GlueLogix Application Note
Master Socket Usage
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Rev D, 02Mar2023

1. Introduction

In 2015, a socket interface was introduced to LineLogixPC ("LLPC") to support running under control of a master program. Its functions were limited to Start Roll, End Roll and count updates.

Starting with `Version 4.167 04Nov2020`, the Master Socket mechanism was extended:

- Start Roll and End Roll are retained,
- In Standalone (no TCU) modes, the detected UID/TID is sent to the Master socket, so the Master can compute encode data,
- In Standalone (no TCU) modes, the Master can optionally send encode data via the Master Socket, overriding the standard LineLogixPC Barcode data path.

Starting with `Version 4.212 05Dec2022`, the Master Socket mechanism was further extended:

- Pause and Resume are introduced,
- Socket Replies are introduced,
- The example application has upgrades for delayed replies to UTid messages and improved robustness for edge case socket failures.

This appnote describes the usage of the new Master Socket. It relies heavily on the disclosure of sample software "Master Socket Tester."

Files referenced in this document are available in the customer's login area on GlueLogix.com.

1.1. Revision History

Rev A, 04Nov2020: Original.

Rev B, 05Nov2020: Added description of heartbeat.

Rev C, 05Dec2022: Added socket replies and Pause/Resume commands.

Rev D, 02Mar2023: Removed customer names.

2. Master Socket Protocol

When configured for this application, LineLogixPC will attempt to open a TCP client socket on localhost port 8081 (see specific configuration below). The example Master Socket Tester application provides that socket. If a connection is not made, LineLogixPC will not Start Roll or try to read tags.

Once connected, the socket protocol is ASCII text, with ASCII-HEX data. The text includes comma delimited fields and ends with a CR ('\n', 0x0A). The first field of each command is a source identifier, either Master or LineLogix. These are the commands:

`Master,StartRoll`

> Commands LineLogixPC to Start a Roll, i,.e., start encoding tags as configured in the JOB and DAT files. This command is not needed if `autostart=True` is set in the JOB file as

shown below. There is no response from LineLogixPC for this command.

As of 05Dec2022, LineLogixPC replies `LLPC: Roll Started` when this command is processed. If that reply is not received by the network Master, the command may have been missed by LineLogixPC and should be resent.

`Master,EndRoll`

Commands LineLogixPC to complete its current log file and cease RFID operations. If this command is not sent before LineLogixPC is Killed through the .Net Process interface, the end of the LineLogixPC Log file will not be written to disk. There is no response from LineLogixPC for this command.

As of 05Dec2022, LineLogixPC replies `LLPC: Roll Ended` when this command is processed. If that reply is not received by the network Master, the command may have been missed by LineLogixPC and should be resent.

`Master,Pause`

Causes Standalone applications to stop polling for a new tag. The End Roll command can be sent while LineLogixPC is Paused. The Paused flag is cleared at the next Start Roll event.

LineLogixPC replies `LLPC: Paused` when this command is processed. If that reply is not received by the network Master, the command may have been missed by LineLogixPC and should be resent.

`Master,Resume`

Causes Standalone applications to resume polling for a new tag.

LineLogixPC replies `LLPC: Resumed` when this command is processed. If that reply is not received by the network Master, the command may have been missed by LineLogixPC and should be resent.

`LineLogix,UTid0,008029c3f2097204`

This message from LineLogixPC alerts the Master to a new Tag ID. Note the byte format – 8 bytes including zero padding, with the 04 manufacturer byte at the end. Four byte UIDs are presented with four 00 bytes on the left. This is the UID byte order presented by the FEIG reader, and required by the reader in a Select command.

LineLogix expects the EncodeData0 message in reply. **If no reply is received in 5 seconds, LineLogixPC will display a dialog box so that barcode data can be manually scanned.** The dialog box can be suppressed by placing `timeout=-1` is included in the `JOB` file `Application` string (see below).

`Master,EncodeData0,u12345678`

This is the encode data message from Master to LineLogix, and should only be sent in response to the UTid message above. Note the 0 in EncodeData0. That denotes the reader number (see [reader0] below). This small feature allows for future expansion to multiple reader configurations.

The 'u' in "`u12345678`" means "User Bank" data. In LineLogixPC, the block data of HF chips is treated similar to Gen2 User Bank data, and the other Gen2 banks are treated as "metadata."

As of 05Dec2022, this reply can be delayed indefinitely if `timeout=-1` is included in the `JOB` file `Application` string (see below). This feature is expected to be used for process flow control. During the delay period, LineLogixPC will resend the UTid message periodically.

```
Feig1: 1 OK 008029c3f2097204,12345678 Wed Nov 04 12:27:27 2020
```

This is the result of encoding. Feig1 is the Name of reader0, set in the JOB file.

A bad encode would show “0 BAD” instead of “1 OK” and might be missing UID, data or both.

Heartbeats

Every 5 seconds when idle, LineLogixPC sends “?\n” as a heartbeat message. If that causes an exception, the socket is closed and reopened. LineLogixPC does not check for an echo of the heartbeat, although Master Socket Test provides one. If MasterSocket Test does not see a heartbeat or other traffic within 10 seconds, it sends “!\n” as a Master heartbeat. An exception on that operation is taken as a sign of LineLogixPC crash, and the Master Socket is reinitialized. No echo or other response to the Master heartbeat is provided by LineLogixPC.

2.1. Troubleshooting

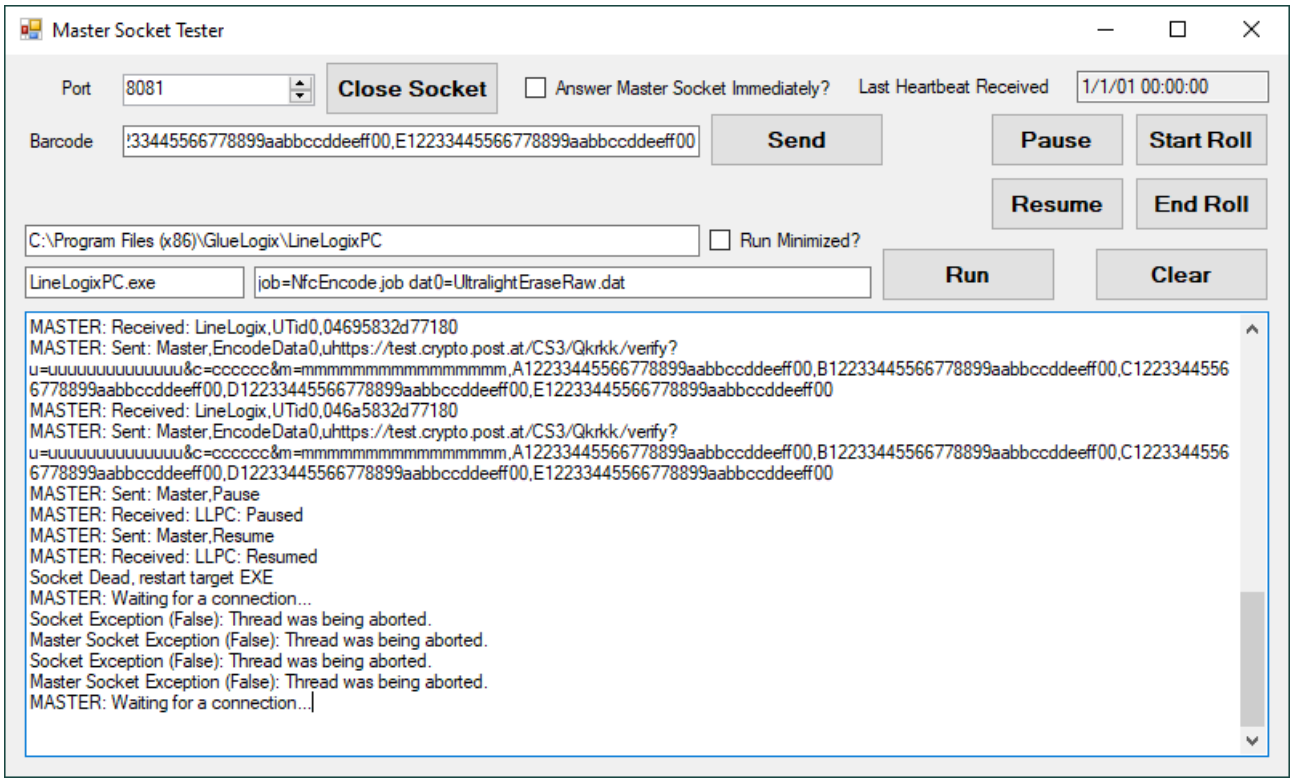
Please note that current versions of Wireshark allow inspection of packets on the loopback interface.

Tag data can be read back using:

- the Dump Tag LLPC button when available
- NXP Tag Info on an NFC capable phone
- by FEIG CPR Start after exiting LineLogixPC.

3. Operation

Install LineLogixPC as described below. Unzip the Master Socket Tester and use the provided Binaries, or recompile in Visual Studio (it was developed in VS2019 for DotNet 4). Run `MasterSocketServer.exe` to provide a Master Socket.



Start LineLogixPC from its installed shortcuts. Select an Operator and the provided test JOB file. Place a tag on the active antenna and watch prompts in LineLogixPC and Master Socket Tester. Allow access through your firewall if prompted. Click End Roll. Exit LineLogix.

Next, test the Process interface by clicking Run. The button text should change to Kill and LineLogixPC should run as in the last step. Click End Roll and Kill.

In the first release, the Run Minimized feature is not working on Windows 10 Home, but the logic has worked before on Windows 7.

4. LineLogixPC Setup

LineLogixPC is set up by ASCII text JOB and DAT files, which can be specified on the command line. These files are fully explained in `LineLogixPCRef_RevG09Jun2018.pdf`. In general, the files work as follows:

> `*.JOB` files set up nearly every aspect of the LineLogixPC session, from COM port to button content.
>
> `*.DAT` files set up a memory image of the RFID chip in ASCII-HEX with whitespace ignored. Metadata in square brackets sets up chip type, lock bytes, and chip-specific features.
>
> `Site.dat` sets defaults for all JOB files. Site.dat usually contains a line identifying the site or installation, for Debug Reports.
>
> `Operators.dat` lists the known operator names for the login screen, unused in this

configuration.

`Supervisors.dat` lists operators who are allowed access to setup controls.

4.1. Installation

LineLogixPC installation is normally performed by GlueLogix staff, and is not well streamlined. It is not hard to do, but is not standard either.

Installation instructions are given in the PC Reference. The installer places LineLogixPC in Program Files (x86). After installation of the EXE, a patch release will need to be installed per `PatchInstructions.txt`. Finally, the permissions of the GlueLogix tree need to be adjusted per `Win7Instructions.txt`, to allow logging in the GlueLogix file tree.

Any application specific JOB, DAT, BMP or other files provided in delivery must be copied to the LineLogixPC installation folder. The CloneTag folder must be copied such that it becomes a folder in the LineLogixPC base folder.

4.2. Command Line

This example command line sets the JOB and DAT files, and sets the operator name. The operator name is logged by LineLogixPC, whether or not it is present in `operators.dat`. If the operator name is contained in file `supervisors.dat`, LineLogixPC will display configuration options.

```
LineLogixPC.exe job=NfcEncode.job op=KR0 dat0=UltralightEraseRaw.dat
```

If the operator name is left out, LineLogixPC assumes an operator named "default."

4.3. Socket

The master socket is assumed to be on the loopback interface, and is set up by this entry in the top (global) section of any JOB file:

```
master="(127.0.0.1,8081)"
```

The punctuation is required. By design, the Master can be on a different IP address, but that configuration has not been tested.

4.4. Standalone Job Setup

The example job for this appnote is a Standalone (no TCU) configuration with program flow as follows:

- Read a new Tag ID
- Send it to the Master Socket
- Wait for Barcode data from the Master Socket
- Plug the Barcode data into the DAT file image
- Encode the chip
- Log result locally and report it to the Master Socket
- Repeat

The JOB file is a classic INI file format, with Key=Value pairs on lines. Lines can be commented with a pound sign ('#"), but comments are not preserved when a job is written by LineLogixPC. The JOB file has some global parameters at the top, followed by several stanzas defined by stanza titles in square brackets.

JOB file features follow:

4.4.1. Global Section

Key=Value pairs at the top of the JOB file are described as Global parameters because they are not in a stanza.

`application=standalone barcode socket tagfirst [timeout=-1]`

> Standalone: sets up some aspects of Standalone behavior. tcupresent=False is also required in the Reader stanzas.
>
> Barcode: tells LineLogixPC to look for barcode data. Source options are COM port, USB, master Socket, and a Helper app that decodes barcodes from camera images.
>
> Socket: Barcode data comes from the Master Socket
>
> Tagfirst: LineLogixPC will look for a tag before a barcode. The default behavior is to display a Barcode dialog and wait for a Barcode before trying to read a new tag.

`master="(127.0.0.1,8081)"`

> Sets up a Master Socket. There can be only one.

`autostartjob=True`

> Relieves the Master of sending a Start Roll command after starting LineLogixPC.

`tagname=Mifare UltraLight`

> Sets up encoding behavior for the original Ultralight/Ntag203 architecture: 4 byte pages with read only bytes in pages 0 and 1; lock bytes in page 2; OTP bytes in page 3; and no other special memory locations. Other choices are given in the PC Software reference. Ultralight EV1 and EV2 might be better handled with tagname "NXP Ntag21x", which provides access to dynamic lock bytes and other special features at the end of memory.

`timerinterval=250`

> Sets the interval of LineLogixPC's master timer in milliseconds. Default is 1000 mS, which works well for reading blocks of data from a TCU running at high speed. In Standalone, a short interval drives more frequent Inventories.

`timeout=-1`

> Allows an infinite wait for barcode data after a UTid message. Without this parameter, LLPC will wait 5 seconds and then display a dialog box for manual data entry. By design, positive values of `timeout` should change the timeout before the dialog box appears, but that configuration is not tested. *Note that the square brackets above indicate that the parameter is optional, and should not be used in the JOB file.*

4.4.2. Buttons Stanza

Sets up configurable buttons for the LineLogixPC NDEF Editor. See the NFC Quick Start document for a better explanation of the NDEF Editor.

4.4.3. Reader Stanza

JOB files can have multiple reader stanzas. Few Standalone jobs have more than one. Exceptions are Standalone jobs with both HF and UHF readers, that share data between two chips.

In the [reader0] stanza, notable lines include:

```
>raction=self.FeigMiFareWriteSectorsFromTextFile()
rdrsetuponetime=WriteBlockData
dynamic=True
```

These lines set up the encode operation. Both are necessary. The >raction is evaluated by LineLogixPC as a Python expression. dynamic=True forces LineLogixPC to reread the DAT file on each chip, providing the Master another path to set up data.

```
barcodeascsv=0
barcodeisascii=False
barcodelookup=False
```

Sets up the usage of incoming barcode data. Barcode strings are treated as if they were read from a CSV file in column A (field 0). For most HF chips, that is the only CSV field. For UHF, the CSV schema is user[,epc[,access[,kill]]]], and most jobs set `barcodeascsv=1` To write the EPC. `Barcodeisascii=True` would suppress translating the barcode string to HEX. **As shown, the barcode string must be ASCII-HEX.**

```
name=Feig1
```

Sets the name of [reader0] for indication and logging, including in the status messages sent via Master Socket.

```
rxantenna=2
txantenna=2
```

Selects the external antenna of the CPR74. An application that uses the internal antenna must set these lines to 1. No Feig reader supports bistatic operation (different antennas).

```
usermemoryfile=noname.DAT
```

Sets the default memory file, which can be overridden on the command line. This example sets up a nonexistent DAT file, which must be overridden on the command line.

4.4.4. tcusetupeverytime Stanza

This stanza has no effect in Standalone but is required by the LineLogixPC job file parser.