supplies and CONVERGE Pro DSPs will need to share the same technical AC ground.
- AC isolation transformers may be used when it is impossible to connect all ClearOne devices to the same AC circuit, or when ground issues are suspected.
- An electrician can certify power quality and correct ground issues that AV installers may not be able to overcome using the above recommendations.

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