Bad broadband Part 2

TechnoTalk

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Last month, we examined ways of improving sluggish broadband performance. A reader who prefers not to be name-checked wrote in to offer further helpful hints. Given that most of us value reliable and consistent broadband service for our hobby (and other) pursuits, I thought it would be useful to pass on this information, which comes 'straight from the horse's mouth' – from a time-served telecoms man.

IN OUR FRIEND'S EXPERIENCE, poor broadband speed is frequently not a network problem but the result of shortcomings in customers' pre-existing internal wiring, which was fine for speech but definitely sub-optimal for data transmission. Very often this is due to the presence of the 'blessed' bell wire (see: **www.filesaveas.com/jarviser/btiplate.html** to identify the wire in question).

More is less

Ever since Antonio Meucci invented the telephone (and Graham Bell took the credit, see **https://en.wikipedia.org/wiki/Antonio_Meucci**), telephones have used two wires (or one wire and earth) to carry speech and ringing. It was only when British Telecom introduced plug-in telephones in the 1980s that an extra wire was added to premises' wiring, to enable speech to be separate from ringing. It made sense then, but this so-called bell wire has no place or function in modern life. It is a throwback to the days of pulse dialling, induction coil telephones and magneto bells.

So, the advice is ditch this wire! Disconnect Terminal 3 on the removable faceplate of the NTE (master socket), and disconnect Terminal 3 connections at all extension sockets. Modern telephones are designed for two-wire operation, even BT-supplied ones. But why does the third (bell) wire cause problems? In one word, 'unbalance'.

Common (mode) problem

As we all know, common-mode noise (interference) can be present on all lines of your internal wiring. To clarify, common-mode means that it appears equally on both signal leads of a transmission line. If it is induced equally in both wires, there is no potential difference at the termination, meaning effectively no noise is detectable! If, however, we upset the carefully-created balance of an internal wiring cable (assured by its manufacturing design) by adding another wire to the circuit, the result is the telephone line becomes a radio antenna – because where we previously had just two wires, we now have three that are decidedly not equally balanced.

Long-wave broadcast signals and/or any other radio frequencies (from power transformers, PC monitor screens, fluorescent lights and suchlike) will all now be able to intermingle with the broadband signal. The broadband signal that comes down the telephone wiring at this point is still analogue, not digital as many suppose.

Says our friend, 'I have proved this point on faults. Measure the DSL line speed (not ISP speed) before work starts. To clarify, line speed (line rate) is the physical or 'sync' speed at which you router communicates with the equipment directly connected to the other end of the telephone line in the exchange. This is not necessarily what a speed tester website will indicate on your PC screen, although some speed testers show both.

'Now disconnect the wire at all Terminal 3 connection points. Then measure the line speed again. Presto! – a marked increase. The ISP speed will also rise, in time. In time, because the ADSL line is adaptive (based on a gradual learning process at the telephone exchange), the adjustment will take time, possible a day or more. The Line speed, or sync speed, responds immediately (in your hub manager).'

Are we nearly there now?

Hopefully, but not necessarily. Once airborne interference is eliminated from your internal 'premises' wiring, you have done all you possibly can. But strong interference on the external wiring can still drag down your broadband speed. It's sneaky stuff and detecting it is not an intuitive process.

Fortunately, there is any easy tool to help locate the source of the interference: an ordinary AM transistor radio. This will almost certainly be fitted with a ferrite rod aerial, which is directional. So switch on the tranny (indoors) and tune the medium wave to any quiet frequency on which you cannot hear a broadcast station. Quiet 'white' noise should be heard. If you do hear raspy, repetitive interference, you're onto something. This covers a broad spectrum, so the actual frequency you tune to doesn't matter. Once you get near the source of the trouble, the sound will become quite raucous.

Now you should rotate the radio slowly about a vertical axis. As **http://topbanddf.org.uk/whatis.htm** explains in greater detail, there will be two directions where the signal fades away. These nulls may be very narrow, but when located in the null, the aerial in your radio is pointing along a line joining your location and the location of the transmitter. The aerial is usually along the long axis of the radio when it is standing in its normal way.

Next, go outdoors and repeat this process on all four sides of your premises, until you have a good idea where the QRM (interference) is coming from. Timing might be critical. A machine giving off radio-frequency interference (RFI) may operate only at certain times, eg, during working hours, so a bit of detective work is sometimes needed.

'In one case we had,' says our informant, 'several customers in a particular rural location who were being affected on their broadband. The customers were dispersed, but they were all served by the same DP (telephone wire distribution pole). So, I walked the route with a transistor radio. Then, where the BT cables passed near a pole-mounted power transformer, the noise on the radio was intense. The transformer was from medium-voltage 11kV to low-voltage 230V. The electricity supply people were notified and they co-operated. Lo and behold, the noise ceased as soon as they removed the input links. They said the transformer was arcing internally.'

Not all broadband botherations will be as complicated or involved as this, but nearly all are soluble. If your broadband is driving you to desperation, why not have a word with your neighbours? If their troubles are as bad as yours, then you can press your broadband supplier(s) much harder.