Testing the signal strength using a HUAWEI E160G USB modem

Note: All of the stuff described below was verified using a HUAWEI E160G USB modem.

It is probable that the same tests will work for other 3G modems, but as a disclaimer, I cannot verify that assumption.

I take no credit for this information; I just found it at the URL below and then put it into a tidier crib sheet.
http://mybroadband.co.za/vb/showthread.php?t=61703

Other refs:
If you are not familiar with seeing signal strengths expressed in **dBm** units
see http://en.wikipedia.org/wiki/DBm

Summary of the test procedure.

Make sure your modem is ready but do NOT launch your ISProvider's software.
For example, I use a HUAWEI USB modem provided by 3-Mobile.
In these tests I do NOT launch 3-Mobile Broadband software.

- Launch HyperTerminal;
- set up a connection to USB modem;
- use AT command AT+CSQ;
- interpret the result.

If you are familiar with HyperTerminal on a PC (or whatever the Mac equivalent is) and you know what an AT command is then just skip to **Step 5**. Otherwise see the step-by-step guide below.
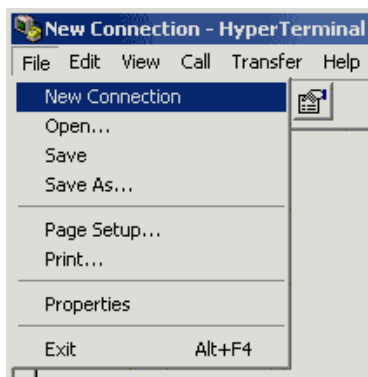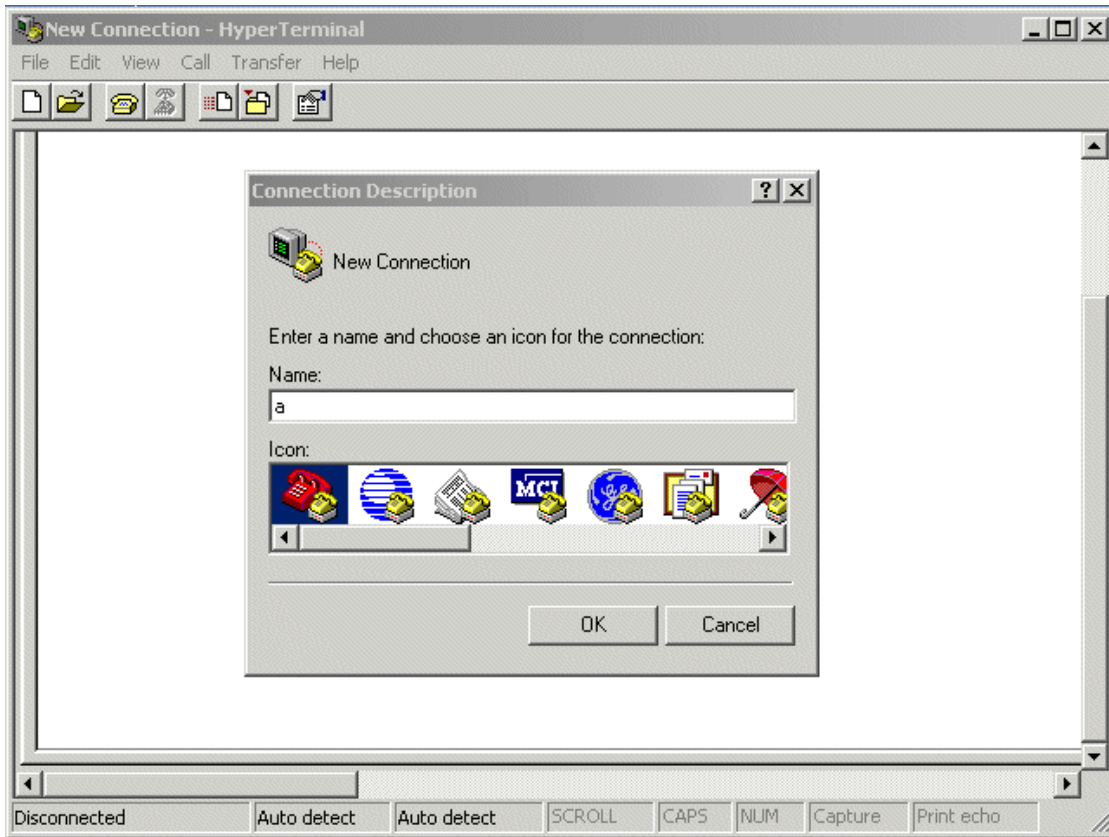
Step 1:
Launch HyperTerminal.
Usually located at **Start / Programs / Accessories / Communication / HyperTerminal**

Step 2:
Create a New Connection

HyperTerminal will probably automatically open the **New Connection** dialogue box as shown above.

If it doesn't, then the use the **File / New Connection** menu as shown left.

Give the connection a name (anything will do) e.g., **a**

Step 2.

Pretend you are setting up a connection and provide the phone details.
These details can all be bogus information because you are not actually going to dial anything.

IMPORTANT. make sure you have selected the right modem in the **Connect using:** field.
In the example below the right modem was HUAWEI Mobile Connect – 3G Modem
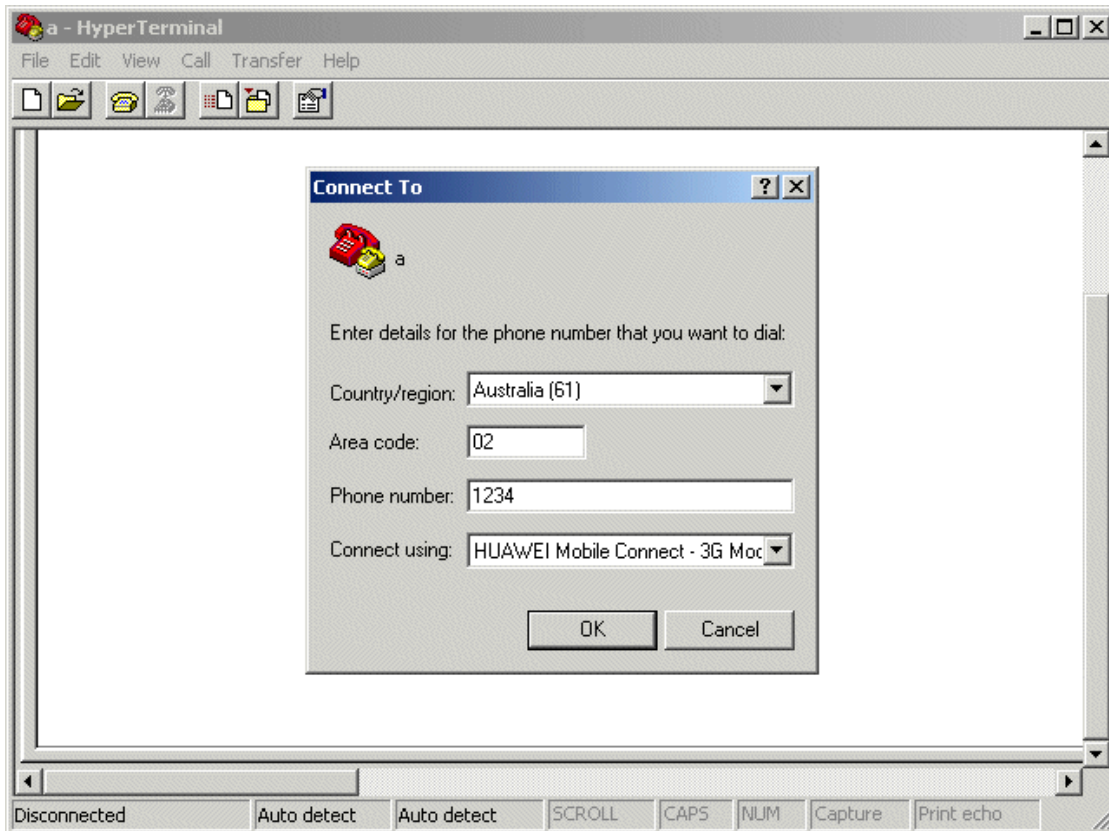
Step 3:

HyperTerminal invites you to **Connect**. Do NOT click on **Dial.** Click on **Cancel** instead
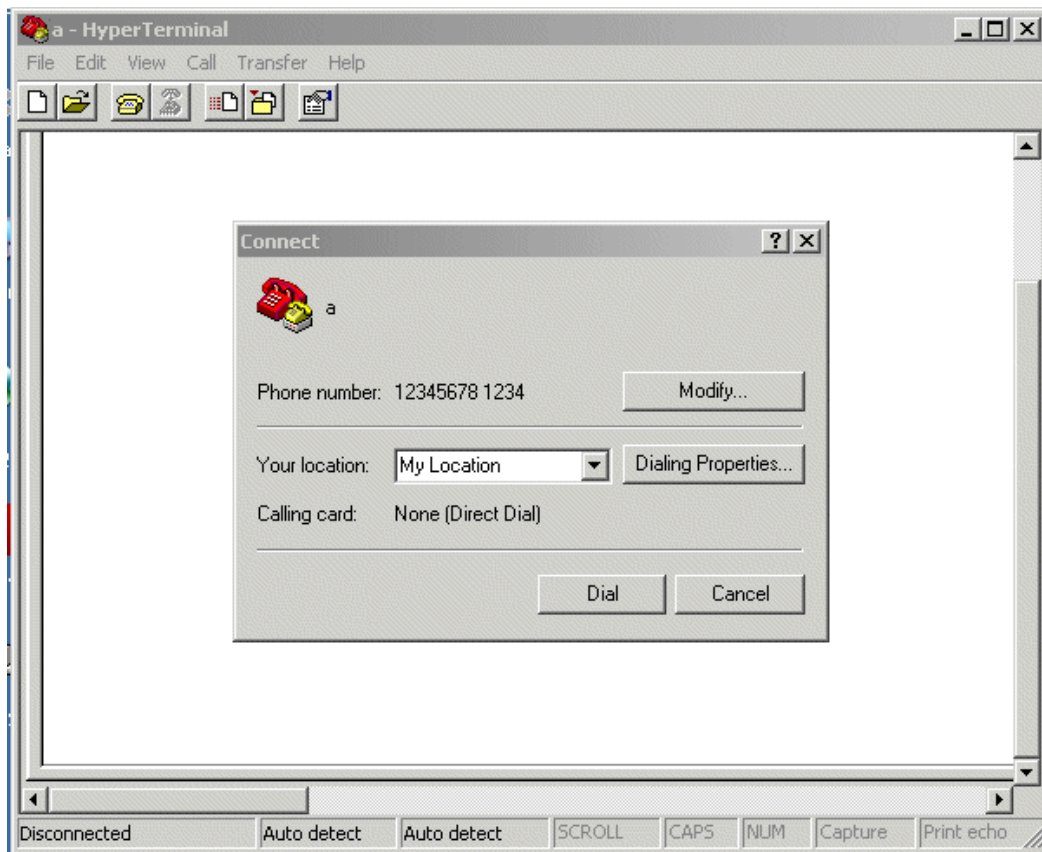
You are then presented with just a blank HyperTerminal window.
You are going to type 'AT commands' into this window.

One little complication is that, by default, HyperTerminal will not display the commands that you type; it just displays the results when you press Return.
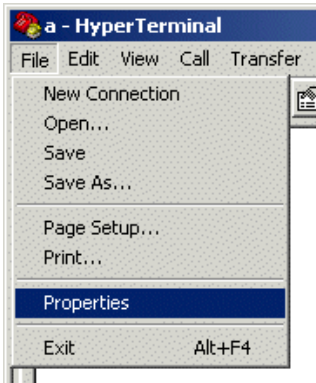So when you type you might be fooled into thinking nothing is happening.
If you don't mind not seeing what you type, just skip to Step 5.
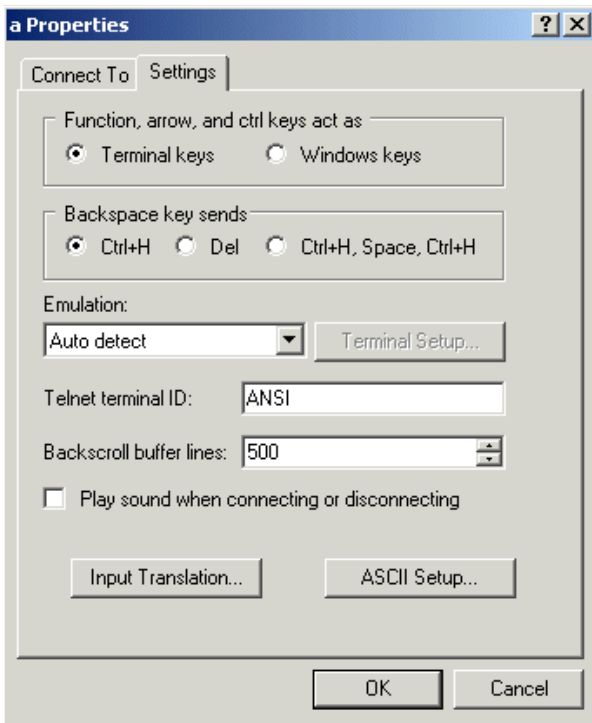If you prefer to first make HyperTerminal display what you type then use Step 4.

Step 4:
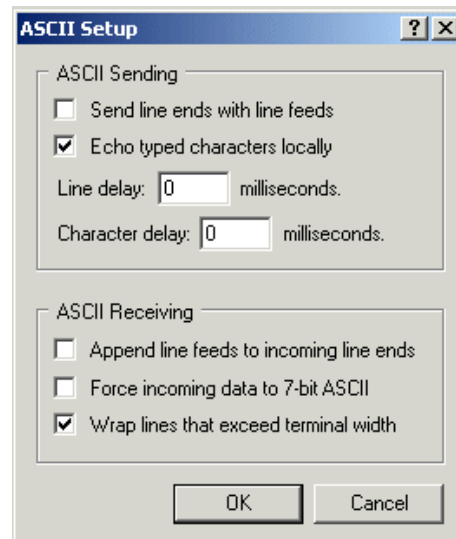Make HyperTerminal display what you type.

Choose **File / Properties**

Choose the **Settings** tab, then click on **ASCII Setup…**

Tick the checkbox **Echo typed characters locally**

Step 5:

Start typing AT commands into HyperTerminal.

Caution: depending on your setup, there is a possibility that careless use of AT commands might upset your modem's configuration.
The only two AT commands recommended here are

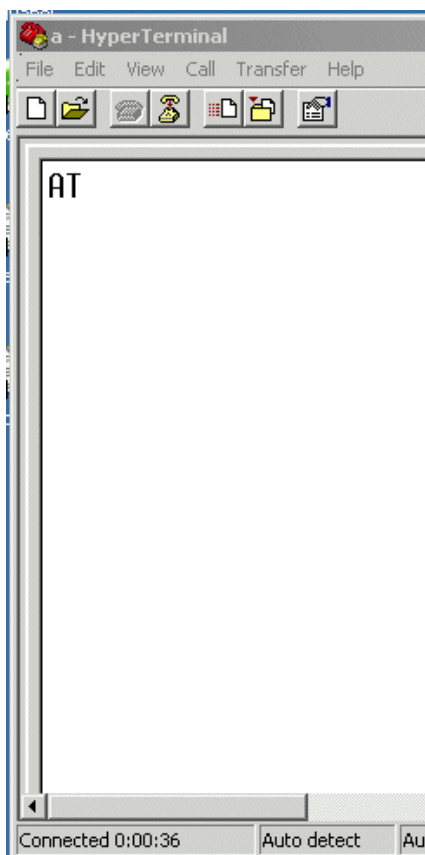| Command	Expected Result
AT	OK
AT+CSQ	+CSQ: xx,99

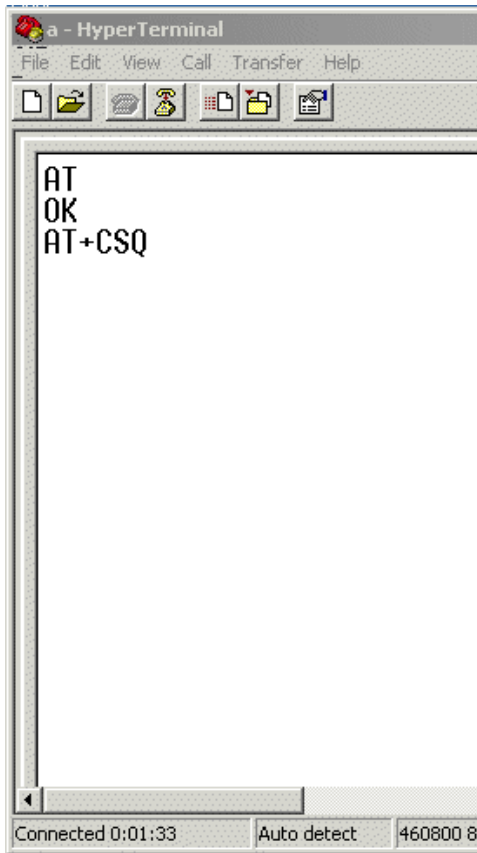**where xx is the two digit number that you are interested in**

Type AT
(note the status bar at the bottom of HyperTerminal window; this is the first time it has shown **Connected**)

Press Return.

HyperTerminal will respond
with **OK** if it's talking to your modem.

Type AT+CSQ

```
a - HyperTerminal
File  Edit  View  Call  Transfer  Help

AT
OK
AT+CSQ



Connected 0:01:33    Auto detect    460800 8-
```

Press Return

HyperTerminal will respond with a number.

Actually two numbers separated by a comma.
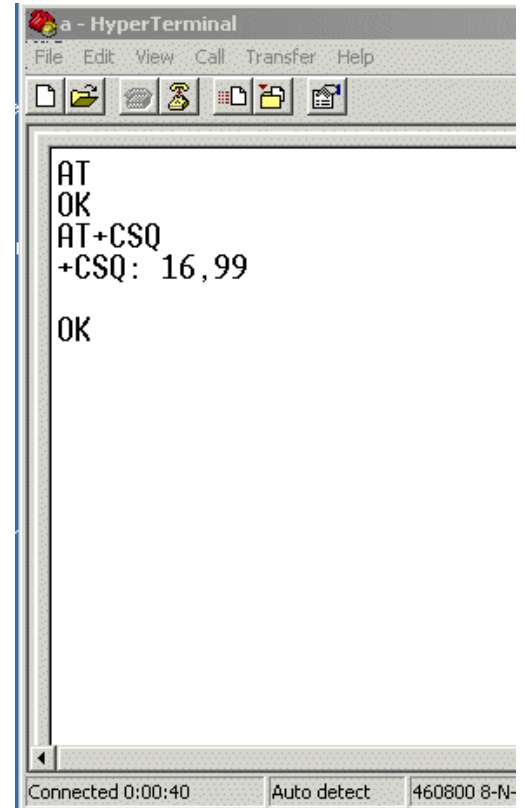
The number before the comma is the one you are interested in.

In this example the number 16 is an indicator of the signal strength.

16 translates to -81dBm

Now you just need to know how to interpret the signal strength number.

See Step 6.

```
a - HyperTerminal
File  Edit  View  Call  Transfer  Help

AT
OK
AT+CSQ
+CSQ:  16,99

OK



Connected 0:00:40    Auto detect    460800 8-N-
```

Step 6:

How to interpret the signal strength number.

There is a formula but it's simpler to just read the table below.

Formula: Take the number before the ,99 and multiply it by 2.
Subtract that figure from -113dBm and that will give you your signal reading in dBm.

The number in the left column is what you see in HyperTerminal (see Step 5)

0	< -113 dBm	
1	-111 dBm	Marginal Levels of -95dBm or lower.
2	-109 dBm	
3	-107 dBm	At these sort of levels, it is very likely that you may suffer low
4	-105 dBm	throughput and disconnects due to cell loading/breathing even with
5	-103 dBm	an outdoor antenna.
6	-101 dBm	
7	-99 dBm	
8	-97 dBm	
9	-95 dBm	Workable under most conditions. Levels of -85dBm to -95dBm.
10	-93 dBm	
11	-91 dBm	Probably worth considering an outdoor gain type antenna. Could
12	-89 dBm	suffer poor throughput and disconnects due to cell
13	-87 dBm	loading/breathing.
14	-85 dBm	
15	-83 dBm	Good Levels between -75dBm and -85dBm
16	-81 dBm	
17	-79 dBm	normally no problem holding a connection with this sort of level
18	-77 dBm	(even with cell breathing) without the use of an external antenna.
19	-75 dBm	
20	-73 dBm	
21	-71 dBm	Excellent Levels above -75dBm.
22	-69 dBm	
23	-67 dBm	Should not be affected by cell breathing/loading and should not
24	-65 dBm	require an external antenna.
25	-63 dBm	
26	-61 dBm	
27	-59 dBm	
28	-57 dBm	
29	-55 dBm	
30	-53 dBm	
31	> -51 dBm	