

# Getting the TI-99/4A Online!

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Users of the TI-99/4A like myself have been used to the day where you could easily call various TI related BBS' as well as many other BBS types.

Lately with the advancements of coding in order to have the TI communicate at speeds faster than 9600 bps accurately along with the F18A video hardware upgrade, we can now connect to BBS as 19200bps and even 38400 bps along with 80 column and ANSI graphics! Of course to connect and utilize the F18A and faster baud rates you will need to obtain the latest version of Super Mass Transfer (TIMXT).

If you do not have the F18A video upgrade please be aware that other terminals like Fast Term and Telco seem to max out at 4800bps accurately and make your adjustments for settings based on the maximum baud rate achievable.

There is even an Internet Browser for the TI and some custom pages made specifically for this browser to support web based e-mail from the TI and even a real-time CHAT application.

I have been using the UDS10 with my TI for years and it is by far one of the most versatile units a user can use to replace the old modem technology. It makes transferring of files between the PC fairly easy as well. But the majority of us use it to call other BBS' that are connected on the internet and accessible via Telnet. Of course these UDS10 devices are not made any more, so we must resort to EBAY. There are some newer technology devices out that do the same thing.

In this article I want to cover how to get your TI online to call BBS' and XFER files from the PC to the TI and vice versa with both the Lantronix UDS devices (I have tested this on a UDS10, UDS100 and UDS1100) as well as a Raspberry Pi 3 utilizing 'tcpser', which is a modem emulation software that will run on the Pi and accept modem commands.

## Lantronix UDS vs Raspberry Pi Scorecard!

Option	Lantronix UDS	Raspberry Pi
Price	\$25 to \$100 US	Less than \$40 US
Currently Supported by Vendor	No	Yes
Compatible with Stuart's TI Internet Browser	Yes	No

Compatible with Nano-PEB and Stuart's TI Internet Browser	Yes	No
Maximum Baud rate tested with the TI	38400	19200
Transfer Files between PC and TI	Yes	Yes
Transfer Files Between TI and TI	Yes	Yes
Transfer Files To/From TI and TI/Geneve BBS	Yes	Yes*
Ease of Setup	Yes	Yes
Use friend URLs to connect	No	Yes
Connect multiple systems at the same time on same device	No	Yes
<p>*Although I was able to get file transfers to work with the Raspberry Pi via a BBS it required an additional hop. In order to get this to work, so I am assuming it is something with my ISP or something. I was able to connect into 'The Keep at thekeep.net' on port 23 and telnet from his system into my BBS and transfer files.</p> <p>This was not an issue transferring files from my PC to the TI and vice versa with tcpser and the Pi.</p>		

## TI and the UDS Lantronix Device

Items needed:

- Broadband Internet Connection
- CAT 5 Cables
- Lantronix UDS device
- TI-99/4A
- PEB with 32k, Disk Controller, RS232 and 1 Disk Drive
- Terminal Program
- Custom made cable DB25Male to DB25Male

For the serial connectors I use usually a DB25 Male to RJ45 connector. This does not require any soldering and you can use a standard CAT5 cable between the two connectors. Just make sure you get the same manufacture for each end, as I have seen different manufactures use different color coding for the pins.

<http://www.amazon.com/Modular-Adapter-DB25m-To-RJ45/dp/B000BSHJGO>

### Step 1: Make the Cable!

Below is the wiring pinout that I used:

TI RS232 Connector		Lantronix UDS Connector
2	←	3
3	→	2
5	→	4
7	-----	7
20	←	5

### Step 2: Setup UDS Device

If you know the IP address and the port to remote to you can connect via telnet to configure it. This is by far the easiest method, but with most of these used and no one knowing what the IP address is and the hard reset button (hold down and power up and count to 20 and release) does not always work. So, since you already have the serial cable made you can use the serial connection to configure it. If you are going to use the TI to configure via the serial port, then you must have a terminal program that supports 9600bps. If not you will need to hook it up to a PC to configure via serial port and must have the correct cable to do so.

Once you have it hooked up to a computer that you will be using for the serial connection configuration method (PC or TI) then boot into your terminal program and set it for 9600bps on the correct communication port. Now make sure your CAPS lock/ALPAH lock is off. While in the terminal mode hold down the 'x' key (make sure it's lowercase) and power up the UDS device. After a few seconds you should see something like the below:

```
*** Lantronix Universal Device Server ***
```

```
Serial Number XXXXXX MAC address XXXXXXXXXXXXX
```

```
Software version V5.8.0.5 (060724) LTX
```

```
Press Enter for Setup Mode
```

```
Press enter
```

```
Select 0 for 'Server'
```

```
Select 1 for 'Channel 1'
```

You can assign a static IP address, Gateway address and netmask here if you like. I recommend to do this

The current settings I use are:

Baud rate = (set this to the max baud rate you want to use and that your terminal will support accurately)

I/F Mode = 4C

Flow = 00

Port = 23

Connect Mode = D6

Disconnect Mode = 80

Flush Mode = 00

All others I default. (just press enter)

After setting the above you will want to press 9 to Save and Exit.

If you are in your current terminal with the correct baud rate set then once the UDS device restarts after a few seconds you should see '**NO CARRIER**' message displayed.

If you type AT and press enter you should receive an **OK** message. This means you are ready to dial out to a BBS via the UDS device.

### **Step 3: Get connection information to BBS'**

The UDS device does not accept DNS (friendly URL's), at least I have not been able to get it to work on the UDS10. You will need to obtain the BBS' public registered IP address to its URL. This is easy, If you know the URL you can just go to a command prompt and PING the URL as follows

#### **Windows PC:**

At a command prompt type:

Ping URLHERE

#### **Linux PC:**

In a terminal window type:

Ping -c 4 URLHERE

### **Step 4: Connect to a BBS**

Now that you have the IP address of the BBS you want to call and know the port # that the BBS listens on (port # should be on the advertisement of the BBS you found) you will type in your TI terminal program:

ATDT IPADDRESS,PORT#

So the IP Address for FuSiON BBS is 99.122.140.172 and the port is 9640.

The command would look like:

```
ATDT 99.122.140.172,9640
```

The comma signifies the separation of the HOST IP and tells the UDS device to attempt the connection on the port number specified after the comma.

## TI and the Raspberry Pi

Using the Raspberry Pi to emulate a modem is fairly easy. It did take me some toying around to figure things out since I was Linux Challenged at the time.

I got to thinking that since I was using the Raspberry Pi to emulate a modem on my MiST machine, then why not see if I could get it to work on the TI. After a few hours of toying around and figuring the cable method out I got it working.

Now with the stock TI RS232 card I was only able to achieve 19200bps max accurately.

Also I tested this with the Raspberry Pi3 and for the Pi3 I actually had to under-clock (yes slow it down) the Pi3 in order to achieve accurate baud rates.

### Items Needed:

- Broadband Internet Connection
- Raspberry Pi
- USB to Serial cable
- 25pin DSub Male connector
- 9 pin DSUB Female connector  
For the DSUB connectors you can use connectors like I explained in the Lantronix area above in order to be able to use a CAT 5 cable
- Cable with 7 wires for making cable or CAT 5
- TI-99/4A
- PEB with 32k, Disk Controller, RS232 and 1 Disk Drive
- Terminal program

### **Step 1: Setup Raspberry Pi With Linux Distribution**

First thing you need to do is setup your Raspberry Pi with Raspbian OS or other Linux distribution that you like.

## Step 2: Slow the Pi3 down (Skip if you have a Pi or Pi2 model)

With the Raspberry Pi3 as stated I had to slow the processor down to achieve accurate baud rates. If you have a Pi or Pi2 then you should be able to skip this step.

- Login to the Pi3 via SSH
- Issue 'sudo su' at the terminal
- Issue 'nano /boot/config.txt'

There are a couple of options to get this to work and please read both of my options and summary before making your decision.

**Option #1** : Will slow the Pi3 down to 600 mhz in order to process accurate baud rates, but I have only been able to successfully transfer files at 19200 bps.

Add the below line and save the config file (CTRL-X to exit and save) and reboot the Pi3

***core\_freq=250***

**Option #2** : Will change it accurately and place the Pi3 in Turbo mode. I have been able to successfully transfer at 38400 bps.

Add the below line and save the config file and reboot the Pi3

***force\_turbo=1***

Option Summary:

Although option 2 may sound like it is the best solution, please be aware that characters can be displayed if for some reason your Pi3 gets out of the temperature window that causes the clocks to shutdown. This is typically between 80C-85C.

I have not experienced this myself, but it is documented on some other threads I have read on the internet. I have seen some odd characters at 38400 with this though, but 19200 seems to be rock solid stable.

**Setting core\_frequency to 250MHz does NOT limit the ARMs to 600MHz. Those clocks are all independent.**

## Step 3: Install 'tcpser' modem emulation

The next step is to install the modem emulation software called 'tcpser' (assuming you are already logged into the Pi via SSH and have issued the 'sudo su' command)

- Issue command 'apt-get install tcpser'

- Issue command 'sudo reboot now'

#### Step 4: Make the cable!

I personally like to use the RJ45 to DB connectors so that I can easily make cables without soldering. Just need to map the lines so that you know the wires associated with the CAT5 cable you are using are going to the correct pins.

Cable Pinout:

TI RS232 Connector		Raspberry Pi USB to Serial
1	→	8
2	←	3
3	→	2
5	→	7
6	-----	6
7	←	4
8	→	5

#### Step 5: Hook it all up

Now that we have the cable made it's time to plug it all in!

Step 6: Verify the Raspberry Pi sees the USB to Serial cable

- Login to the Pi via SSH
- Issue command 'sudo su' (I always do the sudo su just in case more rights are required for a command)
- Issue command 'cd /dev'
- Issue command 'ls ttyUSB\*'

You should see something like the below if the Pi has recognized your USB to serial device cable.

```
root@raspberrypi:/dev# ls ttyUSB*
ttyUSB0 ttyUSB1
```

I have two USB serial cables on my Pi so you see both ttyUSB0 and ttyUSB1

#### Step 7: Execute 'tcpser' utility

- Issue command 'tcpser -d /dev/ttyUSBx -s BAUDRATE -p 9640&'

Note : replace ttyUSBx with name of your USB to Serial cable found in Step 6

Note : replace 'BAUDRATE' with the maximum baud rate you can achieve

To break the command down above for 'tcpser' modem emulator is the following:

- tcpser = Application to execute
- -d = Informs tcpser to map a serial device
- /dev/ttyUSBx = Where X is the # of your USB to Serial device. This tells tcpser which device to map
- -s = Maximum Speed in BPS
- -p 9640 = Use port 9640
- The '&' is key as it will release the terminal process back for to take additional commands.

If you need to terminate a process it is fairly simple to do. If you do not remember what the process ID is you can simply type 'ps' within the terminal once connected via SSH and it will show you all processes running on the Pi. Just look for processes named 'tcpser'. Of course you could have more than one tcpser process running if you executed it for multiple ports. I run a few tcpser processes from my one Raspberry Pi for my TI and MiST machines.

In a terminal window once you have the process id you simply type

'kill PROCESS#'           Where PROCESS# = the Process ID found with the 'ps' command.

### **Step 8: Time to Test**

If you have done everything right then you should be online calling a telnet based BBS like FuSiON BBS or Heatwave!

- Load up the terminal program on the TI
- Configure the terminal program if not already to the correct baud rate that you set and that is supported by the terminal program.
- Type 'AT' and press enter

If all went well then you should see an OK. If you did not see any echoing of the AT command at all then you may have to enter 'AT&K0' (it's a zero). This will disable local flow control and I have seen this on one other system that I needed to do this on. (Not the TI but I thought I would mention it.)



### Step 9: Connect to a BBS

To get the BBS public IP address follow Step #3 in the 'Lantronix UDS' section.

- Load up the communication program on the TI if not already loaded
- Issue the 'ATDT BBSCONNECTURL:PORT#'

Notice with the tcpser we can use a URL to connect!

Example: '**ATDT FUSIONBBS.DDNS.NET:9640**'

Now if you want to transfer files with this method from your PC to the TI or vice versa then it's fairly simple. Below is how I did it once I had I was able to connect.

On the TI we need to tell it to Auto Answer

- On the TI in the terminal program issue 'ATS0=1'
  - This tells the tcpser to answer on the first ring when a connection is coming in; just like auto answer on a Hayes compatible modem.
- From the PC connect from the terminal program via telnet on port 9640 or whatever you assigned it to the IP address of the Raspberry Pi.
- Start your download or upload process on the TI
- Start your download or upload process on the PC
- Wait for transfer to complete. Will not be too long at 19200 or 38400!

For other projects and TI-99/4A information visit <http://shift838.99er.net>

FuSiON BBS

telnet : fusionbbs.ddns.net

port #: 9640