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nanoBTS Installation Manual

NGSM_INST_300

2.1 CP



nanoGSM[®]

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DOCUMENT APPROVAL

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The information contained in this document is commercially confidential and must not be disclosed to third parties without prior consent.

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1 INTRODUCTION

The ip.access nanoBTS is an indoor pico-class BTS offering a standard Um radio interface to GSM mobiles. The nanoBTS is available in 850MHz, 900MHz, 1800MHz, and 1900MHz band versions.

1.1 Overview

This document provides the reader with all the necessary information required to install the ip.access nanoBTS. The document provides step-by-step instructions for the hardware installation, PSU Installation, and configuration steps required to bring the nanoBTS into service.

1.2 nanoBTS Installation Overview

The principal activities for installing and commissioning a nanoBTS are:

- Install the nanoBTS hardware
- Install the power supply
- Commission the nanoBTS with BTS Installer
- Inform the NOC the nanoBTS is ready for network configuration

1.3 Related Information

[GST_120]	nanoGSM System Planning Manual (NGSM_GST_120)
[GST_300]	nanoBTS Product Description (NGSM_GST_300)
[OPM_300]	nanoBTS Operations Manual (NGSM_OPM_300)

1.4 Terminology

NOC	Network Operations Centre
DHCP	Dynamic Host Configuration Protocol

2 NANOBTBS HARDWARE INSTALLATION

2.1 Purpose and Scope

This chapter documents the procedure used to install the nanoBTS hardware and physical connections together with applying the base software configuration.

2.2 Warnings and Regulatory Information

For all warnings and regulatory information, please refer to section 5.

2.3 Unpacking

Unpack the nanoBTS and check to see that the unit has not been damaged in transit. Any damaged units should be returned to the supplier.



Figure 1 - Unpacking the nanoBTS

2.4 Fitting the External Antenna Kit (optional)

2.4.1 139/140 Hardware

Note: When looking at the nanoBTS with the connections facing down and the LED visible the antenna on the left side is the Transmit antenna and the antenna on the right side is the Receive antenna.

Note: The RF feeder cable must not be bent sharply as this may result in a degraded performance.

Remove the plastic covers by removing the top and bottom plates from both ends of the nanoBTS. Lever gently apart with screwdriver in notch.

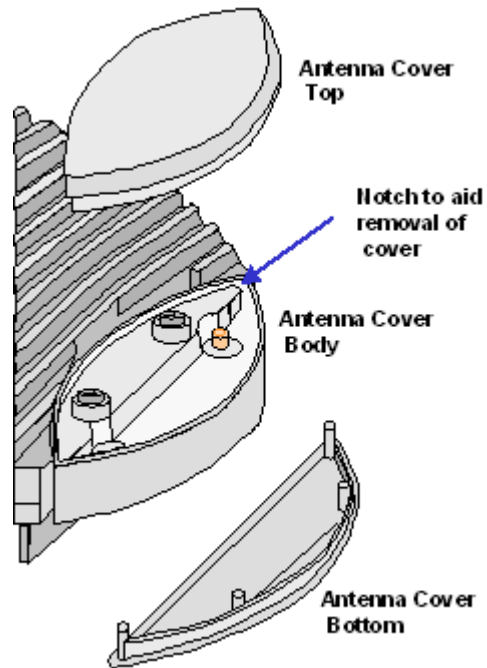


Figure 2 - Removal of antenna covers

Remove the antenna cover body, by unscrewing the two Torx T20 retaining screws.

Remove Torx Screws

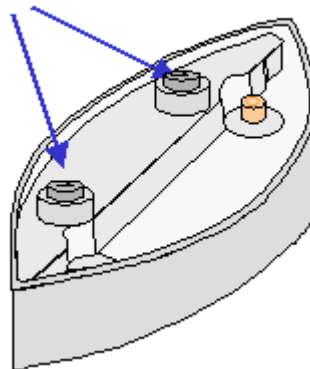


Figure 3 - Removal of antenna cover body

Fit the replacement antenna cover body ensuring that the feeder cable connector fits into the antenna. Note that one cover only fits the receiver whilst the other fits the transmitter.

Fit the clamp as shown below and second Torx screw, then replace top and bottom covers.

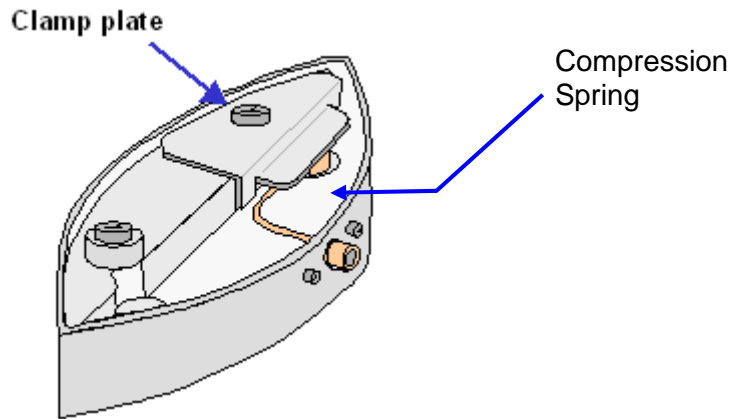


Figure 4 - Fit clamp plate

Repeat the process for the other end of nanoBTS.

2.4.2 165 Hardware

Note: When looking at the front of a 165 nanoBTS with the Ethernet and TIB connectors facing downwards, the TX antenna is bottom left, the RX antenna is bottom right and the Network Listen (NWL) antenna is top right.

To fit external antennas, remove the plastic cover from the unit and unscrew the antennas to expose the SMA connectors. Connect directly to these connectors. The antennas must be oriented perpendicular to the unit, as shown, so that the cover fits correctly without stressing the connectors. (The removable antennas for 165C, 165D, 165G and 165 H are shown in Figure 5 and Figure 7. The removable antennas for 165A and 165B are smaller. 165E and 165F have no removable antennas.)

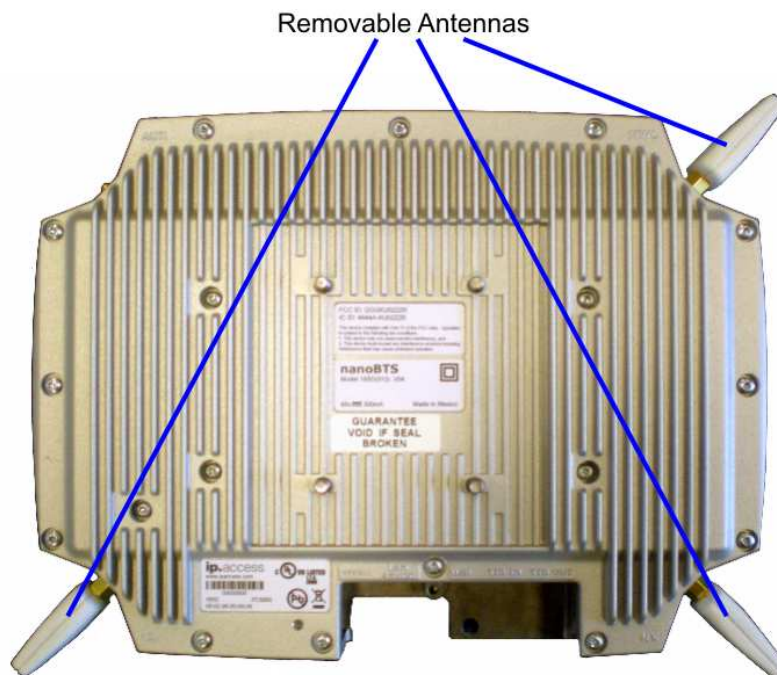


Figure 5 - 165 nanoBTS removable antennas

2.5 Cabling the nanoBTS

2.5.1 139/140 Hardware

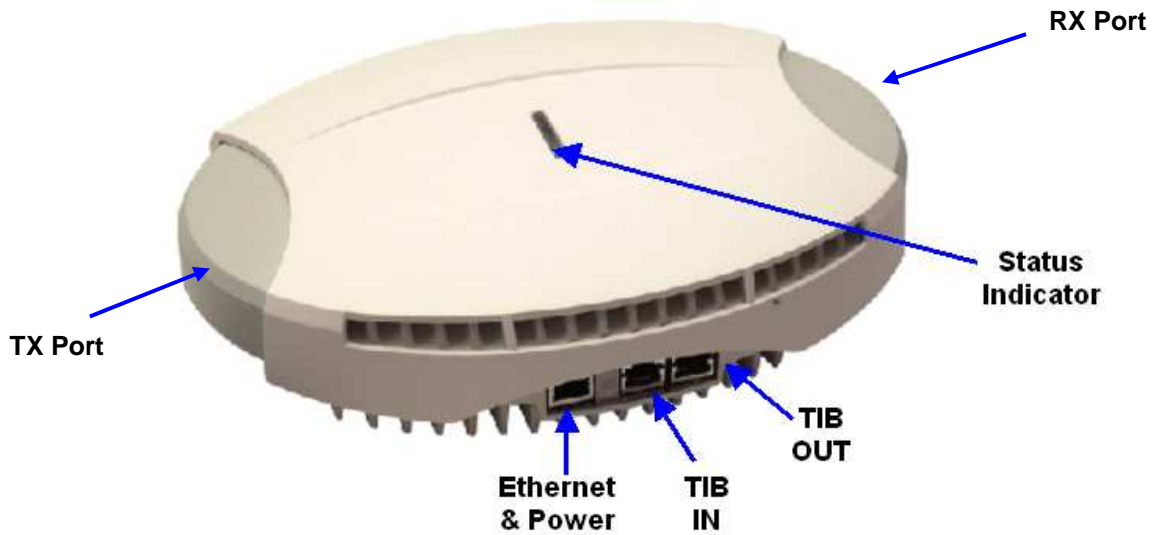


Figure 6 - 139/140 nanoBTS connections

2.5.2 165 Hardware

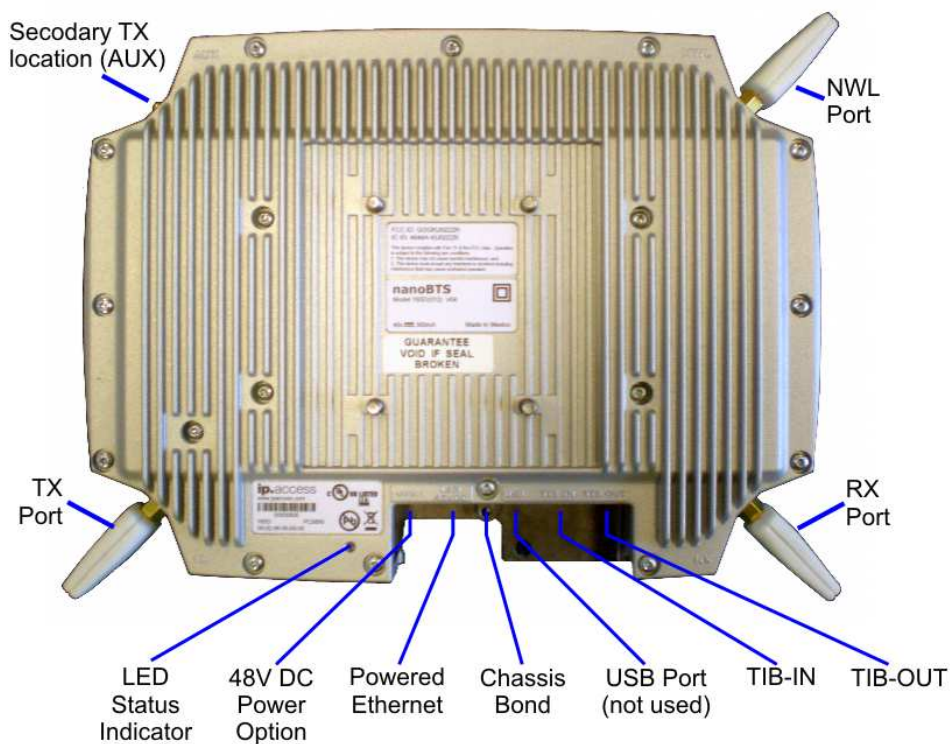


Figure 7 - 165 nanoBTS connections

For information about using the Secondary TX location (AUX), see section 2.5.8.

Figure 8 below illustrates the correct cabling of the Ethernet and TIB cables:



Figure 8 - Ethernet and TIB cabling

2.5.3 Ethernet

Each 139/140/178 nanoBTS must be connected to an Ethernet switch or hub via either a 109 ip.access single power inserter or 126 ip.access Powered Ethernet Switch. Refer to section 5 for details of the power supply connections. The 165 EDGE nanoBTS may use

either the above power options or a separate 48V DC power supply available from ip.access.

2.5.4 Timing Interface Bus (TIB) – Multi-TRX only

The Timing Interface Bus (TIB) is used to provide clock and signalling between the nanoBTS when operating in a Multi-TRX configuration.

The TIB OUT from the Master TRX must be connected to the TIB IN of the slave TRX. This in turn has its TIB OUT connected to the next TRX in the chain. See Figure 9.

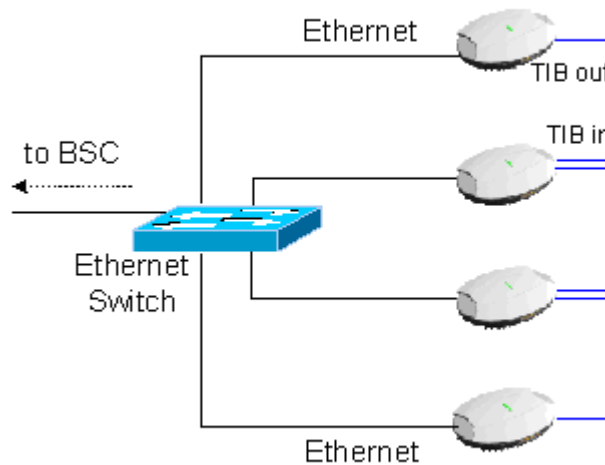


Figure 9 - TIB connections

2.5.5 Chassis Bond Strap – Multi-TRX only

When the nanoBTS is operated in a Multi-TRX configuration, each of the nanoBTS must be connected together using the supplied chassis bond kit.

To fit the chassis bond strap, remove the nanoBTS from the mounting plate.

Using the screw provided, screw the Chassis Bond Strap to the screw on the rear of the nanoBTS, see Figure 10 or Figure 11.



Figure 10 - Chassis bond screw location - 139/140 nanoBTS

Connect the other end of the Chassis Bond lead to the next nanoBTS chassis bond point in the chain.

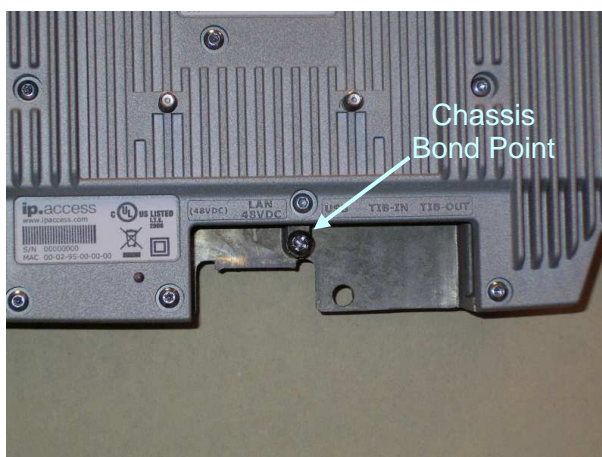


Figure 11 - Chassis bond screw location - 165 nanoBTS

2.5.6 Mounting the nanoBTS

The location of each nanoBTS is shown on the installation floor plan produced at the network planning stage. For example, it must take into account that all BTSs must be at least 2m from any mobile equipment. The network wiring must be complete before the nanoBTS can be installed and commissioned. The nanoBTS should be placed on a wall (at or above head height) or on a ceiling. Unless explicitly stated otherwise, the following procedure is common for both 139/140 and 165 hardware variants.

Remove the nanoBTS from the bracket by sliding the removal tool over the central fin between the bracket and the body of the unit to disengage the locking spring, slide bracket to separate it from the main body of the unit. The tool may be inserted from the top or bottom of the nanoBTS.

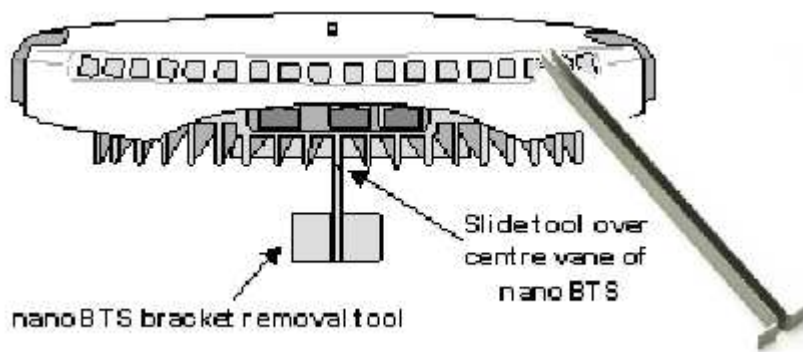


Figure 12 - nanoBTS bracket removal

Position the bracket on the wall and mark the position of the four screw holes. The top of the bracket **MUST** be positioned uppermost. Ensure that the bracket is level and sufficient clearance is maintained to allow the unit to be located on the bracket (at least 80mm from the bracket to the top of wall, and 120mm from the side of the bracket to a side wall). See Figure 13.

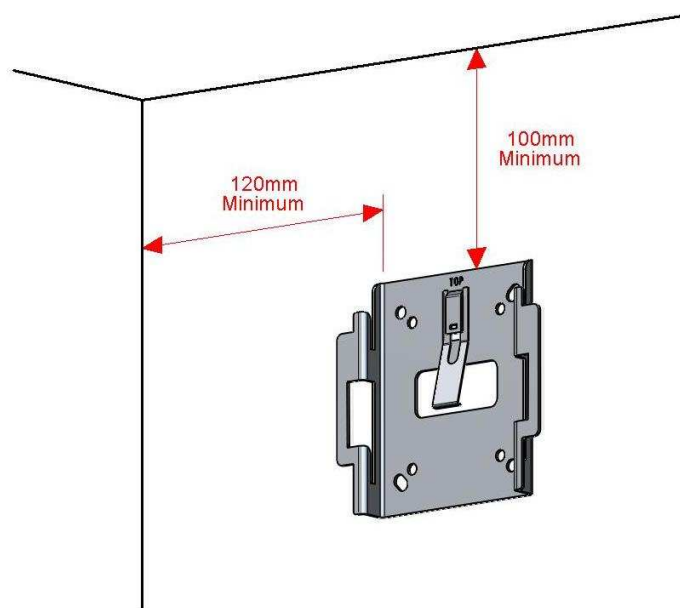


Figure 13 - Fixing the wall bracket

Drill the four holes in the positions marked previously and insert wall plugs (if required) and fix the mounting bracket securely to the wall. The bracket is designed to allow the nanoBTS unit to be mounted with the connections either at the top or at the bottom of the unit.

Slide the nanoBTS onto the bracket and ensure that the retaining spring engages into the indent at the rear of the unit.

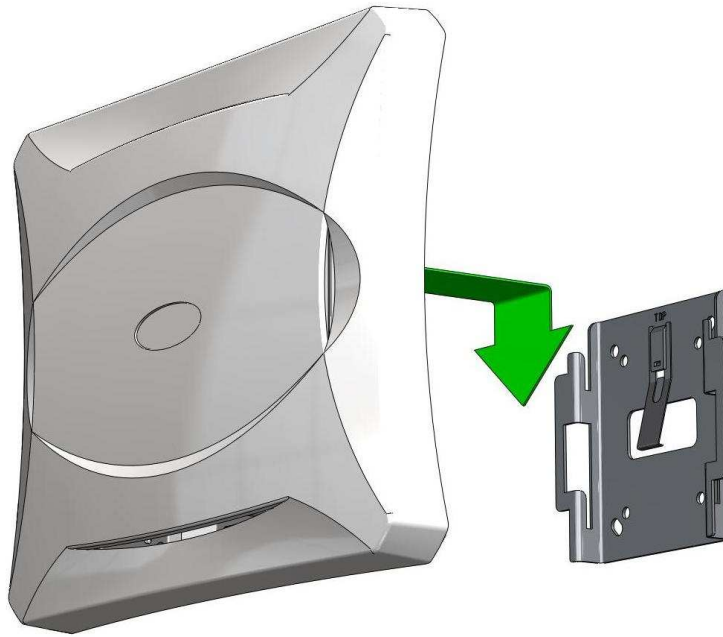


Figure 14 – Mounting the nanoBTS

When fixing to a ceiling or a sloping wall the same fixing process and clearances should be observed as for fixing to a wall (at least 100mm from the bracket to the top of wall and 120mm from the side of the bracket to a side wall). On a sloping surface the top of the bracket **MUST** be uppermost. Once the unit has been attached to the bracket the outer cover **MUST** be removed to expose the cooling vanes, as shown in Figure 15.



Figure 15 - Ceiling mounted nanoBTS

2.5.7 Mounting Multi-TRX nanoBTS

When the nanoBTS are to be installed in a Multi-TRX configuration, then each TRX should be installed in a similar orientation but not closer than 30cm to each other.

A further specific constraint is that the TIB cables must be <1.5m and a 1.5mm² Chassis Bond cable must also be connected between each TRX with a length not exceeding that of the TIB cable.

2.5.8 Mounting Multi-TRX 165 nanoBTS

The 165 (EDGE) BTS may be installed in a stacked two-TRX configuration. See section 2.5.10 for details.

The procedure for mounting a stacked two-TRX configuration is as follows:

1. Fit the first wall bracket to the wall in the desired position.
2. Remove the plastic cover from the bottom unit.
3. Relocate the TX antenna as illustrated in section 2.5.10.
4. Fit the antenna cable (part number 165_072) as illustrated in section 2.5.10.
5. Fit the second wall bracket to the bottom unit as illustrated in section 2.5.10.
6. Mount the bottom unit on the wall.
7. Fit the Ethernet and TIB cables to the bottom unit.
8. Fit the skirt to the bottom unit.
9. Remove the plastic cover from the top unit and attach it to the bottom unit.
10. Attach the Ethernet and TIB cables to the top unit.
11. Replace the plastic cover on the top unit.

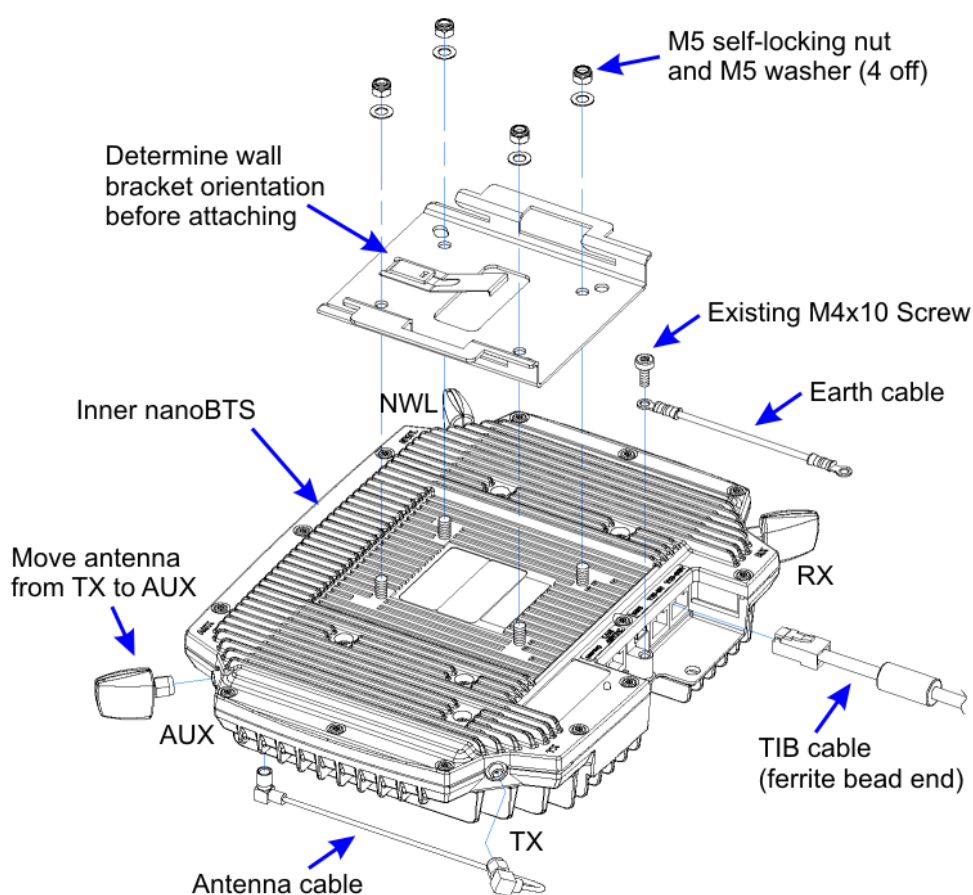
2.5.9 LED Status Indicators

The following table shows the meaning of the state LED under normal and fault conditions.

State	Pattern	When	Precedence
LED_SELF_TEST_FAILURE	Red Steady	In boot or application code when a power on self-test fails	1 (High)
LED_UNSPECIFIED_FAILURE	Red Steady	On s/w fatal errors	2
LED_NO_ETHERNET	Orange Slow Flash	Ethernet disconnected	3
LED_FACTORY_RESET	Red Fast Blink	Dongle detected at start up and the factory defaults have been applied	4
LED_NOT_CONFIGURED	Alternating Red/Green Fast Flash	The unit has not been configured	5
LED_DOWNLOADING_CODE	Orange Fast Flash	Code download procedure is in progress	6
LED_ESTABLISHING_XML	Orange Slow Blink	A management link has not yet been established but is needed for the TRX to become operational. Specifically: for a master a Primary OML or Secondary OML is not yet established; for a slave an IML to its master or a Secondary OML is not yet established.	7
LED_SELF_TEST	Orange Steady	From power on until end of backhaul power on self-test	8
LED_NWL_TEST	Green Fast Flash	OML established, NWL test in progress	9

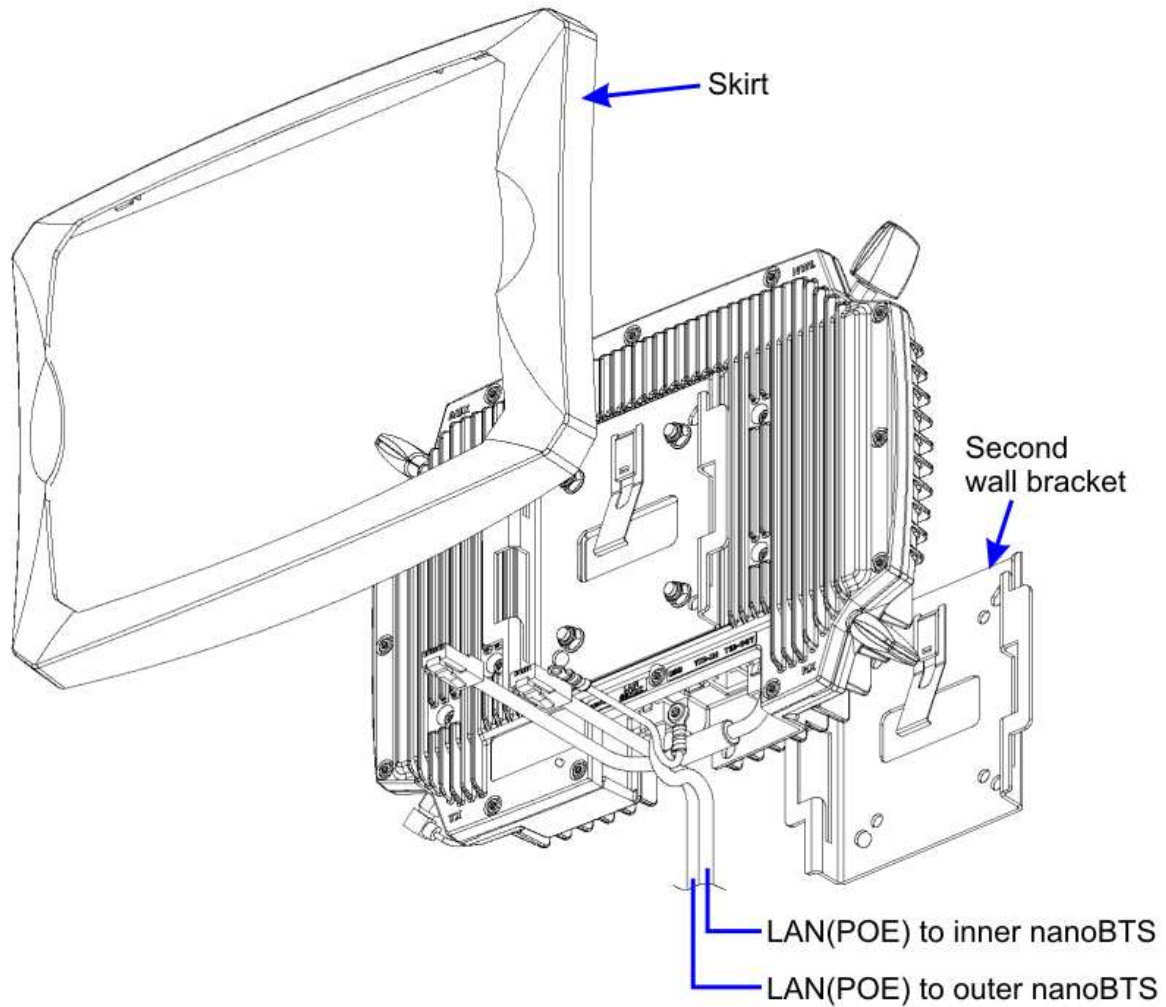
LED_OCXO_CALIBRATION	Alternating Green/Orange Slow Blink	The unit is in the fast calibrating state [SYNC]	10
LED_NOT_TRANSMITTING	Green Slow Flash	The radio carrier is not being transmitted	11
LED_OPERATIONAL	Green Steady	Default condition if none of the above apply	12 (Low)

2.5.10 165 Series 2TRX Assembly



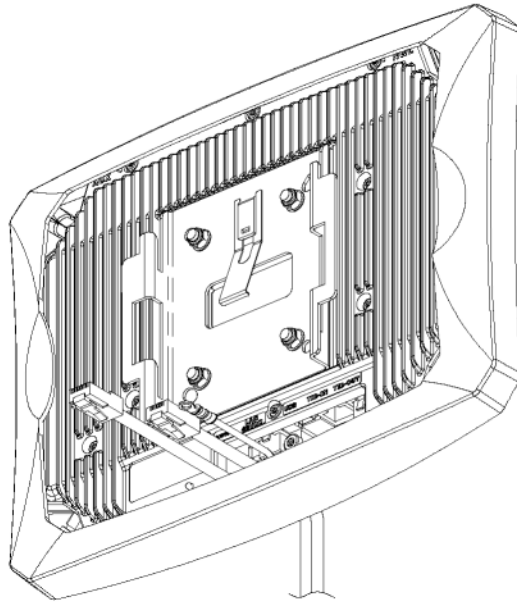
Inner nanoBTS Assembly

1. Remove and discard inner nanoBTS cover
2. Attach wall bracket from outer nanoBTS to top face using M5 nuts and washers
3. Move antenna from **TX** to **AUX** socket
4. Attach antenna cable to **TX** and underside **SMB** socket
5. Attach earth cable using existing M4 screw
6. Plug the ferrite bead end of TIB cable into **TIB-OUT** socket

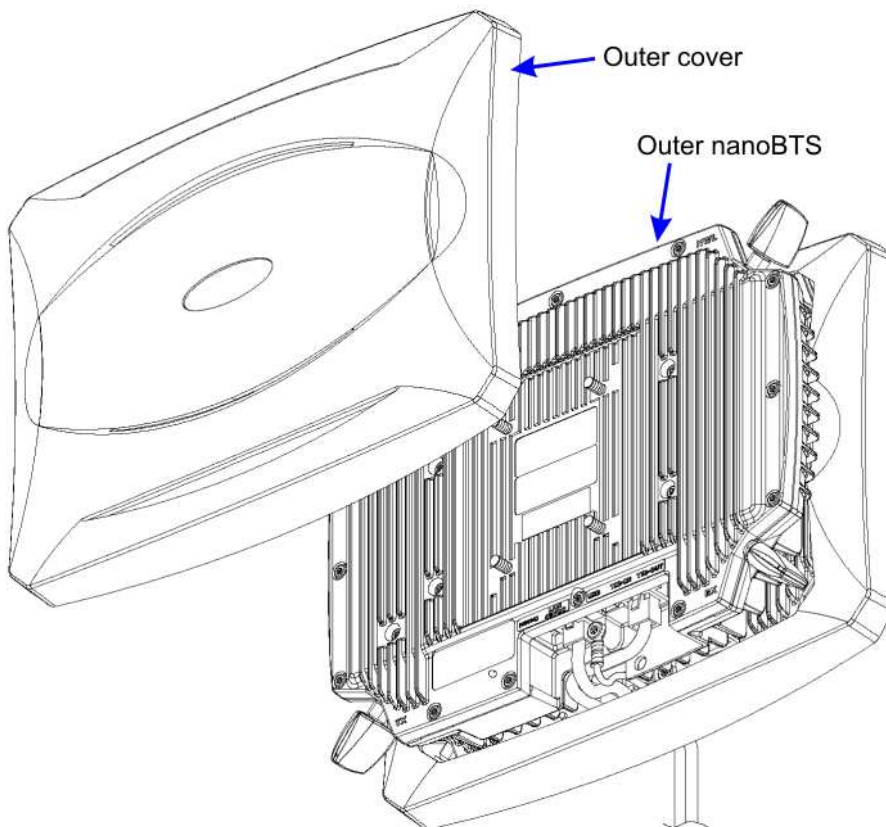


Mount inner nanoBTS assembly

1. Attach second wall bracket to wall, ensuring it can support a load of 10kg minimum
2. Slide inner nanoBTS assembly onto wall bracket
3. Plug one LAN(POE) cable into the **LAN 48VDC** socket and arrange cables as shown
4. Clip on skirt ensuring TIB, earhand second LAN(POE) cables are accessible

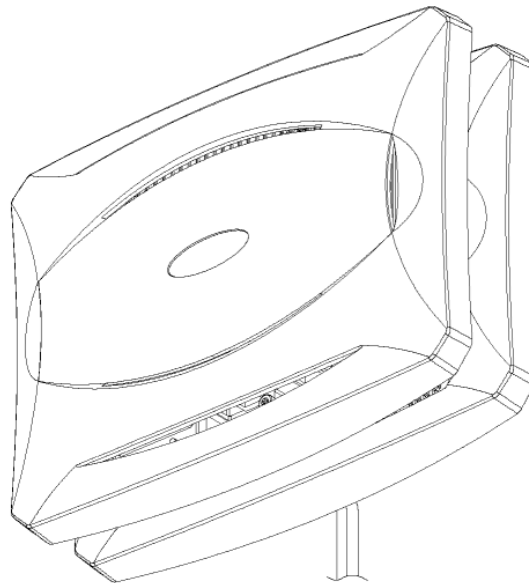


Complete inner nanoBTS assembly



Outer nanoBTS assembly

1. Remove outer nanoBTS cover
2. Slide outer nanoBTS onto inner nanoBTS assembly
3. Plug TIB cable into **TIB-IN** socket
4. Plug second LAN(POE) cable into **LAN 48VDC** socket
5. Attach earth cable using existing M4 screw
6. Clip on cover



Complete 2TRX assembly

2.6 Power Supply Installation

Two power supply modules are available from ip.access, designed for use with the ip.access nanoBTS product range.

The single output power supply is commonly used for single site installations. The powered Ethernet switch is generally used at sites where multiple nanoBTS installations exist.

2.6.1 Warnings



Do not connect any device other than a nanoBTS to any RJ45 socket that is enabled for nanoBTS connection (i.e. 48V DC operation).



Ensure that the connection to the main LAN (Server) is only made to the UPLINK (i.e. 48V DC operation).

2.7 Single Power Supply Unit Installation

The single power supply unit is supplied as standard with each nanoBTS. The power supply has two Ethernet connections, one for connection to the main LAN, the other for connection to the nanoBTS.



Figure 16 - Single power supply unit

The mains input is provided via a figure 8 mains lead connected to the mains supply of either connection. Figure 17 shows the network connections for two possible installation options.

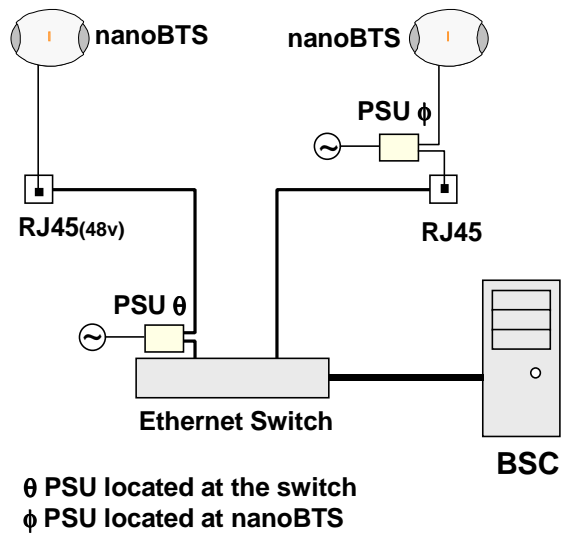


Figure 17 - Locating the PSU

The power supply can be either located locally at the nanoBTS, as shown in Figure 18, or remotely at the network switch, as long as no other network elements are installed between the two points, as shown in Figure 19.

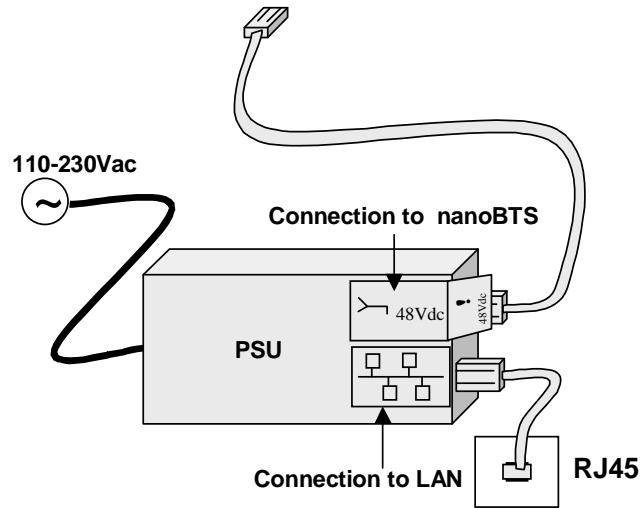


Figure 18 - PSU located at the nanoBTS

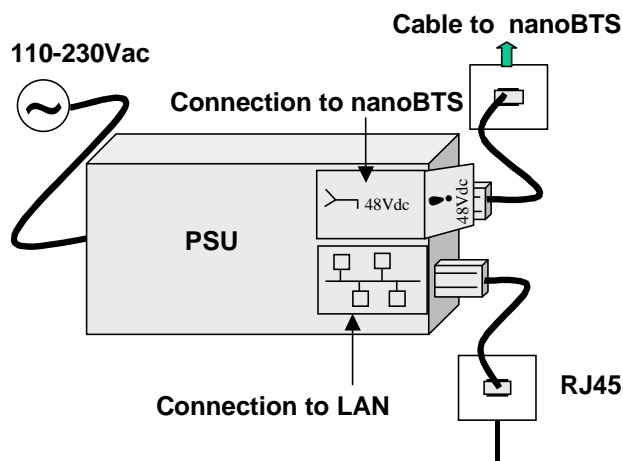


Figure 19 - PSU installation at the switch



Do not connect any device other than a nanoBTS to any RJ45 socket that is enabled for nanoBTS connection (i.e. 48Vdc operation).

2.7.1 8 Port Powered Ethernet Switch Installation

The 8 port powered Ethernet switch, is a combined power inserter, for use with the ip.access range of products and a fully functional 10/100 Ethernet switch.



Figure 20 - 8 port powered Ethernet switch

Power to the unit is provided via a 110 – 240 Volt ac mains plug or via a 48 Volt dc plug and housed in a 1U 19" rack mount case.

2.7.1.1 Mounting The 8 Port Powered Ethernet Switch

The unit is designed to be mounted within a standard 19" rack, and occupies just 1U height, with all connections accessible from the front panel.

Insert 4 cage nuts in the 19" equipment rack at the height and location that the 8 Port Powered Ethernet Switch is to be positioned.

Taking care, slide the 8 Port Powered Ethernet Switch into location, holding the switch steady, then with 4 mounting screws, secure the 8 Port Powered Ethernet Switch into the rack.

2.7.1.2 Connecting The 8 Port Powered Ethernet Switch

Connect **only one** of the required power input connectors to the 8 Port Powered Ethernet Switch, either mains 110/240V AC or 48V DC.



Mains 110-240V AC

Figure 21 - Supply connections

48V DC

Once the 8 Port Powered Ethernet Switch is mounted and the mains AC / DC supply is connected, the main network can be connected, as shown in Figure 22. When powered from the mains AC, ensure the unit is earthed via the IEC power cord. When powered from a 48V DC supply, ensure the unit is earthed via a cable to the screw terminal.

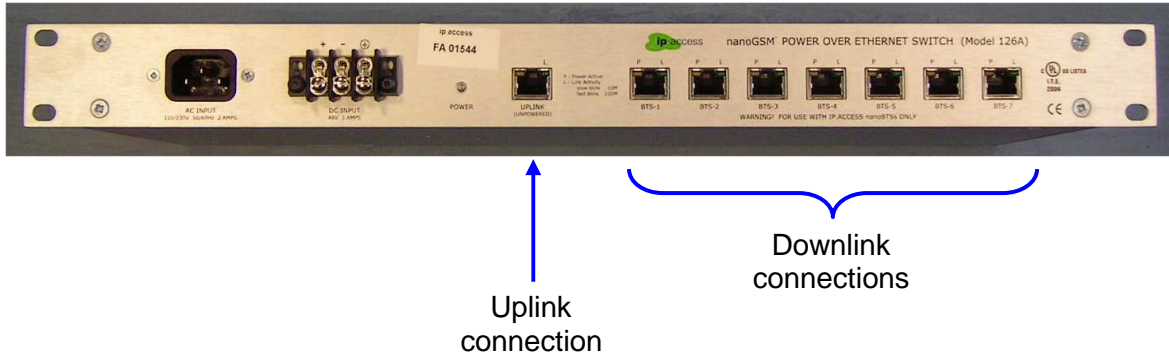


Figure 22 - Ethernet connections



Ensure that the connection to the main LAN (Server) is only made to the UPLINK (unpowered).

Connect each nanoBTS to one of the powered Ethernet outputs, ensuring that the connection is made only to an ip.access nanoBTS.

3 GETTING STARTED WITH BTS INSTALLER

After the nanoBTS hardware has been installed on site, it must be commissioned into the network. This is done by configuring the nanoBTS with BTS Installer. This chapter provides an overview of BTS Installer and installation instructions. Refer to the following chapter for instructions on commissioning a nanoBTS with BTS Installer. Readers familiar with BTS Installer may wish to skip this chapter.

Note: While it is possible to pre-configure a nanoBTS before it is installed on site, this manual assumes that a nanoBTS will be configured after site installation.

3.1 Configuration Phases

Configuration of a nanoBTS takes place in a number of phases. In automatic mode (see section 3.2.1) all enabled phases are run automatically one after another in a fixed order. In manual mode the user chooses which phase to run, one at a time, and can also perform other actions which are not equivalent to automatic configuration phases.

The configuration phases are, in the order in which they are run in automatic mode:

1. Setting the nanoBTS' IP configuration using the built-in DHCP server.
2. Setting the nanoBTS' Unit ID.
3. Setting the nanoBTS' non-volatile attributes.
4. Downloading a file to the nanoBTS.

Each phase can be enabled or disabled separately for each nanoBTS. The download file can download any one of: software; a certificate; a certificate revocation list, but can only download one file at a time.

The BTS Status section of the user interface gives a quick reference to which phases are enabled for which nanoBTSs: this is indicated by the colour code in the columns headed respectively DHCP, UNIT Id, NV Attr, D'LOAD. Grey indicates that this phase is disabled for this nanoBTS, any other colour indicates that this phase is enabled for this nanoBTS. Status colours other than grey are accompanied either by explanatory text, or by a symbol (Grey = no symbol, Red = cross, Yellow = question mark, Red = tick).

3.2 Modes of Operation

BTS Installer has a variety of different modes of operation, to suit different circumstances and requirements.

3.2.1 Manual and Automatic Operation

BTS Installer has an automatic mode of operation, in which it will apply all enabled phases of configuration to all known nanoBTSs in parallel, and when it has finished it will produce a summary in the log window and log file and will display in the BTS Status window which phases of configuration for which nanoBTSs have succeeded and which have failed.

This automatic mode of operation is initiated by pressing the Auto button in the BTS Database Log section of the user interface.

BTS Installer also has a manual mode of operation, in which the user performs just one operation at a time on just one nanoBTS at a time, and has immediate feedback as to the success or failure of the operation.

The various manual operations are available from pressing the Action button in the BTS Status section of the user interface.

Some example scenarios are:

- A number of operating nanoBTSs are to have their software upgraded. Automatic mode is used to download the new version of software to all of them at once.
- A particular nanoBTS is not operating correctly. Manual mode is used to investigate its configuration and diagnose and fix the problem.

3.2.2 Unknown BTS Mode

Normally the BTS Database contains entries for specific nanoBTSs. In particular the DHCP server will only normally only supply an IP configuration to a nanoBTS whose MAC address matches that explicitly specified in the BTS Database entry.

There is a special “Unknown BTS” mode of operation in which the BTS Database contains just one special entry. This special entry acts as if it had a wildcard MAC address, and the DHCP server will recognise any nanoBTS that asks for an IP configuration.



IN THIS MODE THERE IS NOTHING IN BTS Installer TO STOP THE CONFIGURATION OF ANY nanoBTS THAT IS CONNECTED TO THE NETWORK FROM BEING CHANGED.

This special mode of operation is designed to be used when only one nanoBTS at a time is connected to the computer running BTS Installer, usually on a tiny private network, perhaps just a crossover cable. It bypasses the normal safeguards that BTS Installer uses to ensure that it makes configuration changes only to BTSs that are identified as those that the user has specified.

There is no way to create this special BTS Database entry from the graphical user interface; it must be loaded from a configuration file. There is no particular indication to the user that BTS Installer is in Unknown BTS Mode, except that the Find and New buttons in the BTS Status section of the user interface are disabled.

3.2.3 Proxy and Direct Operation

There are various network configurations in which BTS Installer may be used, and the general design of the IP network configuration is outside the scope of this document.

In some network configurations BTS Installer is on the same network as the nanoBTSs, in that there is an IP route from BTS Installer to the nanoBTSs. In such configurations BTS Installer can communicate directly with the nanoBTSs in direct connection mode.

There are two different types of direct connection that BTS Installer can make to a nanoBTS: a normal TCP connection or a secure SSL connection.

In other network configurations BTS Installer and the nanoBTSs are on different networks, and there is no IP routing between the two. Typically in this scenario the BSC will be multihomed, and will have an interface to each network but will not route IP packets between the two networks. An optional system component, the BTS Installer Proxy, can be installed as part of the BSC, and will forward requests from BTS Installer to the nanoBTSs

and return the replies. In such configurations BTS Installer communicates with the nanoBTSs in proxy mode.

There are two different types of proxy that might be present on a BSC: a Primary OML Proxy and a Secondary OML Proxy. Which can be used depends on the network configuration.

Direct connection or proxy mode is indicated to the user in the status bar at the bottom of the user interface. A later section explains how to start BTS Installer in proxy mode, and lists the limitations of BTS Installer whilst in proxy mode.

3.3 The Configuration File

BTS Installer can be given the information it needs in the following ways:

- in a configuration file
- via the graphical user interface
- via some combination of a configuration file and the graphical user interface

The configuration file is a text file which can be created with any text editor and which contains definitions for:

- default values for BTS attributes
- the nanoBTSs to be operated on
- attributes to be set for the BTSs
- the DHCP server's IP address pool

It is not necessary to create a configuration file for most uses of BTS Installer, as almost all necessary information can be entered via the graphical user interface. The only exception is that a BTS Database entry for the "Unknown BTS" cannot be entered via the GUI and can only be entered via the configuration file.

At any point it is possible to save the current state of the BTS Database and IP address pool to a configuration file; this can be done even if no configuration file has been loaded and all data has been entered via the GUI. This allows you to do the following:

- entering configuration information via the GUI
- saving the configuration information to a new configuration file
- loading the configuration file in a later run of BTS Installer

In other words, you can use BTS Installer itself to create a configuration file for later use, instead of using a text editor.

See 'Configuration File Reference' in [OPM_300] for details of the syntax of the configuration file.

3.4 Installing BTS Installer

This section contains information about installing BTS Installer, preparing it for use, and performing an operation on a nanoBTS.

BTS Installer is a Java application. It requires that the Sun J2SE Java Runtime Environment be installed: version 1.5 is required (there is no particular requirement as to

which subversion of 1.5 is used). The J2SE Java Runtime Environment is available, with installation instructions, from Sun's Java web-site (<http://www.java.sun.com>).

3.4.1 Microsoft Windows

3.4.1.1 Pre-Installation Requirements

- Local craft terminal for the installation running Windows 2000 SP2 or Windows XP SP2
- CD-ROM drive or Internet connection
- Java run time environment version 1.5.0_07 or later

3.4.1.2 Installing the BTS Installer Package

The estimated installation time for the product is 5 minutes.

1. Login to the PC ensuring that you have Administrator privileges.
2. Using Windows Explorer, browse to the directory, either on the CD-ROM or network drive where the BTS Installer application is located.
3. Double click on the Icon for BTS Installer:



Note: For actual revision levels of each package, please refer to the System Release Note.

4. Follow the on-screen instructions to complete the installation.

If it is desired to use BTS Installer to make secure (SSL) connections to nanoBTSs then perform the following additional steps:

5. Install the Aladdin eToken run time environment.
Aladin e-Token RTE requires that the computer is running Windows 2000 SP2 or Windows XP SP2.
6. Plug the eToken (a hardware device which contains a certificate and private key for BTS Installer) into a USB port.

3.4.2 Other Platforms

Details of installing BTS Installer on platforms other than Microsoft Windows are beyond the scope of this document. However in most cases copying the file BtsInstaller.jar to a suitable directory will be adequate. On platforms other than Windows there is no support for making SSL connections to the nanoBTS.

3.5 Starting BTS Installer

3.5.1 From Config Manager

BTS Installer can be started from Config Manager, in which case it will be pre-populated with some nanoBTSs selected in Config Manager and will operate in proxy mode. See 'Starting BTS Installer from Config Manager' in [OPM_300] for details.

3.5.2 Microsoft Windows

BTS Installer can be started by double clicking the desktop item or by selecting the menu entry in the normal way.

3.5.3 Other Platforms

Details of starting BTS Installer on platforms other than Microsoft Windows are beyond the scope of this document. However on platforms with a command line interface a command like the following is likely to be useful:

```
java -jar BtsInstaller.jar
```

3.5.4 Command Line Arguments

On all platforms, additional command line arguments can be used to specify that BTS Installer should run in proxy mode, and/or to specify the IP addresses and optionally Unit IDs of some nanoBTSs for which BTS Installer should create BTS Database entries. See 'Command Line Parameters' in [OPM_300] for details of the command line arguments.

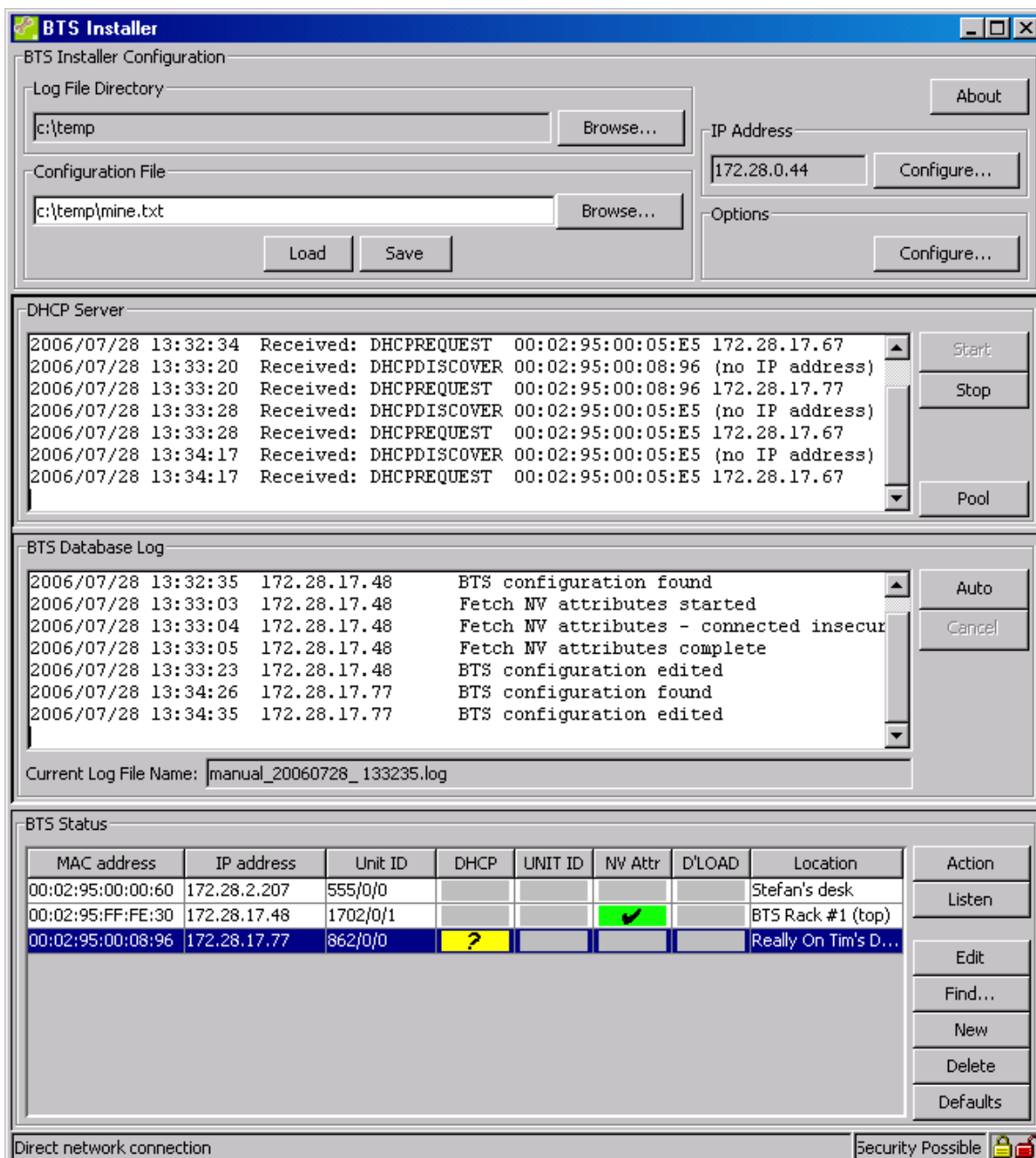
Depending on the platform, it will be possible to set up a shortcut or a script to run BTS Installer with any desired set of command line arguments.

3.5.5 Entering the Password

When BTS Installer starts, if an eToken containing a certificate and private key is found it will prompt the user for the password for the eToken. The password should be entered if it is desired to make secure (SSL) connections to nanoBTSs; if only insecure connections are wanted then the password request may be cancelled. See section 4.5 for further details.

3.6 Setting Up BTS Installer

The BTS Installer Configuration section of the user interface contains some settings that tell BTS Installer how it is to operate. Until some of these settings have been made most of the buttons on the user interface will be disabled and most of BTS Installer's functionality will be unavailable.



Once these settings have been made they are remembered and will not normally need to be made again on later runs of BTS Installer on the same computer.

The items that can be set up are:

- Log file directory – this must be set up, but it can alternatively be done as a by-product of choosing a configuration file
- IP Address – this does not need setting if you are not going to use BTS Installer's built-in DHCP server, but if you are going to use the DHCP server then this must be set up
- Configuration file – this need not be set up unless and until you wish to use a configuration file

- Options – these usually do not need to be set up as the default values are usually adequate.

3.6.1 Creating a BTS Database Entry

BTS Installer will not operate on any nanoBTS that it doesn't know about; in order to do anything to a nanoBTS it must have a BTS Database entry for that nanoBTS (see section 4.1).

A BTS Database entry can be created by any of the following methods as desired:

- creating a new blank BTS Database entry
- finding a nanoBTS on the local area network
- loading a configuration file

3.6.2 Assigning an IP Address

For most operations (other than when operating via a Primary OML Proxy) the nanoBTS must have an IP address assigned, and BTS Installer must know the IP address.

If the nanoBTS on which you wish to operate already has an IP address:

- Ensure that the BTS Database entry for that nanoBTS has the correct IP address; if not use the Edit button to fill in the IP address on the BTS tab of the BTS Configuration dialog box.

If the nanoBTS on which you wish to operate does not already have an IP address then you may use BTS Installer's built-in DHCP server to assign one:

1. Consult the network administrator for the network on which the nanoBTS is installed and ask for an IP address that can be used for the nanoBTS.
2. Use the Edit button to fill in this IP address on the BTS tab of the BTS Configuration dialog box.
3. Go to the DHCP tab on the same dialog box, (and if not already done) tick the Enable DHCP Configuration check box, and enter the correct Subnet Mask (and Router address, if needed).
4. Ensure that the DHCP server is running.
5. Wait until the DHCP server assigns the address to the nanoBTS.

For more information about editing the nanoBTS' attributes using the BTS Configuration dialog box see chapter 4. For more information about the DHCP server, particularly for conditions that must be satisfied before it will work and assign an IP address to a nanoBTS, see chapter 4.

3.6.3 Setting Desired nanoBTS Attributes

For many, but not all, operations it is necessary to specify some attributes that you wish to be configured on the nanoBTS.

Use the Edit button to pop up the BTS Configuration dialog box on which desired attributes may be entered. See chapter 4 for details of the BTS Configuration dialog box.

3.6.4 Perform Desired Operations

At this point any desired operation may be performed on the nanoBTS:

- automatic configuration – use the Auto button
- manual configuration – use the Action button
- network listen functions – use the Listen button.

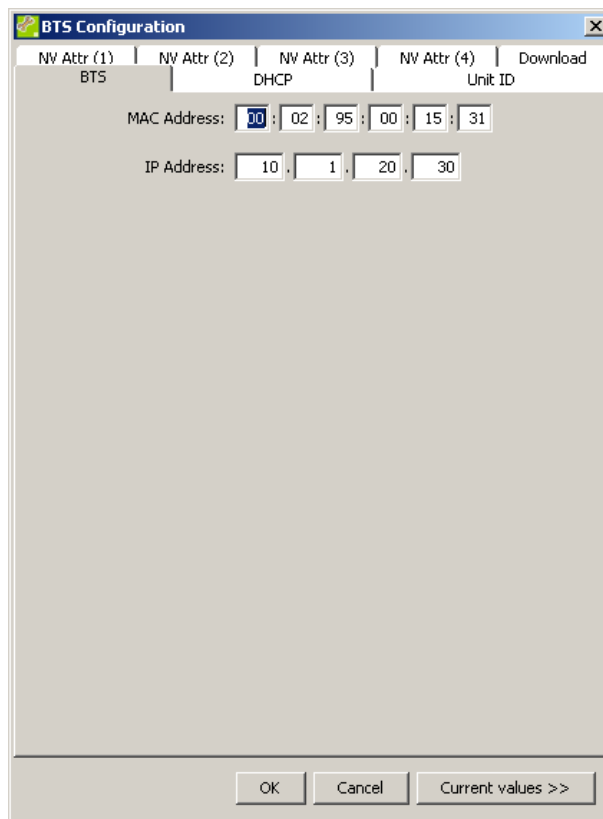
4 COMMISSION A NANOBTBS

4.1 Configure the nanoBTS

The process for manually configuring the nanoBTS is as follows:

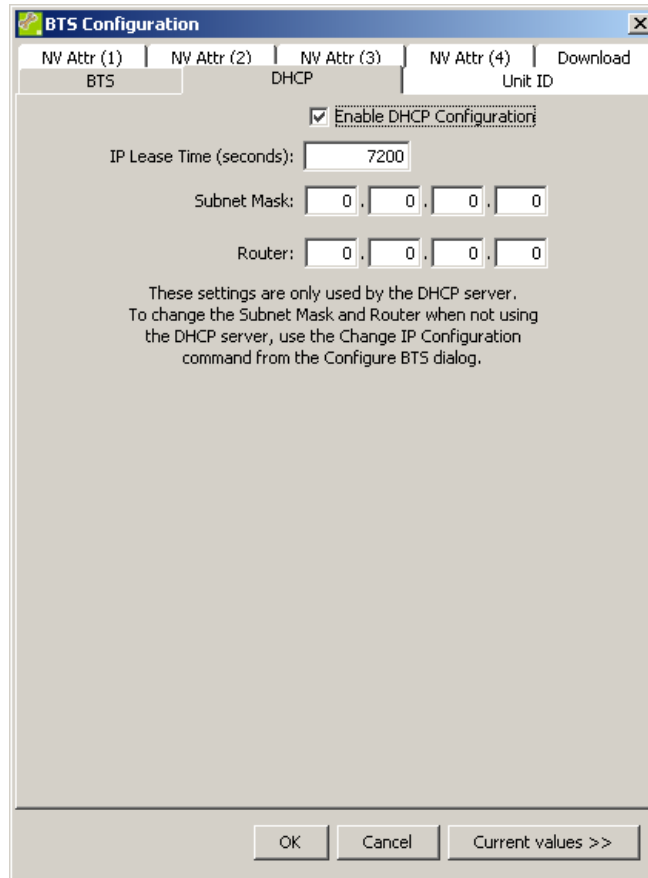
4.1.1 Set the IP Configuration

1. Power up the nanoBTS. This will take approximately 1 minute. The Status Indicator on the nanoBTS will flash green and red. This indicates that the Unit ID has not been set (when the nanoBTS has been fully configured the Status Indicator will slow blink orange).
2. Open BTS Installer.
3. In the BTS Status section, click **New** to add the new nanoBTS to the BTS database. The BTS Configuration dialog is displayed.



4. On the BTS tab, enter the MAC Address of the new nanoBTS.
5. On the BTS tab, enter the IP Address of the new nanoBTS.

- On the DHCP tab, select the **Enable DHCP Configuration** check box.

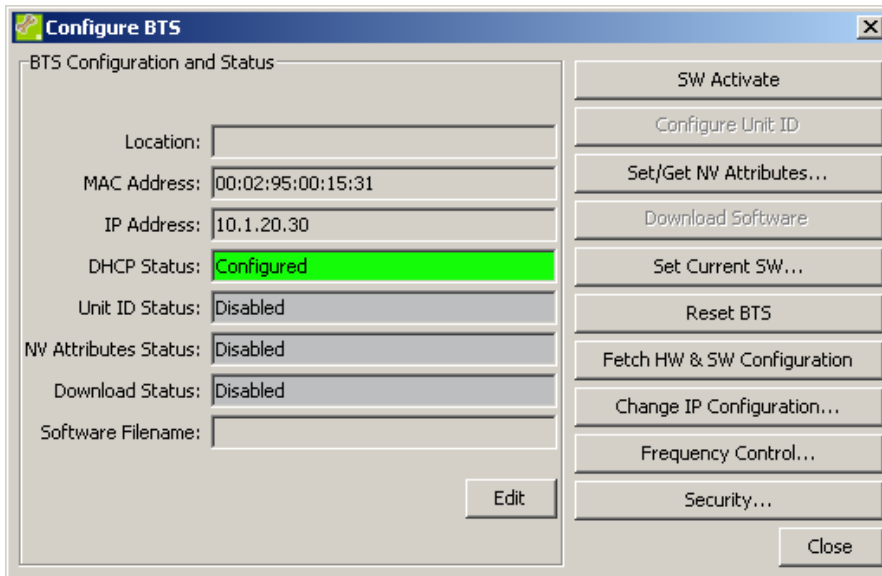


- On the DHCP tab, enter the Subnet Mask and IP Address of the gateway router if required.
- Click **OK**. The DHCP field in the BTS Status section should turn green. If not, ensure that the DHCP server is running.

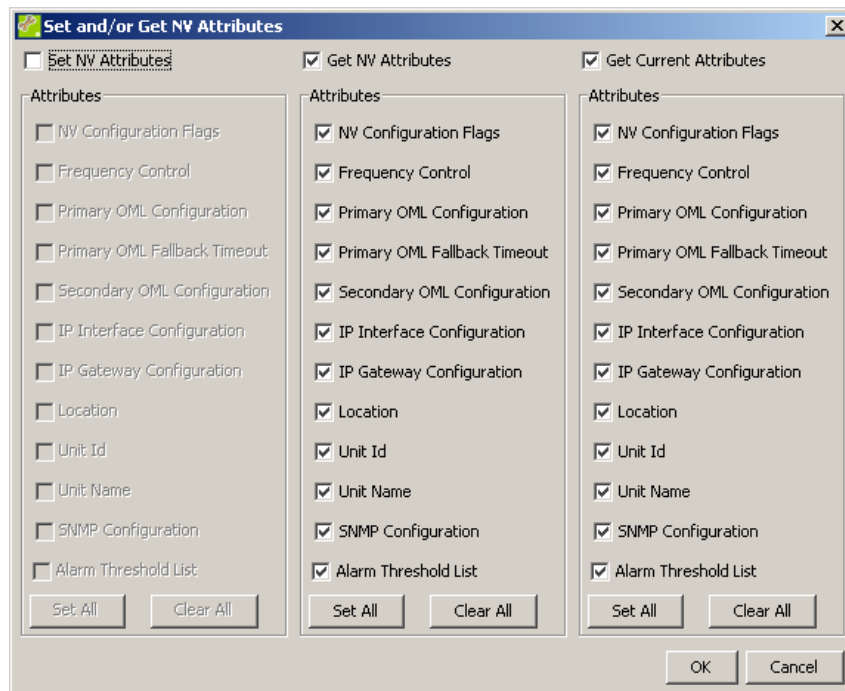
BTS Status						
MAC address	IP address	Unit ID	DHCP	UNIT ID	NV Attr	D'LOAD
00:02:95:00:05:D9	10.1.10.20	0/0/0	✔			

4.1.2 Set the Non-Volatile Attributes

1. Ensure that the new nanoBTS is selected in the BTS Status section, and then click **Action**. The Configure BTS dialog is displayed.

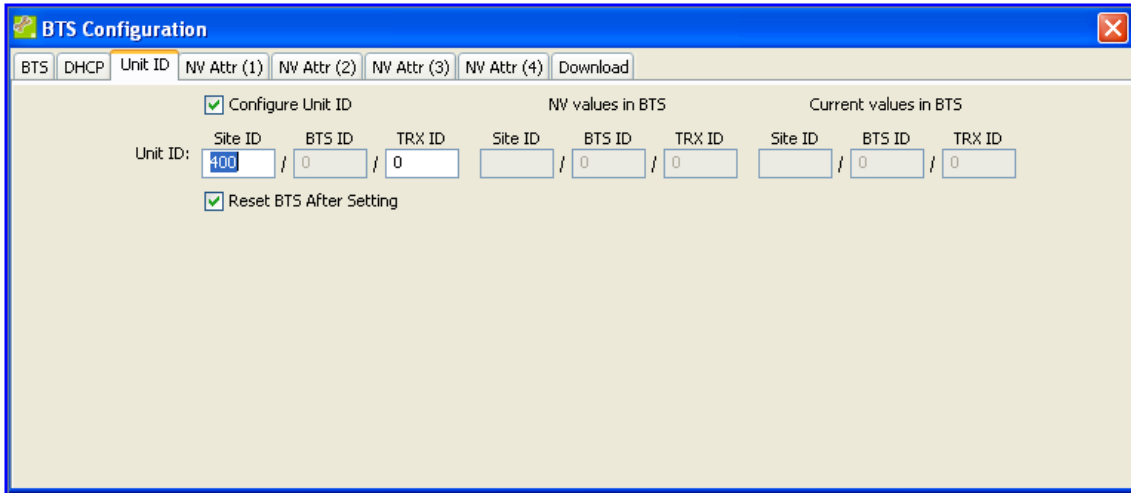


2. Click **Set/Get NV Attributes**.

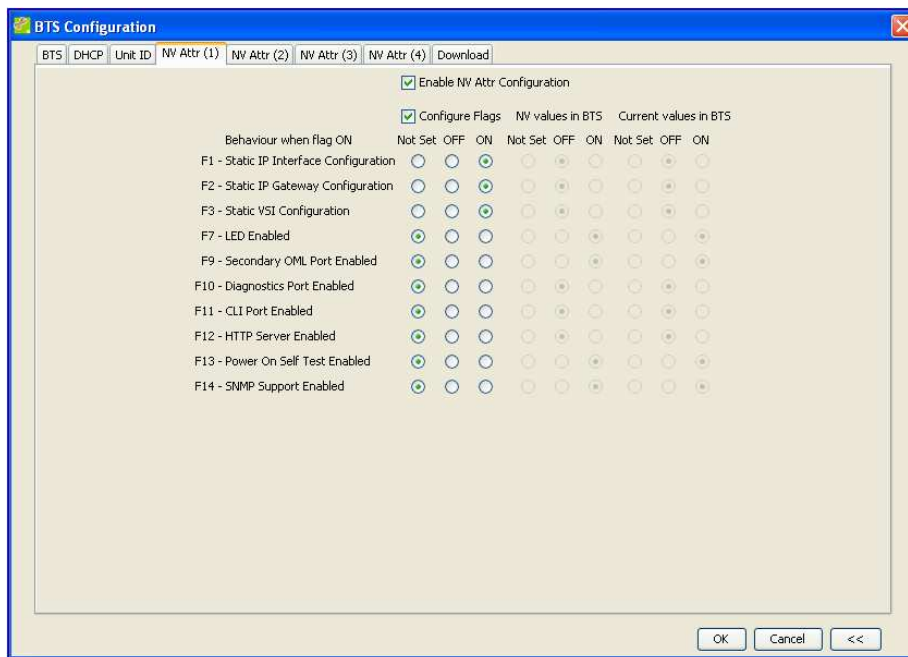


3. In the Set and/or Get NV Attributes dialog, select the required attributes. By default all attributes are selected.
4. Click **OK**. A progress dialog is displayed, then the BTS Configuration dialog is displayed.

- On the Unit ID tab, enter a unique Site ID. A slave TRX will have the same Site ID as the master TRX.



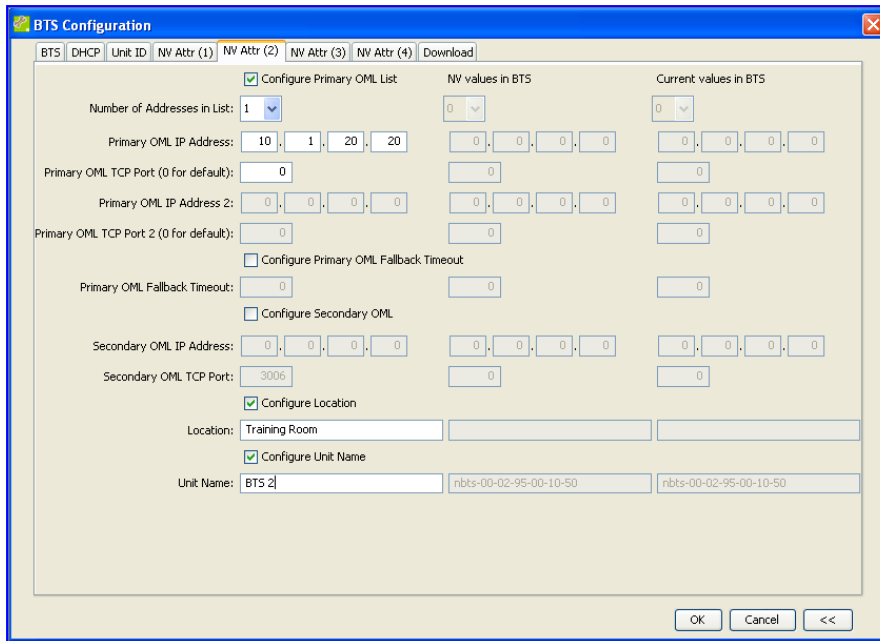
- On the Unit ID tab, enter a TRX ID. For a master TRX, TRX ID is 0. For a slave TRX, TRX ID is 1, 2 or 3.
- On the NV Attr (1) tab, select the Enable NV Attr Configuration check box.



- To configure a static IP address, select the Configure Flags check box and set F1, F2 and F3 to **ON**. To configure a dynamic IP address, do not make these settings.

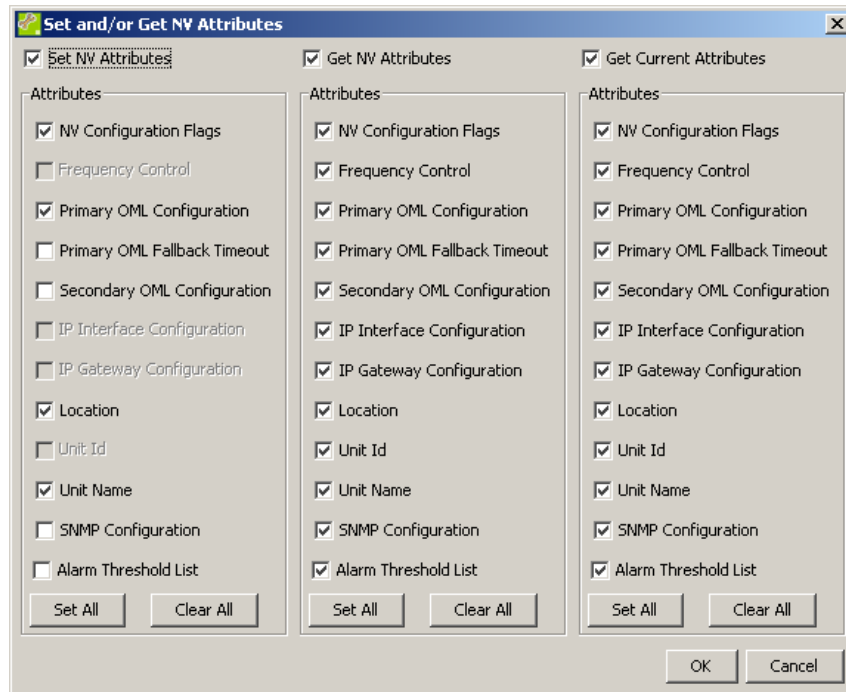
Note: Changes made on the NV Attr (1) tab will not be applied to the BTS until it has been reset.

- On the NV Attr (2) tab, select the `Configure Primary OML List` check box.



- From the `Number of Addresses in List` drop-down list, select the number of BSCs. Typically this will be 1. If there is a second BSC configured for redundancy, select 2.
 - Enter the `Primary OML IP Address`. This is the IP address of the BSC.
 - If there is a second BSC configured for redundancy, enter the `Primary OML IP Address 2`.
 - Select the `Configure Location` check box.
 - Enter appropriate descriptive text in the `Location` field.
 - Select the `Configure Unit Name` check box.
 - Enter appropriate descriptive text in the `Unit Name` field.
- Note:** Changes made on the NV Attr (2) tab will be applied to the BTS without a reset.
- Click **OK**. In the `BTS Status` section, the `Unit ID` field should be yellow, and the `NV Attributes` field should be red.

18. Click **Set/Get NV Attributes**.

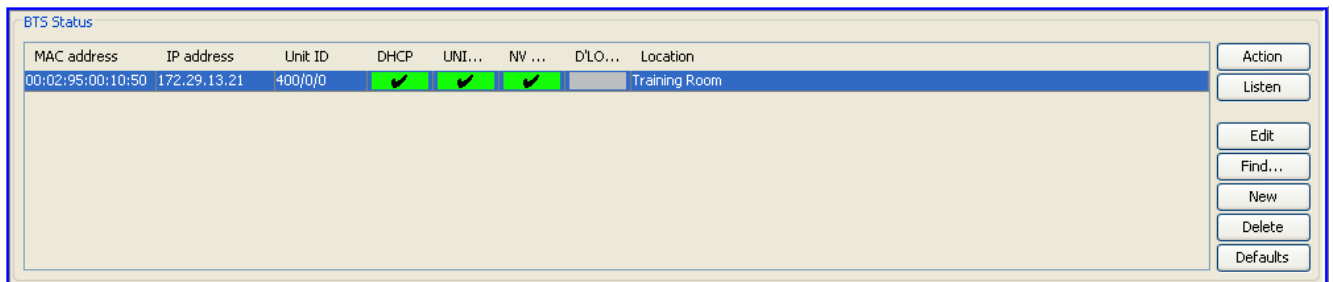


19. In the Set and/or Get NV Attributes dialog, ensure that the **Set NV Attributes** check box is selected.

20. Ensure that the check boxes are selected for the required configuration settings.

21. Click **OK**.

22. In the Configure BTS dialog, click **Configure Unit ID**. The DHCP, Unit ID and NV Attributes fields in the BTS Status section should all be green.



4.2 Software Download

Download any required files to the nanoBTS including:

- Software
- Certificate
- Certificate revocation list

1. In the BTS Status section, click **Edit**. The BTS Configuration dialog is displayed.

The screenshot shows the 'Download' tab of the BTS Configuration dialog. At the top, there are tabs for 'NV Attr (2)', 'NV Attr (3)', 'NV Attr (4)', and 'Download'. The 'Download' tab is active. Below the tabs, there is a checked checkbox labeled 'Enable Download'. A note states: 'Only one type of file may be downloaded in a single operation.' There are three radio button options: 'Download Software' (selected), 'Download Certificate', and 'Download Certificate Revocation List'. Under 'Download Software', there is a 'File Name:' field with a 'Browse...' button, a 'Details' button, and two checked checkboxes: 'Make New Software the Default' and 'Reset BTS After Download'. Under 'Download Certificate', there is a 'File Name:' field with a 'Browse...' button, a text box containing 'No .zip file name specified.', and a checked checkbox 'Reset BTS After Download'. Under 'Download Certificate Revocation List', there is a 'File Name:' field with a 'Browse...' button, a 'Latest CRL:' field containing '(no CRLs found)', and a checked checkbox 'Reset BTS After Download'.

2. On the Download tab, select the Enable Download check box.
3. Select Download Software, then click **Browse** and navigate to the software file.
4. Select the Make New Software the Default check box.
5. Select the Reset BTS After Download check box.
6. Click **OK**.
7. Click **Action**. The Configure BTS dialog is displayed.
8. Click **Download Software**. A progress dialog is displayed as the software downloads.
9. Click Set Current SW. The BTS dialog displayed enables selection of the Boot Code software, Backhaul software, and TRX software.

10. Select the required software versions. The software version number is described by HWTe00s-vxxxxx

Where:

HWT indicates hardware type (nanoBTS model)

- 120 = Model 139/140
- 119 = Model 108/110
- 168 = Model 165

e indicates encryption algorithms

- a = A5/1 and A5/2 encryption algorithms
- b = A5/2 encryption algorithm only
- c = no encryption

00s indicates software type

- 001 = TRX software
- 002 = backhaul software
- 004 = bootcode software

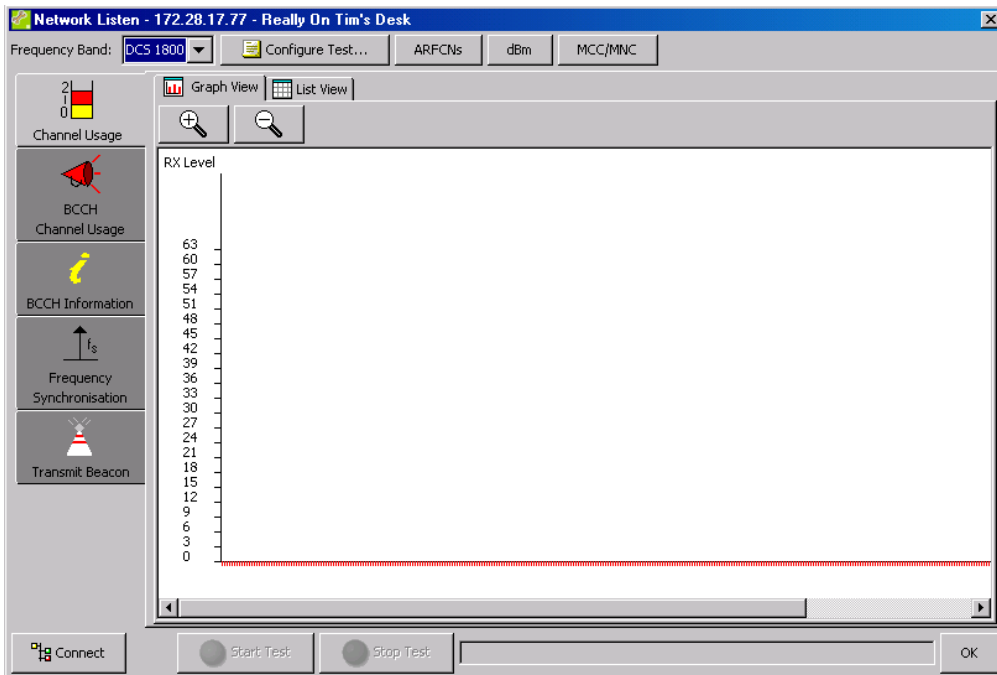
Vxxxxx indicates software version and build number.

11. Select the `Reinitialize BTS After Setting Current SW` check box.
12. Click **OK**.

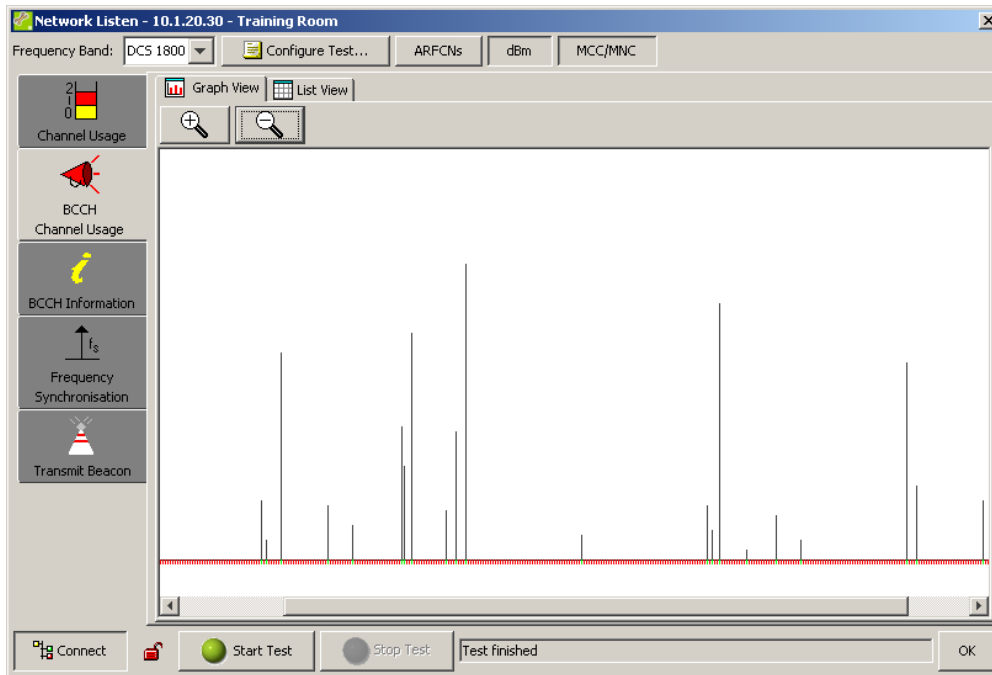
4.3 RF Planning with Network Listen

The Network Listen feature is used to aid frequency planning. It is controlled by BTS Installer. When Network Listen is activated, the nanoBTS is placed in receive mode and can be used to identify other nanoBTS, and monitor their power levels, frequency usage and BCCH information.

1. Ensure that the new nanoBTS is selected in the BTS Status section, and then click **Listen**. The Network Listen dialog is displayed.



2. In the **Frequency Band** drop-down list, ensure that the correct GSM band is selected.
3. Click **Connect**. It will take approximately 90 seconds to create the connection from BTS Installer to the nanoBTS. When the connection is complete, the message *Ready to run test* is displayed in the status pane at the bottom of the dialog and the **Status Indicator** on the nanoBTS will flash green.
4. Click **Channel Usage** on the left side of the dialog. The options on the left side of the dialog are the Network Listen tests.
5. Click **Start Test**.
6. When the **Channel Usage** test is complete, click **BCCH Channel Usage**.
7. Click **Configure Test**.
8. Make the required settings in the **Configure Test** dialog. The **BCCH Channel Usage** test reports on channels containing a GSM frequency correction and synchronisation burst. For more information see [OPM_300].
9. Click **Start Test**. When the test is complete, the results are displayed in a graph.



4.4 Frequency Calibration

When the nanoBTS has been installed and configured, the local oscillator must be calibrated.

The frequency calibration should be performed 10 minutes after the nanoBTS has been powered up. This provides time for the oscillator to stabilise. The frequency calibration should then be performed again 24 hours after the nanoBTS has been powered up.

The frequency calibration can be performed in two ways.

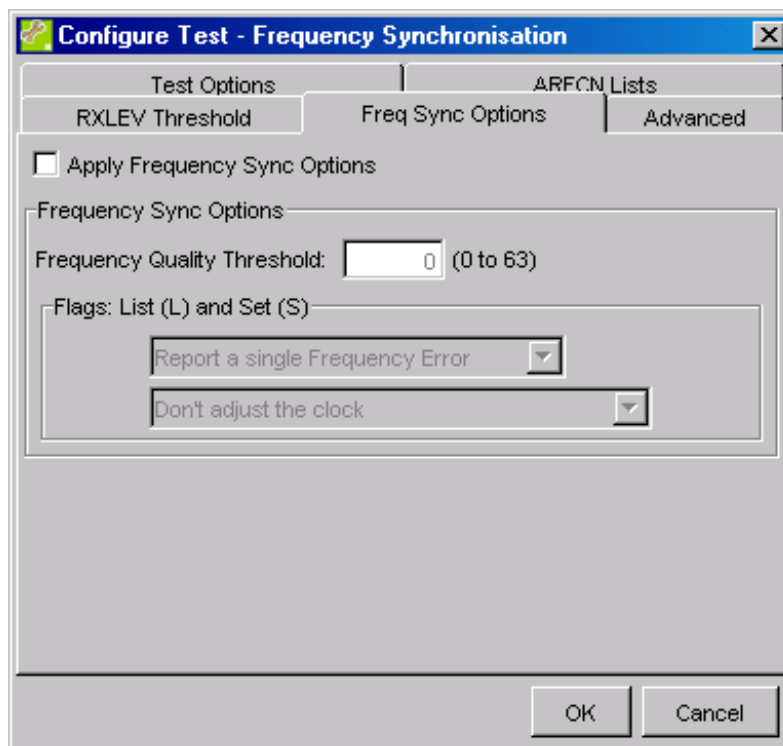
4.4.1 Frequency Synchronisation (Recommended)

The Frequency Synchronisation test in the Network Listen dialog can be used to calibrate the nanoBTS.

During this test the nanoBTS measures the frequency error of the local oscillator relative to the measured channel. The frequency errors are reported and the local oscillator can be adjusted to reduce the error.

Note: The nanoBTS can only adjust its clock if the internal OCXO is the active clock source.

1. Click **Frequency Synchronisation**.
2. Click **Configure Test**.
3. Make the required settings in the Configure Test dialog. To correct the reported frequency errors select the `Apply Frequency Sync Options` check box, and then select `Adjust the clock to correct the reported errors from the Flags Set` drop-down list.



4. Click **OK**.
5. Click **Start Test**.

Note: The nanoBTS may not be able to correct the frequency error in one go. It may be necessary to re-run this test a few times to get the error down to a reasonable level.

4.4.2 Frequency Control

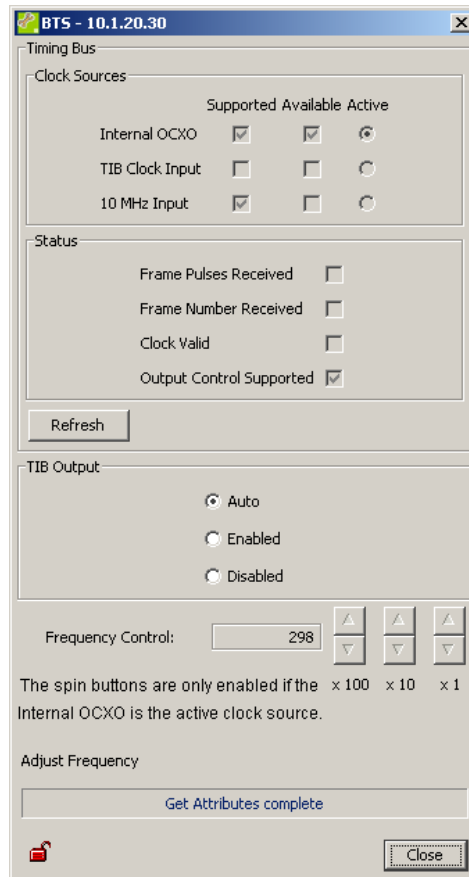
Frequency Control enables the user to make manual adjustments to the nanoBTS clock frequency via the Frequency Control attribute, which is represented as a number of ppb (parts per billion) from a nominal value. It also enables the user to view the Timing Bus status.

1. Connect external frequency measuring equipment to the nanoBTS TIB Out port.

Note: The external frequency counter should be referenced to an accurate and stable source.

Note: If the nanoBTS is used in a Multi-TRX configuration, then the TIB Out must be disconnected from each nanoBTS in the chain prior to calibration and reconnected afterwards.

2. Ensure that the new nanoBTS is selected in the BTS Status section, and then click **Action**. The Configure BTS dialog is displayed.
3. Click **Frequency Control**. If the nanoBTS has been powered up for more than 24 hours the Frequency Control dialog is displayed.



Note: If the nanoBTS has not been powered up for 24 hours, a warning message will be displayed. The warning messages re-iterate the importance of waiting 24 hours before performing the final calibration. To continue with the calibration, click **OK** to display the Frequency Control dialog.

Note: The frequency of a nanoBTS can only be adjusted manually if `Internal OCXO` is the active clock source. If the `Internal OCXO` is not the active clock source and the nanoBTS being adjusted is a master, remove its 10 MHz input.

4. If required, click **Enabled** in the TIB Output section.
5. Use the Frequency Control spin buttons to adjust the internal OCXO frequency while observing the effects in real-time using the external measuring equipment. The frequency can be adjusted in steps of x1, x10 or x100.

Note: The ideal tolerance range for Freq Qual is 50...63, for Freq Error -50...0...50.

6. When the nanoBTS is set to the required frequency (26 MHz for nanoBTS models that are not multi-TRX capable, 1.625 MHz for nanoBTS models that are multi-TRX capable) and within the required tolerance, stop.
7. Click **Close**. If any settings have been changed in the Frequency Control dialog, a warning message is displayed that enables these settings to be returned to their earlier values.

4.5 nanoBTS Security

BTS Installer is capable of connecting to a nanoBTS using an authenticated encrypted SSL (secure sockets layer) connection.

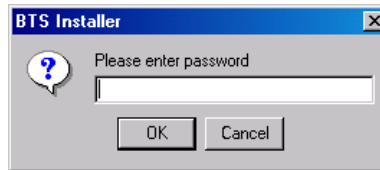
Before an SSL connection can be set up you must:

- Ensure that BTS Installer is correctly installed on Windows 2000 SP2 or Windows XP SP2.
- Install the Aladdin eToken run-time environment
- Be able to export the cryptographic technology to the BTS

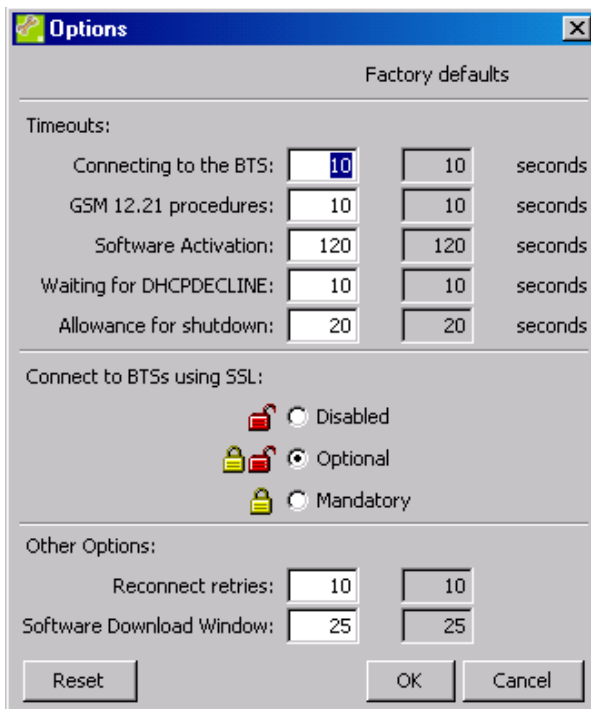
1. Plug the eToken into a USB port on the local terminal. The new hardware wizard is displayed.



2. Permit the new hardware wizard to run, and allow the system to install the requested certificates.
3. Start BTS Installer. BTS Installer detects the eToken and prompts for a password.



4. Enter the correct password for the eToken connected to the local terminal.
5. In the Options section of BTS Installer, click **Configure**. The Options dialog is displayed.

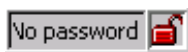


6. In the **Connect to BTSs using SSL** section, select either **Optional** or **Mandatory**.
7. Click **OK**.

The Status bar at the bottom of the BTS Installer indicates that a secure connection is possible by displaying a closed padlock.



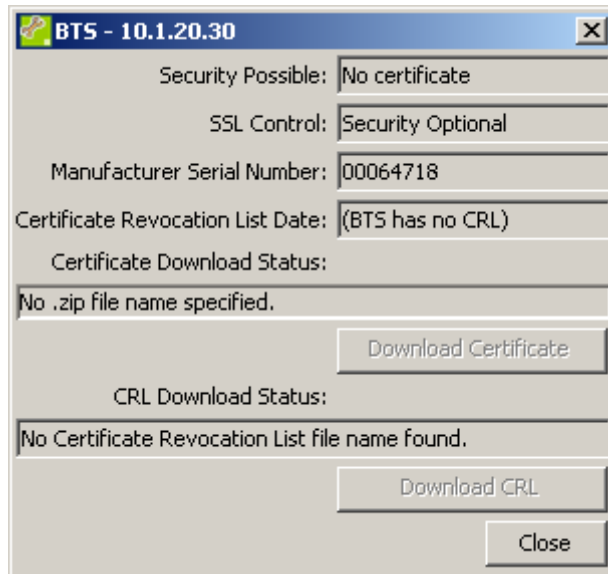
If there is a problem and a secure connection is not possible, then an open padlock will be displayed with a description of the error.



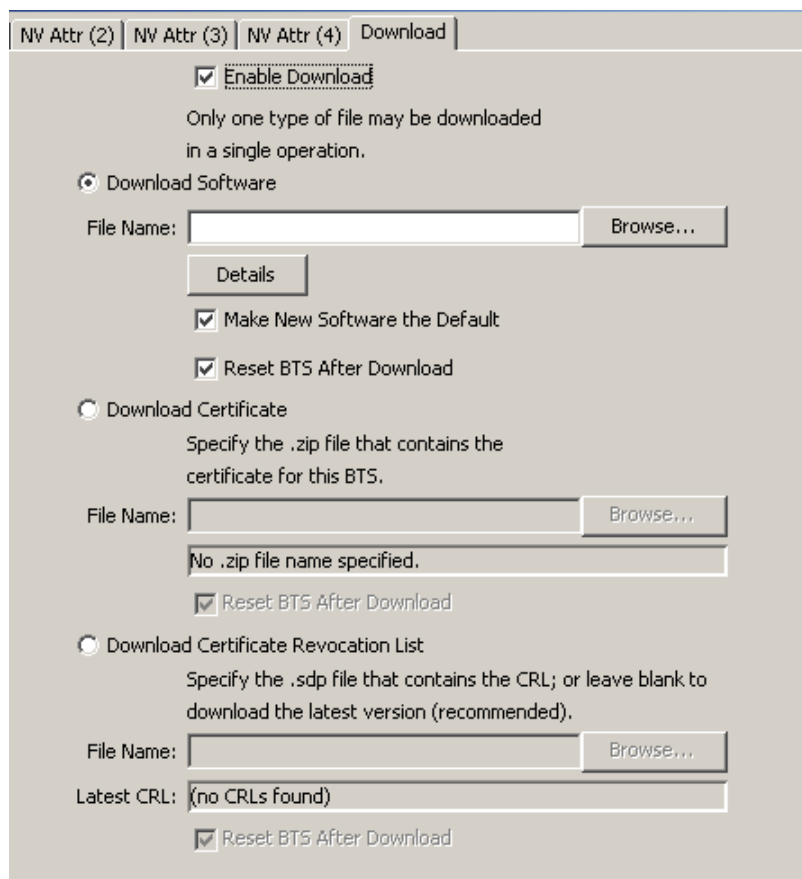
In the example above, the wrong password was entered for the eToken. Alternatively, a secure connection may not be possible if a security certificate has not been downloaded to the nanoBTS.

To investigate the status of BTS security:

1. Ensure that the new nanoBTS is selected in the BTS Status section, and then click **Action**. The Configure BTS dialog is displayed.
2. Click **Security**.



To download the security certificate and certificate revocation list, follow the steps in section 0 and use the **Download Certificate** and **Download Certificate Revocation List** options on the Download tab of the BTS Configuration dialog (see below).



5 NANOBTs AND PSU REGULATORY INFORMATION

This chapter provides the customer with safety and regulatory warnings, cautions and information for the ip.access Ltd range of products.

Products covered are the model 108, 110, 139, 140, 165 and 178 range of nanoBTs and model 109 and 126 power supplies.

5.1 Terminology

UL	Underwriters Laboratories
FCC	Federal Communications Commission
IC	Industry Canada
CE	European Union

5.2 nanoBTs Products

5.2.1 nanoBTs - Handbook - Warnings and Cautions



This system is designed to be operated indoors as a fixed system device and must be located either on or near the ceiling away from the user. It must be mounted in a manner to ensure that all users and bystanders are kept a minimum of 20cm away from the integral antennas at all times.



Do not touch or move the antenna(s) while the unit is transmitting or receiving.



Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes while transmitting.



In most parts of the world, regulatory approval(s) are needed before the nanoBTs is operated.



Do not connect any device other than the nanoBTs to any RJ45 socket that has been enabled for nanoBTs connection (i.e. 48Vdc operation).



The nanoBTs is intended for dry indoor applications only. If evidence of condensation is present do not apply power to the nanoBTs.



The nanoBTS must only be powered using an ip.access model 109 PSU (PPI part number ILA1711112) or ip.access model 126 Ethernet switch and power inserter (unless prior written approval is obtained from IP Access). Model 165 BTS's may also be powered by a direct 48V connection using a PSU specified in writing by IP Access Ltd.



PSU's supplied by ip.access must not be used for powering any other equipment (unless carried out in a manner having prior written approval from IP Access).



TIB ports on the NanoBTS may only be connected with ip.access supplied cables with part numbers 139-040, 139-041, 139-042, 139-043 or 165-076.



Fitting external antenna or antenna cabling to the BTS invalidates the type approval, CE marking and UL listing referred to herein (unless carried out in a manner having prior written approval from IP Access).



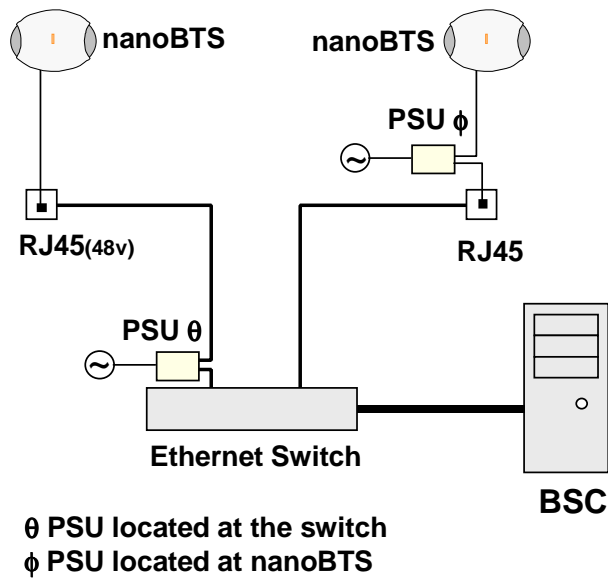
Maximum cable length from the Ethernet Hub, Switch or PSU is limited to 100m.

5.2.2 nanoBTS - Handbook - Parts Required for each nanoBTS

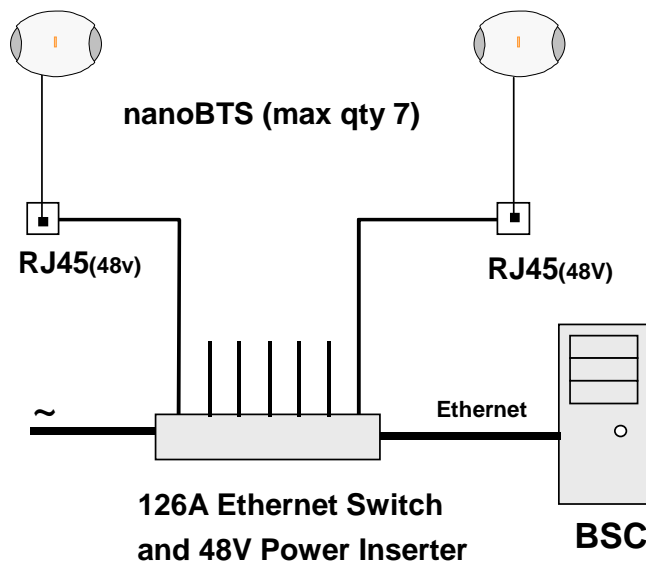
- Wall Fixings: These are not normally provided as part of the nanoBTS but should be suitable for the wall material and weight of the nanoBTS (2.7kg). Suggested materials are 4 x 30mm no.10 woodscrews or M5 bolts and wall plugs (if required).
- PSU.
- NanoBTS complete with mounting bracket.
- RJ45-RJ45 connecting leads.

5.2.3 nanoBTS - Handbook - Provision of Power to the nanoBTS

Power for the NanoBTS may be inserted at either the RJ45 outlet or at the output of the last Ethernet switch/hub/router etc. see figure below.

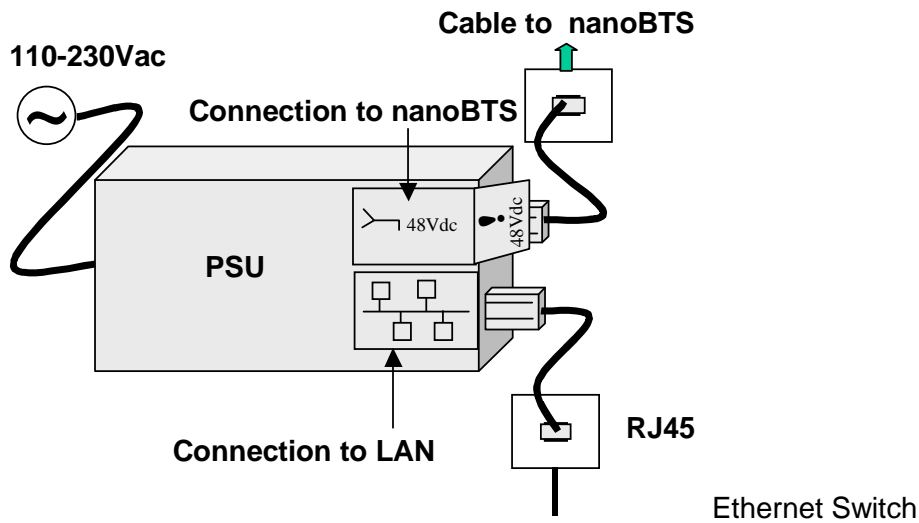


When using the ip.access model 126A Ethernet Switch and Power Inserter, external PSU's are not required, the NanoBTS is connected locally or via site cabling to the powered ports of the 126.



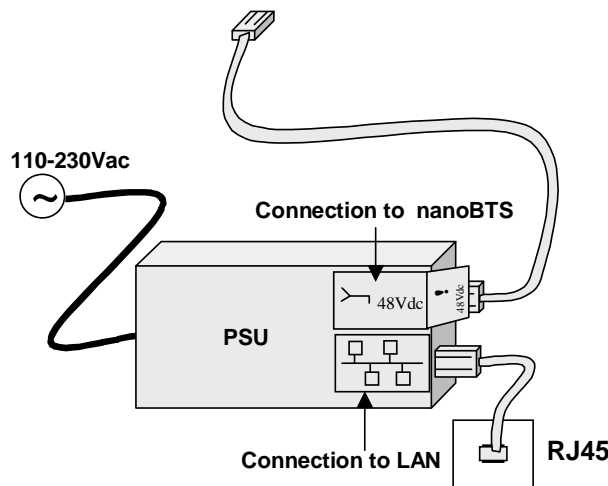
5.2.3.1 nanoBTS - Handbook - Installing the PSU at the Ethernet Switch.

If the 109 PSU is located at the patch panel /output port of the Ethernet switch, it is important that the 109 PSU is connected exactly as illustrated below (failure to do so may cause damage to the switch). Ensure that the 109 PSU is placed in a location that is ventilated and that the connection leads provide no safety hazard.



5.2.3.2 nanoBTS - Handbook - Installing the PSU at the nanoBTS.

Ensure that the 109 PSU is placed in a location that is ventilated and that the connection leads provide no safety hazard.



5.2.4 nanoBTS - Handbook – FCC Text

Standards

- FCC Rule 47 Parts 2, 15, 24

Note: Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate this equipment.

Model 110 NanoBTS has FCC ID QGGM180TVX

Model 140 NanoBTS has FCC ID QGGKU02ZZT

Model 165B NanoBTS has FCC ID QGGKU02ZZP

Model 165D NanoBTS has FCC ID QGGKU02ZZR

Model 165F nanoBTS has FCC ID QGGKU02ZZP

Model 165H nanoBTS has FCC ID QGGKU02ZZS

Federal Communications Commission

Note: This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

5.2.5 nanoBTS - Handbook – IC Text

Standards

- RSS133 issue 2

Note: Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate this equipment.

Model 110 NanoBTS has IC (Industry Canada) ID 4644B-M180TVX

Model 140 NanoBTS has IC (Industry Canada) ID 4644A-KU02ZZT

Model 165B NanoBTS has IC (Industry Canada) ID 4644A-KU02ZZP

Model 165D NanoBTS has IC (Industry Canada) ID 4644A-KU02ZZR

Model 165F NanoBTS has IC (Industry Canada) ID 4644A-KU02ZZP

5.2.6 nanoBTS – Handbook - Regulatory Compliance Statement

The nanoBTS conforms to the following regulatory standards.

5.2.6.1 Type Approvals

- GSM essential requirements under article 3.2 of the R&TTE directive ETSI EN 301 502. CE Marking (CE0168).
- FCC - see above
- IC – see above

5.2.6.2 EMC Standards

- ETSI EN 301 489-1 and –8, ETSI EN 301 502
- FCC - see above
- IC – see above

5.2.6.3 Environmental Standards

- ETS 300 019

5.2.6.4 Safety Standards

- EN60950 (CE Marking)
- IEC 60950
- UL60950 Listed (file number E230296, USA and Canada)
- CB Certificate

This product is intended for use in all Member States of the European Union.

"Hereby, ip.access declares that this NanoBTS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC."

A copy of regulatory compliance documentation may be obtained in writing from

"IP access Ltd, Building 2020, Cambourne Business Park, Cambourne, Cambridge, CB23 6DW, UK".

5.3 Model 109 Power Supply

5.3.1 109 - Handbook - Warnings and Cautions



This document is written in English, please request a copy in your local language if required.



This product is only intended to power products approved by IP Access. Ensure that only IP Access products are connected to an Ethernet circuit enabled for 48V operation, this also applies to outlets remote from the unit.



For indoor use only, output cabling is SELV / LAN for indoor routing only.



Do not cover casing or otherwise impede cooling.



Do not apply power to unit if there is any evidence of condensation.



Do not open casing as mains voltages may be present within the unit.



90 to 264VAC input is via a 2 pin IEC C7 (figure 8) connector. Inlet cable assembly must carry a suitable local approval (e.g. UL marked for US and Canadian markets).

5.3.2 PSU109 – Environmental Specification

- -10 to +45 degrees Centigrade ambient operating temperature.
- This product has been listed by UL for use in a 25 degree C ambient.
- -20 to +80 degrees C ambient storage temperature.
- 5 to 95% RH non condensing humidity.

5.3.3 109 - Handbook - FCC Text

WARNING

This is a class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission

Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

5.3.4 109 – Handbook - Industry Canada text

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérisé de la classe B est conforme à la norme NMB-003 du Canada.

5.3.5 109 – Handbook - Regulatory Compliance Statement

5.3.5.1 EMC Standards

- EN 55022 and EN55024 (CE marked)
- FCC Part 15 class B
- ICES-003

5.3.5.2 Safety Standards

- EN60950 (CE marked)
- UL60950 Listed (File number E231617) (USA and Canada)

This product is intended for use in all Member States of the European Union.

"Hereby, ip.access declares that this Ethernet Power Inserter is in compliance with the essential requirements and other relevant provisions of Directives 73/23/EEC and 89/336/EEC."

The PSU109 is supplied by Poly-Products Industries, model number ILA1711112.

A copy of regulatory compliance documentation may be obtained in writing from

"IP access Ltd, Building 2020, Cambourne Business Park, Cambourne, Cambridge, CB23 6DW, UK".

5.4 Model 126 Ethernet Switch and Power Inserter

5.4.1 126 - Handbook - Warnings and Cautions



This document is written in English, please request a copy in your local language if required.



This product is only intended to power products approved by IP Access.



Ensure that only IP Access approved products are connected to an Ethernet circuit enabled for 48V operation, this also applies to outlets remote from the unit.



To be located in a restricted access location only (accessible to maintenance personnel only).



For indoor use only, output cabling is SELV / LAN for indoor routing only.



Do not block ventilation holes or otherwise impede cooling.



Refer to National Engineering Code (USA). Wiring methods must be in accordance with NEC Article 300.



When rack mounting, secure via front panel plate with 4 bolts and ensure that no additional load is placed upon the caseworks (e.g. heavy objects on top).



When rack mounting, ensure that the internal rack temperature does not exceed the rating of this product.



Do not apply power to unit if there is any evidence of condensation.



Do not open casing as mains voltages may be present within the unit.



AC inlet cable must carry suitable local approval (e.g. UL marking for US and Canadian markets).

5.4.2 126 - Input Power Source Specification

- Unit may be powered via AC or DC (not both).
- 90 to 132 and 180 to 264VAC (auto-ranging) via an IEC C13 connector. 135W, 2A rating.
- 47 to 57V DC via screw terminals on the front panel. 115W 3A rating. The installer must ensure that this supply connection is fused externally at 5A and provision is made for an external disconnection device.
- Appliance must be earthed, either via the mains connector (mains operation) or screw terminal on the front panel (DC operation).

5.4.3 126 – Environmental Specification

- -5 to +45 degrees C ambient operating
- -20 to +80 degrees C ambient storage
- 5 to 95% RH non condensing

5.4.4 126 – Handbook - FCC Text

WARNING

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission

Note: This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

5.4.5 126 – Handbook - Industry Canada text

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérisé de la classe A est conforme à la norme NMB-003 du Canada.

5.4.6 126 – Handbook - Regulatory Compliance Statement

The nanoBTS conforms to the following regulatory standards.

5.4.6.1 EMC Standards

- EN 55022 and EN55024 (CE marked)
- FCC Part 15 class A
- ICES-003

5.4.6.2 Safety Standards

- EN60950 (CE marked)
- IEC 60950
- UL60950 Listed (File number E230296) (USA and Canada)
- CB certificate (DK-7033)

This product is intended for use in all Member States of the European Union.
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"Hereby, ip.access declares that this Ethernet Switch / Power Inserter is in compliance with the essential requirements and other relevant provisions of Directives 73/23/EEC and 89/336/EEC."

A copy of regulatory compliance documentation may be obtained in writing from

"IP access Ltd, Building 2020, Cambourne Business Park, Cambourne, Cambridge, CB23 6DW, UK".