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## Improving your BT Line based Broadband Speed and reliability - Isolate the Bellwire!

The **original** web article from which so many others took their inspiration!

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This page is also available as a [pdf document.](#)

## Citations

See latest Frequencycast podcast [www.frequencycast.co.uk/cast32.html](#) ([extract](#))

"In Issue 273 of Computeractive magazine, they give a link to your site ([www.snipurl.com/3470h](#)) re disabling the bell wire to improve broadband speed. ... much appreciated" - Tom W 11/9/08

"...thanks for your help much appreciated" - David A 11/9/08

"When I pulled the orange wires from the box I said my speed shot up 30 Kbs. I tested the line every 15 minutes or so after that and try as it might it was climbing - slowly but surely. Then after an hour or so it shot over 2MB !!" - Jeff D 25/5/08

"In the one month before I found your web-site, my broadband connection failed on 40 separate occasions for periods between 3 minutes and 9 hours.

Since the bell wire has been disconnected I've not had a single time out." - Bob C-B 7/7/08

"Just removed 3 and 4 from the master socket as per your artical, and the noise on the line has reduced to an almost un-noticeable level and my broadband has increased from 1888kbs to 4096kbs which according to BT is the maximum for my postcode!" - Jason 2/7/08

"hi Jarviser, removed bell wire Thanks mate doubled my speed get you a beer" Sandra D - BT Beta forum 8/5/08

"I had a similar problem. Have a look at this [http://www.jarviser.co.uk/jarviser/broadbandspeed.html](#) Before disconnecting my bell wire I would start with a link speed of 3.8MB but within hours it would be down to 1.8MB and occasionally less than 1MB. Since disconnecting my bell wire on boxing day I have had a steady 3.8MB connection." Mike L BT Beta Forum 16/1/08

"Thanks for the information, this 2 minute fix increased by ADSL broadband speed by 2mb from 6mb - to 8mb" - James G 14/10/08

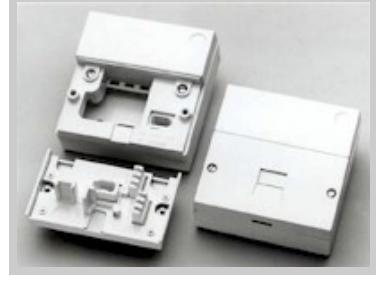
"I read your articles about bellwire problems with interest as I had experienced problems with a friend's installation in an old cottage where the BT Home Hub would not sync until an extension wire to an upstairs telephone was unplugged from a two-way extender plugged into the master socket. As his extension connections are done as described above, the removal of pin 3/4 connections by disconnecting wires is not possible in the way you suggest, so I came up with another idea for your consideration to suit this type of situation. On the plug part of the two (or more) way connectors, the connections are often made with pressed-in brass insulation displacement inserts. It is quite easy to lever the middle two brass pieces out of the plastic with the corner of a small screwdriver or bradawl. Doing this means that ANY extensions will have wires 3 and 4 disconnected, so this might improve matters." Don J by email 14/2/08 (See ADSL Killers below)

"Hi jarviser, just want to say ur guide on tweaking broadband speed by cutting out the bellwire, really improved my broadband speed, and profile, i removed extensions that was not been used also, and now thanks to u have btprofile ofADSL Speed (DS/US) 7200/448 Kbps . What a change from 5000, thank u " Snake S by email June 2009

## 1. Introduction

Even if your phone extension sockets are unused, those extensions can still generate electrical interference (REIN) from the bell-wire down the BT line and reduce your exchange profile speed setting.

If you have no REIN interference, this approach will in most cases do no harm even if there is no improvement, and will protect from future RF interference.



*Only proceed if...*

- You have a standard NTE5 master socket with a removable lower half
- You have telephone extensions wired in the house

If you have the split ADSL/Phone Master socket, proceed only out of interest, but leave the bellwires intact. Personally I find that kind of ADSL/Phone twin socket unhelpful as it does not allow the modem to be plugged into extension sockets.

This Bellwire fix using a standart BT master socket will allow you to plug the Hub into any extension in the house without problems.

If you want to cut the science and go straight to the fix look [here](#)

## 2. The Symptoms

BT Modems work with the exchange equipment to determine the fastest stable speed that the exchange is happy with. It is optimised to give the best speed considering the signal errors received. This optimised speed is known as your "IP Profile" speed at the exchange.

The "Downstream" speed displayed on your hub pages is the Synchronisation (Sync) speed and is the initial speed negotiated with the exchange equipment when you first connect the hub, based on their database information and line condition.

I strongly recommend you spend some time diagnosing the actual speeds you enjoy by reading my web page [here and not simply rely on what the hub tells you.](#) )

Typical symptoms of Repetitive Electrical Impulse Noise (or "REIN") on the extensions when using the BT home hub are when Sync speed starts high after reconnecting the hub to the DSL line, then slows down to maybe a half or a quarter of that speed after a couple of days. It can also cause connection drop-outs. Your IP Profile speed and drop-outs may only improve if you can fix the noise problem.

To help you diagnose speeds, BT supply two websites. Firstly the [speedtester.bt.com](http://speedtester.bt.com) site is recommended to display the IP Profile and to measure Actual speeds from exchange to hub. This must be run using Internet Explorer for best results. There is also a ["BT Broadband Speed checker"](#) site to tell you the speed expectations at your address.

You MUST use your **POSTCODE** in that expectations site. If you use your phone number, as an existing customer you will more likely get your current IP profile, and if you do have a problem locally you want to know what you COULD be getting rather than what you ARE getting - hence use POSTCODE!

If you compare the two sites, and the Profile speed is a lot less than the Postcode Expectations speed, (say at least 30 percent less) then suspect either

- A noisy house installation
- A bad BT line

Be assured that this speed adjustment by the ISP is essential - the alternative to managing the speed is an unstable connection. What you need to do is to find out why.

### 3 Diagnosis

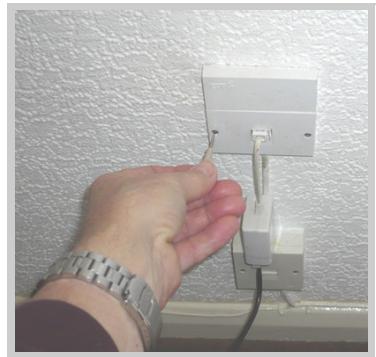
(the "Clean Socket" test)

*If this test shows no improvement after three days, your wiring is probably not the problem.*

*First check you are not using P2P or downloading too much (BT Option 3 caps at around 50 - 100Gb a month, but that figure is not published in the Fair Usage Policy (FUP).*

*If you are certain you have not been capped under the FUP, having done the Clean Socket test to eliminate your house wiring you are then well armed to tell BT it's their problem!*

In order to see if your house wiring is affecting your speeds you should go to the master socket i.e. the first white socket in the property with BT or Openreach printed on it. (If it says Openreach you may well have one of the new bellwire filtered sockets - see later).



This is the NTE5 master socket fitted up to 2007. House phone extensions are wired into the removable lower part of the socket to which the homeowner is allowed to remove and add extensions.

Remove the lower half of the socket and let it hang. If you have hard wired extensions they will be connected to this removable part.

Plug a BT ADSL filter into the socket in the remaining part of the socket still attached to the wall. Plug one phone into the filter, and the Home Hub's ADSL (Broadband) lead into the other socket in the filter.

Leave the socket like this for THREE DAYS.

Then repeat the speed tests and see if your profile has improved significantly.

If the IP profile is much better at the end of the 3 days, you have a problem with your extension wiring, and the most likely culprit is the bellwire.

However the main twisted pair can also pick up interference so you should also check routing of the extensions and avoid mains wires and equipment such as microwaves, TVs and other radio devices like DECT phones.

Having a home hub, you are lucky in that you can use Wi-fi from the Hub in its temporary position by the master socket, but if you have only ethernet cable or USB, DO NOT EXTEND THE PHONE OR CABLE for this test, MOVE THE PC NEARER THE HUB!! There is no point in eliminating the extension wiring then adding more flexible extensions which contain their own bellwires!



## 4 The Science.

At the [Home Hub Forum](#) a contributor codenamed Bramshot told me his story of the BT engineer who removed his bellwire and the subsequent hike in speed. More web research I did using Google and Yahoo also came up with the theory that the "bell-wire" is the cause. (See other citations at the bottom of this article).

The Bell Wire is the third wire on terminal 3 (usually orange/white) used in the standard BT extension wiring that was introduced in the early 1980's when DIY extensions became legal, and BT relaxed their monopoly on supply of phones.

From under the road or along a telegraph pole, your house is served by just TWO wires. This third "bell-wire" is generated by the BT master socket and enables actual bells on old type phones to ring using the 50 volt AC ringer signal. Modern phones have electronic ringers which do not need the bell wire. Its other function is to stop other bells tinkling when rotary dials are used, and it was always known as the "anti-tinkle wire" in the 1980's when we all experimented with DIY extensions.

On standard domestic phone with broadband and individual ADSL filters you don't need any wires apart from the two main conductors on terminals 2 and 5, usually blue/white and white/blue. This is because [ADSL filters](#) isolate the phones from the bellwire and recreate the function in the filter. This makes the bellwire **totally redundant** in a broadband enabled domestic phone system.

Leaving the bell wire in place creates a huge long antenna which picks up radio frequency (RF) interference all over the house. The two conductors that carry the voice and DSL signals are a "randomly twisted pair" which carry current in opposite directions (from master socket to extension socket and back again) so the RF interference cancels itself out. The unpaired bell-wire cannot cancel out the RF. There is also another redundant (white/orange; terminal 4) wire which has never been used by BT on simple domestic wiring. Best to disconnect this too to avoid confusion.

## 5. The DIY Cure.

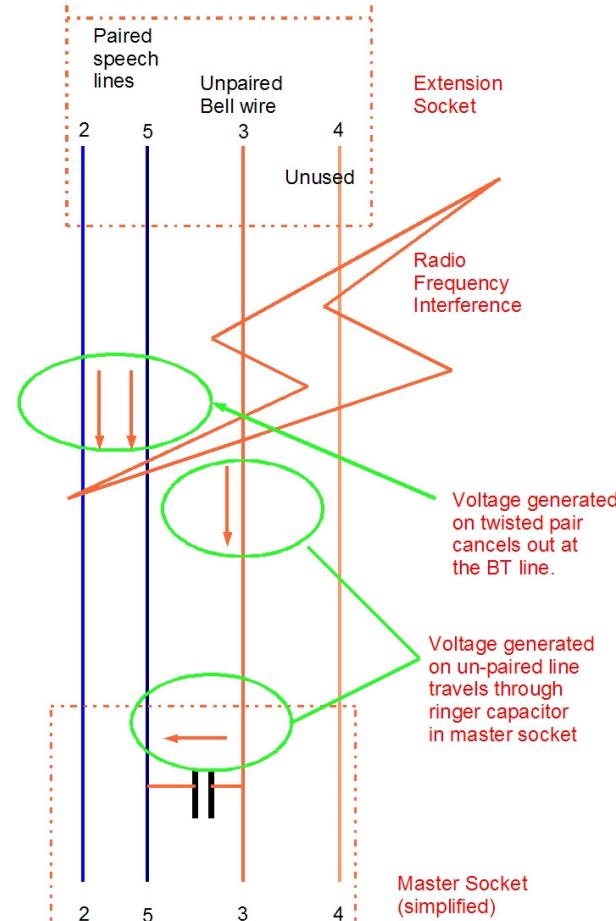
The cure is to disconnect all wires in terminals 3 and 4 at the NTE5 master socket.

On the Master socket disconnect the wires that are connected to terminal 3 of the removable face plate. May as well take the white/orange wire from terminal 4 too - it is unused anyway. Look [here](#) for details.

*If you have an old plain BT master socket you could snip out the bellwire(s) from the back of the faceplate that go to the extension sockets, although this is by law supposed to be done by BT. The bellwire carries no current so I leave it to your conscience.*

*You are not supposed to fiddle with the two BT wires coming from outside, and there is no need to anyway, unless you want to fit your own replacement NTE5a socket. Again, it's illegal to do so, but it's not rocket science. Provided you don't allow the incoming wires to touch each other or to touch anything else metal, you will do no damage, but again it's illegal in the UK so I can't suggest fitting your own master sockets either - it's up to you, and if you can find a UK supplier.*

The result is that throughout the extension system, you leave just TWO WORKING CONDUCTORS on terminals 2 and 5, (white/blue and blue/white.) N.B. This fix is LEGAL.

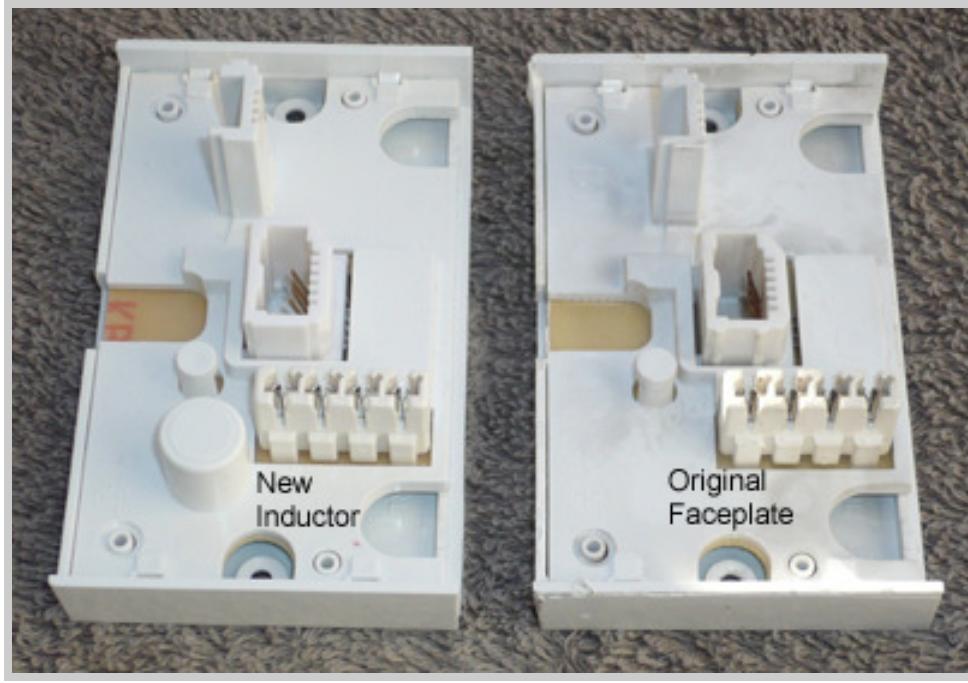


## 6. BT's solution

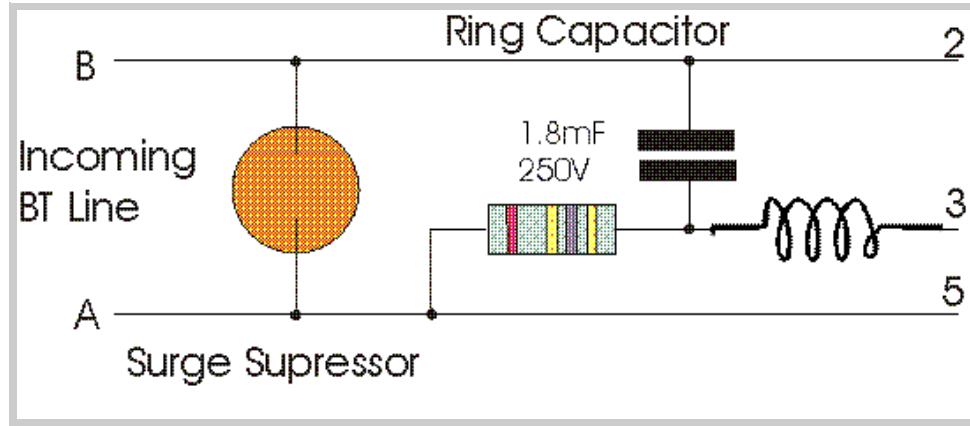
More recent master sockets labelled "Outreach" rather than "BT", will most probably have the new inductor in the bellwire circuit. I tested one of these with my bellwire reinstated. My IP profile remained at 3000k and the sync speed dropped only minutely from 3684 to 3584kbps , so I can confirm that the new faceplates do work almost as well at reducing bellwire "REIN" noise as the bellwire being cut.

The photograph shows the difference between the new (LEFT) and old (RIGHT). The new one has a cylindrical bulge in the lower removable plate that houses the inductor.

Unfortunately it may cost you for an engineer visit but ask your BT sales helpdesk.



The way the original master seems to have been modified is shown below. the inductor blocks high frequency interference.



## iPlate

They also have a new idea - the "iPlate" or Interstitial Plate which fits between the old type frontplate and the backplate

It CANNOT be used if you have either the new type of filtered plate as above, or a double socket ADSL/Phone master front plate.

See [here](#) for more details

## 7. THE ADSL KILLERS!

The pictured "DIY Extension Cables" are still on sale in "good hardware shops" but are capable of killing your ADSL speed unless you have an "iPlate" or bellwire-filtered master socket. The bellwire fix will probably not help you if you have any of these killers in circuit.

Quite simply the 15m of bellwire plugs straight into the ringer capacitor of a master socket and cannot be isolated without a scalpel and giving the wire a vasectomy.

ONLY use proper round phone cable with loose random twisted solid core wires and properly wired to the master socket faceplate (or extension socket backplate if on a daisy-chain) using terminals 2 and 5 only.



If you must use one of these nasty flat cable extensions, make sure it is only plugged into a fixed extension wall socket where the bellwire has been isolated at the master end, and make sure you fit the ADSL filter at the end of the extension furthest from the wall socket. You can always fit an additional fixed extension a few inches from the master with just the two conductors on 2 and 5 terminals for this purpose.

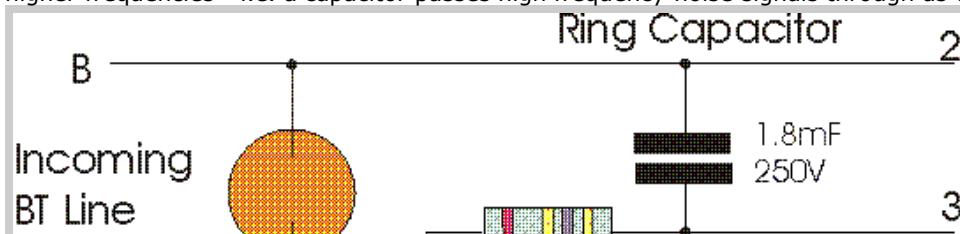


Even better this idea was emailed to me by Don J. The plug-in extension can often be doctored by prising out the middle two pins which relate to the bellwire (3) and unused (4) wires. Adapters can also be doctored the same way. This will convert ADSL killers into 2-wire extensions. Use a compass point or small sharp screwdriver. Right hand pic shows the brass pins half removed.

## 8. Other References

### Master Socket (diagrams copied from [WPP site](#))

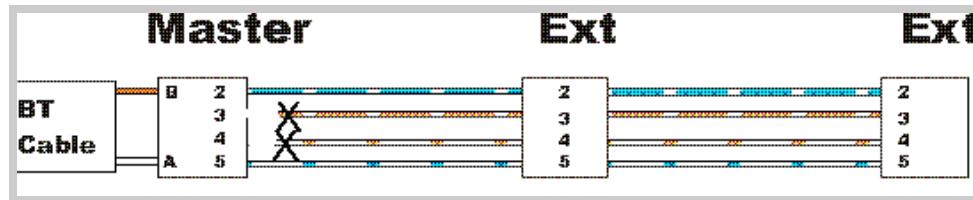
See how the bell-wire on terminal 3 connects to BT "B" via the 1.8 mf capacitor which has a low impedance to higher frequencies - i.e. a capacitor passes high frequency noise signals through as though it was a conductor.



**Standard  
domestic BT  
wiring -**

## Test Resistor

**Disconnect  
wires at X.**



**DISCONNECT  
ORANGE CABLES  
ON TERMINALS 3  
AND 4!!**

Simply cut them or pull them out of the faceplate terminals. They carry no

voltage and are quite safe to cut individually. Leave only the Blue/White wires on 2 and 5. For details see [here](#)

That will reduce RF interference to a minimum and increase your stabilised throughput speed.

More supporting data I found since my own experiments can be found on [Doug Rice's website](#)

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