Mike's PBX Cookbook

Mac's and serial TTY's

Mac's are excellent tools for accessing serial device TTY ports (to console into PBX's, switches, and routers). You just need a serial to USB adapter, the right driver, and some Terminal software.
You can use screen, although Minicom (or a GUI program) offer more features and functionality.

Drivers:

Most Serial-to-USB adapters will work on a Mac with one of the following OS X drivers...
UPDATE: Mavericks (10.9) includes a driver for FTDI-based Serial-to-USB adapters.

- Prolific PL2303: PL2303_MacOSX_1_6_0.zip
- FTDI USB Serial: FTDIUSBSerialDriver_v2_3.zip

NOTE: It may be necessary to remove any previous driver before installing a newer one,
eg: `$ sudo rm -rf /System/Library/Extensions/ProlificUsbSerial.kext`

If your adapter doesn't work with either of these, try the following sources:

- Silicon Labs - CP210x USB to UART Bridge Virtual COM Port (VCP) drivers.
- Belkin - USB Serial Adapters: F5U257, F5U103, F5U003 (poor OS X support).
- Keyspan serial-USB adapter drivers can be found in their Support Section.

After installing the correct driver, plug in your USB-Serial adapter, and open a **Terminal** session (Applications/Utilities).
Enter the command `ls /dev/cu.*`, and look for something like `usbserial` (or similar):

```
$ ls /dev/cu.*
/dev/cu.Bluetooth-Modem          /dev/cu.iPhone-WirelessiAP
/dev/cu.Bluetooth-PDA-Sync       /dev/cu.usbserial
```

This indicates the USB-Serial driver is working. Select this port name in a terminal program.

⚠ **Note:** Check your adapter works after an OS Update, as you may have to re-install the driver.

You might notice that each serial device shows up twice in /dev, once as a tty.* and once as a cu.*. So, what's the difference? Well, TTY devices are for calling into UNIX systems, whereas CU (Call-Up) devices are for calling out from them (eg, modems). We want to call-out from our Mac, so /dev/cu.* is the correct device to use.

The technical difference is that /dev/tty.* devices will wait (or listen) for DCD (data-carrier-detect), eg, someone calling in, before responding. /dev/cu.* devices do not assert DCD, so they will always connect (respond or succeed) immediately.

Software:

Having installed the right driver, our USB-Serial adapter will show up in **/dev/cu.*** (shown above). We now need to install some terminal emulation software before we can connect to anything.

- Two terminal methods are Screen and Minicom
- For a GUI solution, see OS X Serial Port Apps

Note: If you can't find a driver for your adapter (eg, Belkin), try Serial which has built-in support for many USB-Serial devices.

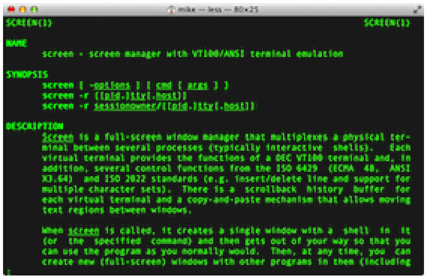
Screen

It's not actually necessary to download an install extra software, as you can use the Mac OS X built in Terminal and **screen**. Screen lacks some features, but it does include VT100/ANSI terminal emulation, and can be extremely useful.

1. Open an OS X terminal session (window)
2. Find the right TTY device. Type: `ls /dev/cu.*`

   With the USB-Serial adapter plugged in, you'll get a list, including something like this:

```
$ ls /dev/cu.*
/dev/cu.Bluetooth-Modem          /dev/cu.iPhone-WirelessiAP
/dev/cu.Bluetooth-PDA-Sync       /dev/cu.usbserial
```



```
SCREEN(1)                                                            SCREEN(1)

NAME
       screen - screen manager with VT100/ANSI terminal emulation

SYNOPSIS
       screen [ -options ] [ cmd [ args ] ]
       screen -r [[pid.]tty[.host]]
       screen -r sessionowner/[[pid.]tty[.host]]

DESCRIPTION
       Screen is a full-screen window manager that multiplexes a physical ter-
       minal between several processes (typically interactive  shells).   Each
       virtual terminal provides the functions of a DEC VT100 terminal and, in
       addition, several control functions from the ISO 6429  (ECMA  48,  ANSI
       X3.64)  and ISO 2022 standards (e.g. insert/delete line and support for
       multiple character sets).  There is a  scrollback  history  buffer  for
       each virtual terminal and a copy-and-paste mechanism that allows moving
       text regions between windows.

       When screen is called, it creates a single window with a  shell  in  it
       (or  the  specified  command) and then gets out of your way so that you
       can use the program as you normally would.  Then, at any time, you  can
       create new (full-screen) windows with other programs in them (including
:
```

The 9600 at the end is the baud rate. You can use any standard rate, eg, 9600, or 19200 for a Sig Server!

4. To quit the screen app, type **CTRL-A**, then **CTRL-\**.

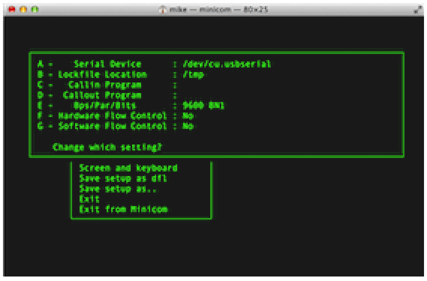
Type `man screen` in Terminal for further information on **screen**. (use 'enter' or 'space' to scroll, and 'q' to quit).

Minicom

Alternatively, if you'd like a few more features, and a retro feel, you can install **minicom 2.2** .
Minicom supports VT100 emulation, which means it sorta kinda works with Meridian Mail (Function keys: fn + f-key).

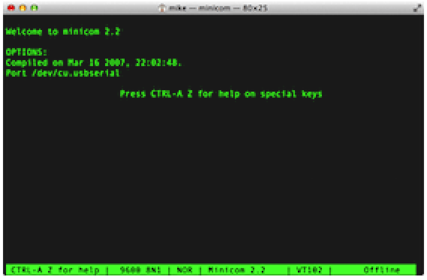
1. Download and run the **minicom 2.2** package installer.
2. Then manually edit your $PATH with `sudo nano /private/etc/paths`.
3. Add the following line to the bottom of the file: `/opt/minicom/2.2/bin`, save and exit - then relaunch the terminal.

Run `minicom -s` first to configure your serial interface device name, and other options. Then, **Save setup as dfl** (default) and **Exit**. Your serial interface device name is found with `ls /dev/cu.*` (as shown above). Always launch **minicom**, with your selected serial adapter plugged in and available to avoid an error. In the example below, the serial device is */dev/cu.usbserial*:



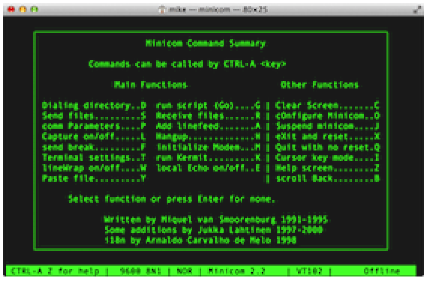
```
 A -    Serial Device      : /dev/cu.usbserial
 B - Lockfile Location     : /tmp
 C -   Callin Program      :
 D -  Callout Program      :
 E -    Bps/Par/Bits       : 9600 8N1
 F - Hardware Flow Control : No
 G - Software Flow Control : No

    Change which setting?

        Screen and keyboard
        Save setup as dfl
        Save setup as..
        Exit
        Exit from Minicom
```

Configuration Options



```
Welcome to minicom 2.2

OPTIONS:
Compiled on Mar 16 2007, 22:02:48.
Port /dev/cu.usbserial

                      Press CTRL-A Z for help on special keys

CTRL-A Z for help |  9600 8N1 | NOR | Minicom 2.2    | VT102 |      Offline
```

Connected to Port

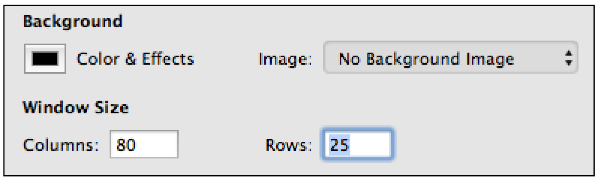


```
                     Minicom Command Summary

              Commands can be called by CTRL-A <key>

                 Main Functions                  Other Functions

     Dialing directory..D  run script (Go)....G | Clear Screen.......C
     Send files.........S  Receive files......R | cOnfigure Minicom..O
     comm Parameters....P  Add linefeed.......A | Suspend minicom....J
     Capture on/off.....L  Hangup.............H | eXit and reset.....X
     send break.........F  initialize Modem...M | Quit with no reset.Q
     Terminal settings..T  run Kermit.........K | Cursor key mode....I
     lineWrap on/off....W  local Echo on/off..E | Help screen........Z
     Paste file.........Y                       | scroll Back........B

          Select function or press Enter for none.

             Written by Miquel van Smoorenburg 1991-1995
             Some additions by Jukka Lahtinen 1997-2000
             i18n by Arnaldo Carvalho de Melo 1998

CTRL-A Z for help |  9600 8N1 | NOR | Minicom 2.2    | VT102 |      Offline
```

Command Summary

In **minicom**, commands can be called by **CTRL-A <key>**, for example, change your serial port settings with **CTRL-A P**
Press **CTRL-A Z** for a Command Summary, and help on special keys. Enter **CTRL-A X** to quit.

HINT: Change your OS X terminal window size to 80x25 (1 line more) so you can see the bottom **Minicom** status bar. **(Terminal Preferences ▶ Settings ▶ Window)**. Open a new window for this change to take effect.



Background

■ Color & Effects   Image: No Background Image

Window Size

Columns: 80   Rows: 25

Note, the **minicom** installer creates **/opt**, and its not hidden in the OS X finder. Rectify this with: `sudo chflags hidden /opt`

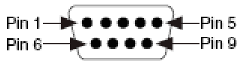
Connecting

With handshaking set to software (*xon/xoff*) or *none*, which covers most devices, serial data communication needs just 3 wires: RXD (2), TXD (3), and GND (5). Generally, hitting *<enter>* should cause a response, or *<ctrl-r>* should 're-draw' the screen. If you don't get any characters, try adding a Null-Modem cable or adapter, which swaps RXD and TXD (pins 2 and 3). Signal ground is Pin 5 in a DB-9, or Pin 7 in a DB-25.

Pin Functions for RS-232

Data		
TXD	(3)	Serial Data Output
RXD	(2)	Serial Data Input
GND	(5)	Signal Ground
Other		
RI	(9)	Ring Indicator

Handshake		
RTS	(7)	Request to Send
CTS	(8)	Clear to Send
DSR	(6)	Data Set Ready
DCD	(1)	Data Carrier Detect
DTR	(4)	Data Terminal Ready

DB-9 Male

Front (pin) view