NBN™ DATA INSTALLATIONS

COMMON PROBLEMS ON FTTN CONNECTIONS

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Depending on locations, with the ongoing rollout of the nbn™, technicians must possess multiple cable testing and fault-finding techniques. Originally the nbn™ was to be installed as a fibre to the house only service. Cost blowouts and ongoing delays led to revision of this standard to include a range of other technologies.

The range of delivery methods for nbn™ services now includes:

- FTTP – fibre to the premises
- FTTB – fibre to the building
- HFC – hybrid fibre coaxial
- FTTC – fibre to the curb
- FTTN – fibre to the node.

The above are classified as fixed line connections. All types of nbn™ access network connections that utilise a physical line running to the premises (FTTP, FTTB, HFC, FTTC and FTTN) are considered fixed line.

The difference between each type of connection comes down to how it utilises existing network technology in connecting the nearest available fibre node to specific premises. Note that there are also a range of wireless technologies in use which are beyond the scope of this article.

This article focuses on FTTN (fibre to the node), as it represents a large proportion of the installed network particularly in high-density regional areas.

The FTTN model can be likened to a data installation in a large commercial building or a campus. Fibre optics are used to provide high-speed backbone cabling between distribution points (Nodes). Copper is used to deliver and distribute the services within buildings generally for the last 100m.

The ability of copper cabling to carry the DSL frequencies required for data transmission is limited to around 2km. Installing fibre-optic cabling to nodes from where the copper distribution length may be as little as 50m provides the opportunity to utilise a broader frequency range which in turn provides more channels to transmit data. This is the principle behind VDSL, which is the network technology utilised on the FTTN NBN network.

The closer to the node your property is, the higher the available speeds. For residential installations, maximum speeds are theoretically limited to 100 Mbps but typically maximum speeds are around 90Mbps. Most Internet service providers will have engineering data on the maximum speed they expect any address as they know the length of copper running from the node to the premises. Some consumers at the end of copper lines may be limited to lower speeds in order to provide a stable connection. In general, most of the networks teething problems have been (or are being) resolved and most reputable service providers provide adequate bandwidth to achieve their agreed

speeds even during peak hours.

Common problems on the network are near end crosstalk (NEXT) and far-end crosstalk (FEXT).

- NEXT is interference that appears on another pair at the same end of the cable as the source of the interference. Its level is substantially independent of cable length.
- FEXT, is interference that appears on another pair at the opposite or far end of the cable to the source of the interference. Its level is attenuated at least as much as the signal itself if both have travelled the same distance.

Both NEXT and FEXT are network issues and are resolved by nbn™ technicians. It's nbn™ responsibility to ensure you have a clean and stable connection up to the network boundary (often the first connection point of your house). This is normally tested in an FTTN area at the pillar on the street to ensure the connection is both active and stable after activation.

Common problems with reduced network speeds occur with aged internal cabling. Intermittent dropouts are often the result of 'bridge taps' within customers' premises. Bridge taps can be considered as un-terminated branch circuits connected in parallel with the cable that the modem is connected to, it can also be a result of disconnected jumpers left in place on an MDF (main distribution frame). Branch circuits are often the cause in older premises with daisy chain style cabling and sockets connected in parallel branches within the daisy chain or branching off to other sockets. I've come across cases where phone lines have been extended to a garage and that cabling was left in place with the modem connected.

In simple terms, radio frequencies react somewhat like waves in the ocean. If a wave hits a break wall it will bounce back on itself creating some interesting effects in water with the waves still travelling towards the break wall. The same principle applies with wave frequencies travelling across our copper networks. The effect of this is to create a reflective path for the signal. When the signal reaches an unterminated end, it bounces back on itself creating interference by superimposing itself over the upstream and downstream signals.

When working as a data technician, I found bridge taps a very common cause of dropouts. An nbn™ NTU is a VDSL Modem that on power up listens for line noise, it then superimposes the line noise 180° out of phase to effectively cancel out the noise components on the signal.

Consider it a little like noise cancelling headphones. Bridge taps reduce the effectiveness of the network termination unit's ability to handle this type of noise and so reduces the reliability of the service. The network terminating unit will often drop out and try to adjust itself to what it believes is line noise by going through the listening process again and again. This often results in what appears to be intermittent and random dropouts, which can be very frustrating for a customer.

Wherever your customer has had multiple phone points throughout the house, consider disconnecting them to ensure you have one incoming line to the modem. Alternatively, run a new cable from the lead in location to create a new first point that the modem can then be plugged into.

If the customer is also receiving phone services, phone sockets should only be plugged into separated cabling from the incoming line. These sockets can be connected to the phone jack on the modem. You can then connect and run standard PSTN-style phones in the house on this separated cabling. This will not interfere with the VDSL signal and your customer should have a reliable and stable nbn™ broadband and phone service.

Registered cablers are now allowed to relocate the first socket to accommodate this and move a larger range of nbn™ services under the recently released Authority to Alter Facilities in Residential and Small Business Premises document. The nbn™ allows registered cabling technicians to make a range of changes to nbn equipment within a user's premises without seeking prior permission from nbn™. Such changes may include rewiring a home in order to move a Network Termination Device (NTD) from one room to another more suited to the end user's needs.

The original Authority to Alter only allowed registered cablers to modify internal cabling after the network boundary on the nbn™ FTTN Network. This has now been expanded to include the FTTP, FTTC and HFC networks. Modification of the nbn™ Wireless and Satellite premises networks prior to the NTD still requires permission from nbn™.

Note, all licensed cablers must use approved equipment and methods to make any modifications under the Authority to Alter and all work still requires provision of a TCA1 form verifying compliance of the work to the standard AS/CA S009:2013. The Authority to Alter now provides cablers with the ability to remove and rectify original copper cabling that may be interfering with the service, including removal of bridge taps.

The full authority to alter document is available at www.nbnco.com.au/content/dam/nbnco2/documents/authority-to-alter-facilities-on-resdential-and-small-businesses-premises.pdf. It is generally applied to premises fed by a copper network with copper cables up to 10 pairs or less, as well as the Hybrid Fibre Copper network and fibre network as per authorised work activities listed within the document.

A copy of AS/CA S009:2013 can be download free from www.commsalliance.com.au/__data/assets/pdf_file/0017/ 39203/S009_2013.pdf ■