

## 1.1 Introduction

### 1.1.1 Purpose and Scope

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

### 1.1.2 Related Documents

Reference Number	Document Title	Description
1	CENG0133	Customer Safety and Regulatory Information
2	CENG0220	Operations Procedure

## 1.2 Warnings



This document must be translated into your local language, if English is not commonplace.



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 and users are kept a minimum of 20cm away from 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 cabling to the nanoBTS and power supply is to run indoors only.



The nanoBTS must only be powered using a PSU supplied by ip.access; the approved part is APC model PSU109 with UL file number E231617.



PSUs supplied by ip.access must not be used for powering any other equipment.



The external antenna ports are not covered by this products UL approval.

### 1.3 Regulatory Information

For all regulatory information please see CENG0133 Ref{1}.

### 1.4 Unpacking

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



Figure 1 - Unpacking the nanoBTS

## 1.5 Fitting the External Antenna Kit (optional)

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

NOTE: The RF feeder cable must not be bent 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.

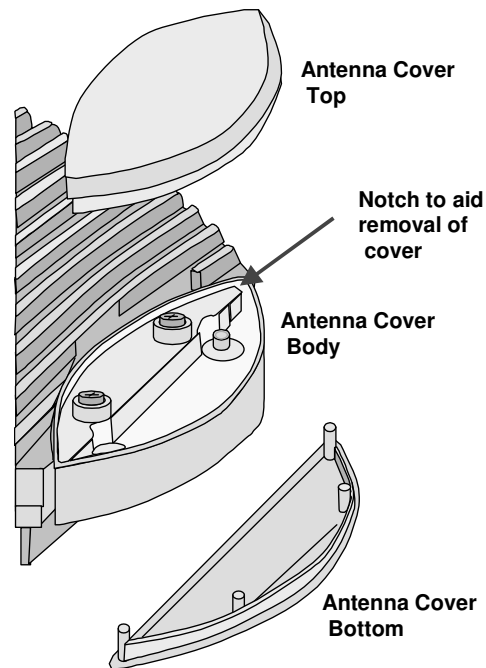


Figure 2 - Removal of antenna covers

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

Remove Torx Screws

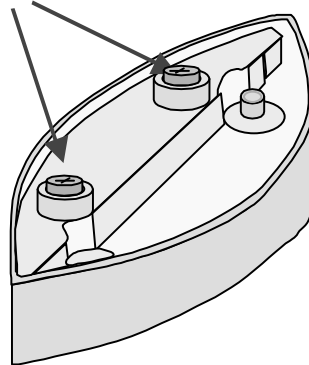
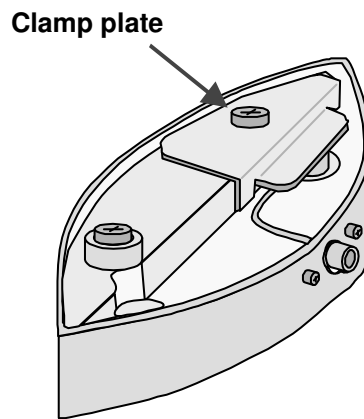


Figure 3 - Removal of antenna cover body

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

## 1.6 IP Configuration

- Connect the nanoBTS up as shown in Figure 5 nanoBTS Connections and power on the nanoBTS

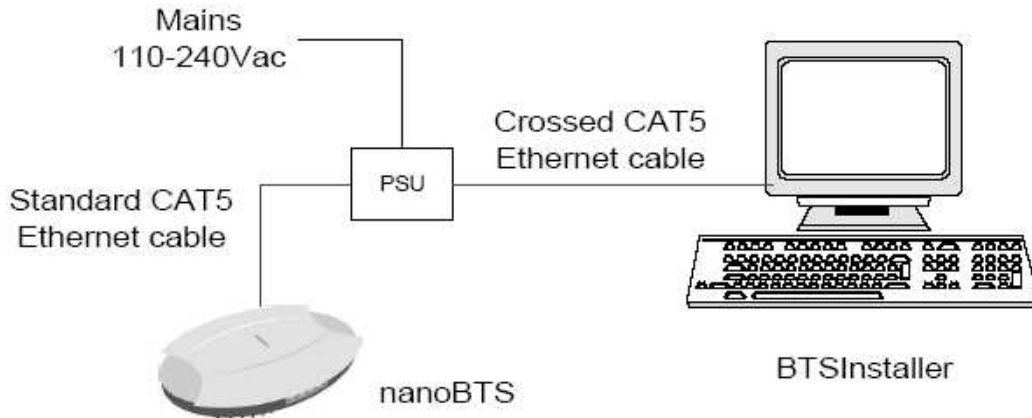


Figure 5 - Local BTS Connection

- Start the BTSInstaller application
- If the IP address of your PC is not shown in the IP Address window (see Figure 6)



Figure 6 - BTSInstaller Interface

- Click on the “Configure” button and select the network interface, then IP address that is being used to connect to the nanoBTS then click on the “OK” button.
- In the DHCP pane, click on the “Pool” button and then the “Add” button
- Enter the IP address for the nanoBTS and click on the “OK” button.
- In the DHCP pane, click on the “Stop” and then “Start” button, to make the DHCP server take the new IP address pool.
- Under the BTS Status pane, click on the “New” button
- From the “BTS tab”, enter the MAC address of the nanoBTS (see label on the side of the nanoBTS)
- From the “DHCP tab”, Enable the “DHCP Configuration” tick box and enter the Subnet Mask and Router address. If no router is used leave the router address as 0.0.0.0
- From the “Unit ID” tab, Enable the “Configure Unit ID” tick box and enter the Site ID. If the nanoBTS is part of a multi-TRX site also enter the TRX ID.
- From the “NV Attr (1)” tab, enable the “NV Attr Configuration” tick box and select the “Configure Flags” tick box and set “F1”, “F2” and “F3” to the “ON” state.

- From the “NV Attr (2)” tab, enable the “Configure Primary OML” tick box and set the “Primary OML IP Address” to the IP address of the BSC.
- From the “NV Attr (2)” tab, enable the “Configure Location” tick box and enter a text string for the nanoBTS location.
- From the “NV Attr (2)” tab, enable the “Configure Unit Name” tick box and enter a text string for the nanoBTS name.
- If new software is required to be downloaded to the nanoBTS, then from the “Download” tab; enable the “Software Download” tick box.
- Click on the “Browse” button and using the standard Windows dialogue box, select the software you wish to download to the nanoBTS and then click on the “OK” button.
- Click on the “OK” button to accept the configuration.
- From the “BTS Database Log” window, click on the “Auto” button.

The BTSInstaller application will now assign an IP address and automatically configure the nanoBTS parameters. Once this process has completed, the four (4) indicators in the “BTS Status” pane will turn green.



**Figure 7 - BTS Status**

## 1.7 Cabling the nanoBTS

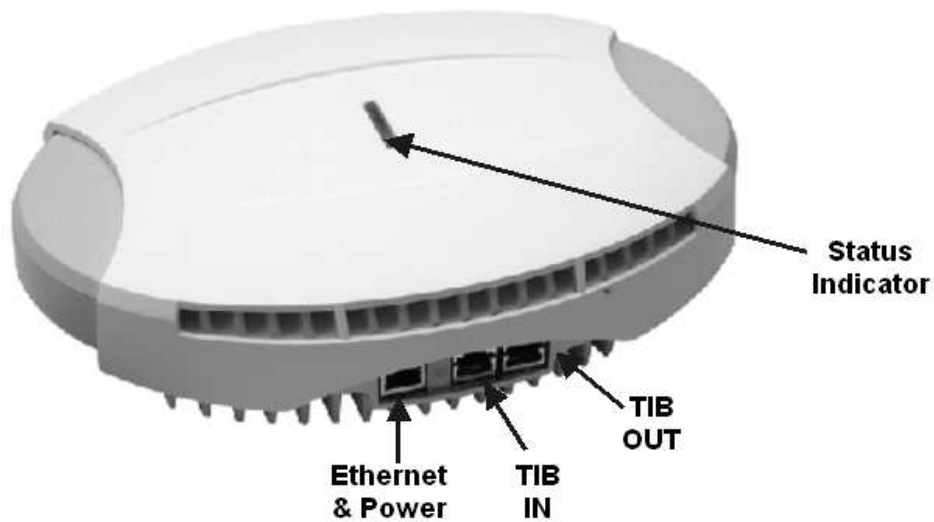


Figure 8 - nanoBTS Connections

### 1.7.1 Ethernet

Each 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 CENG0033 for details of the power supply connections.

### 1.7.2 Timing Interface Bus (TIB) – Multi-TRX only

The Timing Interface Bus (TIB) is used to provide clock and signaling 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 - TIB Connections

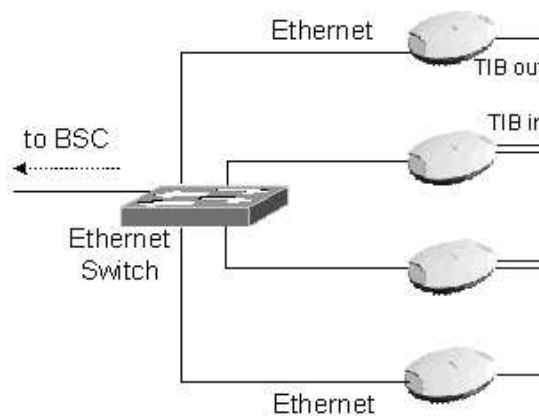


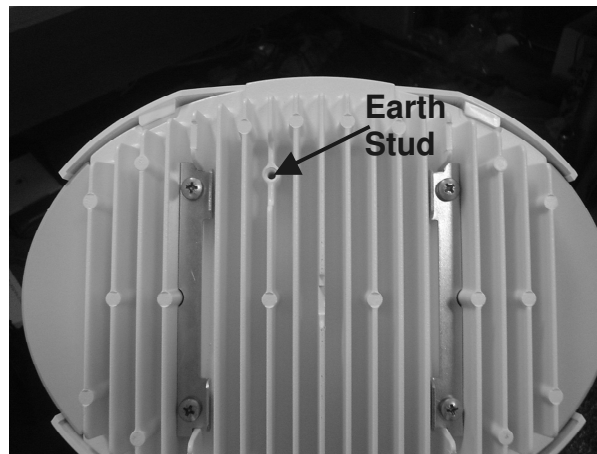
Figure 9 - TIB Connections

### 1.7.3 Earth 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 earth kit.

To fit the earth strap, remove the nanoBTS from the mounting plate

Using the screw provided, screw the Earth Strap to the stud on the rear of the nanoBTS, see Figure 10 - Earth Stud.



**Figure 10 - Earth Stud**

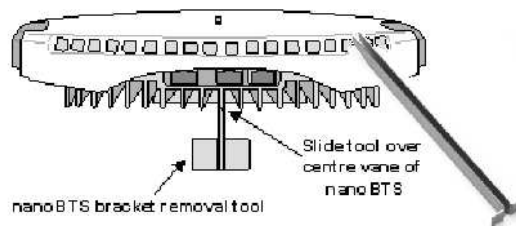
Connect the other end of the Earth lead to the next nanoBTS Earth stud in the chain.



## 1.8 Mounting the nanoBTS

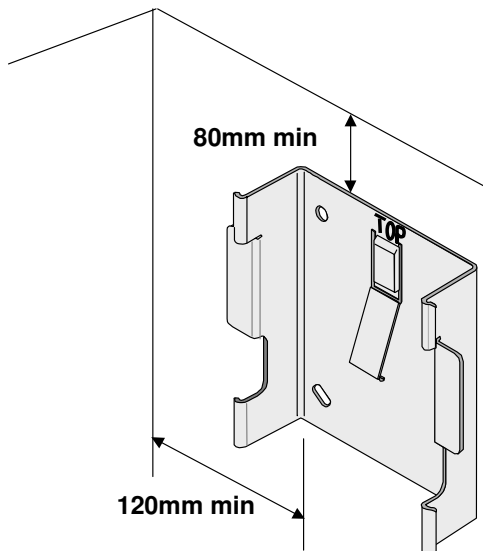
The location of each nanoBTS is shown on the installation floor plan produced at the network planning stage. The network wiring must be complete before the nanoBTS can be installed and commissioned. The nanoBTS should be placed on a wall at or above head height or on a ceiling.

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



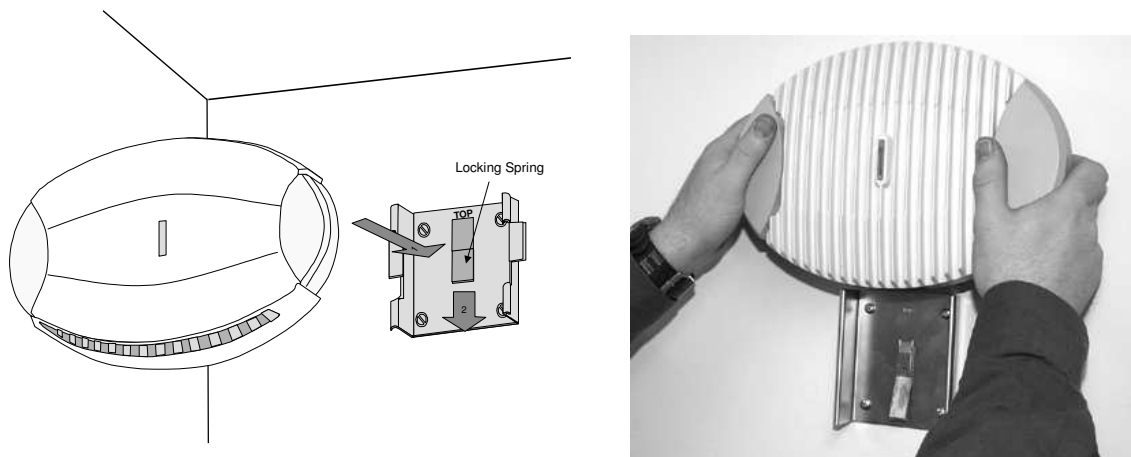
**Figure 11 - nanoBTS Bracket Removal**

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 the diagram below, Figure 12 - Fixing the wall bracket.



**Figure 12 - 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 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 13 - 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 80mm 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 14 - Ceiling Mounted nanoBTS



**Figure 14 - Ceiling Mounted nanoBTS**

### 1.8.1 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 1.5mm<sup>2</sup> Earth cable must also be connected between each TRX with a length not exceeding that of the TIB cable.

## 1.9 Initial Frequency Calibration

**NOTE: *The nanoBTS must be powered on for a minimum of 24 hours prior to final frequency calibration. It is recommended that during installation an initial, local calibration is made following a powered on time of > 10 minutes followed by a final operational calibration after 24 hours power on time.***

**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.***

- Using BTSInstaller, select the nanoBTS that is to be calibrated and then click on the “Listen” button in the “BTS Status” pane.
- Select the frequency band to match that of the nanoBTS to be installed.
- Click on the “Connect” button, this will cause the nanoBTS TRX to power up. The status LED will flash green when completed.
- Click on the “Channel Usage” tab and then click on the “Start Test” button.
- When completed click on the “BCCH Channel Usage” tab and then click on the “Start Test” button.
- When completed, click on the “Frequency Synchronisation” tab.
- Select “Configure Test”
- Select the “Freq Sync Options” tab and then click on the “Apply Frequency Synch Options” and change the Option to “Adjust The Clock To Correct The Reported Errors” then click “OK”
- Click on the “Start Test” button.

Once the test completes then the calibration is completed and the procedure should be repeated for all installed nanoBTS before reconnecting the TIB cables.

Following the 24-hour period, the Frequency Calibration procedure should be performed as per the Operations procedure – Ref {2}

## 1.10 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)