

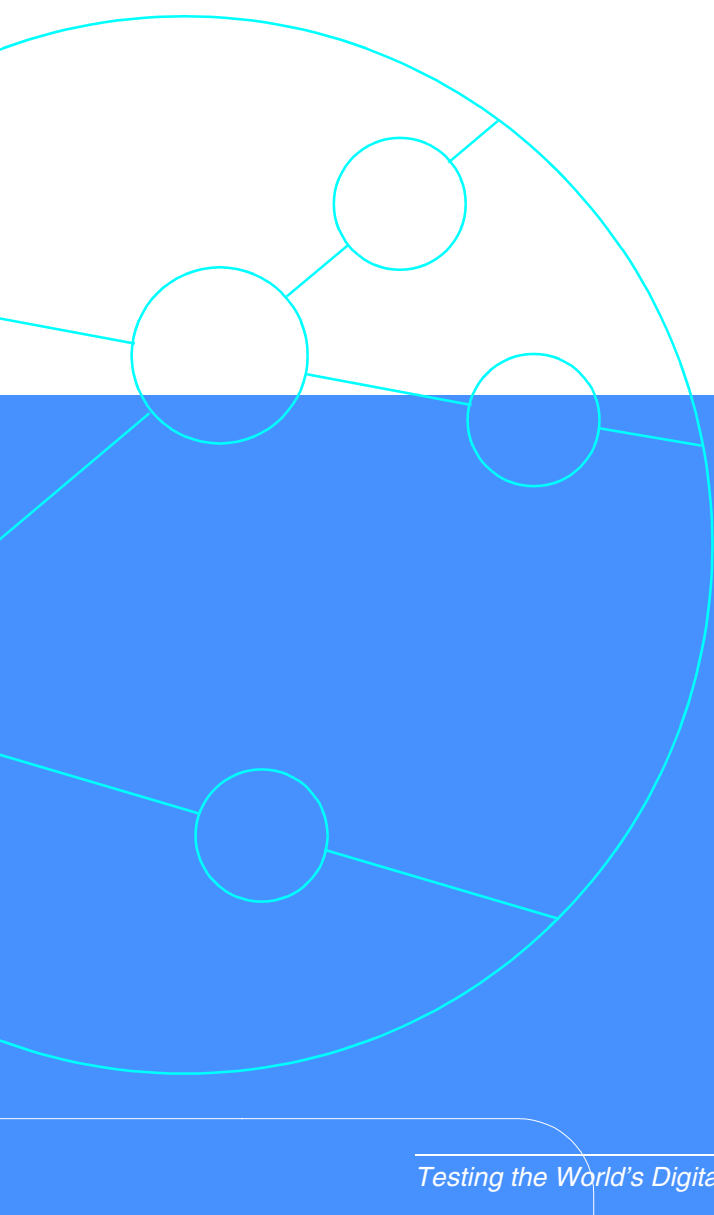


# FlexaNetxDSL Copper Testing

*This application note gives an overview of Copper testing using the FlexaNet xDSL Copper Test Option.*

*It describes some of the possible problems that are caused by poor performance of the copper.*

*Application Note ANFlexxDSL 03*



*Testing the World's Digital Networks*

FlexaNet xDSL is a system for managing problems reported by users of xDSL lines. When a customer reports a problem with their xDSL line it provides the tools to quickly diagnose the cause of the problem, and advise the call centre operator on the next step that is needed. One of the steps recommended may be to ask an engineer to perform manual in-depth tests on the copper pair.

This *Application Note* concentrates on using the manual copper tests to diagnose common faults that may be reported by users. This *Application Note* is aimed at experienced engineers performing second line support.

This *Application Note* can only give brief information, for more detailed information on interpreting test results, see the on-screen help supplied with FlexaNet xDSL Fault Manager.

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## INTRODUCING THE COPPER TESTS

Installation of new broadband services using higher bandwidths has created the need to qualify the performance of the copper pair. Tests are needed to make sure that reliable service can be assured at these higher data rates. The copper pair will have operated fault-free at the narrower bandwidths used by POTS and ISDN, but may not be suitable for the high-speed xDSL services. FlexaNet xDSL enables you to both pre-qualify the copper pair and perform fault-finding when problems occur.

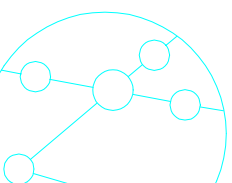
This *Application Note* briefly describes the copper tests available when you are performing manual tests using FlexaNet xDSL. It also describes some of the problems and symptoms associated with poor results from the copper tests.

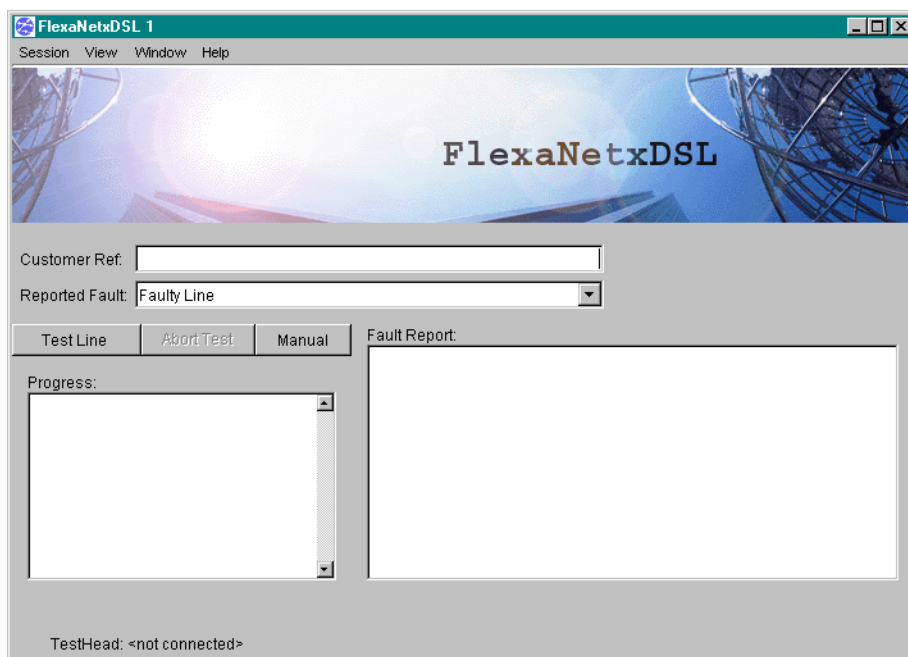
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## TESTING THE LINE

To start to test a copper pair:

1. Double-click on the FlexaNet xDSL Fault Manager icon on the PC desktop.  
The FlexaNet xDSL window is displayed.





2. Type the **Customer Ref** for the line you want to test.

3. Choose **Manual**.

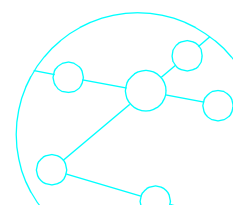
The FlexaNet xDSL manual window is displayed.

You can only perform a copper test if the xDSL layer is down. If the xDSL layer is active you must first deactivate it. If the xDSL layer is already down you do not need to perform the next two steps:

4. Choose the **xDSL** button.

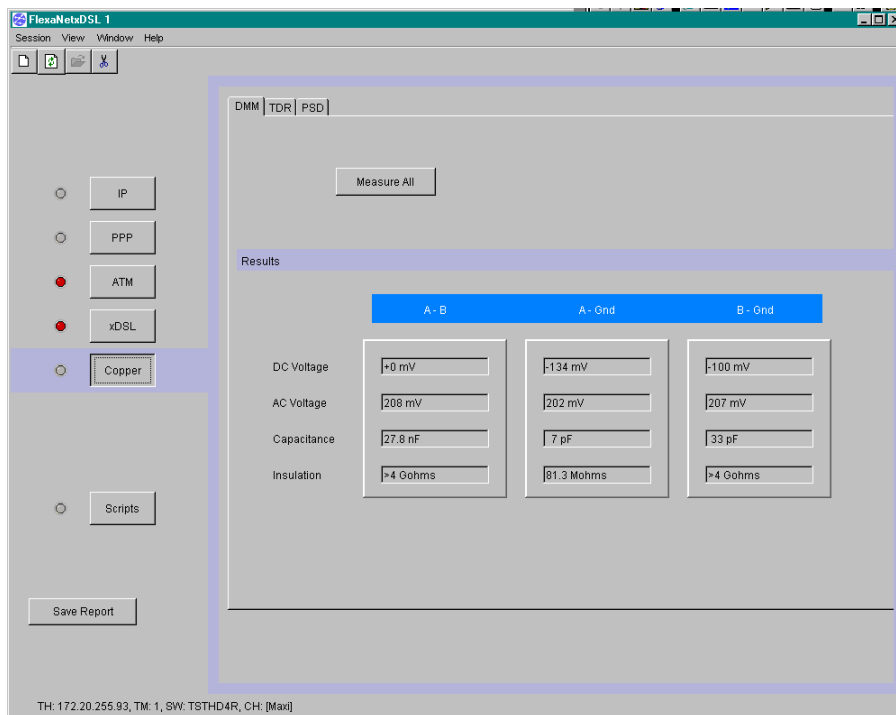
5. Choose the **xDSL Deactivate** button.

6. To display the copper testing tab, choose the **Copper** button.



# FlexaNetxDSL Copper Testing

Testing the line



You can perform three types of test as indicated by the three tabs on the screen - **DMM** (Digital Multi-Meter), **TDR** (Time Domain Reflectometer) or **PSD** (Power Spectral Density).

7. Choose the type of test you want to run by choosing the appropriate tab.
8. Choose **Measure All** (DMM) or **Start**.  
The test starts and the results are displayed.
9. To stop a TDR or PSD measurement choose **Stop**.

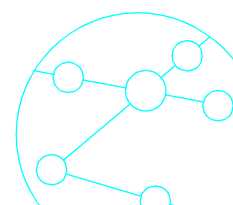
## LOOKING AT THE TEST RESULTS

The results of **TDR** and **PSD** tests are presented as graphs.

### DMM

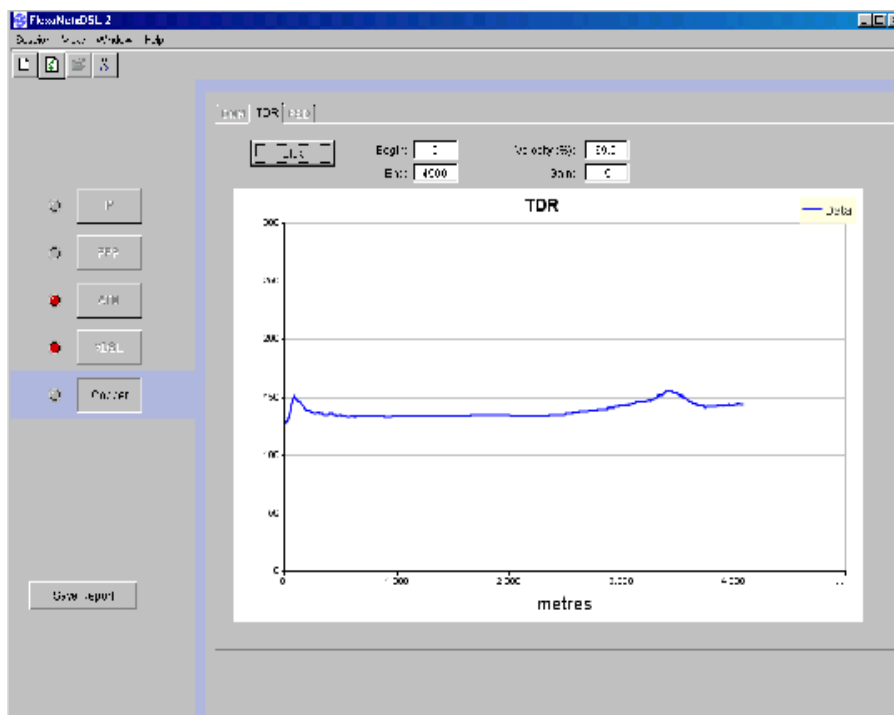
In the **FlexaNetxDSL** manual window the copper **DMM** tab displays properties of the line under test.

Measurement	Comments
Voltage	If the line voltage is too high (over 1 Volt) it indicates that an incorrect service, for example ISDN, is connected to the line.
Capacitance	If the line capacitance is low (less than 1 nF) it indicates that the line is disconnected at, or near the MDF.
Insulation	If the value is: <b>Greater than 100 M<math>\Omega</math></b> – indicates that no modem is connected to line. A splitter may be connected but no phone is connected to the splitter. <b>Between 10 M<math>\Omega</math> and 100 M<math>\Omega</math></b> - indicates that a modem is connected to line possible through a splitter but that no phone is connected to the splitter. <b>Between 1 M<math>\Omega</math> and 10 M<math>\Omega</math></b> - indicates that the line is probably connected to the subscriber splitter and that a phone is connected to the splitter. <b>Less than 1 M<math>\Omega</math></b> - indicates that the line is probably shorted out to itself or another pair.



### TDR

The **TDR** tab displays a TDR (Time Domain Reflectometer) trace for the line under test.



The trace can be used to detect faults on the line - an open circuit fault is displayed as an upward “peak”; a short circuit or a bridge tap fault is displayed as a downward “trough”. For more information on interpreting TDR results see the Application Note *Locating Faults with FlexaNet xDSL*.

While you make a measurement you can change the test conditions, you can change the range the measurement is made over (**Begin** and **End**), and the **Gain** used. This is useful if you want to look in detail at one area of the TDR curve.

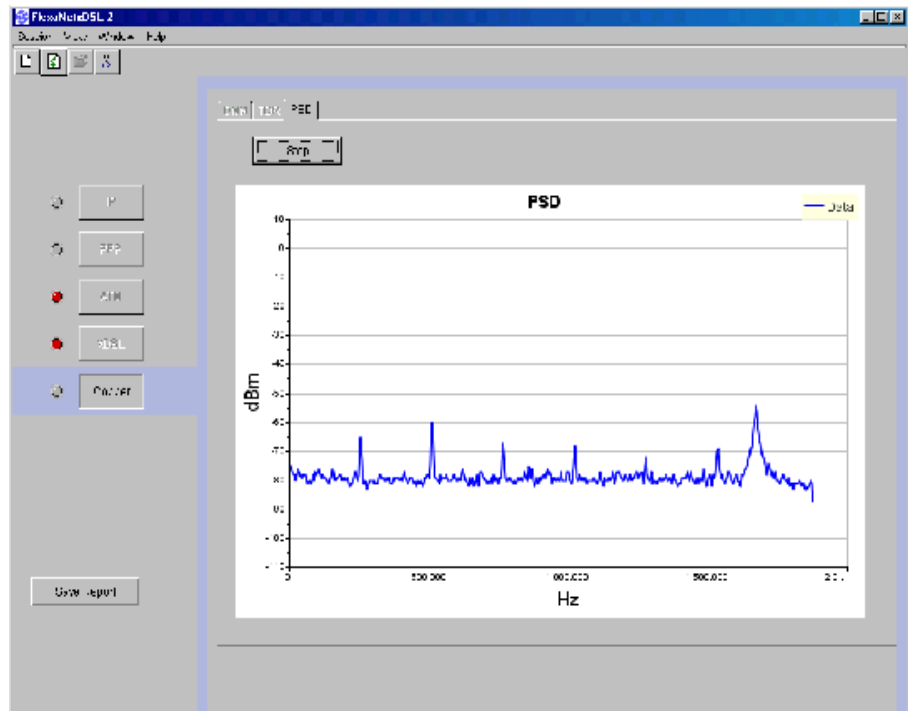
In order to achieve accurate results the velocity factor (**Velocity (%)**) must be set for the type of cable you are testing. It is defined as the percentage of the speed of light ( $3 \times 10^8$  m/s). For typical telephone twisted pair cable this varies between 60 and 75, the range available is 50 to 99.9.

To change one of the values:

1. Put the cursor in the setting you want to change and enter a new value.
2. Move the cursor to another setting.  
The TDR curve is redrawn for the new setting.

## PSD

The PSD displays a graph of power (dBm) against frequency.

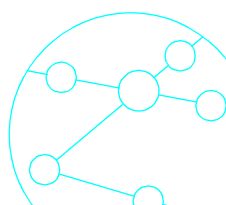


ADSL uses the same copper pair as voice, but the two use different frequency ranges. Voice uses the spectrum from 300 Hz to 3200 Hz and ADSL uses from 20 kHz to 1.1 MHz. For ADSL the upstream signal uses the lower part of the spectrum and the downstream signal uses the higher part of the signal.

The spectrum used by ADSL is split into 256 frequency bands. These channels are allocated flexibly by the modems as they attempt to maximise the bit rate, depending on the signal-to-noise ratio for each frequency band.

Outside noise may cause problems with xDSL lines, reducing bit rates or in the extreme meaning that modems do not synchronize.

The PSD enables you to identify problems with noise, and identify the frequency of the noise causing the problem.





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