IDEAL INDUSTRIES NETWORKS

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# NaviTEK II

***User Guide***
***151810 issue 1***

## COPYRIGHT NOTICE


Publication ref: 151810 Issue 1
Issue 1 - 03/12
Applies to software revision 1.0.0 onwards

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## CONTENTS

## Care of your NaviTEK II

Although light and portable, NaviTEK II is robust and has been designed to operate in a protected outdoor working environment.

To ensure reliable operation:

- Avoid very high or low temperatures - NaviTEK II is designed to operate between 0°C and +40°C, although you should only charge the battery between +10°C and +30°C. You can store the unit safely between -20°C and +70°C.
- To avoid damage, we recommend that you keep NaviTEK II in its carrying case when you are not using it.
- Do not use solvents, strong detergents or abrasive materials to clean NaviTEK II. Use only cleaning agents approved for use on ABS and polycarbonate plastics.

## Final Disposal

When your NaviTEK II has reached the end of its life you must dispose of the complete unit in accordance with local environmental regulations.

## Safety Information

When using NaviTEK II, always take basic safety precautions to reduce the risk of fire, electric shock and injury to persons. These include the following:

- When connecting to the line, special care must be taken as high voltages may be present on the line and there may be a danger of electrocution.
- Avoid using the tester during an electrical storm - there is a remote risk of electric shock by lightning.
- Use only the mains electricity adaptor supplied with your NaviTEK II.

CLASS 1 LASER PRODUCT. Light output from the fiber optic port can damage eyesight even though it is invisible. Never stare into open optical ports or the end of a fiber to see if light is coming out.

### Connector Safety

The following connectors conform to EN60950 SELV safety status:

- RJ-45 Ethernet port.
- USB port.
- DC inlet port.

**DO NOT CONNECT ANY TELECOMMUNICATIONS NETWORK TO ANY OF THE TESTER'S PORTS**

## Power

All models of NaviTEK II can be powered from:

- A rechargeable power module,
- Directly from power connected to the DC inlet built in to the power module.
- From an alkaline battery pack.

The type of module or pack supplied as standard depends on the model purchased.

### Power Module Management

A fully charged power module will support up to five hours of heavy, continuous use. For maximum life of the power module it is recommended to discharge it fully and then recharge it fully at least once a month.

The power module is not user-serviceable. When it has reached the end of its life, contact your local IDEAL representative for service.

### Power Module Recharging

The power module can be fully recharged in three hours with the NaviTEK II switched ON or OFF. To recharge the power module, connect the supplied power adaptor to the DC inlet. For convenience the power module may be removed from, or left attached to, the tester for charging. The Power LED next to the DC inlet glows green to show that the battery is being charged, and flashes green to show that it is not being charged. The power module's charge state is indicated at FULL, 2/3, 1/3 and EMPTY by the graphical power meter shown in the information bar at the top of the display.


**Fig 1 Power indications**

### Battery Pack

The battery pack accepts four replaceable AA alkaline cells. These cells cannot be recharged.

**Switching ON and OFF**

To switch the tester ON, press and hold the Power button. Wait until the home screen is visible on the display; the tester is ready for use.

To switch the tester OFF, press and hold the Power for approximately 1/2 second, a shutdown message is displayed on the screen. The currently stored setup is saved. If the tester does not switch OFF within five seconds, see *Master Reset*.

**Power Saving**

Power saving preferences are selected from SETUP>SYSTEM>PREF. Auto off can be Disabled (tester remains ON indefinitely), or set to switch the tester OFF after three, 10 or 30 minutes of inactivity. The backlight can be set to Always On, or to dim to 50% brightness after three minutes of inactivity. Note that when mains power is connected the display is always on full brightness and the tester remains ON indefinitely.

**Master Reset**

In the unlikely event of a system lock-up which prevents the tester from being switched OFF, it may be necessary to perform a master reset. This will not delete any stored data.

- Remove the power module or battery pack to access a small aperture in the NaviTEK II (Fig 2).
- Insert a paper clip into the reset hole and press the internal reset switch.

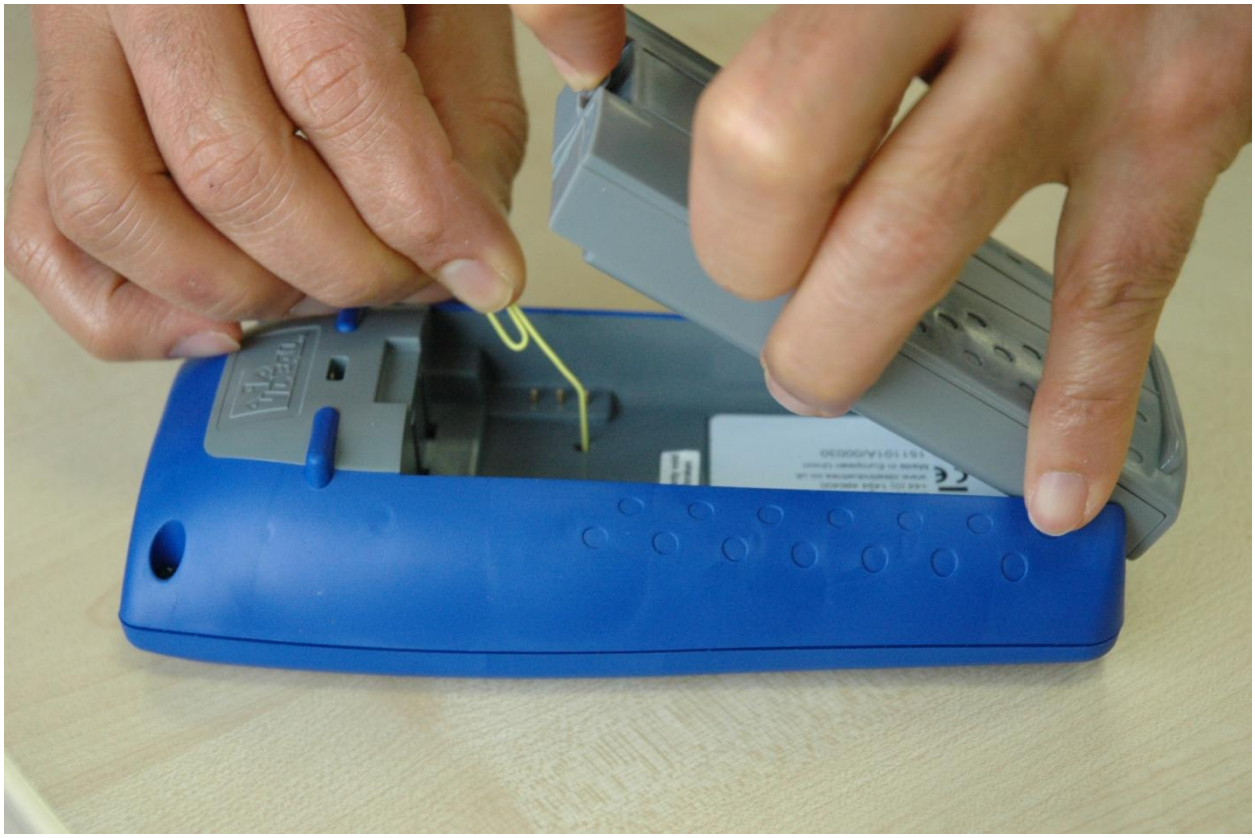


**Fig 2**

- Replace the power module or battery pack.

## Replaceable insert – RJ-45 socket

To replace a damaged or worn RJ-45 socket insert proceed as follows:

Equipment required: Kit, IDEAL part number 150058 – includes Tool x1 and Replacement Insert x10.

- Switch the NaviTEK II OFF.
- Connect the tool to the socket insert that is to be replaced.
- Note the orientation of the insert within the socket and carefully remove it using the tool.
- Install the new insert to the socket using your fingers.

## Functional overview

The NaviTEK II range offers three models. The available functions are listed below. The information throughout this publication details the functions available to NaviTEK II PRO. Please check this table to confirm the functionality of your tester.

| Function | NaviTEK II | NaviTEK II PLUS | NaviTEK II PRO |
|---|---|---|---|
| LAN testing over copper | ✓ | ✓ | ✓ |
| IPv4 | ✓ | ✓ | ✓ |
| IPv6 | ✓ | ✓ | ✓ |
| Advanced Wiremap | ✓ | ✓ | ✓ |
| PoE detection | ✓ | ✓ | ✓ |
| Tone Generator | ✓ | ✓ | ✓ |
| Ping test | ✓ | ✓ | ✓ |
| Traceroute test | ✓ | ✓ | ✓ |
| Hub blink | ✓ | ✓ | ✓ |
| VLAN support | | ✓ | ✓ |
| Netscan | | ✓ | ✓ |
| Traffic utilization | | ✓ | ✓ |
| Results storage & export | | ✓ | ✓ |
| 802.1x security | | | ✓ |
| LAN testing over optical fiber | | | ✓ |
| Loopback mode (copper & fiber) | | | ✓ |

## Handset Controls, Indicators and Ports

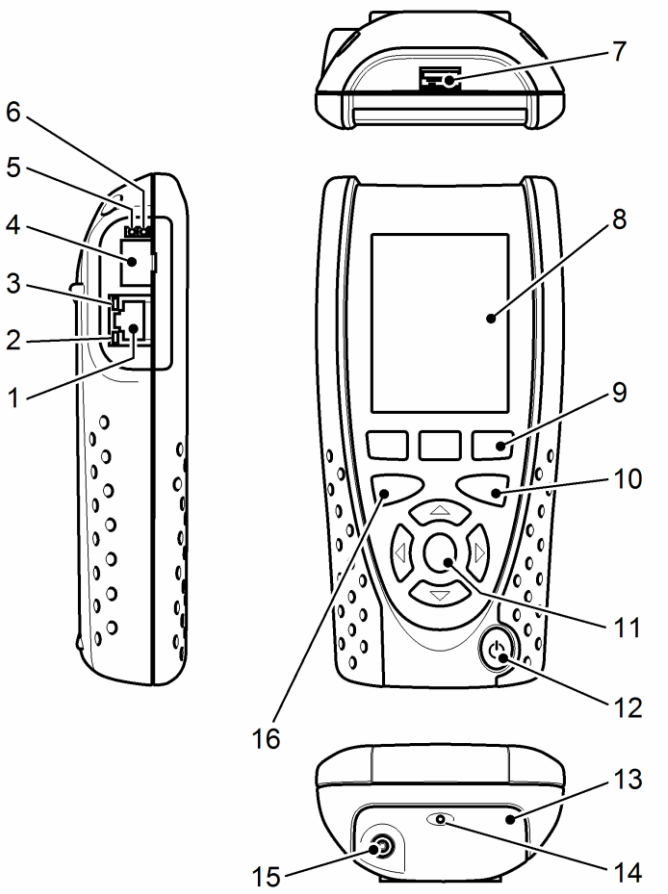



**Fig 3**

| | | | |
|---|---|---|---|
| 1 | RJ 45 port | 9 | Function keys F1 to F3 |
| 2 | RJ 45 activity LED | 10 | Escape key |
| 3 | RJ 45 link LED | 11 | Cursor and ENTER keys |
| 4[1] | Optical port (SFP) | 12 | ON/OFF button |
| 5[1] | Optical activity LED | 13[2] | Power module |
| 6[1] | Optical link LED | 14[2] | Charger LED |
| 7 | USB port | 15[2] | DC in connector |
| 8 | LCD color display | 16 | Autotest button |

[1] Fig 3 items 4, 5 & 6 – NaviTEK II PRO only.

[2] Fig 3 item 13 shows optional power module.

## Menu Navigation

**Cursor and ENTER keys**. The arrowed cursor keys are intuitively marked to move the highlighted field between all menu icons, settings fields and drop-down menus[1] that appear on the display. ENTER selects the currently highlighted option.

**Escape key**. Returns to previous screen or hides the options of a drop-down menu. Note that when a value in a settings field is changed, if the Escape key is pressed *before* the soft key 'APPLY', the value will not be stored.

**Autotest key**. Immediately runs pre-stored tests. A new tester will have factory stored tests in memory. These are easily changed using the SETUP menu.

**Function keys**. F1 to F3 are to select the corresponding soft keys at the lower edge of the display.

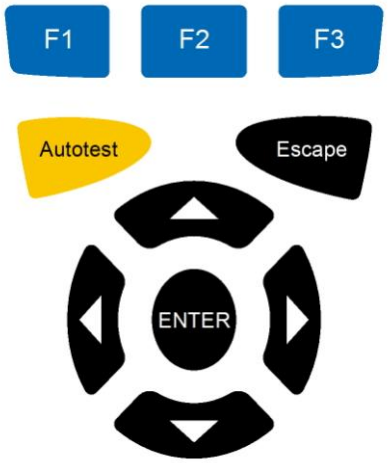



**Fig 4**

## Soft Keys

The soft keys appear along the bottom edge of the display. Their function changes and is dependent on the screen currently shown on the display.

## Data entry


**Fig 5**

When you navigate to and select a field that requires a value or text to be entered, such as a customer's name or a URL, a QWERTY keyboard will be shown on the display (Fig 5). All data is entered using the QWERTY keyboard. Move the key that is highlighted on the keyboard using the tester's cursor keys. ENTER selects the currently highlighted key which will now appear in the text window directly above the keyboard. Key stroke errors are corrected using the backspace key ( <− ). Press the UP cursor key to move the cursor into the text window for editing.

Press the QWERTY keyboard's SHIFT key to change the display from lower to upper case. Press SHIFT a second time to display symbols and punctuation characters.

When the text or value has been entered, press the soft key OK (F1). The display will return to the previous screen which is now populated with the required data. You must press the soft key APPLY to save the changes.

[1] Only NaviTEK II PLUS and PRO support drop-down menus. For NaviTEK II, to select a value from a field that offers a list of values, use the LEFT and RIGHT cursor keys. To move to the previous or next field on the screen use the UP or DOWN cursor keys. ENTER will move to the next field. With all models, press the soft key APPLY (F2) to save changes.

## Getting started

Press the soft key DETECT (F1) and the tester will determine the mode of operation dependent on the services detected.

The modes of operation that follow are available:

## Modes of Operation

NaviTEK II has two fundamental modes of operation –

**Cable**

When the tester is connected to a copper cable, with or without an active remote, press the soft key DETECT (F1) to display all options available from the Cable mode screen (Fig 6). When an active remote is connected it will be shown on screen and its identification number displayed. For a full description of these options, see - *Tests menu description – Cable mode*.

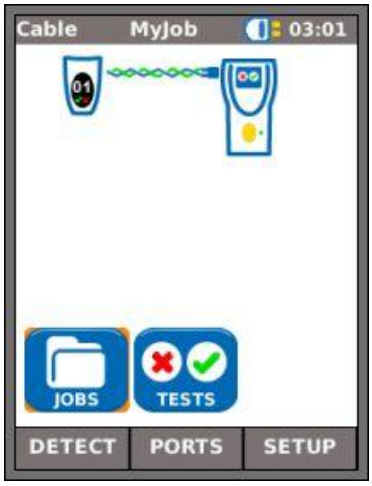



**Fig 6**

**Ethernet**


**Fig 7**

When the tester is connected to a network/device, using either copper or fiber cable, press the soft key DETECT (F1), to display all options available from the Ethernet mode screen (Fig 7). For a full description of these options see – *Tests menu description – Ethernet mode.*

The detected services are PoE (802.3af/at. Not Cisco pre-standard), ISDN S, PBX and Unknown. The IPv4 and IPv6 addresses assigned to the tester are displayed (when available).

**NOTES**

If the NaviTEK II is connected to an active network when it is switched ON, it will automatically detect the network and display its IP address in the HOME screen.

If the NaviTEK II is not connected to an active network when it is switched ON, it will automatically enter Cable mode and run a Wiremap test.

If the NaviTEK II is connected to an active network after it is switched ON, press the soft key DETECT (F1) to detect the network.

## Ports

From the home screen press the soft key PORTS (F2), highlight the required port and press ENTER (Fig 8).

Tick the check box to always see this screen at startup.

**NOTE**

Testing over fiber is available with the NaviTEK II PRO only.


**Fig 8**

## Setup

All user-defined settings and preferences of the NaviTEK II are set from the SETUP menu. A map of the SETUP menu is shown at Fig 9 and a description of the available settings and preferences is found on *pages 13 to 16*.

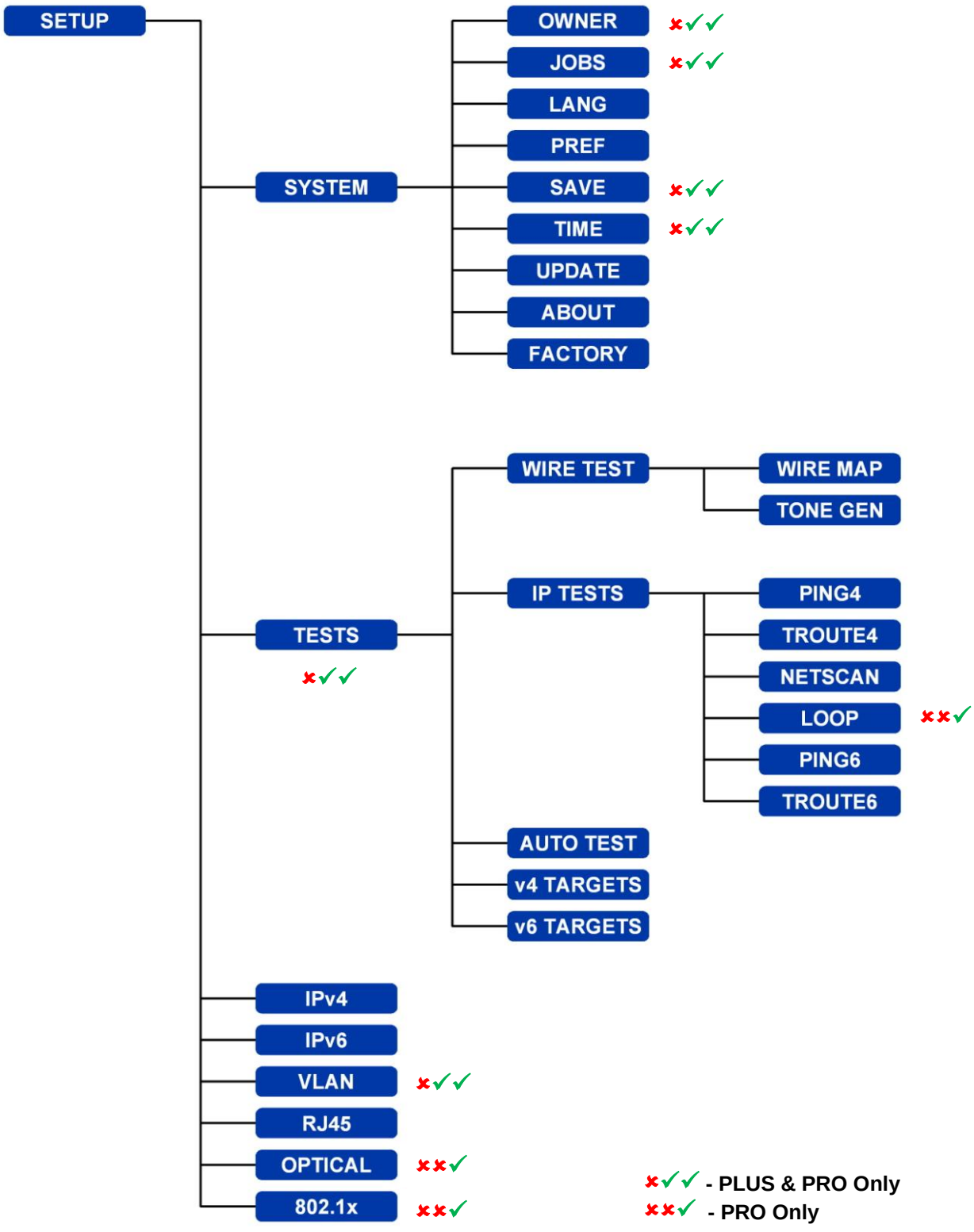



**Fig 9**

## Setup menu descriptions

From the Cable or Ethernet home screen, press the soft key SETUP (F3) to display the Setup menu shown in Fig 10. The settings for all tests, functions and preferences can be changed and saved from here.

Selecting any of the eight icons will produce the options that follow:


**Fig 10**


Highlight the System icon and press ENTER to access the settings and preferences listed below:


Enter your name or your company's name, address and phone number(s). The details stored here will appear on all reports exported via a USB key.


This option enables you to manage Jobs as follows: Create new Jobs. View, edit or delete existing Jobs. Save Jobs to a USB key. The 'Activate' icon selects the Job you require to be active. See *Jobs* for a full description.


Sets the language for the tester. The on-screen display, and the exported results and reports will appear in the selected language.


Sets the power saving options, the preferred units of length and the date and time formats.


Export or import setup information to/from a USB stick. Use this function when you wish to copy setup information from one tester to another.


Sets the current date and time. Note that the date and time are recorded against test results and will appear on exported reports. The internal clock is autonomous of the power module or battery pack for up to one day.


For PLUS and PRO models this menu item facilitates software updates downloaded from the IDEAL website and saved to a USB key. Select the update icon and follow the on-screen instructions. To update NaviTEK II only: with tester switched OFF, insert USB key and then PRESS and HOLD the AUTOTEST key while switching on the tester. A dialogue will then appear on screen indicating that a software update is in progress.


Provides model, software, hardware and firmware information.


Provides the option to return all settings to the factory default.

**A FACTORY RESET WILL REMOVE ALL STORED DATA FROM THE TESTER**


Highlight the Tests icon and press ENTER to access the settings and preferences listed below:


The two wiretests that follow are available **:-**


Set the cable type and color scheme to suit the cable to be tested, crossover allowed y/n, and NVP. NVP is preset at 72% but can be custom set anywhere in the range of 59 to 89% to suit the cable to be tested.


Select from three tones. This avoids confusion when a second or third tester is being used on the same installation. Choose on which pin, or pin pair, to play the tone to achieve the best results.


The six IP tests that follow are available **:-**


Set the target URL/Numerical address (select from up to 10 targets stored in the v4 TARGET look up table or edit the currently displayed URL),
Count (Number of times to repeat the Ping - 1 to 999999),
Pause (Interval between successive Pings - 1 to 5 seconds),
Length (Number of bytes in Ping frame payload - 8 to 1000 bytes).


Set the target URL/Numerical address (select from up to 10 targets stored in the v4 TARGET look up table or edit the currently displayed URL)
Maximum number of hops (2 to 100),
Timeout (Abort timeout for any hop: 2 to 30 secs), Use a short timeout to reduce test time, or a long timeout to reach remote internet locations.
Protocol (ICMP or UDP as required by your network).
Select Name Lookup if supported by your network. If not required, de-select Name Lookup to reduce test time.


Select whether the Netscan is to be Local (scan within the range of the tester's own IP address) or Custom (scan within the range of the IP address configured).
Set the Scan Range depending on whether a wide scan or a short test time is more important.

| Scan Range | Max Number of Hosts | Test time |
|---|---|---|
| Class C/24 | 256 | Short |
| Class C/20 | 2048 | Medium |
| Class B/16 | 65,536 | Long |

IPv6 Netscan Setup – None required (Automatically set).


Set type of loopback between:

| | |
|---|---|
| Wireline: | Physical loop of all traffic |
| MAC: | Swaps source and destination MAC address |
| IP | Swaps source and destination MAC and IP addresses |
| UDP | Swaps source and destination MAC and IP addresses and port numbers |

Deselect the All Traffic check box to loop only Unicast traffic directed at this tester.
Select the check box to loop all traffic.


IP Tests continued


Set the target URL/Numerical address (select from up to 10 targets stored in the v6 TARGET look up table or edit the currently displayed URL),
Count (Number of times to repeat the Ping - 1 to 999999),
Pause (Interval between successive Pings - 1 to 5 seconds),
Length (Number of bytes in the Ping frame payload - 8 to 1000 bytes).


Set the target URL/Numerical address (select from up to 10 targets stored in the v6 TARGET look up table or edit the currently displayed URL),,
Maximum number of hops (1 to 30),
Timeout (Abort timeout for any hop - 2 to 30 secs),
Select Name Lookup if supported by your network. If not required, de-select Name Lookup to reduce test time.


Select the Cable mode and Ethernet mode tests that will run every time the NaviTEK II's Autotest button is pressed. Select from: Wiremap, Ping4, Ping6, TRoute4, TRoute6 and Netscan.


Select this option to enter up to 10 IPv4 targets in a look up table. The targets you save here can be quickly selected when running Ping4 and TRoute4 tests.


Select this option to enter up to 10 IPv6 targets in a look up table. The targets you save here can be quickly selected when running Ping6 and TRoute6 tests.


Enable/disable IPv4 and set IP address as static or dynamic (DHCP) depending on which type your network supports. If Static is selected, enter the numerical address, Netmask, Gateway, DNS1 and DNS2.


Enable/disable IPv6 and select address type as Static, Stateless, Stateful (DCHP) depending on which type your network supports. If Static is selected, enter numerical IP address, Prefix (64 or 128), Gateway, DNS1 and DNS2.


Enable/disable VLAN. If VLAN is enabled, set ID (0 to 4094) and VLAN priority (0 to 7) of the VLAN you want to use on your network.


Enable Auto negotiate to allow NaviTEK II to change its settings automatically to suit the connected network.

Disable Auto negotiate to fix the settings, and set speed (10Mb/s, 100Mb/s or 1Gb/s), and mode to Full or Half Duplex.

Set minimum Rx size (19 to 99), used to detect Undersize frames in LINK STATS.

Set MDI to Auto to compensate for straight/crossover connections automatically.

Set MDI to MDI or MDIX to fix the MDI type for network troubleshooting.

**NOTES**

1) The factory set MAC address of the tester is displayed for information only and cannot be adjusted.

2) The current 802.1x setting is displayed (for setting see below).


Provides the information that follows on the SFP connected to the Optical port:

Status – Available or Not Fitted, Vendor, Part number.

See

*Supported* SFP Transceivers below.

The current 802.1x setting is displayed (for setting see below).


Enable/disable 802.1x to suit your network configuration. With 802.1x disabled, the tester will not be able to connect to any network which uses 802.1x security. With 802.1x enabled, the tester will not be able to connect to any network which does not use 802.1x security.

Select the EAP method to suit your network configuration. Extensible Authentication Protocol is an authentication framework. It can provide 802.1x authentication by a number of different methods. NaviTEK II supports the six most common methods. Select the method that suits your network. Select Any to allow NaviTEK II to attempt each supported method in turn.

Select the Tunneled Method to suit your network.

Enter the Username and Password issued by your network administrator.

For step-by-step instructions on how to import 802.1x certificates and how to set the EAP method and Tunneled method see *page 24*.

## Supported SFP Transceivers

The SFP types that follow are supported. The use of other SFP types is possible but correct operation is not guaranteed.

| Type | Manufacturer | Part No | Speed | Fiber type | Wavelength | Connector Type |
|---|---|---|---|---|---|---|
| SX | Avago | AFBR-5705Z | 1Gb/s | Multimode | 850nm | LC Duplex |
| SX | Apac | LM28-C3S-TI-N-DD | 1Gb/s | Multimode | 850nm | LC Duplex |
| LX | Avago | AFCT-5705Z | 1Gb/s | Singlemode | 1310nm | LC Duplex |
| ZX | Apac | LS48-C3U-TC-N-DD | 1Gb/s | Singlemode | 1550nm | LC Duplex |

## Tests - General

In either Cable or Ethernet mode, when you select the TESTS icon, the display will show the range of tests available. The tests are shown in the menu maps at Fig 11 and Fig 12.

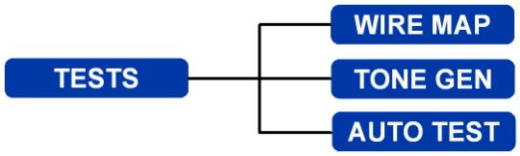



**Fig 11 Tests Menu – Cable mode**

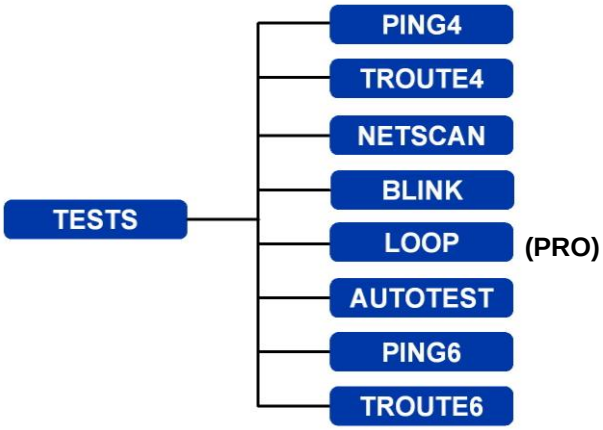



**Fig 12 Tests menu – Ethernet mode**

To select a test highlight its icon and press Enter. Each test has its own result screen. This is indicated by the test name being shown in the information bar. Press the soft key RUN (F1) to start the test. The test will use the setup criteria currently stored for that test. The F1 soft key changes to STOP, giving you the opportunity to abort the test.

When you want to change the setup criteria before a test is run, press the soft key SETUP (F3). The display will show a screen where all variables for the test can be changed. Press the soft key APPLY (F2) to save the changes and return to the result screen.

For all tests a symbol is displayed at the top right hand corner of the screen below the clock in the information bar.

Indicates test has not been run and that the tester is ready.

Indicates test is in progress. This symbol is also displayed while the tester is detecting a port.

Will be displayed if the test is aborted, or when a test has been run and a fault detected or a network is unknown or unreachable.

Indicates a test has been run with no faults detected.

When a test is complete the results will be displayed; the soft keys now read RUN, SAVE and SETUP. You can save the results now or press Escape to return to the Tests screen and select another test to run. The results of the previous test are not lost unless you wish to discard them by pressing the soft key RESET (F1). This arrangement gives you the choice of saving the results of either one or several tests to a single Result. To find out how Results are stored, see the description of 'Jobs' on *page 27*.

Press the soft key SAVE (F2) and the test results will be stored in a sequentially numbered Result in the currently active Job. Test results may be selectively exported to generate customer reports. For a full description of the storage of test results see *Jobs*.

## Tests menu description – Cable mode

When the TESTS icon from the cable mode home screen is selected, Fig 13, the available tests will be displayed, Fig 14.


Fig 13


Fig 14

After any one of the three available tests from the menu is selected, the soft keys RUN and SETUP will appear:



**Wiremap**

When the soft key RUN (F1) is pressed a wiremap test will be run on the cable currently connected to the tester's RJ45 port. The settings used for the test will be those that have been preset via the setup menu: SETUP>TESTS>WIRETEST>WIREMAP.

After the test has been run, the display will show a graphical interpretation of the result (Fig 15) and an indication of the distance to the fault or, the length of the cable. In addition, a FAULT icon and a SAVE soft key will appear. Select the FAULT icon and the display will show a textual list of the faults detected, Fig 16.

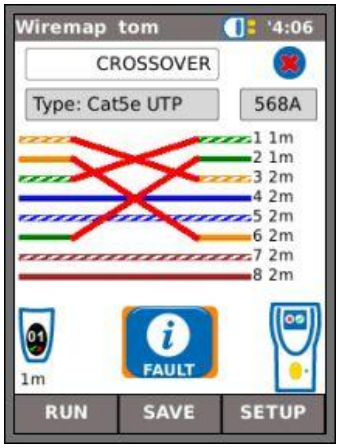



Fig 15

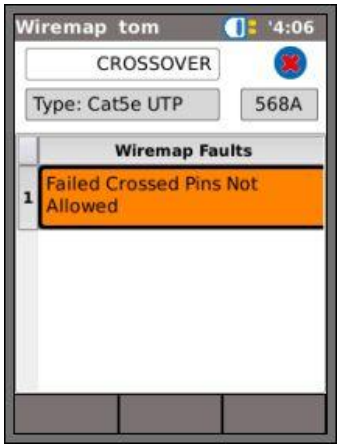



Fig 16

Note that for the example of a Wiremap test shown above; if the option 'XOver Allowed' had been checked in the Wiremap SETUP options, the results would be displayed as shown in Fig 17 and Fig 18.

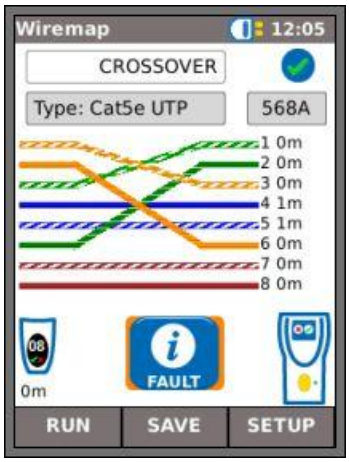



**Fig 17**


**Fig 18**

The wiremap tests may be run with no termination – open, or with an Active Remote termination. When connected, an image of an Active Remote will be shown on the display and its type identified. After a test has been run, the length of the cable is displayed (range up to 100m (330ft)).

With an <u>open termination</u> the possible faults detected are:

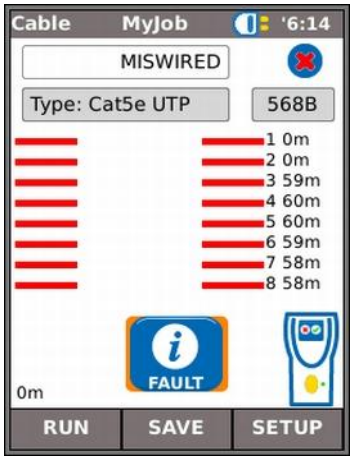



**Fig 19 Open circuit by pair**

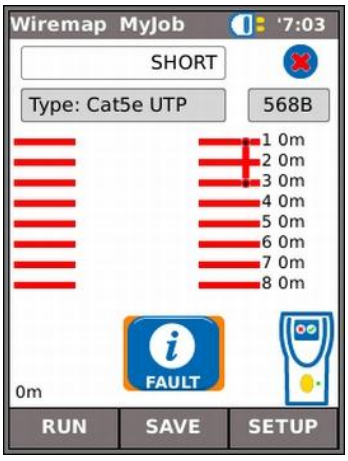



**Fig 20 Short circuit by pin**

With an active remote termination the possible faults detected are:

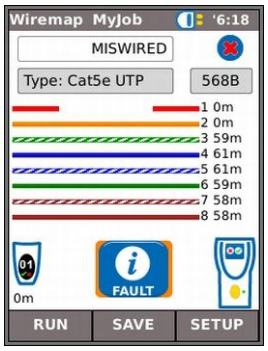



**Fig 21 Open circuit by pin**

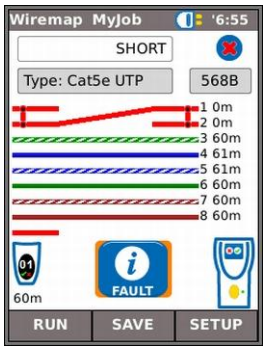



**Fig 22 Short circuit by pin**

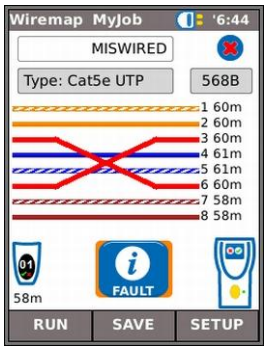



**Fig 23 Crossed pairs**

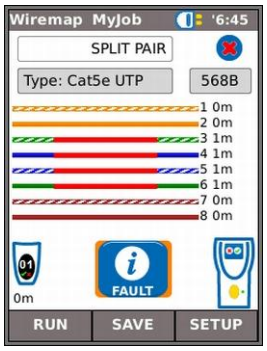



**Fig 24 Split pairs**

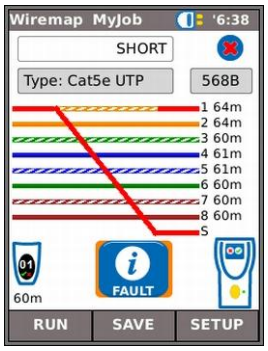



**Fig 25 Bridged shorts**

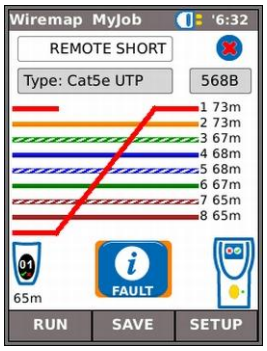



**Fig 26 Remote shorts**

As with the result of the Crossover fault shown in Fig 15 and Fig 16, all wiremap test results are displayed as a graphic that includes the FAULT icon. When the icon is selected, the faults are presented as a list.

The indications that follow appear on the Active Remote device:

- Flashing green LED – Test Passed.
- Flashing red LED – Test Failed.
- Amber LED – DC voltage greater than 12 Volts detected – cannot perform test.

## Tone


**Fig 27**

NaviTEK II can act as a tone generator (Fig 27). Together with a compatible tone probe, the route of a cable can be traced. A choice of three tones can be selected. To achieve the best result, the tone may be played over one of eight pins relative to the other seven, or over one of four pairs. The tone is started and stopped with the F1 soft key which displays as RUN or STOP accordingly.

Press the soft key SETUP (F3) to change the tone and the pin, or pin pair, that the tone is played on. Press the soft key APPLY (F2) for your changes to take effect.

## Auto test

NaviTEK II can be set up to run a predefined range of tests when the yellow Autotest button on the handset is pressed. The range includes Wiremap, Ping4, Ping6, TRoute4, TRoute6 and Netscan. The range of tests is set from SETUP>TESTS>AUTOTEST by ticking the check boxes next to your choice, Fig 28. Press the soft key APPLY (F2) for your changes to take effect.

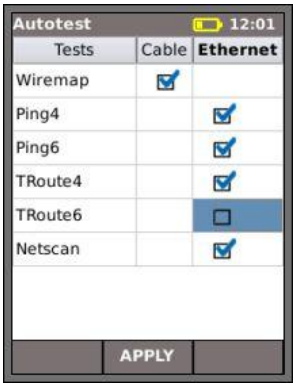



**Fig 28**

When an Autotest is run, Fig 29, the display shows a list of selected tests and the status of each. After the Autotest is complete, or has been stopped, each individual test can be selected and its detailed results displayed.

In Cable mode, Autotest is limited to Wiremap.


**Fig 29**

## Tests menu description – Ethernet mode

When the TESTS icon from the Ethernet mode home screen is selected, Fig 30, the available IP tests will be displayed on the Tests screen as shown in Fig 31.


**Fig 30**

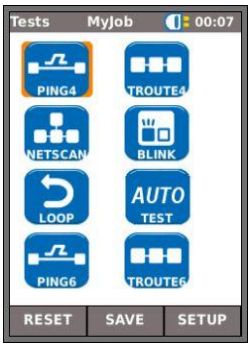



**Fig 31**


**Blink**

A Hub Blink test forces the connected port of a network device to blink. NaviTEK II also changes the speed and therefore LED color (on supporting devices) making it easier to identify the correct port. Select the BLINK icon from the Tests screen, the test is started and stopped with the soft key F1 which displays as RUN or STOP accordingly.


**Loop**

Loop is to be used with an Ethernet traffic generator.
See Tests on *page 14* for details of loopback types.


**Netscan**

Netscan will report the number of IPv4 hosts and IPv6 hosts detected within the scan range. Press the soft key SETUP (F3) to adjust the scan settings if required.

.

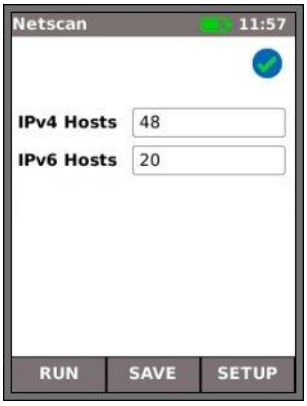
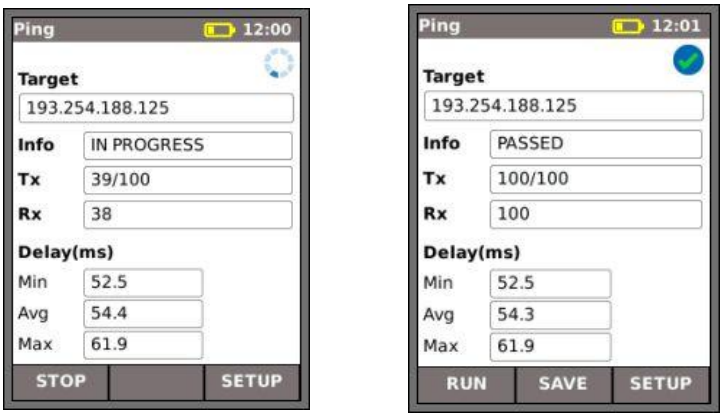



**Fig 32**


**Ping4 and Ping6**

Ping will test the availability and measure the response times of devices and URLs.

The results of a successful test, both in progress and passed are shown in Fig 33. The range of possible results are listed next to the figure.




- Info: READY, IN PROGRESS, PASSED, NO RESPONSE, UNKNOWN HOST.
- Tx: Count of transmitted ping frames: 1 to 999999.
- Rx: Count of successfully received Ping responses: 1 to 999999.
- Delay: Round trip delay in ms between transmitting Ping and receiving response. Displayed as Minimum, Average and Maximum.

**Fig 33**


**TRoute4 and TRoute6**

Trace Route will display the route and measure transit delays of frames across an IP network.

Press the soft key SETUP (F3) to enter the target or select one from the v4 or v6 TARGET look-up table, and to view or amend the test settings.


Select an individual hop to view its statistics.

The soft keys PREV (F1) and NEXT (F3) and are used to navigate between individual hops.

Each hop is traced three times. The time recorded during each trace is displayed in ms as T1, T2 and T3.

**Fig 34**

## 802.1x Certificates

Import client certificates and root certificates as follows:

- On your PC, create a directory, name it ‘certs’ and copy the required client and root certificates to that directory.

**NOTE**

Root certificates must be of the file type **.pem**. Client certificates must be of the file type **.p12**.

- Copy the directory to a USB key and insert it into the NaviTEK II USB port.
- From the home screen press the soft key SETUP (F3).
- Select the icon 802.1x. The 802.1x setup screen is displayed, Fig 35.
- Press soft key CERTS (F1) to load the certificates to the NaviTEK II. The loaded certificates will remain on the NaviTEK II until further certificates are loaded or a factory reset is performed.

When entering the 802.1x setup details, scroll to each field, press Enter and select from the drop down menu or look up table as required. Press enter again to return to the 802.1x setup screen. RESET clears all certificate data from the setup screen.

Username and Password fields will display the QWERTY keyboard. When you have entered the Username/Password, press OK to return to the 802.1x setup screen.

The tester’s time and date must be correct before 802.1x will work.

- Set the ‘802.1x’ field to Enable.
- Select the required EAP Method from the drop down menu in the ‘EAP Method’ field. See Notes 1 to 4 below.
- Scroll to the ‘Certificate’ field and select the required certificate from the look up table.
- Enter a username and password (when required).
- Scroll to the ‘Root Cert’ field and select the required certificate from the look up table (when required).
- Press the soft key APPLY (F2). You can now connect through the 802.1x port.


**Fig 35**

**NOTES**

1) Completing the fields ‘Client Certificate’ and ‘Certificate Password’ is required only when the EAP Method is: EAP-TLS, Any or, the Tunneled Method is TLS.

2) The Tunneled Method and Root Certificate options are enabled only when the EAP Method is EAP-TLS, EAP-PEAP, EAP-TTLS or Any.

3) Use the Root Certificate option only when you want to authenticate the server (RADIUS server).

4) When the EAP Method is EAP-TLS and the Tunneled Method is TLS, the fields Username and Password are optional. For all other types of EAP Method a Username and Password must be entered.

## Statistics

From the Ethernet home screen select the STATS icon, the Stats screen is shown on the display, Fig 36.

**NOTE**

When an IP test result is saved, all Stats data available at the time of the test is also saved to the same Result.

The graph shows Traffic Utilization and plots time against %utilization. Press the soft key SCALE (F2) to change the time axis between 60secs, 10mins and 60mins.

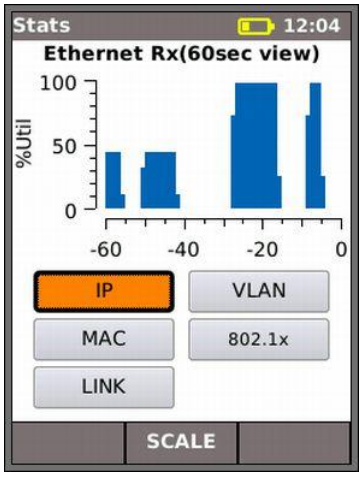



Fig 36

**Stats menu description**

Select from the five buttons below the graph to provide the information that follows:

**IP** The F1 soft key is used to toggle between IPv4 and IPv6 data.

The IPv4 data listed is:

Info: IP Assigned successfully or, Listening or, DHCP failed.
Also listed are: IP Address, Gateway, Subnet Mask, Primary & Secondary DNS, DHCP Server.

The IPv6 data listed is:

Info: IP Assigned successfully or, Listening or, DHCP failed.
Also listed are: IP Address, Prefix-64 or 128 bit, Link Address, Gateway, Primary & Secondary DNS.

**MAC**

Tx and Rx data listed is:

Total frames, Total Bytes, Unicast frames, Broadcast frames, Multicast frames, Max Frames/sec, Current, Average and Maximum rate in b/s, Current and Average Utilization as %, frame Size Distribution.

Discovery data listed is:

LLDP/CDP/EDP, Protocol, MAC Address, Hostname/address, Port Name.

**LINK**

Port data listed is:

PoE Voltage: 0 to 60V, PoE Pairs: 12/36 or 45/78, Speed, Duplex, MDI or MDIX, Signal level, Polarity.

Error data listed is:

Collisions, FCS Errors, Undersize (set in RJ45 SETUP – applies to both RJ45 and Optical ports), Oversize (>1522 bytes), Jabbers, Bad Length.

Partner data listed is:

10M-HD, 10M-FD, 100M-HD, 100M-FD, 1000M-HD, 1000M-FD.

**VLAN**

Detection data listed is:

Rx: The VLAN I/Ds of up to eight different VLANs detected in the received traffic.

Tx: The VLAN I/Ds of up to eight different VLANs detected in the transmitted traffic.

**NOTE**

Only one level of VLAN is supported. Therefore stacked VLANs (QinQ) cannot be detected.

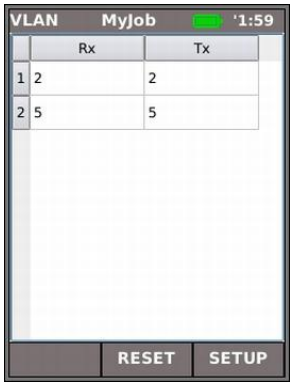



**Fig 37**

**802.1x**

Status data listed is:

Auth Not Started, Auth Started, Auth Completed Successfully, Auth Failed.

Port Status data listed is:

Unauthorized, Authorized.

Also shown are: EAP Method Used and Key Management Used.

## Jobs

NaviTEK II PLUS and PRO provide a system that enables the storage and organization of test results and statistics. Test results can be exported via a USB key and used to produce reports.

The two elements of this storage and organization system are Jobs and Results. A Job is a named repository for a collection of Results. A Result is a group of test results. It may contain the saved results of one or several tests. Therefore, a Job may be understood as a folder, a Result as the file(s) held within that folder. NaviTEK II can store up to five Jobs each containing 50 Results.

At any time, one Job is always 'active'. Test results are saved to the active Job. Any existing Job can be activated, at any time, via the menu on the Jobs Options screen. The currently active Job is indicated in the information bar shown at the top of the display.

Every time test results are saved, they are saved to a Result which is assigned a sequential number. In turn, each Result is allocated to the currently active Job.

The structure in which Jobs, Results and test results are stored is shown in Fig 38.

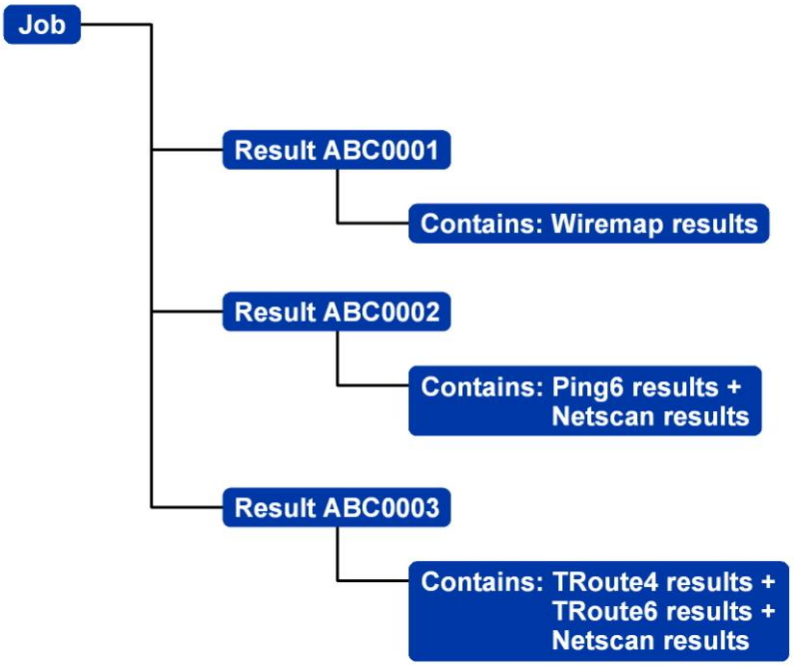



**Fig 38 Example of Job storage structure**

When creating a new Job, you can store:

- The customer's contact, address and telephone details. This information will appear on reports that are compiled from exported test results.
- A prefix (relates to all associate Results). It will appear at the front of every Result number, e.g. ABC0001, where ABC is the user-defined prefix and 0001 is the system-allocated Result number. The prefix must be an alphanumeric string (no spaces or punctuation). Adding a prefix for Result numbers is optional.
- A Job title (user defined). Enables Jobs to be named. The Job title must be an alphanumeric string (no spaces or punctuation).

**Using the Jobs menu**

From the home screen select the JOBS icon. The display will show the Job List screen, Fig 39. The Job List screen lists all currently stored Jobs. The column 'Tests' indicates the number of Results saved to each Job. The column 'Pass %' indicates the percentage of the total number of tests in all Results allocated to a Job that have passed.

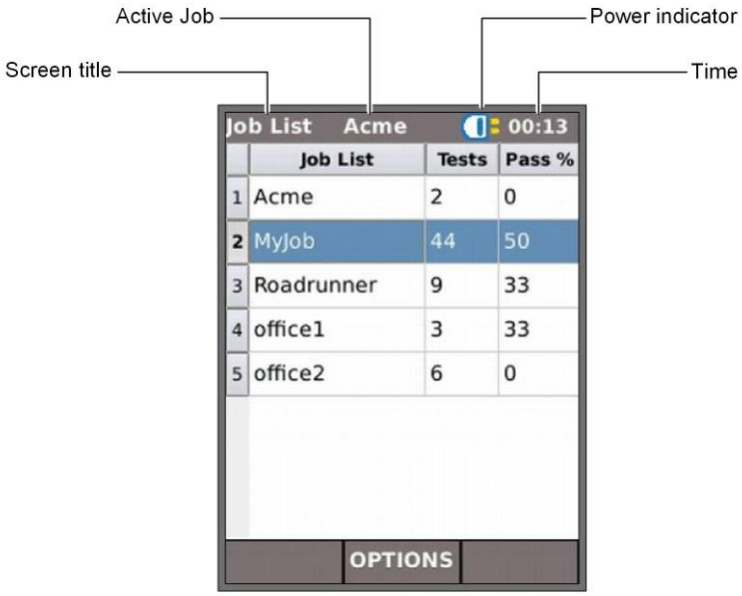



**Fig 39 Job List screen**

**Change the active Job**

In the example of a Job List screen shown at Fig 39, the active Job is 'Acme' as indicated on the display's information bar. To change the active Job, scroll to the Job required (e.g. My Job) and press the soft key OPTIONS (F2); the display will show the Options screen, Fig 40. Highlight the ACTIVATE icon and press ENTER.


**Fig 40 Options screen**

The display will show a dialogue stating:

'MyJob is set as current job'

To change the active Job List from Acme to MyJob Press ENTER to confirm.

The display returns to the Job List screen, and the new active Job is now shown in the information bar.

**Managing Jobs**

Select one of the icons from the Job List screen to manage Jobs as follows:


Create a new Job. Up to five Jobs can be stored. Data entry fields are:

- Prefix. Enter an alphanumeric string which will be prefixed to all Results stored under the new Job.
- Job. Enter an alphanumeric string which will be the title of the new Job. For example, your customer's name.
- Customer details. Fields are provided for – Company, Address, City, State, ZIP, Phone No.

When a new Job is created it automatically becomes the Active Job.


Amend any details of an existing Job. Press the soft key APPLY (F2) to save the changes.


Delete a Job and all its associated Results. When DELETE is selected, the dialogue 'Are you sure you want to delete 'Job' will appear.

**ONCE DELETED, A JOB CANNOT BE RESTORED**


Selects the Job to be currently active. All test results are saved to the active Job. Full details of this function are described on *page 28*.


When selected, the display will show the Results screen. The Results are shown as a list and can be viewed, deleted or exported to a USB key. The soft key SHOW (F2) toggles between Status (pass/fail), and the Date and Time that the test was saved.


Exports the active Job List to USB. Information on how to generate reports is detailed below.

## Generating Reports

Reports can be generated using test results exported via a USB key.

To generate a report:

- Insert a USB key into the NaviTEK II USB port.
- From the home screen select the JOBS icon. The display will show the Job List screen.
- Highlight the Job to be exported and press the soft key OPTIONS (F2). The display will show the Options screen.
- Highlight the TO USB icon and press Enter. The dialogue 'Result saved to USB' appears.

Alternatively, an individual Result from a Job may be exported:

- Insert a USB key into the NaviTEK II USB port.
- From the home screen select the JOBS icon. The display will show the Job List screen.
- Highlight the Job required and press ENTER. The display shows all Results contained within the Job.
- Highlight the Result you require and press the soft key TO USB (F3). The dialogue 'Result saved to USB' appears.

Test results and statistics are now saved on the USB key and can be viewed as a report on any PC installed with Microsoft Internet Explorer™ version 8, Mozilla Firefox™ version 9 or other suitable browser.

Two files are saved to the USB key, the test results are stored as an XML document and a report template is stored as an XSLT file. Open the XML document to view the report.

## Specifications - NaviTEK II

The specifications listed below are for the NaviTEK II PRO. To confirm the functionality of other models refer to the table *Functional overview* on *page 7.*

## ***Connectors***

***Test Ports***

**RJ45**

*Used for* - Cable Test
- Ethernet Test

*Connector type* - Samtec Lifejack with user-replaceable contacts

**Optical**

*Used for* - Ethernet Test

*Connector type* - SFP socket

***System Ports***

**USB**

*Used for* - Software Update
- Results transfer
- 802.1x certificate transfer
- Import/export of config

*Class* - Host

*Connector type* - A

*USB type* – 1.1

**Power**

*Used for* – Battery charging
- Mains powering via adaptor

*Connector type* – 2.5mm pin power jack

*Polarity* – Centre pin positive

Voltage – 12v

Current – 2 amp

*Location* – Bottom of optional power module
(Not present in standard alkaline battery pack)

## ***Controls***

***ON/OFF***

**Push button**

*Used for* – Power ON/OFF

***Function Keys***

**F1 to F3**

*Used for* – Screen-defined functions

***Navigation Keys***

**Cursor and ENTER**

*Used for* – User interface navigation

**Escape**

*Used for* – Return to previous menu

**Autotest**

*Used for* – Launch of automatic test function

***Reset***

**Push button**

*Used for* – Escape from exceptional lockup condition

## Displays

### *Screen*

**LCD**

*Used for* – Display of setup functions and results
*Location* – Front
*Size* – 2.8 inch diagonal
*Type* – QVGA Colour
*Pixels* – 240 x 320

### *LEDs*

**Charger LED**

*Used for* – Indication of charging status
*Colour* – Green
*Location* – Bottom of optional power module
(Not present in standard alkaline battery pack)

**RJ45 Link LED**

*Use*– ON indicates link UP
*Colour* - Green

**RJ45 Activity LED**

*Use* – Flashing indicates link activity
*Colour* - Green

**Optical Link LED**

*Use* – ON indicates Optical link UP
*Colour* - Green

**Optical Activity LED**

*Use* – Flashing indicates Optical link activity
*Colour* – Green

## Ports

### *RJ45*

**Setup**

*Auto Negotiation* – Enabled
- Disabled

*Speed* – 10Mbps
- 100Mbps
- 1Gbps

*Mode* – Full Duplex
- Half Duplex

MDI - AUTO
- MDI
- MDIX

Min Rx Size – 19:99 bytes
*MAC* – Factory set
*VLAN* – Enabled / Disabled
- VLAN ID – 0 to 4094
- VLAN Priority – 0 to 7

(continued)

## ***Ports*** (continued)

### *RJ45*

**Setup**

802.1x
- Enabled / Disabled
- EAP Method
  - EAP-MD5
  - EAP-MSCHAPV2
  - EAP-GTC
  - EAP-TLS
  - EAP-PEAP/MD5
    - EAP-PEAP/MSCHAPV2
    - EAP-PEAP/GTC
    - EAP-PEAP/TLS
    - EAP-TTLS/MD5
    - EAP-TTLS/MSCHAPV2
    - EAP-TTL/GTC
    - EAP-TTLS/TLS
- Username
- Password
- Certificate
- Import password
- Root/CA certificate

**Results**

*Link pulse polarity* – Normal or Inverted
*Link pulse height* – Normal or Low

**Tests**

*Ethernet Mode*
- Ping4
- Ping6
- Trace Route4
- Trace Route6
- Hub Blink
- Netscan
- Loopback
- Auto (Ping, Trace Route, Netscan)

*Cable Mode*
- Wiremap
- Tone Generator
- Auto (Wiremap)

**Service Detection**

*Detected Services*
- PoE (802.3af/at. Not Cisco pre-standard)
- ISDN S
- PBX
- Unknown

### *Optical*

**Supported SFPs**

*The following SFP types are supported. Use of other types of SFP is possible but correct operation is not guaranteed.*

**SFP Type SX**

*Manufacturer Part #* - Avago AFBR-5705Z / Apac LM28-C3S-TI-N-DD
*Speed* – 1Gbps
*Fibre Type* – Multimode
*Wavelength* – 850nm
*Connector Type* - LC Duplex

(continued)

## ***Ports*** (continued)

### *Optical*

**SFP Type LX**

*Manufacturer Part #* - Avago AFCT-5705Z
*Speed* – 1Gbps
*Fibre Type* – Singlemode
*Wavelength* – 1310nm
*Connector Type* - LC Duplex

**SFP Type ZX**

*Manufacturer Part #* - Apac LS48-C3U-TC-N-DD
*Speed* – 1Gbps
*Fibre Type* – Singlemode
*Wavelength* – 1550nm
*Connector Type* - LC Duplex

**Setup**

*Speed* - 1Gbps
Min Rx Size – 19:99
*MAC* – Factory set
*VLAN* – Enabled / Disabled
- VLAN ID – 0 to 4094
- VLAN Priority – 0 to 7

802.1x - Enabled / Disabled
- EAP Method
  - EAP-MD5
  - EAP-MSCHAPV2
  - EAP-GTC
  - EAP-TLS
  - EAP-PEAP/MD5
    - EAP-PEAP/MSCHAPV2
    - EAP-PEAP/GTC
    - EAP-PEAP/TLS
    - EAP-TTLS/MD5
    - EAP-TTLS/MSCHAPV2
    - EAP-TTL/GTC
    - EAP-TTLS/TLS
- Username
- Password
- Certificate
- Import password
- Root/CA certificate

**Tests**

*Optical* - Tx Power µW (using a specified SFP)
- Rx Power µW (using a specified SFP)

*Ethernet Mode*
- Ping4
- Ping6
- Trace Route4
- Trace Route6
- Hub Blink
- Netscan
- Loopback
- Auto (Ping, Trace Route, Netscan)

## ***Cable Tests***

***Wiremap***

**Setup**

*Cable Type* – Cat3 UTP
- Cat3 STP
- Cat5 UTP
- Cat5 STP
- Cat5e UTP
- Cat5e STP
- Cat6 UTP
- Cat6 STP
- Cat7
- USOC
- ETH S1236
- ETH S1278
- ETH U1236
- ETH U1278
- IND. M12
- COAX RJ59

*Colour Scheme* - None
- 568A
- 568B
- USOC
- TERA

*Crossover Allowed* – Yes
- No

*NVP* – Fixed 72%
- Custom 59% - 89%

**Termination Type**

*None* - Open
*Active Remote* - #1 - #12

**Tests (No Termination)**

*Faults* – Open circuit by pair
- Short circuit by pin

*Length of pair* – Metres / Feet (Set in System Setup)
- Range 100m / 330ft

**Tests (Active Remote Termination)**

*I/D* – Remote #
*Indications on Remote* – Voltage Warning (>±10volts on any pins)
- Pass/Fail

*Faults* – Open circuit by pin
- Short circuit by pin
- Crossed pairs
- Split pairs
- Bridged shorts
- Remote shorts

*Length of pair* – Metres / Feet (Set in System Setup)
- Range 100m / 330ft

***Tone Generator***

**Setup**

*Tones – 3*
*Wire I/D – Tone applied to one of 8 pins relative to the other 7*
*- Tone applied across one of 4 pairs*

**Test**

*Audible tone detected using compatible tone probe*

## ***Ethernet Tests***

**IPv4**

**Setup**

*IPv4 Enable* - Enabled
- Disabled

*Addressing* - DHCP
- Static

*Numerical* - Address
- Netmask
- Gateway
- DNS1
- DNS2

**IPv6**

**Setup**

*IPv6 Enable* - Enabled
- Disabled

*Addressing* - Stateful (DHCPv6)
- Stateless
- Static

*Numerical* - 128bit HEX IP address

*Network Prefix*
- 64 bit
- 128 bit

***Pingv4***

**Setup**

*Target*
- Numerical address
- URL (Store up to 10)

*Count* - 1 to 999999

*Pause* - 1 to 5 Sec

*Length* - 8 to 1000 bytes.

**Results**

*Info*
- READY
- IN PROGRESS
- PASSED
- NO RESPONSE
- UNKNOWN HOST

*Tx Count* - 1 to 999999

*Rx Count* - 1 to 999999

*Delay(ms)* - Minimum
- Average
- Maximum

***Pingv6***

**Setup**

*Target*
- IPv6 address
- URL (Store up to 10)

*Count* - 1 to 999999

*Pause* - 1 to 5 Sec

*Length* - 8 to 1000 bytes.

(continued)

## ***Ethernet Tests*** (continued)

### *Pingv6*

**Results**

| | |
|---|---|
| *Info* | - READY |
| | - IN PROGRESS |
| | - PASSED |
| | - NO RESPONSE |
| | - UNKNOWN HOST |
| *Tx Count* | - 1 to 999999 |
| *Rx Count* | - 1 to 999999 |
| *Delay(ms)* | - Minimum |
| | - Average |
| | - Maximum |

### *Trace Routev4*

**Setup**

| | |
|---|---|
| *Target* | - Numerical address |
| | - URL |
| *Max Hops* | - 2 to 100 |
| *Timeout* | - 2 to 30 sec |
| *Type* | - ICMP |
| | - UDP |

**Results**

| | |
|---|---|
| *Info* | - READY |
| | - IN PROGRESS |
| | - PASSED |
| | - NO RESPONSE |
| | - UNKNOWN HOST |
| *Hop* | - Numerical address |
| *Delay(ms)* | - t1 |
| | - t2 |
| | - t3 |

### *Trace Routev6*

**Setup**

| | |
|---|---|
| *Target* | - Numerical address |
| | - URL |
| *Max Hops* | - 2 to 100 |
| *Timeout* | - 2 to 30 sec |
| *Type* | - UDP |

**Results**

| | |
|---|---|
| *Info* | - READY |
| | - IN PROGRESS |
| | - PASSED |
| | - NO RESPONSE |
| | - UNKNOWN HOST |
| *Hop* | - Numerical address |
| *Delay(ms)* | - t1 |
| | - t2 |
| | - t3 |

(continued)

## ***Ethernet Tests*** (continued)

***Netscan***

**Setup**

*Address Type* - Local
- Custom

IP Address - IPv4 address

Scan Range - 0 (class C /24)
- 1 (class C /20)
- 2 (class B /16)

**Results**

- Total of IPv4 hosts
- Total of IPv6 hosts

***Loopback***

**Setup**

*Type* - Wireline
- MAC
- IP
- UDP

*All Traffic* - Yes
- No

***Blink***

**Test**

*Sequence* - Off/10/Off/100/Off/1000 Mb/s (RJ-45)
- Off/On (Optical)

## ***Statistics***

***IP***

**Results**

**IPv4**

- Enabled or Disabled
- info: listening, assigned, DHCP failed
- DHCP or Static
- IPv4 Address
- IPv4 Netmask
- IPv4 Gateway
- IPv4 DNS1
- IPv4 DNS2

**IPv6**

- Enabled or Disabled
- info: listening, assigned, DHCP failed
- Stateful (DHCPv6) or Stateless or Static
- IPv6 Address
- IPv6 Network Prefix, 64 bit or 128 bit
- IPv6 Link Address
- IPv6 DNS

(continued)

## ***Statistics*** (continued)

***MAC***

**Results (Tx & Rx)**

- Total Frames
- Total Bytes
- Unicast
- Broadcast
- Multicast
- Max Frames/sec
- Current Rate b/s
- Average Rate b/s
- Max Rate b/s
- Current Utilisation %
- Average Utilisation %
- Max Utilisation %
- Size Distribution

**Discovery**

- LLDP/CDP/EDP
- Protocol
- MAC address
- Hostname / address
- Port Name
- Max 10 hosts

***VLAN***

**Detection** - 1 Level

- Tx / Rx

***802.1x***

**Status**

- Auth Not Started
- Auth Started
- Auth Completed Successfully
- Auth Failed
- Connected Successfully (auth)

**Port Status**

- Unauthorised
- Authorised

**EAP Method Used**

**Key Management Used**

***LINK***

**Results**

*PORT*

- PoE Voltage 0 – 60V
- PoE Pairs 12/36 or 45/78
- Speed, Duplex
- MDI / MDIX
- Signal Level
- Polarity

*PARTNER*

- *10M-HD*
- *10M-FD*
- *100M-HD*
- *100M-FD*
- *1000M-HD*
- *1000M-FD*

(continued)

## ***Statistics*** (continued)

***LINK***

**Results**

*ERRORS* - *Collisions*
- *FCS Errors*
- *Undersize*
- *Oversize*
- *Jabbers*
- *Bad Length*

***Traffic Utilisation***

**Bargraph**

*Direction* - *Rx*

*Format* - *Percentage of Link rate*
- *Peak value*

*Time Interval*- 1 min
- 10 min
- 60 min

## ***Storage***

***Configurations***

**Internal storage**

*Number of configurations* – 2 (Current & Factory settings)

**Export/Import**

*Port* – USB

*Format* - .xml

***Certificates***

**802.1x**

*Max number - 10*

***Results***

**Internal storage**

*Max Number of Jobs* – 5

*Max Number of result sets per Job* – 50

*Max total number of result sets* - 250

**Export**

*Port* – USB

*Format* – .xml

*PC Viewer* – IE-compatible browser

## ***System***

***Setup***

**Owner**

*Details* – Name
- Company
- Address
- Phone

(continued)

## ***System*** (continued)

***Setup***

**Preferences**

*Language* – English
- French
- German
- Spanish
- Italian
- Portuguese
- Chinese

*Auto off* - Disabled
- 3 mins
- 10 mins
- 30 mins

*Backlight* - Always On
- Dims to 50% after 3 mins

*Length Units* - Meters
- Feet

*Date Format* - dd/mm/yy
- mm/dd/yy

*Time Format* - 12 hour
- 24 hour

***Software update***

*Upgrade* - Via USB

## ***General***

***Date/Time***

**Internal Clock**

*Used for* – Timestamping results
*Autonomy* – Up to 1 day with battery removed

***Power***

**Battery**

*Supported Types* - Standard power module (4 x AA NiMH cells)
- Alkaline battery pack with 4 AA cells

*Autonomy* - *Up to 5* hours (power module only)
*Recharge time* – 3 hours (Power module only)
*Battery level Indication* - Full
- 2/3
- 1/3
- Empty

***Physical***

**Dimensions**

*Length* - 175mm
*Width* - 80mm
*Depth* - 40mm

**Weight**

*Unit* - 0.22kg
*Batteries* – 0.18kg

(continued)

## ***General*** (continued)

***Environmental***

**Temperature**

Operating – 0°C to 40°C
Storage – -20°C to 70°C

**Relative Humidity**

Min 5%
Max 90% non-condensing

***Approvals***

**EMC**

EN 55022:2006 / A1:2007
EN55024:1998 / A1:2001 / A2:2003

**Safety**

IEC 60950-1:2005+A1:2009/EN 60950-1:2006+A1:2010

## Glossary, abbreviations and acronyms

| Term | Description |
|---|---|
| 10M-HD | 10 Mb/s Half Duplex |
| 10M-FD | 10 Mb/s Full Duplex |
| 100M-HD | 100 Mb/s Half Duplex |
| 100M-FD | 100 Mb/s Full Duplex |
| 1000M-HD | 1000 Mb/s Half Duplex |
| 1000M-FD | 1000 Mb/s Full Duplex |
| Broadcast | Communication from single sender to all connected receivers |
| CRC | Cyclic Redundancy Check |
| DHCP | Dynamic Host Configuration Protocol |
| | |
| Discovery data | |
| LLDP | Link Layer Discovery Protocol |
| CDP | Cisco Discovery Protocol |
| EDP | Extreme Discovery Protocol |
| | |
| DNS | Domain Name System |
| | |
| EAP method | Extensible Authentication Protocol used in 802.1x |
| MD5 | Message Digest Algorithm |
| MS-CHAP v2 | Microsoft Challenge Handshake Authentication Protocol version 2 |
| GTC | Generic Token Card |
| TLS | Transport Layer Security |
| PEAP | Protected Extensible Authentication Protocol |
| TTLS | Tunneled Transport Layered Security |
| | |
| ICMP | Internet Control Message Protocol |
| IP | Internet Protocol |
| | |
| IPv4 | Internet Protocol version 4 |
| Static | IP address assigned manually by the operator |
| Dynamic | IP address assigned automatically using DHCP |
| | |
| IPv6 | Internet Protocol version 6 |
| Stateful | IP address assigned automatically using DHCPv6 |
| Stateless | IP address assigned automatically using ICMPv6 |
| Static | IP address assigned manually by the operator |
| | |
| Key Mgmt | 802.1x Key Management |
| LAN | Local Area Network |

## Glossary, abbreviations and acronyms (continued)

| Term | Description |
|---|---|
| LINK error data | |
| Collisions | Collisions on the Ethernet frame transmission |
| FCS errors | Frame Check Sequence errors |
| Undersize | Frames smaller than the minimum set in SETUP>RJ45 or SETUP>OPTICAL |
| Oversize | Frames longer than 1522 bytes |
| Jabbers | Frames longer than 1518 bytes with bad CRC |
| Bad length | Frames with actual length different from the length specified in their ethertype field |
| MAC | Media Access Control |
| MDI | Medium Dependent Interface |
| MDIX | Medium Dependent Interface Crossover |
| Multicast | Communication between single sender and multiple receivers |
| NVP | Nominal Velocity of Propagation of signals in a cable, expressed as a percentage of the speed of light in a vacuum. Can be determined using cable manufacturers' data or experimentally using a known cable length. |
| PoE | Power over Ethernet |
| QinQ | Ethernet frame format that allows multiple VLAN headers to be inserted into a single frame |
| RJ45 | Registered Jack standard for a modular connector using 8 conductors |
| Rx | Receive |
| SFP | Small Form-factor Pluggable |
| STP | Shielded Twisted Pair |
| Tx | Transmit |
| UDP | User Datagram Protocol |
| Unicast | Communication between single sender and single receiver |
| URL | Uniform Resource Locator |
| USB | Universal Serial Bus |
| UTP | Unshielded Twisted Pair |
| VLAN | Virtual Local Area Network |
| XML | Extensible Markup Language |
| XSLT | Extensible Stylesheet Language Transformations |

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