

*The following has been written specifically for Sky's ADSL2+ LLU products. However, the principles also apply to Connect. Apologies to any technical readers – this has been written with non-technical readers in mind.*

## **Getting to your router stats**

Several useful pieces of information about your connection can be found within your Sky router's admin pages. To find these you need to first log in to the router:

- Open up a web browser (IE, Firefox etc) and type 192.168.0.1 into the address bar and click go or enter.
- In the screen that appears type admin in the username field and sky in the password field then click OK
- This gets you to the Netgear Router Status page and at the bottom click Show Statistics.

You now have sight of your router's current connection details. For the purposes of this guide I'll concentrate on the set in the lower box.

## **Connection Speed**

You'll see two columns: Downstream refers to the connection coming from the exchange to you and Upstream refers to the connection going from you to the exchange.

Most people are interested in their downstream speed. There are a couple of things to note:

- The figure you see is the actual speed that your router negotiated with exchange when the router was connected and last powered up.
- If you were to run a speedtest at a test site then you will **not** see this speed because of transmission overheads – expect up to 80-90% of the router reported connection speed for a very fast site. Slow sites will give a much lower result.
- The figure reported may not be at all close to the speed you've "bought". This is for a number of reasons which should soon become apparent.

## Line Attenuation

Again for the purposes of this guide we're more interested in Downstream Line Attenuation.

Attenuation is a measure of the loss in power of electromagnetic signals between transmission and reception points. Many factors affect attenuation but by far the largest factor is line length. In simple terms, the further you are away from the exchange the higher your attenuation figure will be as the signal loss increases.

Attenuation is the single most important factor in determining the speed your router can connect at. You may be signed up for 16Mb Sky Max but you will only get close to this speed if your line is fairly short. As a point of interest whilst you can identify the distance between your home and the exchange "as the crow flies" with a site like [www.samknows.com](http://www.samknows.com), you can get a reasonable approximation of the actual line length by dividing your (ADSL2+) downstream attenuation by 13.8 to get the distance in kilometers.

The following table shows the relationship between downstream attenuation and potential connection speed on a low noise line:

Attenuation.....	Approximate Line Length.....	Potential Connection Speed
32db.....	2.3km.....	16000kbps
35db.....	2.5km.....	14500kbps
40db.....	2.9km.....	11800kbps
45db.....	3.2km.....	8500kbps
50db.....	3.6km.....	6500kbps
55db.....	4.0km.....	4500kbps
60db.....	4.3km.....	3200kbps
65db.....	4.7km.....	2000kbps

## Noise Margin

Before we go into noise margin we need to cover noise.

The connection between you and the exchange is made up of two copper wires. Copper is a great transmission medium but it also is susceptible to various electromagnetic interference, generally known as noise. Any length of copper wire will naturally carry noise but the longer it is the more likely it is to be noisy. The challenge for your router is to distinguish between background noise and the ADSL signal. You may have heard the term Signal to Noise Ratio (SNR). This is simply the ratio between the strength of the signal and the background noise on the line expressed in decibels.

The noise margin reported by your router is **not** a measure of noise on your line. It is a measure of the margin it has given itself when it negotiated with the exchange. This is in effect the difference between the actual SNR and the SNR the router requires to run at a given speed.

## **Why is any of this important?**

Well to understand this we need to consider what is happening between your router and the exchange equipment.

Again, in simple terms, when your router talks to the exchange when powered up it measures and negotiates a number of factors. First it tests the transmission qualities of your line (in effect attenuation) then it measures noise level and quality. With this information it identifies which part of the frequency spectrum is available and usable and assigns upstream and downstream “channels”. In effect it blocks out part of the frequency bandwidth where noise is above a certain level and doesn’t use this part. A noisy line means less bandwidth is available. Less bandwidth means lower speeds. So going back to the above table, you will only get those potential connection speeds on a relatively quiet line.

So in summary, if you have a long line then this is the first thing that sets your connection speed. If it is noisy too then the connection speed is further reduced.

You can’t do anything about attenuation. You can (often) do something about noise and you will find details in the cabling and faceplate help forum:

<http://www.skyuser.co.uk/forum/cabling-faceplate-help/>

## **What is the right Noise Margin?**

There is no “right” but the higher the figure the better.

When the router negotiates with the exchange it is trying to sync at the highest speed possible with a noise margin of 6.9db or higher. If you have understood the guide so far you will appreciate that this means that for anyone with a line attenuation of much above 32db will probably always see their router report a noise margin of 6.9db when the router connects.

So if you check your noise margin now will it be 6.9? Only if you’ve only just powered up the router. Noise varies through the day depending on a variety of environmental factors plus cross-talk from other local Sky ADSL users (the more active other users are the more noise generated). It will have been 6.9 (higher with a short line) when it first connected but the current noise levels may be higher or lower than they were then so the margin will/may have changed.

Most people find their noise margin is at its lowest in the evening, typically between 6 and 10.

## Noise Margin and disconnections.

ADSL2+, the technology used for Sky ADSL LLU products *should* adapt in near real time to changes in noise levels. It should but for some reason in the Sky implementation it (currently) doesn't. This can be bad news for users because the router needs a certain margin to operate properly. For the Sky router, connection difficulties become apparent if the margin drops below a little over 6db and connection is generally lost if it drops below about 5db. So if you last powered up your router in a "quiet" part of the day, then come evening there is a chance your noise margin may drop below that required for a stable connection.

Until Sky are able to implement ADSL2+ to automatically correct this problem and renegotiate with the exchange as needed the user must take a simple preventative step: it is easy – power up your router at the time of highest noise and it will sync at 6.9db with the highest speed it can.

The noisiest time of day is typically the evening between about 5pm and 11pm but you may find variations through the day.

To "lock" your router to a high noise margin do the following:

- open a separate browser window, log into the router and open up the stats page and leave it open
- if your noise margin is at 6.5db or lower then reboot.
- keep your eye on the stats from time to time - if it reaches or drops below 6.5db again then reboot
- keep doing this until it stops dropping

If you then leave the router powered up and connected to the exchange (you can turn the PC off) then it should always have an adequate noise margin right through the following days from then on.

Alternatively have a look at Mognuts' utility in the sticky in the Tech Discussion forum. With this you can change your noise margin at will. *If you consider this route then please be aware that there is always a risk that you could mess up your router.* Any changes you make should be removed with a reboot but I think I should ensure that you understand the risks involved.