



ip.buffer App Note
AN008 : Testing the ip.buffer



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1. Introduction

When the ip.buffer is manufactured it is fully tested using ATE (Automated Test Equipment) that was designed and coded by Scannex. The ATE tests all the COM-ports, the battery functionality, and all other elements of the ip.buffer. The ATE consists of special firmware for the ip.buffer and a PC-based application and hardware.

For the benefit of some of our customers Scannex has made available the ATE Firmware for the ip.buffer. This document describes how to load and use this firmware with a simple Telnet command line tool on a PC.

2. Loading the ATE Firmware

2.1. *Before you start*

Although it is possible to run the ATE Firmware without touching the data or configuration in the normal ip.buffer firmware it is advisable to make backup copies of the configuration, and to download the stored data - just in case!

2.2. *Entering the BootLoader*

This step is not strictly needed - you can upload the ATE Firmware through the main firmware upgrade process of the ip.buffer. However, this is the procedure that the full Scannex manufacturing ATE goes through:

- Connect the RJ45 network cable into the ip.buffer
- Hold the front button in (the little hole between the LEDs on the ip.4 & ip.2, or in the front of the plastic case on the ip.1)
- Keep holding the button in while connecting the power supply
- When the LEDs start “beebing” (bouncing from right to left), then let go of the button
 - The ip.buffer is now in “boot loader” mode.

2.3. *Uploading the ATE Firmware*

- Using SEDiscover, refresh the display - you should see “!*!LOADER!*!” next to the serial number of the ip.buffer
- Select the buffer from the list and click the browse button (the “world” icon) to load your default web-browser
- You should see a web page appear with “Scannex BootLoader”.
 - The Serial Number is displayed (this is stored in a read-only area)
 - The Factory information is also displayed - giving the device type and manufacture date.
 - The Flash size is also displayed
 - The currently loaded firmware is also shown
- Select the “[Upload]” link
- Click the “Browse” button and select the firmware file:
 - The firmware file will be in the form “20081124_atetest.blf”
 - Click the “[Upload]” button at the bottom of the page
- When asked, click the “REBOOT” link to reboot the buffer
- Close the browser (the ip.buffer will no longer be at 192.168.0.235 and will not have a web-interface).
- While the ATE Firmware is running the LEDs will bounce from right to left and back left to right in a continuous loop.

3. Connecting to the ATE Firmware

The ATE Firmware is accessed through a simple Telnet interface. However, you first need to get the PC to link to the ip.buffer correctly.

- Locate the ip.buffer
 - Run up SEDiscover and click the refresh
 - Any ip.buffer running ATE Firmware will show “!!!ATE!!!” in the name field.
 - Select the ip.buffer you wish to access and click the browse button (the “world” icon)
 - Your browser will **fail** to connect. However, SEDiscover will have created the correct ARP entry and a temporary routing entry so your PC can talk to the ip.buffer¹.
- Now connect to the ATE Firmware:
 - Select “Start / Run”
 - Type “telnet 192.168.0.233” and hit [Return]
 - You should see a help screen for the “Test” firmware.
 - Note: the serial number is displayed underneath the title.

The above approach works even if there are multiple ip.buffer running on the same physical LAN segment.

¹ If your PC has multiple Ethernet interfaces, or multi-home addresses the SEDiscover may not successfully create the routes required. These routes can be created manually with the “route add” command, and the ARP cache can be controlled with the “arp -d” and “arp -s” commands under Windows. Scannex can provide detailed information if necessary.

4. Using the ATE Firmware

The ATE Firmware allows full functional testing of all COM ports, power supply flags, real time clock, and a simple check on the modem.

4.1. Getting Help

Just type “`HELP`” and hit [Return] at the “>” prompt. The initial help screen will be displayed, showing a command summary for the ATE firmware.

4.2. Loop-back Connector

The COM-ports require a loop-back connector with the following design:

- D9 female connector
- pins 2 & 3 shorted
- pins 4 & 6 shorted
- pins 7 & 8 shorted
- All other pins (1,5,9) not connected

4.3. COM-port testing

To test the COM-port you will require at least one serial loop-back connector.

- Connect the D9 loop-back connector into the required COM port on the ip.buffer
- Type in “COM1” to test COM1.
- For a successful test you should see:
(OFF) passed.
(DCE) passed.
(DTE) passed.
COM1: passed.
- If the port fails there will be information shown that indicates what the fault is (only selection shown):
 - Three port configurations are tried:
 - “(OFF)” - the port is unpowered and the loop-back is attempted. Nothing should be reflected.
 - “(DCE)” - the port is setup in DCE mode and loop-back attempted.
 - “(DTE)” - the port is setup in DTE mode and loop-back attempted.
 - “!dtr1/0, rts0/0” indicates that DTR was asserted, but DSR remained unasserted.
 - “!dtr0/0, rts1/0” indicates that RTS was asserted, but CTS remained unasserted.
 - “!TO0” shows that the data receive timed-out while receiving character 0.
 - “!AB” shows that the auto-baud detection has failed
 - “!NEG1/0” indicates that the negative line detection circuit expected “1” but got “0”²
 - “!LINE1/0” indicates that the line detection circuit expected “1” but got “0”⁰
 - For all failures, “COM1: !!FAILED!!” is shown as a summary.

² “0”=nothing, “1”=pin 2 detected, “2”=pin 3 detected, “3”=both pins 2 and 3 detected (illegal state in ATE Firmware).

4.4. NAND Flash Enquiry

Typing “NF” and hitting [Return] will show a summary of the NAND Flash parameters.

Since NAND flash can be shipped from the chip manufacturer with some bad blocks this command also shows the list of factory marked bad blocks (these blocks are never used).

4.5. Modem Query

The modem query command “MODEM” will do a simple query. It should display:

```
MODEM:ATI3
```

```
CX86501
```

```
OK
```

```
>
```

- This command simply checks the link between the Multitech module modem and the CPU. It does not check modem handshake lines, dial-out, and dial-in.

4.6. Power Supply Testing

The “PSU” command will show the current state of the power-related inputs:

- `Button` - shows whether the front button is currently pressed
- `Power` - shows whether system power is ok³
- `-48V` - shows whether the optional 48V input is detected (ip.2 & ip.4 only)
- `BatteryFitted` - shows whether batteries appear to be installed and are charging.
- `BatteryPower` - shows whether currently running on batteries

4.6.1. Full battery test

You will need 3 x AA NiMH batteries that are already charged (see the ip.buffer user manual for installation details). First, power off the ip.buffer and install the batteries. Then reconnect to the ATE Firmware using Telnet.

With the Telnet connection running:

- Running on mains:
 - Type “PSU” and hit return
 - `Power=1` (see footnote 3)
 - `BatteryFitted=1`
 - `BatteryPower=0`
- Running on battery:
 - Disconnect the plug-top charger from the wall (leave the connector plugged in)
 - Type “PSU” and hit return
 - `Power=1` (see footnote 3)
 - `BatteryFitted=1`
 - `BatteryPower=1`
- Now disconnect the DC connector
 - Verify that the ip.buffer dies.
 - (The DC connector has a switch that should power off the buffer when the plug is removed.)
 - You will need to break out of the Telnet tool:
 - Press `Ctrl-]`
 - At the “Microsoft Telnet>” prompt, type “Q” and hit `[Return]`

³ If “`Power=0`” is shown then the input supply is too low and the ip.buffer cannot correctly detect power down situations.

4.7. Erasing the NAND Flash

Typing “ERASE” and hitting [Return] will completely erase the NAND flash.

- **WARNING:** All scripts, configuration parameters, and data will be utterly destroyed. The ip.buffer will automatically revert to a “virgin” device once the genuine firmware is reloaded.

If you wish to preserve the current scripts, configuration parameters, and data then don't run this command. Once the genuine firmware is reloaded everything should return.

4.8. Erasing the ATE Firmware and Rebooting

The “ERASEFW” command will erase the ATE Firmware, while “REBOOT” will then reboot the ip.buffer.

- This command does not affect scripts, configuration parameters, or data. (On the other hand, the “ERASE” command will!!)

With no firmware loaded the ip.buffer will automatically reboot into the “Scannex BootLoader”.

- *Having run the “ERASEFW” command from the ATE...*
- Type in the command “REBOOT” in the ATE command window
- Wait 10 seconds
- Using SEDiscover
 - Click the refresh button in SEDiscover (or F5 key)
 - Open the web page for the ip.buffer
 - Load the required version of firmware
 - Reboot the ip.buffer when asked

The ip.buffer should now have genuine firmware.

4.9. Verifying the real time clock

Once the correct firmware is installed you can also check the RTC (Real-Time-Clock) battery:

- Use the ip.buffer web page “Setup / Date & Time Synchronize” to ensure the RTC is correct
- Unpower the ip.buffer
- Wait for at least 10 seconds
- Power up the ip.buffer
- Open the web page for the ip.buffer (or refresh your browser if already showing the buffer's status screen)
- Check the status screen:
 - Real Time Clock⁴ (shown as “System Time”)
 - *(You can verify any other settings at this point - e.g. firmware version)*

⁴ If the year shows 2000, then the RTC battery needs replacing.

5. Troubleshooting

If the ip.buffer fails to boot-up, the LED sequences on the front panel give some indication as to the problem.

- The Network Link LED is driven by the Ethernet chip directly and will always show what the Ethernet link status is. (It is not driven by software/firmware)
- **Channel 1 LED on, all other LEDs off**
 - CPU complete boot failure
 - Return to Scannex
- **Red “E” solid for around 10 seconds then rapidly flashing forever (Channel 1 green LED is also on)**
 - This indicates an SDRAM failure.
 - You can:
 - Connect a serial terminal to COM1
 - Set the 115200baud, 8bit word
 - Reboot the ip.buffer again
 - The ip.buffer will output a memory diagnostics pattern to the serial port
 - Return to Scannex
- **LEDs “beebling” in a bouncing pattern from right-to-left then left-to-right**
 - Running ATE Firmware
- **Red “E” flashing at 2Hz**
 - Running the BootLoader
 - While pressing the front button the LEDs should “beeble” from right-to-left.
 - SEDiscover functions, along with the web-interface for the BootLoader
 - Upload firmware via the web-interface
- **Red “E” blinks rapidly for about one second, then all LEDs blink on then off.**
 - Normal boot-up sequence. The boot-up time is extremely quick (no longer than 10 seconds).
 - The green “S” LED should blink once every second to show the main ip.buffer application is running.
 - Every 8 seconds all LEDs will blink on, then off to indicate that the INTEGRITY kernel is running.