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**471223A**
**Nokia UltraSite EDGE BTS, Rel. CX5, Product Documentation, v.1**

# Expanding and Upgrading UltraSite EDGE BTS

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## Contents

# 1 Summary of changes in Expanding and Upgrading UltraSite EDGE BTS

The following changes have taken place in the *Expanding and Upgrading UltraSite EDGE BTS* document:

- Warnings and cautions relocated from the beginning of the document in applicable procedures.

# 2 Overview of BTS optimisation and expansion

## Steps

1. **Expand the BTS to include EDGE capability.**
   a. Prepare the BTS for expansion to include EDGE capability.
   b. Remove GSM units for expansion.
   c. Install GSM/EDGE units for expansion.
   d. Expand common TRX configurations.

2. **Inspect and modify ATM settings.**
   a. Inspect and modify BTS AAL2 multiplexing settings.
   b. Inspect and modify access profile.
   c. Inspect and modify traffic descriptor.
   d. Modify ATM cross-connection.
   e. Modify virtual channel.
   f. Modify virtual path.

3. **Inspect interface settings.**
   a. Inspect and modify CES settings.
   b. Inspect and modify fractional interfaces.
   c. Inspect and modify IMA settings.
   d. Inspect and modify PDH settings.
   e. Inspect and modify Q1 EOCs.
   f. Inspect and modify SDH/Sonet settings.

4. **Inspect and modify IP settings.**
   a. Modify DCN settings.
   b. Modify IP routing table.
   c. Modify NTP settings.
   d. Modify public IP address.

5. **Inspect and modify Management Protocol settings.**

6. **Modify AXC configuration with XML configuration file.**

7. **Modify synchronisation settings.**

8. **Modify AXC Q1 support function.**

# 3 Expanding common TRX configurations

**Before you start**

The following table shows the units referenced in the procedures for expanding common TRX configurations. The units are shown as they appear when facing the cabinet. The cabinet slots are numbered 1-12 from the top to bottom.

| Sector | Units | | |
|---|---|---|---|
| 1 | M2xA #1-2 | TSxx #1 | WCxA #1 |
| | | TSxx #2 | DVxx #2-3 |
| | M2xA #3-4 | TSxx #3 | |
| | | TSxx #4 | WCxA #4 |
| 2 | M2xA #5-6 | TSxx #5 | WCxA #5 |
| | | TSxx #6 | DVxx #6-7 |
| | M2xA #7-8 | TSxx #7 | |
| | | TSxx #8 | WCxA #8 |
| 3 | M2xA #9-10 | TSxx #9 | WCxA #9 |
| | | TSxx #10 | DVxx #10-11 |
| | M2xA #11-12 | TSxx #11 | |
| | | TSxx #12 | WCxA #12 |

**Summary**

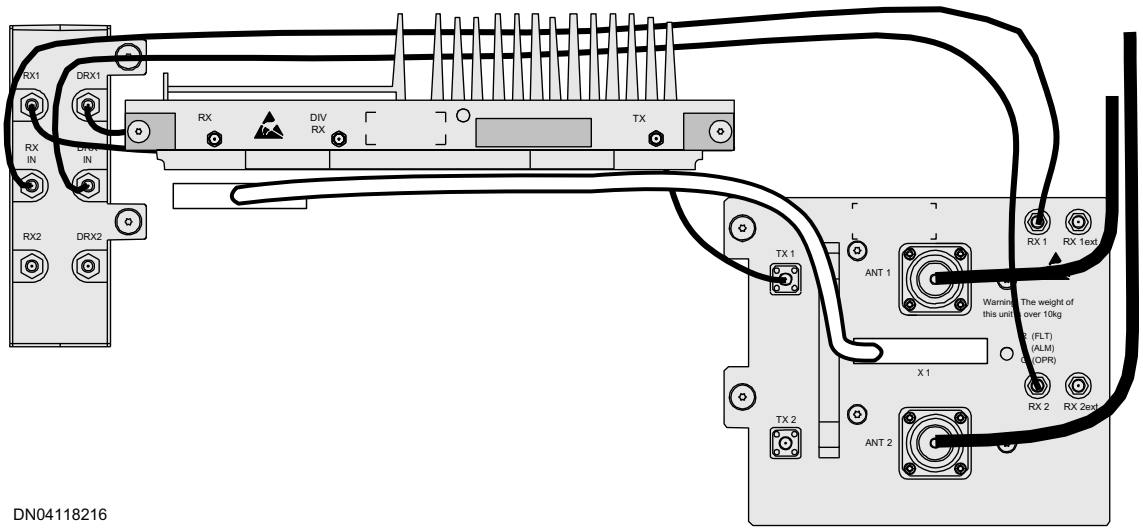


Figure 1. RF cabling for 1+1+1 bypass configuration

## Steps

1. **To install a 1+1+1 bypass configuration to a 2+2+2 bypass configuration**
   a. Install TSxx units #2, #6, and #10.
   b. Install the following RF cables for each sector. Upon completion, each sector matches the following figure.

| Sector | From | To |
|---|---|---|
| 1 | M2xA #1-2 RX2 | TSxx #2 RX |
| | M2xA #1-2 DRX 2 | TSxx #2 DIV RX |
| | TSxx #2 TX | DVxx #2-3 TX2 |
| 2 | M2xA #-5-6 RX2 | TSxx #6 RX |
| | M2xA #5-6 DRX 2 | TSxx #6 DIV RX |
| | TSxx #6 TX | DVxx #6-7 TX2 |
| 3 | M2xA #9-10 RX2 | TSxx #10 RX |
| | M2xA #9-10 DRX 2 | TSxx #10 DIV RX |
| | TSxx #10 TX | DVxx #10-11 TX2 |

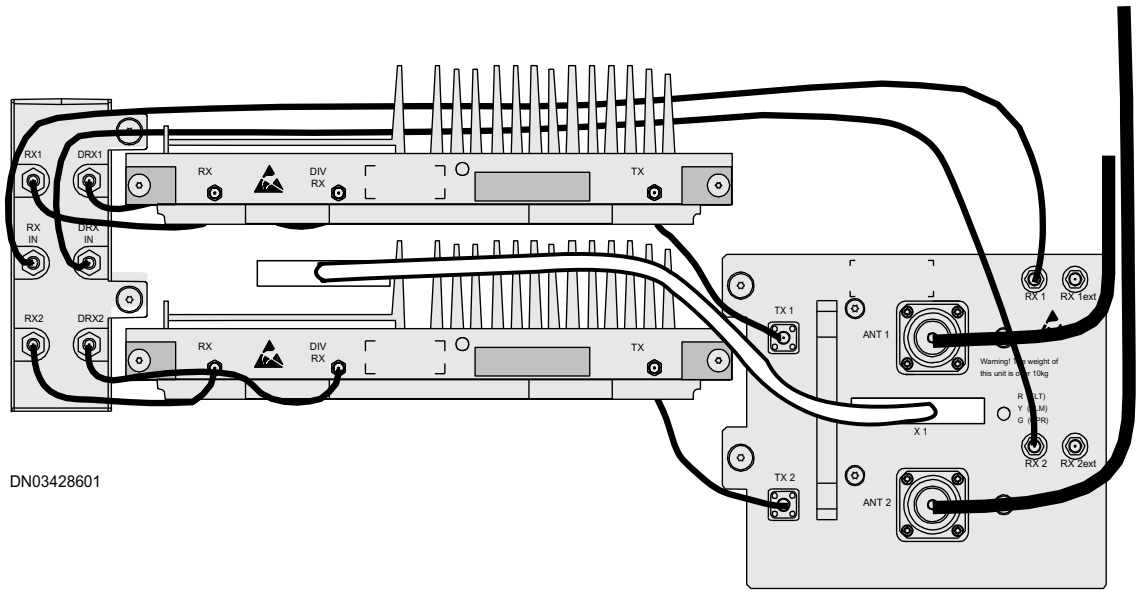


Figure 2. 2+2+2 bypass configuration

**2. To install a 2+2+2 bypass configuration to a 3+3+3 two-way WBC configuration**

a. Remove the following RF cables:

| Sector | From | To |
|---|---|---|
| 1 | M2xA #1-2 DRX IN | DVxx #2-3 RX2 |
| | TSxx #1 TX | DVxx #2-3 TX1 |
| | TSxx #2 TX | DVxx #2-3 TX2 |
| 2 | M2xA #-5-6 DRX IN | DVxx #6-7 RX2 |
| | TSxx #5 TX | DVxx #6-7 TX1 |
| | TSxx #6 TX | DVxx #6-7 TX2 |
| 3 | M2xA #9-10 DRX IN | DVxx #10-11 RX2 |
| | TSxx #9 TX | DVxx #10-11 TX1 |
| | TSxx #10 TX | DVxx #10-11 TX2 |

b. Install M2xA units #2, #5, and #8.

c. Install TSxx units #3, #7, and #11.

d. Install WCxA units #1, #4, #5, #8, #9, and #12.

e. Install the following RF cables. Upon completion, each sector matches the following figure.

| Sector | From | To |
|---|---|---|
| 1 | M2xA #1-2 DRX IN | DVxx #2-3 RX2 ext |
| | M2xA #3-4 RX IN | DVxx #2-3 RX2 |
| | M2xA #3-4 DRX IN | DVxx #2-3 RX1 ext |
| | M2xA #3-4 RX1 | TSxx #3 RX |
| | M2xA #3-4 DRX1 | TSxx #3 DIV RX |
| | TSxx #1 TX | WCxA #1 TX1 |
| | TSxx #2 TX | WCxA #1 TX2 |
| | TSxx #3 TX | WCxA #4 TX2 |
| | DVxx #2-3 TX | WCxA #1 TX OUT |
| | DVxx #2-3 TX | WCxA #4 TX OUT |
| 2 | M2xA #5-6 DRX IN | DVxx #6-7 RX2 ext |
| | M2xA #7-8 RX IN | DVxx #6-7 RX2 |
| | M2xA #7-8 DRX IN | DVxx #6-7 RX1 ext |
| | M2xA #7-8 RX1 | TSxx #7 RX |
| | M2xA #7-8 DRX1 | TSxx #7 DIV RX |
| | TSxx #5 TX | WCxA #5 TX1 |
| | TSxx #6 TX | WCxA #5 TX2 |
| | TSxx #7 TX | WCxA #8 TX2 |
| | DVxx #6-7 TX | WCxA #5 TX OUT |
| | DVxx #6-7 TX | WCxA #8 TX OUT |
| 3 | M2xA #9-10 DRX IN | DVxx #10-11 RX2 ext |
| | M2xA #11-12 RX IN | DVxx #10-11 RX2 |
| | M2xA #11-12 DRX IN | DVxx #10-11 RX1 ext |
| | M2xA #11-12 RX1 | TSxx #11 RX |
| | M2xA #11-12 DRX1 | TSxx #11 DIV RX |
| | TSxx #9 TX | WCxA #9 TX1 |
| | TSxx #10 TX | WCxA #9 TX2 |
| | TSxx #11 TX | WCxA #12 TX2 |
| | DVxx #10-11 TX | WCxA #9 TX OUT |
| | DVxx #10-11 TX | WCxA #12 TX OUT |

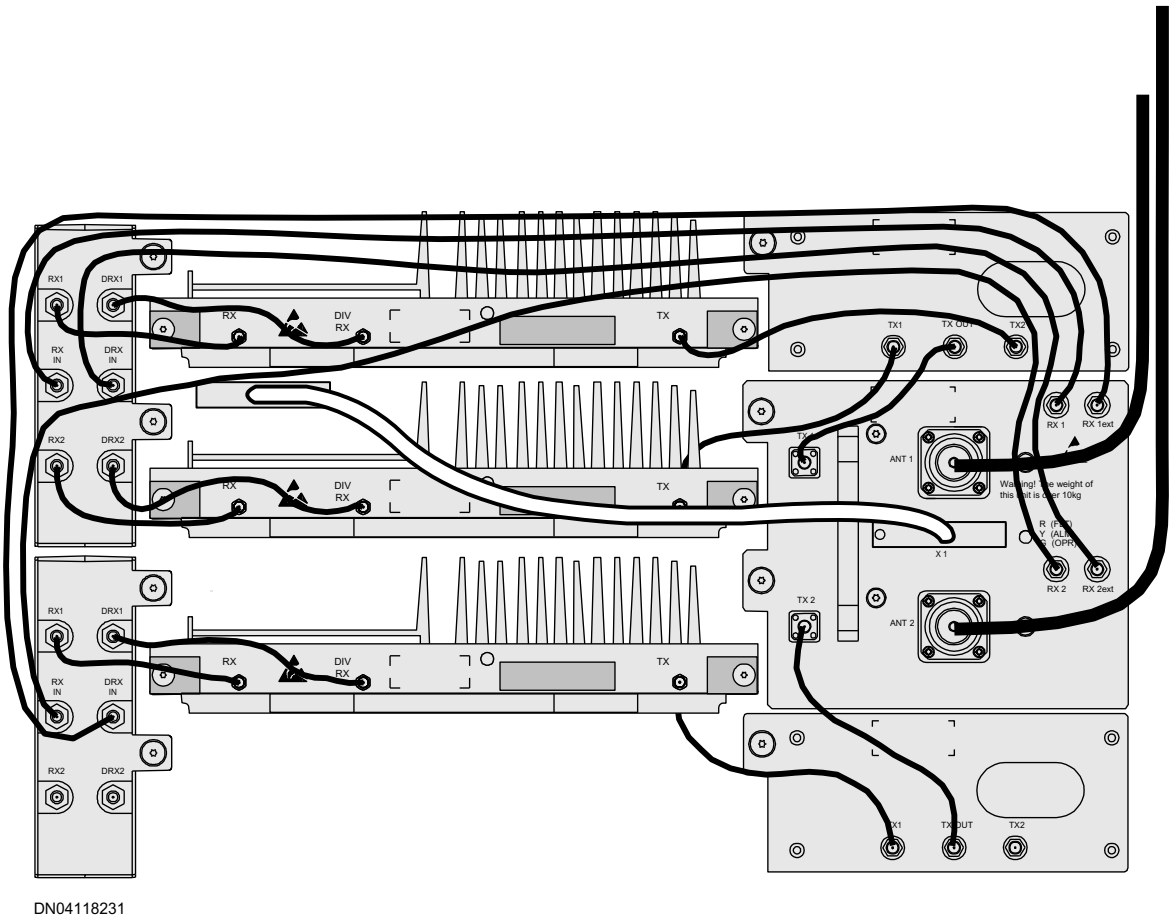


Figure 3. RF cabling for 3+3+3 WBC configuration

**3. To install a 3+3+3 two-way WBC configuration to a 4+4+4 two-way WBC configuration**

a. Install TSxx units #4, #8, and #12.

b. Install the following RF cables. Upon completion, each sector matches the following figure.

| Sector | From | To |
|---|---|---|
| 1 | M2xA #3-4 RX2 | TSxx #4 RX |
| | M2xA #3-4 DRX2 | TSxx #4 DIV RX |
| | TSxx #4 TX | WCxA #4 OUT TX1 |

| Sector | From | To |
|---|---|---|
| 2 | M2xA #7-8 RX2 | TSxx #8 RX |
| | M2xA #7-8 DRX2 | TSxx #8 DIV RX |
| | TSxx #8 TX | WCxA #8 OUT TX1 |
| 3 | M2xA #11-12 RX2 | TSxx #12 RX |
| | M2xA #11-12 DRX2 | TSxx #12 DIV RX |
| | TSxx #12 TX | WCxA #12 OUT TX1 |

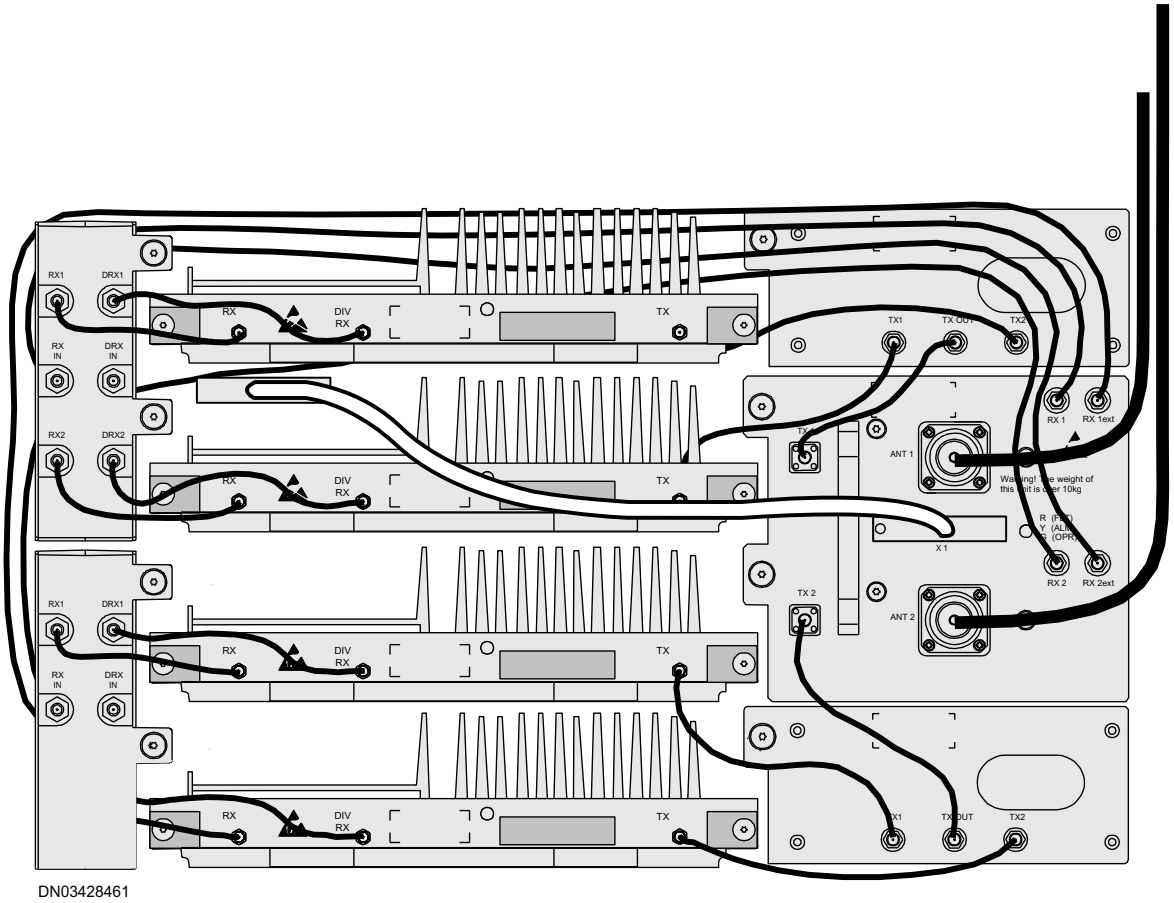


Figure 4. RF cabling for 4+4+4 WBC configuration

# 4 Technical description of transmission capacity expansion

In addition to being transmission nodes, the BTS transmission Hub or MetroHub serve as flexible transmission capacity reserves in the network, enabling rapid revenue growth by easy and flexible expansion of capacity with minimised implementation time and cost.

The growing amount of traffic in the network requires flexible transmission capacity expansion. This is accomplished by adding transmission units into the transmission node when needed. With these transmission units, the transmission node can be connected, for example, to eight Nokia FlexiHopper (Plus) radios, with up to 16 x 2 Mbit/s capacity each, or to eight Nokia MetroHopper radios, with 4 x 2 Mbit/s capacity each. The radio connections are made through a single Flexbus cable that carries the payload and the radio power feed.

The maximum interface capacity of Nokia MetroHub is 222 x 2 Mbit/s, with 2 FXC STM-1 and 6 x Flexbus interface. Of the total capacity 56 x 2 Mbit/s can be cross-connected between FXC units. In addition, bypass cross-connects are supported for the FXC STM-1 and FXC RRI units to cross-connect additional capacity transparently. The maximum interface capacity of UltraSite BTS Hub is 190 x 2 Mbit/s, with the same cross-connect capacity as MetroHub.

It is also possible to connect the transmission node to other transmission equipment through sixteen E1 or T1 connections. Furthermore, several transmission nodes can be chained using a single coaxial cable.

Table 1. Nokia MetroHub transmission capabilities

| | | |
|---|---|---|
| Cross-connection bus capacity | | 56 x 2 Mbit/s non-blocking<br>with 8 kbit/s granularity |
| *Basic cross-connection types:* | | Granularities: |
| B2 | Bi-directional | 2M / nx64k / 64k / 32k / nx8k |
| M2 | Bi-directional masked | 64k / 32k / 16k |
| D | Uni-directional fixed | 64k / 32k / 16k / 8k |

Table 1. Nokia MetroHub transmission capabilities (cont.)

| | | |
|---|---|---|
| *Protected cross-connection type:* | | Granularity: |
| P2 | Protected bi-directional | nx64k / 64k / 32k / 16k |
| Max. interface capacity of the node | | 222 x 2 Mbit/s (with 2 x STM-1 and 6 x Flexbus interface) |

Table 2. Nokia UltraSite EDGE BTS transmission capabilities

| | | |
|---|---|---|
| Cross-connection bus capacity | | 56 x 2 Mbit/s non-blocking<br>with 8 kbit/s granularity |
| *Basic cross-connection types:* | | Granularities: |
| B2 | Bi-directional | 2M / nx64k / 64k / 32k / nx8k |
| M2 | Bi-directional masked | 64k / 32k / 16k |
| D | Uni-directional fixed | 64k / 32k / 16k / 8k |
| *Protected cross-connection type:* | | Granularity: |
| P2 | Protected bi-directional | nx64k / 64k / 32k / 16k |
| Max. interface capacity of the node | | 190 x 2M (with 2 x STM-1 and 4 x Flexbus interface) |

# 5 Expanding to include EDGE capability

## 5.1 Preparing the BTS for expansion to include EDGE capability

### Steps

1. **Establish the final configuration for the BTS being upgraded.**
2. **Ensure all required units are available for the upgrade and unpacked from shipping containers.**
3. **Contact the Operational Maintenance staff to reroute the traffic from the BTS being upgraded.**
4. **After confirmation of traffic reroute, block the BTS from the BSC.**
5. **Power down the BTS.**
6. **Switch Mains Breakers to OFF.**

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**Warning**

**To prevent electrical shock, verify that power has been removed from the BTS input cables with a voltage measurement device.**

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7. **Identify the existing units that require replacement for the new configuration.**

## 5.2 Removing GSM units for expansion

**Summary**

This section describes how to remove existing GSM units from the BTS. Depending on the desired configuration, you may need to remove additional units to allow for the desired configuration.

### Steps

1. **Remove the BB2A units being replaced.**
2. **Disconnect the RF cables from the TSxA units to be removed, noting their existing connections for reconnection.**
3. **Remove TSxA units being replaced.**
4. **Remove any additional units, as required for the desired configuration.**
5. **Package removed units to prevent damage and allow for future use.**

## 5.3 Installing GSM EDGE units for expansion

**Summary**

GSM/EDGE-capable TSxB, BB2E, and BB2F units for the BTS are compatible with the GSM TSxx and BB2x units and fit into the same slots in the BTS cabinet. In addition to providing EDGE services, GSM/EDGE TSxB, BB2E, and BB2F units are backward compatible with legacy GSM hardware.

Note

Overtightening causes stress on the connectors. For the TSxB units, ensure a gap of 1.0 to 3.0 mm (0.04 to 0.12 inch) exists between the front flange of the unit and the cabinet when tightened. See *Torque settings*.

### Steps

1. **Install the BB2E or BB2F unit.**
2. **Install the TSxB units.**

3. **Install any additional units required for the desired configuration.**

4. **Replace any units necessary for the desired configuration.**

5. **Install, route, and connect RF cabling for the new configurations.**

# 6 Preparing to upgrade GSM to GSM/EDGE

## 6.1 Overview of upgrading UltraSite GSM BTS to GSM/EDGE

**Summary**

Note

Overtightening causes stress on the connectors. For the TSxB units, make sure a gap of 1.0 to 3.0 mm (0.04 to 0.12 inch) exists between the front flange of the unit and the cabinet when tightened to 1.0 Nm (maximum).

**Steps**

1. **Remove the BTS from the network.**
2. **Remove GSM units from the BTS.**
3. **Install EDGE units to the BTS.**
4. **Commission GSM/EDGE UltraSite EDGE BTS.**

## 6.2 GSM/EDGE upgrade kit transportation package

Table 3. Components of GSM/EDGE upgrade kit

| Part | Quantity | Check |
|---|---|---|
| BTS software, version CX3.3 or later | 1 | |
| Transceiver (TSxx) unit | 1 | |

Table 3. Components of GSM/EDGE upgrade kit (cont.)

| Part | Quantity | Check |
|---|---|---|
| Transceiver Baseband (BB2x) unit | 1 | |

The BTS cabinet, backplane and other units do not change.

## 6.3 Preparing for GSM to GSM/EDGE upgrade

**Summary**

Before you can begin the upgrade to GSM/EDGE, the BTS must be removed from the network.

### Steps

1. **Establish the final configuration for the BTS being upgraded.**
2. **Ensure all required units are available for the upgrade and unpacked from shipping containers.**
3. **Remove the BTS from the network:**
   a. Contact the Operational Maintenance staff to re-route the traffic from the BTS being upgraded.
   b. After confirming the traffic reroute, block the BTS from the BSC.
4. **Power down the BTS by switching the power supplies OFF.**
5. **Switch Mains Breakers to OFF.**



### Warning

**To prevent electrical shock, verify that power has been removed from the BTS input cables with a voltage measurement device.**

6. **Identify the existing units that require replacement for the new configuration.**

# 7 Removing GSM units

## 7.1 Removing GSM units

**Summary**

Remove additional units to allow the desired configuration. During removal of existing units from the BTS, only perform the physical steps for removal of existing units as the units are not being replaced during operation of the BTS and different units are being installed later in this procedure.

### Steps

1. **Remove BB2x units that are replaced.**
2. **Disconnect RF cables from TSxA units to be removed. Note their existing connections for reconnection.**
3. **Remove TSxA units that are replaced.**
4. **Remove any additional units as required for the desired configuration.**
5. **Package removed units to prevent damage and allow for future use.**

## 7.2 Removing a Transceiver Baseband (BB2x) unit

### Steps

1. **Block the TRXs associated with the BB2x.**

   Block the TRXs locally with Nokia BTS Manager or request BCF lock from the BSC.

2. **Loosen the upper and lower unit retaining screws.**

3. **Remove the faulty BB2x unit.**

## 7.3 Removing a Transceiver (TSxx) unit

### Steps

1. **Before you touch the assembly, discharge to ground any electrostatic charges that may have accumulated by touching the ground stud with your bare hand.**

2. **Use a grounding wrist strap to remain discharged.**

   See *Connecting the antistatic wrist strap* for instructions.

3. **Block the TRX associated with the TSxx unit.**

   Use Nokia BTS Manager or request TRX lock from the BSC.

4. **Check the TSxx unit cable configuration.**

5. **Disconnect the TSxx unit cables.**

6. **Loosen the unit retaining screws with a T20 Torx driver.**

7. **Remove the TSxx unit.**

   The backplane connector is fragile. When removing a plug-in unit, pull it straight out of the backplane with no upward force.

# 8 Installing GSM/EDGE units

## 8.1 Installing EDGE units

**Summary**

GSM/EDGE-capable TSxB, BB2E, and BB2F units for the BTS are compatible with GSM TSxxs and BB2xs and fit into the same slots in the BTS cabinet. In addition to providing EDGE services, GSM/EDGE TSxB, BB2E, and BB2F units are backward compatible with legacy GSM hardware.

Note

Overtightening causes stress on the connectors. For the TSxB units, ensure a gap of 1.0 to 3.0 mm (0.04 to 0.12 inch) exists between the front flange of the unit and the cabinet when tightened.

### Steps

1. **Install the BB2x unit.**
2. **Install the TSxB units.**
3. **Install any additional units required for the desired configuration in accordance with the appropriate procedure.**
4. **Replace any units necessary for the desired configuration in accordance with the appropriate procedure.**
5. **Install, route, and connect RF cabling for the new configuration.**

# 8.2 Installing a Transceiver (TSxx) unit

**Before you start**

Before you start the installation, remove the connector caps prefitted in the Mini Outdoor cabinet.

**Summary**

Caution

The connector pins are fragile. Use minimum force to avoid breaking any connector pins.

Caution

The cabinet does not contain dust filters. Protect all unused connectors and slots in the outdoor cabinet with connector caps and sealing units.

Note

A connector cap is only necessary for outdoor installations.

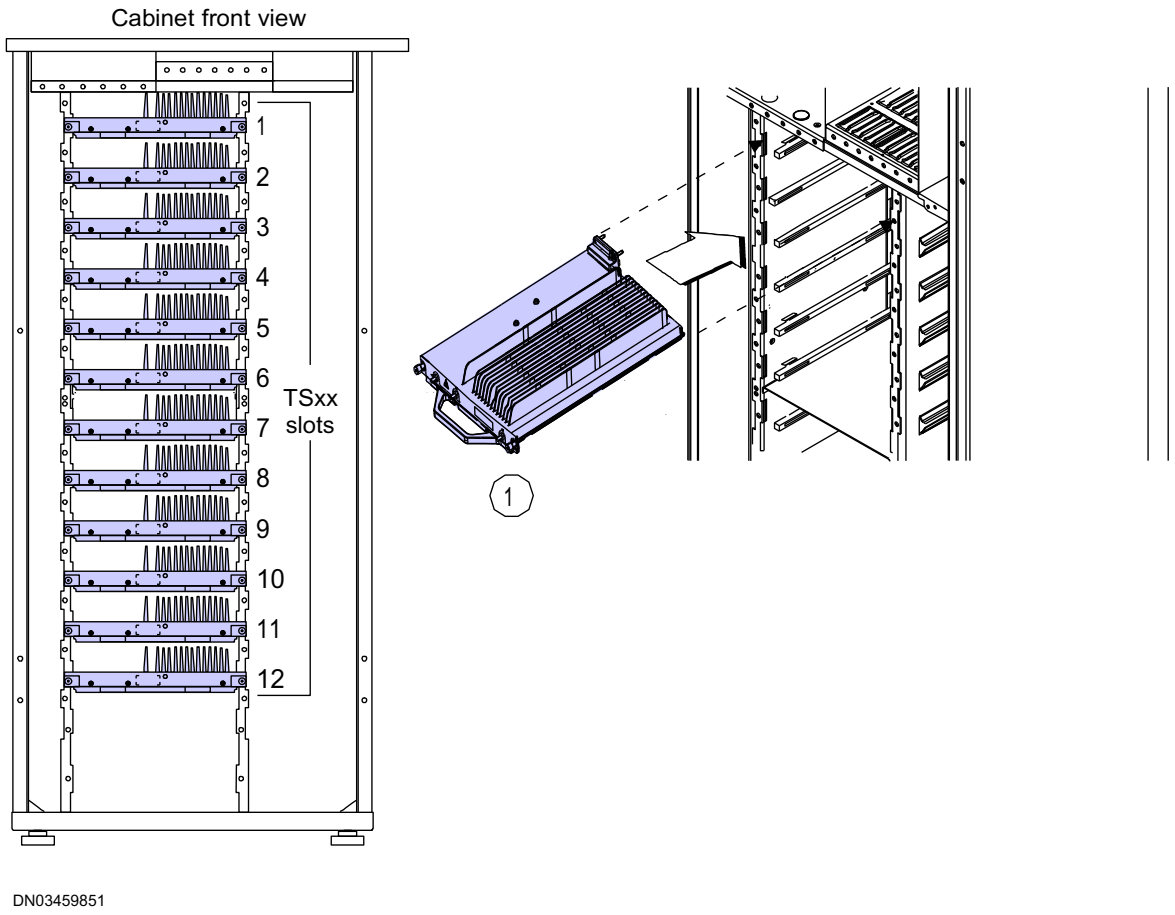


Figure 5. TSxx unit installation

| | |
|---|---|
| 1 | TSxx |

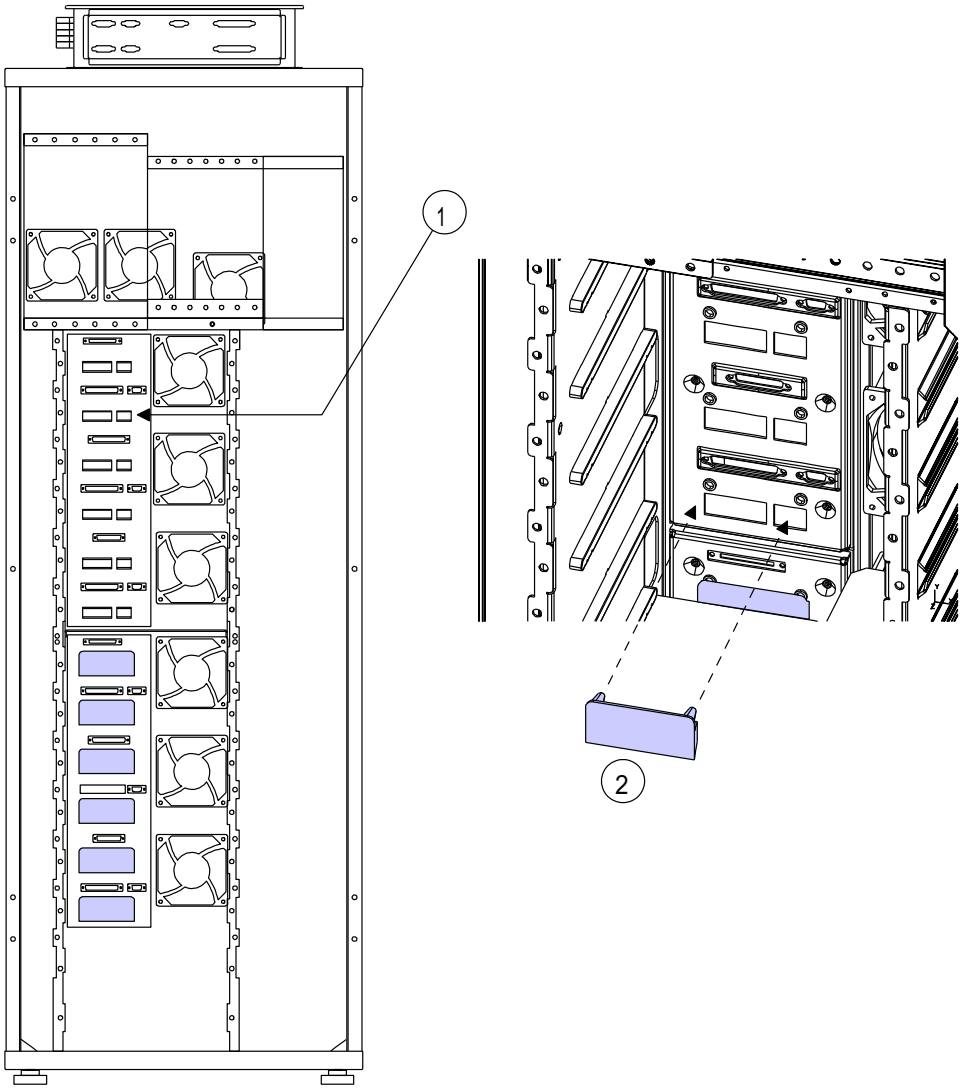


Figure 6. TSxx connector cap installation

| | |
|---|---|
| 1 | TSxx connector (12 places per cabinet) |
| 2 | TSxx connector cap |

The TSxx unit consists of one transmitter, one main receiver, and one diversity receiver. The slots in the middle of the cabinet can hold up to 12 TSxx units from top to bottom.

The Mini Outdoor cabinet provides only four slots for TSxx units. See *Overview of installing GSM/EDGE units* for TSxx unit positions in the Mini Outdoor cabinet.

### Steps

1. **Insert the TSxx unit into a free slot.**
2. **Push the TSxx unit into the RFU backplane carefully but promptly and without hesitation.**
3. **Tighten the retaining screws to 1.0 Nm (0.74 ft lb) with a T20 Torx driver.**
4. **Repeat steps 1, 2 and 3 for each additional TSxx unit.**
5. **Connect TSxx cables.**
6. **Place one connector cap on each unused connector slot (outdoor cabinet only).**

## 8.3 Installing a Transceiver Baseband (BB2x) unit

#### Purpose

The BB2x unit consists of two independent baseband modules. Each module functions with its respective TSxx unit. The cabinet provides slots from left to right for up to six BB2x units.

The Mini Outdoor cabinet provides only two slots for BB2xx units. See *Overview of installing GSM/EDGE units* for BB2xx unit positions in the Mini Outdoor cabinet.

#### Before you start

**Caution**

Always use an ESD wrist strap when handling units labelled with the ESD sign. Labelled units are sensitive to electrostatic discharge.

Note

The far right slot of the common subrack area in the Mini Outdoor cabinet is reserved for installation of a BOIx unit. Do not install BB2x unit into this slot.

Note

BB2x units can be in any position when flexible cross-connects are used. You must install them from left to right in sequential order when the flexible cross-connects are not used.

Note

A dummy unit is required for each unused BB2x slot in an OAKx.

**Summary**

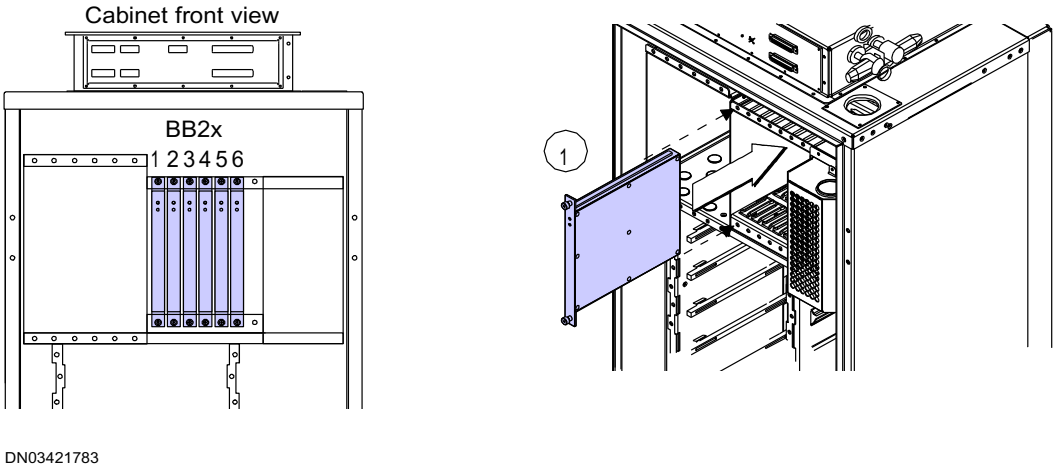


Figure 7. BB2x unit installation

| | |
|---|---|
| 1 | BB2x |

## Steps

1. **Remove the BB2x unit from its protective package and check for visible damage.**
2. **Insert the BB2x unit into an unused slot.**
3. **Tighten the retaining screws to 1.0 Nm (0.74 ft lb) with a T20 Torx driver.**
4. **Repeat steps 1 - 3 for each additional BB2x unit.**
5. **Install dummy BB2x units, if required.**

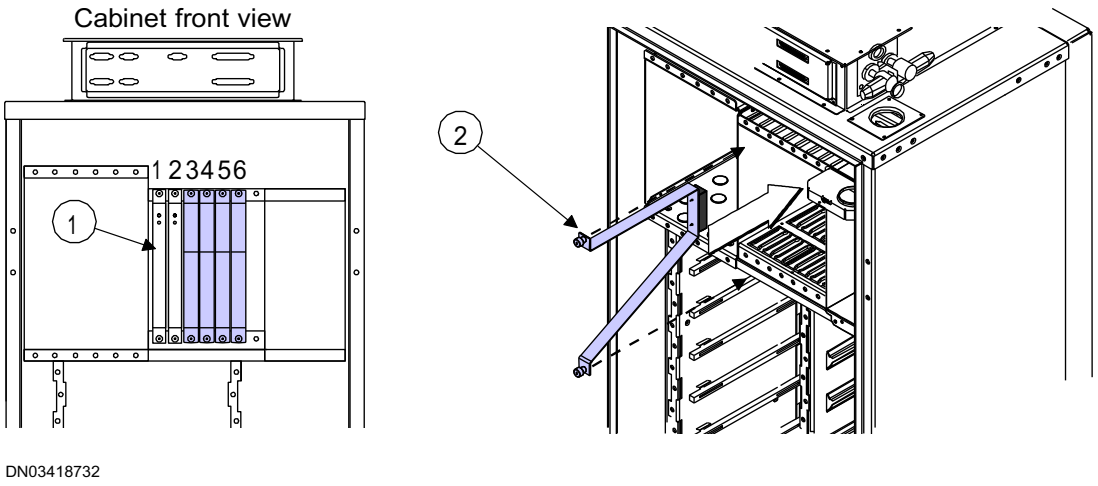


Figure 8. Dummy BB2x unit installation

| | |
|---|---|
| 1 | BB2x |
| 2 | Dummy BB2x unit |

a. Unpack the dummy BB2x unit from its protective package and check for visible damage.
b. Insert the dummy unit into the unused slot.
c. Tighten the unit retaining screws with a T20 Torx driver.
d. Repeat steps a - c for additional unused slots.

6. **Recycle the packing material.**

# 9 Overview of commissioning GSM/EDGE UltraSite EDGE BTS

**Before you start**

Note

It is necessary to connect a frequency counter to the BOIx unit's 13 MHz test port and power on the frequency counter before beginning the commissioning procedure. This action enables the counter timer to warm up and provide accurate measurements.

**Summary**

The BTS is manually commissioned using these Nokia software applications:

- BTS HW Configurator - a tool for creating, checking, and updating the configuration of a BTS cabinet.
- BTS Hub Manager - a tool for configuring and testing the transmission of the BTS and its Hub node (if there are FXC units in the configuration).
- BTS Manager - a tool for configuring, commissioning, and managing the BTS and related transmission equipment. The BTS Commissioning Wizard is included in the BTS Manager (includes FC E1/T1 transmission unit configuration).

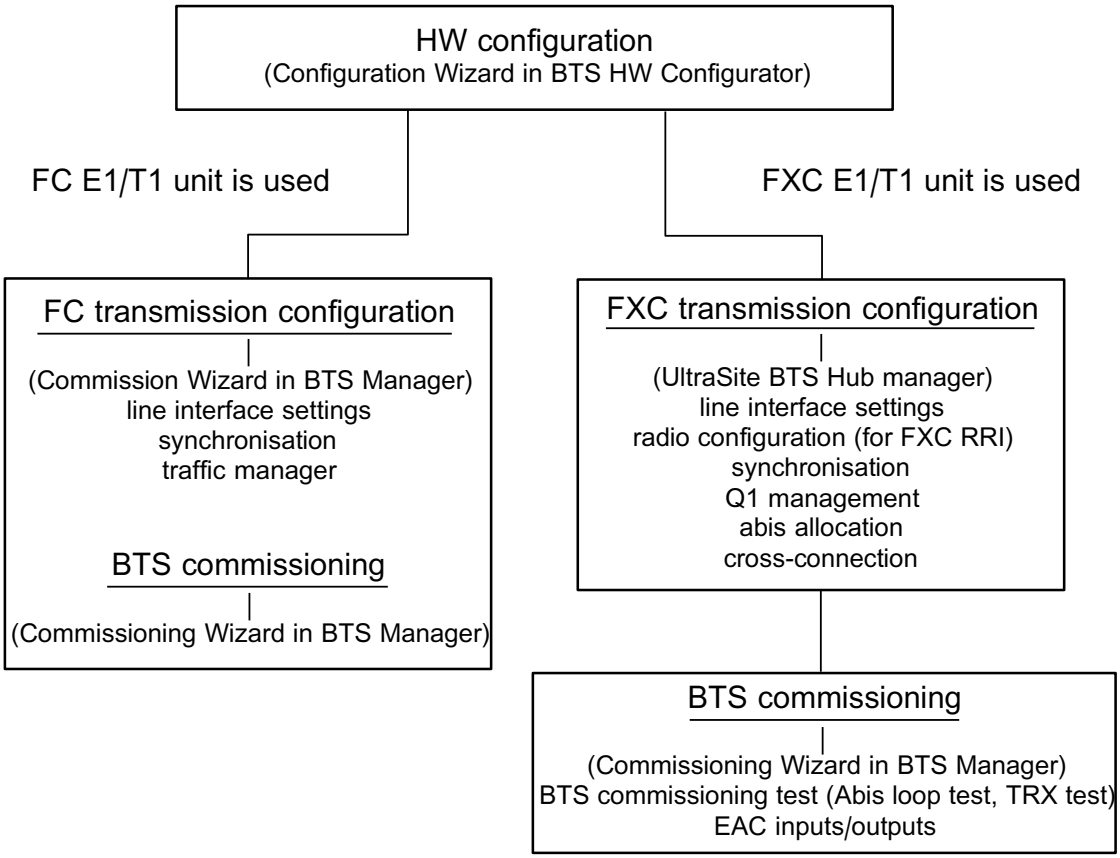


Figure 9. Commissioning procedure overview

**Note**

Only one application can communicate with the BTS at a time. Close the BTS HW Configurator before starting UltraSite BTS Hub Manager, and close Hub Manager before starting BTS Manager.

Nokia BTS Manager and related UltraSite BTS Hub Manager software have a convenient, context-sensitive online Help facility.

To get help, perform one of the following actions:

- Press F1
- Click the Help button on the toolbar
- Choose one of the Help menu commands
- Click the Help button in any dialog box

To exit Help, press ESC or ALT+F4.

The Help Topics window displays a set of tabbed pages:

- Contents - displays a list of topics organized in books by category.
- Index - lists keywords in alphabetical order through which different topics can be reached.
- Find - provides a full-text search functionality that allows you to search for any word or phrase in the Help file.

Note

All images in this document are typical in nature and are for general reference only. For hardware, the versions depicted may differ from the latest version of equipment. For software, any version numbers shown in any of the windows/ screens/dialog boxes may not be the same as the actual software that is to be installed. It is important to remember that the procedure must be followed, as these provide advice on the correct software to be installed and the correct text to be displayed in each window/screen/dialog box.

## Steps

1. **Define the BTS configuration with Nokia BTS HW Configurator.**

   The Nokia BTS HW Configurator allows you to use an existing configuration or to create a new configuration, if there is not a pre-defined hardware configuration file available for the BTS. A BTS HW configuration file with basic BTS configurations is delivered with the Nokia BTS HW Configurator. Use the default parameters or modify them as necessary.

2. **Commission the FXC transmission units with Nokia UltraSite BTS Hub Manager.**

Use the Nokia UltraSite BTS Hub Manager to configure and test the transmission of the BTS and its Hub node during commissioning. You can commission FXC transmission units manually or based on a node file. When commissioning based on a node file, send the node file to the node during the commissioning procedure with the BTS Hub Commissioning Wizard. This action allows more network setup to be performed offsite.

Note

If the BTS configuration includes an FC E1/T1 transmission unit, that unit is configured with the Commissioning Wizard in the BTS Manager.

3. **Commission the BTS with the BTS Commissioning Wizard.**

   The BTS Commissioning Wizard guides you through the commissioning tasks, including manual entry of the commissioning parameters. Commissioning Wizard runs automatic BSC-controlled tests and generates the BTS Commissioning Report, which contains information collected during the commissioning procedure. FC E1/T1 transmission units are configured during this step.

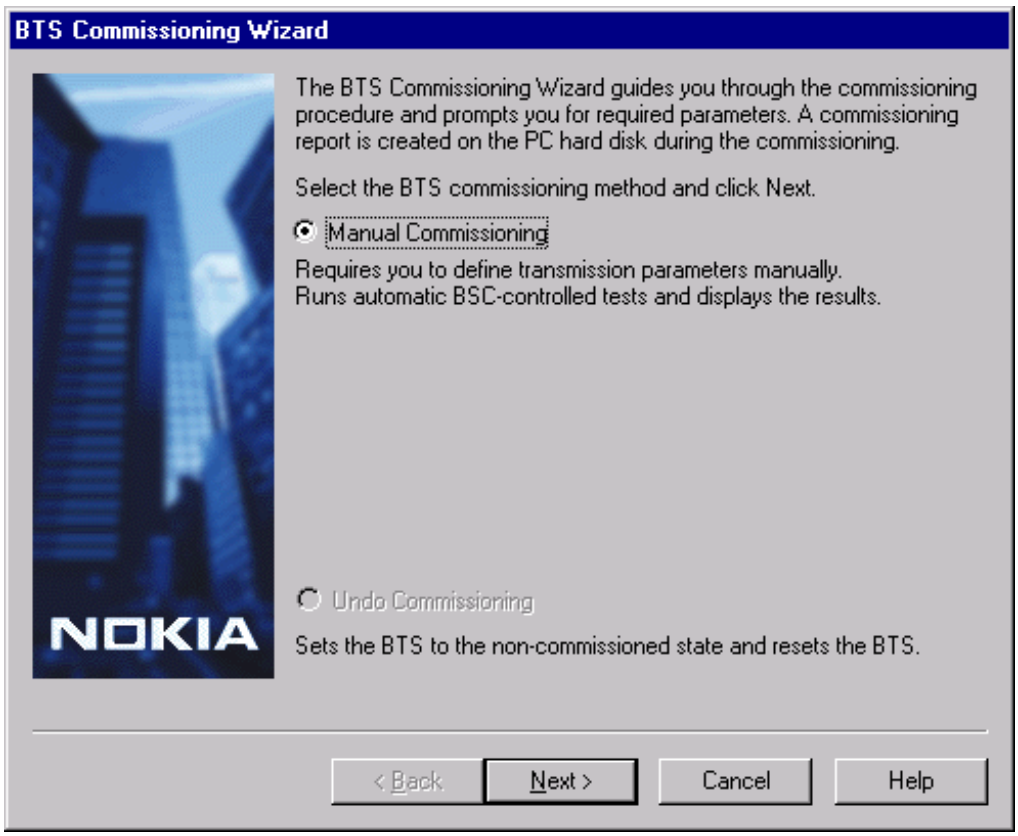


Figure 10. Manual Commissioning option

## Note

If the BTS is already commissioned, **Undo Commissioning** is the only option available in the BTS Commissioning Wizard. Because the BTS can only be commissioned in its non-commissioned state, this procedure is typically necessary when the BTS must be re-commissioned (for example, when it has been commissioned with incorrect parameters). The **Undo Commissioning** procedure clears previous commissioning data from the BTS.

# 10 Preparing to upgrade the BTS using hot insertion

## 10.1 Description of hot insertion

This section describes the features and benefits of hot insertion and its use.

**Features and benefits of hot insertion**

The hot insert feature allows you to remove and install BTS units without powering off the BTS. Use the hot insert feature to:

- Replace a faulty unit.
- Upgrade the BTS (non-hopping, RF hopping, or BB hopping).
- Install additional GSM hardware to increase the capacity of a GSM BTS.
- Install additional GSM/EDGE hardware to add EDGE capacity to a GSM BTS.
- Install additional GSM/EDGE hardware to increase the capacity of a GSM/EDGE BTS.

**Using hot insertion**

Hot insertion can be used with a BTS when you:

- Replace a faulty unit.
- Add TRXs to upgrade the BTS.

Note

These procedures apply to BTS software CX4.0-3 or later.

To avoid sparking when replacing plug-in units, it is recommended to turn off the mains breaker of the site before replacing the units.

**Warning**

**When a plug-in unit is replaced with power on (hot insertion), sparks may occur in the plug-in unit rear connector.**

If the connector area is contaminated, an external object exists on the connector, or the backplane/connector is damaged, a short circuit may develop to the connector area. If the mains breaker of the site is not able to break the fault current, this may result in overheating of the backplane. In extremely rare cases, fire may occur in the RFU backplane as a consequence of the overheating.

If fire occurs, close the cabinet door, switch off the mains breaker, and wait for the fire to extinguish at a safe distance (beware of possible smoke development). Make sure that the fire has completely extinguished before leaving the site unattended.

Hot Insert can be used with the following units:

- Transceiver Baseband unit, GSM (BB2A)
- Transceiver Baseband unit, GSM/EDGE (BB2E)
- Transceiver Baseband unit, GSM/EDGE (BB2F)
- Dual Variable Gain Duplex Filter unit (DVxx)
- Receiver Multicoupler unit - 2-way (M2xA)
- Receiver Multicoupler unit - 6-way (M6xA)
- Remote Tune Combiner (RTxx)
- Transceiver RF unit, GSM (TSxA)
- Transceiver RF unit, GSM/EDGE (TSxB)
- Wideband Combiner unit (WCxA)
- Power Supply unit (PWSx)

Note

Additional PWSx units can be hot inserted only when PWSx on/off switch is in off position when inserted.

Note

The BTS only supports the hot insertion feature for the units listed above.

## 10.2 Preliminary checks for upgrading the BTS using hot insertion

### Steps

1. **Check the power supply requirements.**
   a. If additional power supply unit(s) (PWSx) are required, add them before starting the Hot Insert procedure to upgrade the BTS.
   b. Support items related to the additional power supply requirements may also need to be upgraded, including circuit breakers, rectifiers, and site cooling capacity.

2. **Check the capacity requirements for the Abis interface.**
   a. Check the total Abis capacity required for traffic channels, signalling links, and Dynamic Abis Pools in the final configuration.
   b. If necessary, reduce the data rate of the existing signalling links (D-channels) and/or increase the available Abis capacity to allow for the BTS upgrade.

3. **Check the capacity requirements for internal D-bus.**
   a. Check the total D-bus capacity required for traffic channels and signalling links in the final configuration to ensure the capacity does not exceed the 2 Mbps limit of the internal D-bus.
   b. If necessary, reduce the data rate of the existing signalling links (D-channels) to allow for the BTS upgrade.

4. **Check the working SDCCH channel ratio.**

a. Ensure that the ratio "(SDCCH channels)/(Traffic channels)" for the upgraded configuration remains below the alarm threshold (Alarm 7712).

b. If necessary, allocate more SDCCH channel capacity to the BTS sector during the upgrade process.

# 11 Upgrading the BTS (non-hopping or RF hopping) using hot insertion

## 11.1 Overview of upgrading the BTS (non-hopping or RF hopping) using hot insertion

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

The following procedures are necessary for upgrading a non-hopping or RF hopping BTS sector:

- Creating new TRXs at BSC
- Adding new units to BTS cabinet
- Enabling added TRXs on network
- Testing added TRXs
- Applying optional settings

# 11.2 Creating new TRXs at the BSC for upgrading the BTS (non-hopping or RF hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

## Steps

1. **Create TRXSIG D-channels at the BSC for the additional TRXs (ZDSE) and set these to WO state (ZDTC).**

2. **If EGPRS will be enabled for the added TRXs, then:**
   a. Temporarily lock the BTS sector at the BSC (ZEQS).
   b. Temporarily disable GPRS for the BTS sector (ZEQV, GENA=N).

Note

This action allows the new TRXs to be created with a Dynamic Abis Pool (DAP) attached for EGPRS operation.

3. **Create new TRXs at the BSC (ZERC) and leave them in a locked state.**

4. **If EGPRS will be enabled for the added TRXs, then:**
   a. If EDGE TRXs and non-EDGE TRXs exist in the same BTS sector, set the TRX parameters for correct operation (ZERM, GTRX=Y/N, and PREF=P/N).
   b. Enable GPRS and EGPRS for the BTS sector (ZEQV, GENA=Y, and EGENA=Y).
   c. Unlock the BTS sector at the BSC (ZEQS).

# 11.3 Adding new units for upgrading the BTS (non-hopping or RF hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

## Steps

1. **Ensure the units required for upgrade are removed from the shipping containers.**
2. **If using the BTS software CX4.0-3, ensure the Nokia BTS Manager is disconnected from the BTS.**
3. **Add any non-TRX units (such as DVxx, MxxA, RTxx, and WCxA) and additional cabling to the BTS.**
4. **Add BB2 and TSxx units to the BTS, as required, and connect the cables.**
5. **Using the Nokia BTS hardware configurator, create a new configuration, open a saved configuration, or use the currently active configuration. Then, send the BTS configuration to the BTS.**
6. **Allocate Abis connections for the additional TCHs and TRXSIGs using Traffic Manager in Nokia BTS Manager or Nokia UltraSite BTS Hub Manager.**
7. **Verify that the added TRXs have reached the Configuring state, which is indicated by the BB2x unit LEDs (for the added TRXs) flashing yellow.**
8. **Temporarily connect Nokia BTS Manager to the BTS and select 'Update Abis allocations' from the Tools menu.**
9. **If using the BTS software CX4.0-3, disconnect the Nokia BTS Manager from the BTS.**

## 11.4 Enabling added TRXs on Network for upgrading the BTS (non-hopping or RF hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Unlock the added TRXs at the BSC (ZERS).**

## 11.5 Testing added TRXs for upgrading the BTS (non-hopping or RF hopping)

**Summary**

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Run the TRX test for each added TRX:**
   a. If using the BTS software CX4.0-3, ensure the Nokia BTS Manager is disconnected from the BTS and then run the TRX test from the BSC (ZUBS, ZUBP).
   b. If using the BTS software CX4.0-4 or later, run the TRX test either from the Nokia BTS Manager or from the BSC.

# 11.6 Applying optional settings for upgrading the BTS (non-hopping of RF hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

## Steps

1. **To enable hopping and/or increase SDCCH capacity, if required:**
   a. Lock the BTS sector at the BSC (ZEQS).
   b. Set additional SDCCH capacity in the BTS sector, if required (ZERM).
   c. Enable hopping, if required (ZEQE, HOP=BB).
   d. Unlock the BTS sector at the BSC (ZEQS).

# 12 Upgrading the BTS (BB hopping) using hot insertion

## 12.1 Overview of upgrading the BTS (BB hopping) using hot insertion

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

The following procedures are necessary for upgrading a BB hopping BTS sector:

- Creating new TRXs at BSC
- Adding new units to BTS cabinet
- Testing added TRXs
- Enabling added TRXs on network

## 12.2 Creating new TRXs at the BSC for upgrading the BTS (BB hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Create TRXSIG D-channels at the BSC for the additional TRXs (ZDSE) and set these to WO state (ZDTC).**

2. **Lock the BTS sector at the BSC (ZEQS).**

3. **If EGPRS will be enabled for the added TRXs, then temporarily disable GPRS for the BTS sector (ZEQV, GENA=N).**

Note

This action allows the new TRXs to be created with a Dynamic Abis Pool (DAP) attached for EGPRS operation.

4. **Create new TRXs at the BSC (ZERC) and leave them in a locked state.**

5. **If EGPRS will be enabled for the added TRXs, then:**
   a. If EDGE TRXs and non-EDGE TRXs exist in the same BTS sector, set the TRX parameters for correct operation (ZERM, GTRX=Y/N, and PREF=P/N).
   b. Enable GPRS and EGPRS for the BTS sector (ZEQV, GENA=Y and EGENA=Y).

6. **Unlock the BTS sector at the BSC (ZEQS) to allow traffic to continue using the BTS sector during the next stage of the upgrade.**

## 12.3 Adding new units for upgrading the BTS (BB hopping)

#### Summary

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Ensure the units required for upgrade are available and unpacked from their shipping containers.**
2. **If using the BTS software CX4.0-3, ensure that the Nokia BTS Manager is disconnected from the BTS.**
3. **Add any non-TRX units (such as DVxx, MxxA, RTxx, and WCxA) and additional cabling to the BTS.**
4. **Add BB2 and TSxx units to the BTS, as required, and connect the cables.**
5. **Using the Nokia BTS hardware configurator, create a new hardware configuration, open a saved configuration, or use the currently active configuration. Then, send the BTS configuration to the BTS.**
6. **Allocate Abis connections for the additional TCHs and TRXSIGs using Traffic Manager in Nokia BTS Manager or Nokia UltraSite BTS Hub Manager.**
7. **Verify that the added TRXs have reached the configuring state, which is indicated by the BB2x unit LEDs (for the added TRXs) flashing yellow.**
8. **Temporarily connect Nokia BTS Manager to the BTS and select 'Update Abis allocations' from the Tools menu.**
9. **If using the BTS software CX4.0-3, disconnect Nokia BTS Manager from the BTS.**

## 12.4 Testing added TRXs for upgrading the BTS (BB hopping)

#### Summary

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Lock the BTS sector at the BSC (ZEQS).**
2. **Temporarily set the BTS sector to non-hopping mode to allow the TRX tests to be completed (ZEQE, HOP=N).**
3. **Temporarily set the BTS sector to Cell Barred to prevent customer calls (ZEQF, BAR=Y).**
4. **Unlock the added TRXs at the BSC (ZERS).**
5. **Unlock the BTS sector at the BSC (ZEQS).**
6. **Run the TRX test for each added TRX:**
   a. If using the BTS software CX4.0-3, ensure the Nokia BTS Manager is disconnected from the BTS. Run the TRX test from the BSC (ZUBS, ZUBP).
   b. If using the BTS software CX4.0-4 or later, run the TRX test either from Nokia BTS Manager or from the BSC.

## 12.5 Enabling added TRXs on the Network for upgrading the BTS (BB hopping)

**Summary**

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

### Steps

1. **Lock the BTS sector at the BSC (ZEQS).**
2. **Set the BTS sector to BB hopping mode (ZEQE, HOP=BB).**
3. **Clear Cell Barred for the BTS sector (ZEQF, BAR=N).**
4. **Set additional SDCCH capacity in the BTS sector, if required (ZERM).**
5. **Unlock the BTS sector at the BSC (ZEQS).**

# 13 Preparing the cabinet and removing GSM/EDGE equipment

## 13.1 Removing a GSM/EDGE heater (HETA) unit

**Summary**

Note

If you are installing the HETA unit, install the AC filter unit in addition to any DC filter unit. The AC filter unit does not replace the DC filter unit.

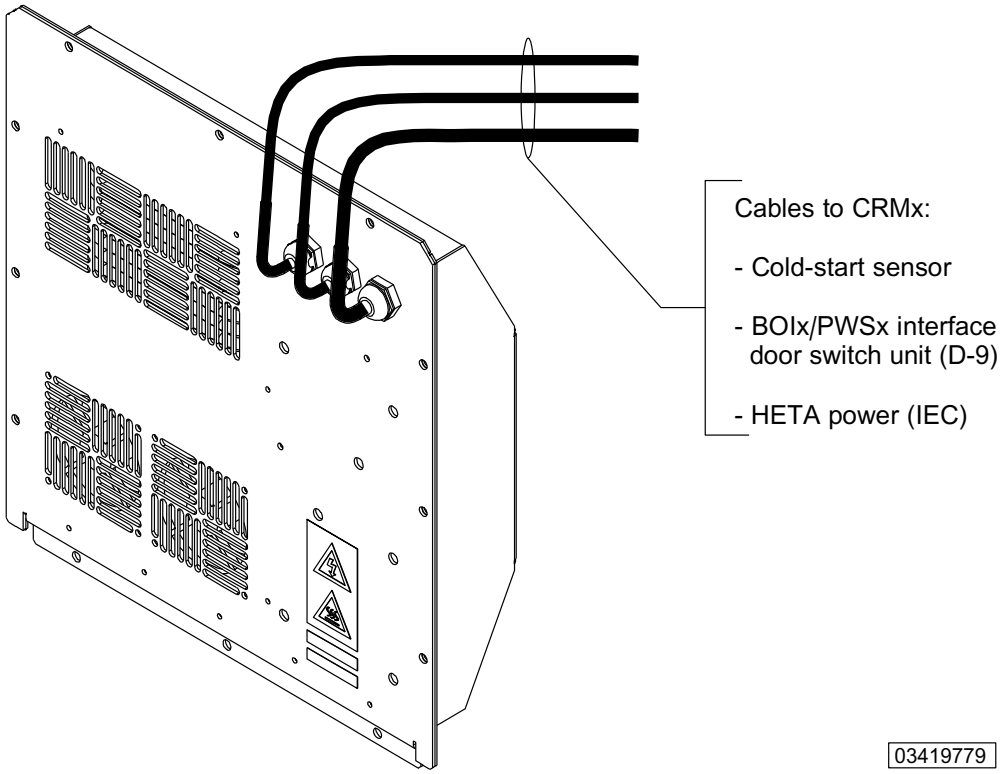


Figure 11. HETA unit cables

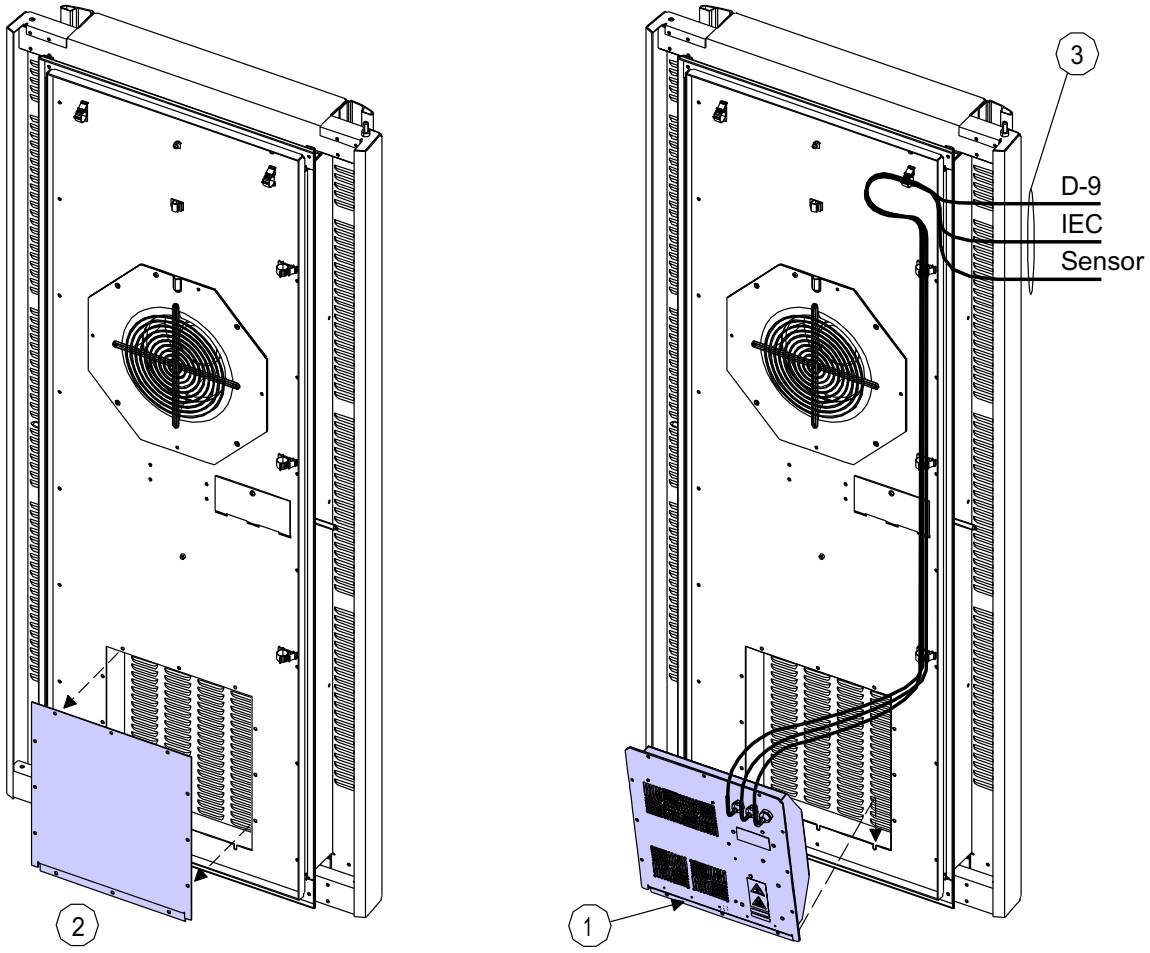


Figure 12. HETA mounted in ODCA door

| | |
|---|---|
| 1 | HETA unit |
| 2 | Cover (when HETA unit not used) |
| 3 | Wiring to HETA power and control |

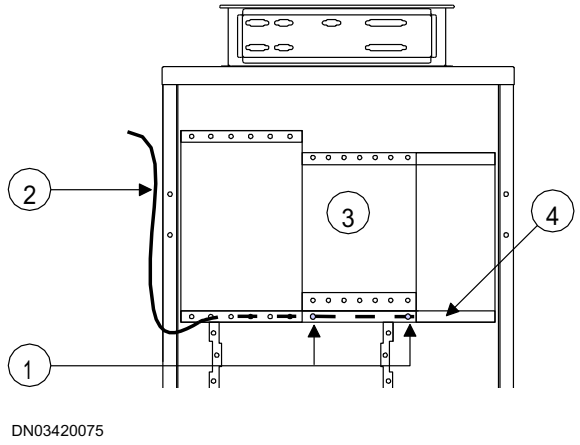


Figure 13. Sensor cable installation

| | |
|---|---|
| 1 | Cold-start sensor cable from door mounted HETA unit |
| 2 | Cold-start sensor cable from door mounted HETA unit |
| 3 | Upper rack |
| 4 | Front flange |

### Steps

1. **Disconnect the HETA signalling interface from the door switch box.**
2. **Remove the cold-start temperature sensor cable from the cabinet.**
3. **Disconnect the AC power cable for the HETA.**
4. **Cut any cable ties and remove the cables from the support clips.**
5. **Unscrew the 12 T25 mounting screws.**
6. **Remove the HETA unit.**

## 13.2 Removing the door from the indoor cabinet

**Summary**

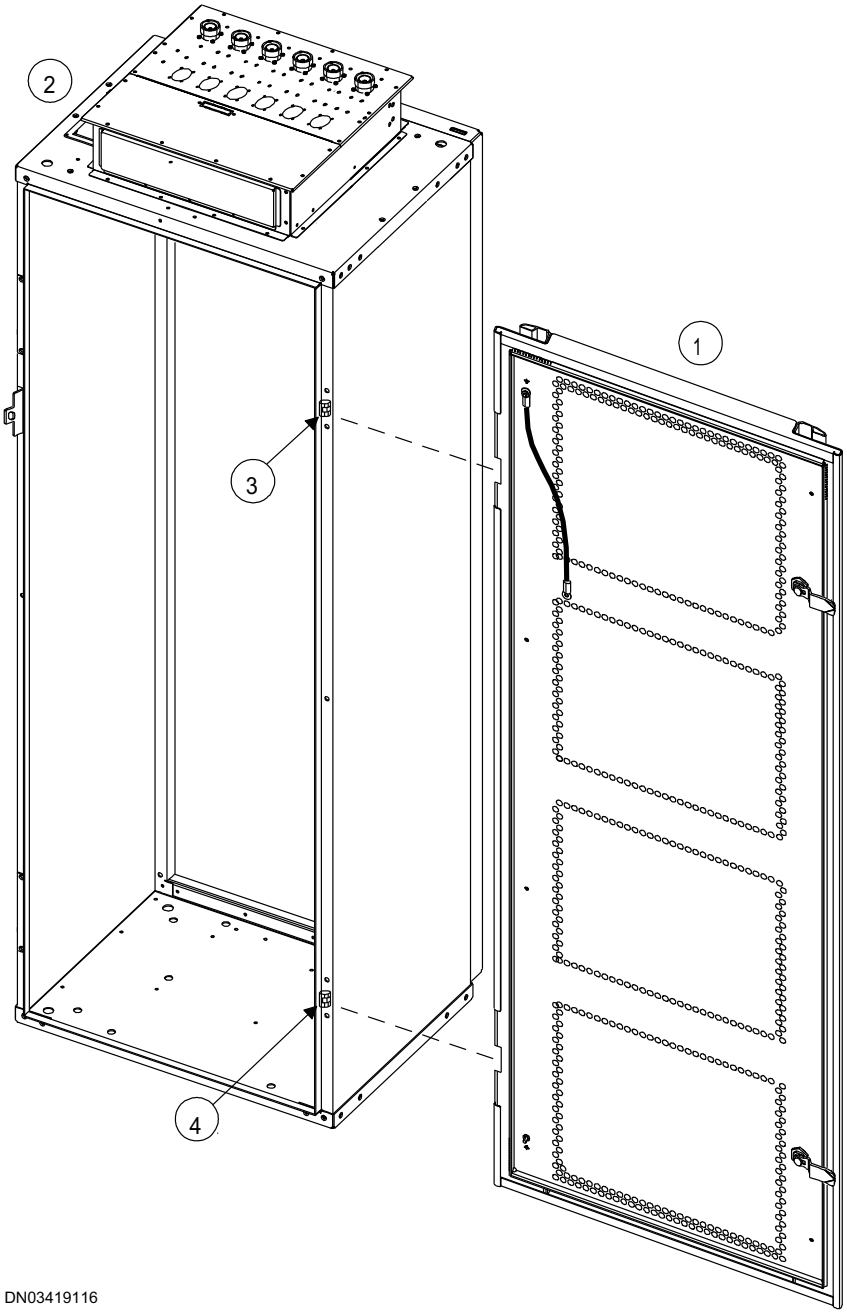


Figure 14. Removing the IDCx door

| | |
|---|---|
| 1 | Cabinet door |

| | |
|---|---|
| 2 | Cabinet core |
| 3 | Hinge (2 palces) |
| 4 | Hinge pin (2 places) |

### Steps

1. **Open the IDCA door to a 180$^{o}$ angle.**
2. **Remove the door ground strap.**
3. **Remove upper and lower hinge pins.**
4. **Remove the door from the cabinet.**

## 13.3 Removing the door from the outdoor cabinet

**Summary**

Note

A minimum of two installers are required to remove the door.

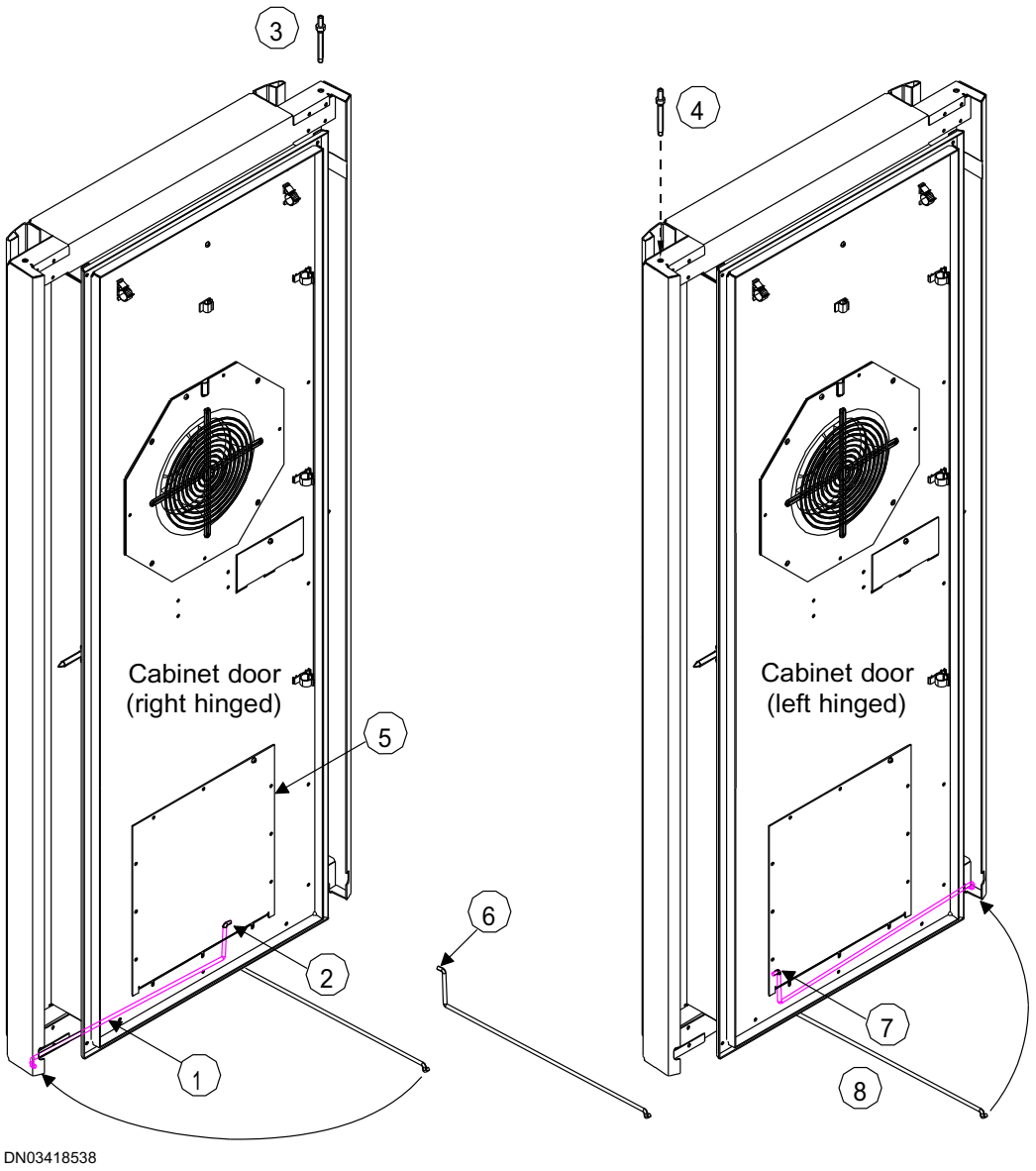


Figure 15. Configuration of outdoor cabinet door hinge pins and door stay

| | |
|---|---|
| 1 | Door stay retracted into cabinet |
| 2 | Attachment point |
| 3 | Remove upper hinge pin (lower hinge pin identical) |

| | |
|---|---|
| 4 | Re-install upper hinge pin (lower hinge pin identical) |
| 5 | Cover panel removed to show door stay attachment points |
| 6 | Attachment end of door stay |
| 7 | Attachment point |
| 8 | Re-install door stay |

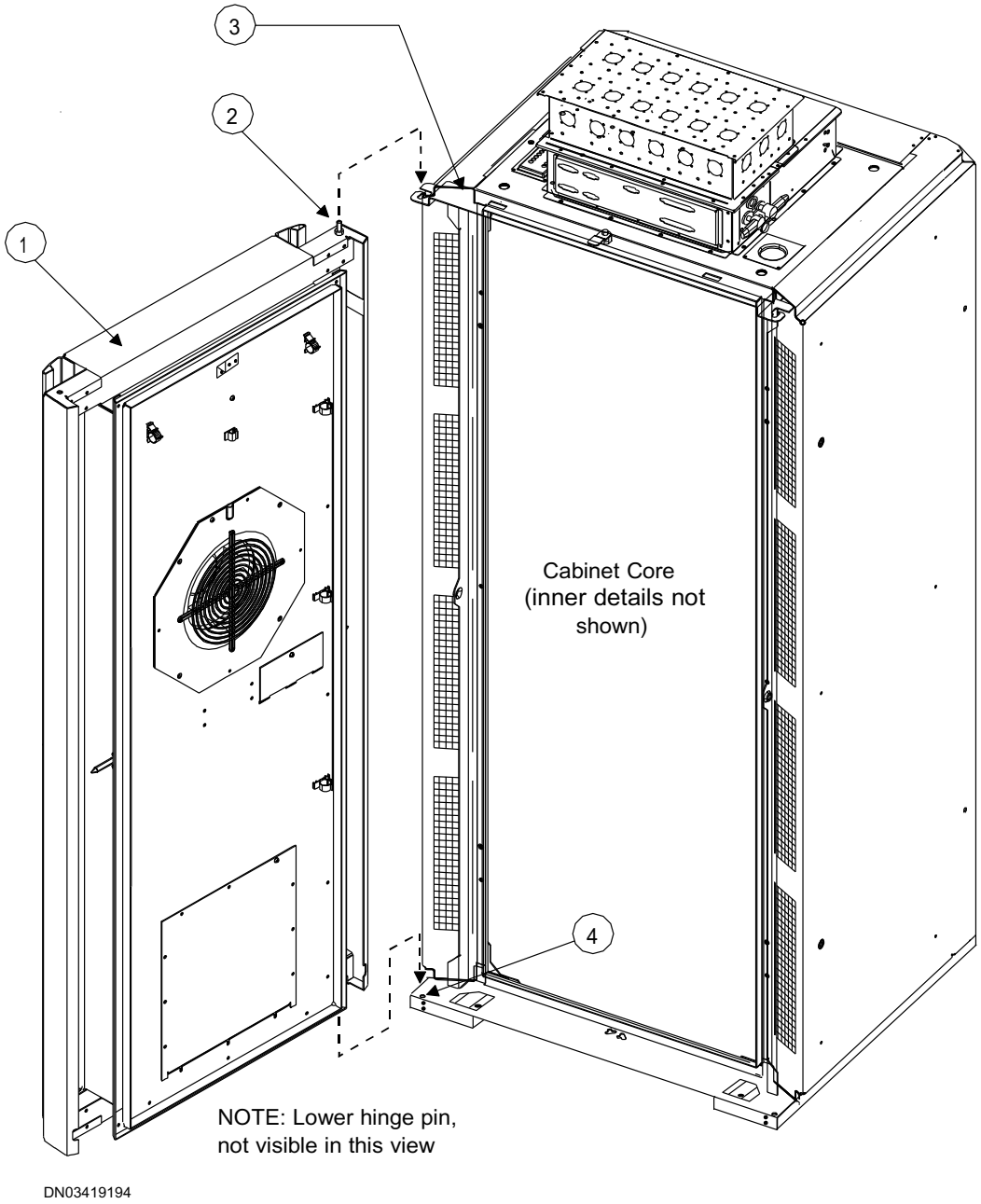


Figure 16. Removing the outdoor cabinet door from the cabinet

| | |
|---|---|
| 1 | Cabinet door |
| 2 | Upper hinge pin (lower hinge pin identical) |

| | |
|---|---|
| 3 | Door frame |
| 4 | Hole for lower hinge pin |

### Steps

1. **Locate the upper and lower hinge pins and the door rod on the door.**

Note

Hinge pins can be installed on the right or left side of the door.

2. **Open the cabinet door.**
3. **Remove the door rod from the bottom of the door.**
4. **Lift and hold the open door up to reduce the tension on the upper and lower hinges.**
5. **With a hammer and long-handle screwdriver, tap out lower hinge pin from inside.**
6. **Continue to lift the door and slide the lower door hinge pin out of the lower hinge hole in the door frame.**
7. **With a hammer and long-handle screwdriver, tap out the upper hinge pin from inside.**
8. **Continue to lift and hold the door while you tap out the upper hinge pin from inside.**
9. **Disengage the upper hinge pin of the door in the slot at the top of the door frame.**
10. **Carefully lower the door until it rests on a flat surface.**

## 13.4 Removing the roof from the indoor cabinet

### Steps

1. **Loosen the four screws on top of the cabinet securing the roof assembly.**

**2. Slide the slots on the bottom of the roof assembly off the four screws installed in the cabinet and lift to remove the roof.**

## 13.5 Removing a roof from the roof support of the outdoor cabinet

**Summary**

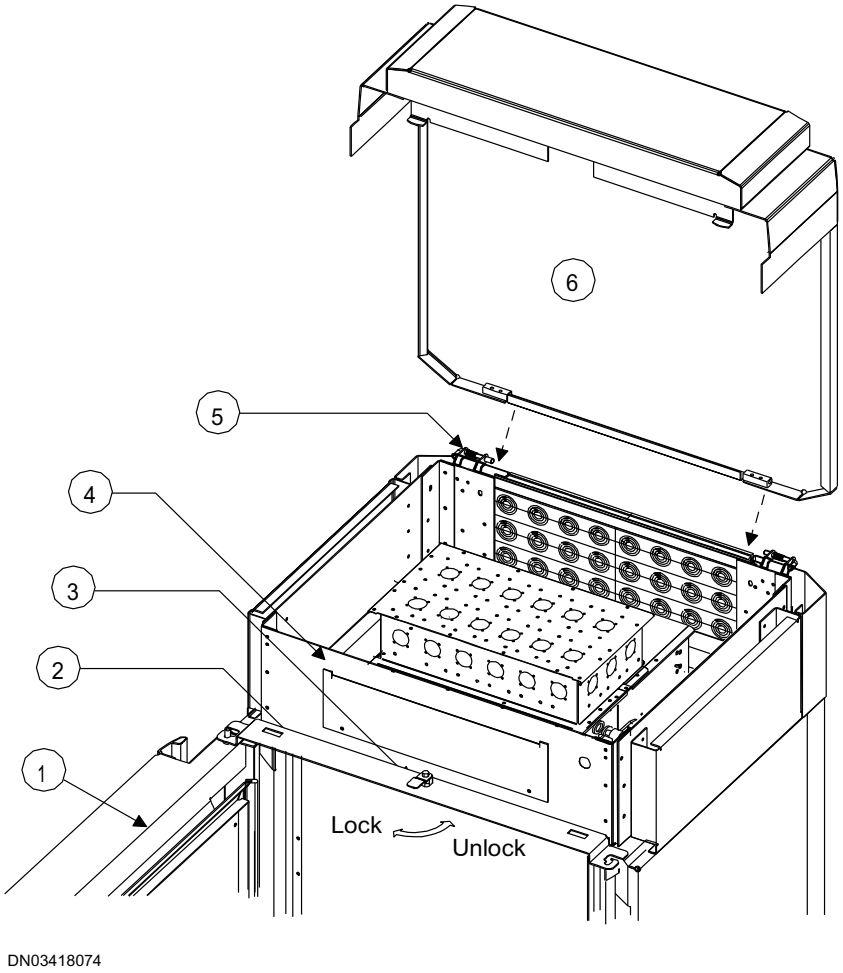


Figure 17. Removing the roof from the roof support assembly

| | |
|---|---|
| 1 | Cabinet door |
| 2 | Door frame |

| | |
|---|---|
| 3 | Roof latch |
| 4 | Roof support assembly |
| 5 | Roof hinge pin, spring-loaded (two places) |
| 6 | Roof |

### Steps

1. **Unlock the cabinet roof by turning the roof latch on the door frame to the right.**

2. **Detach the roof from the roof support assembly at the spring-loaded hinge pins.**

## 13.6 Removing a lower RFU backplane

**Summary**

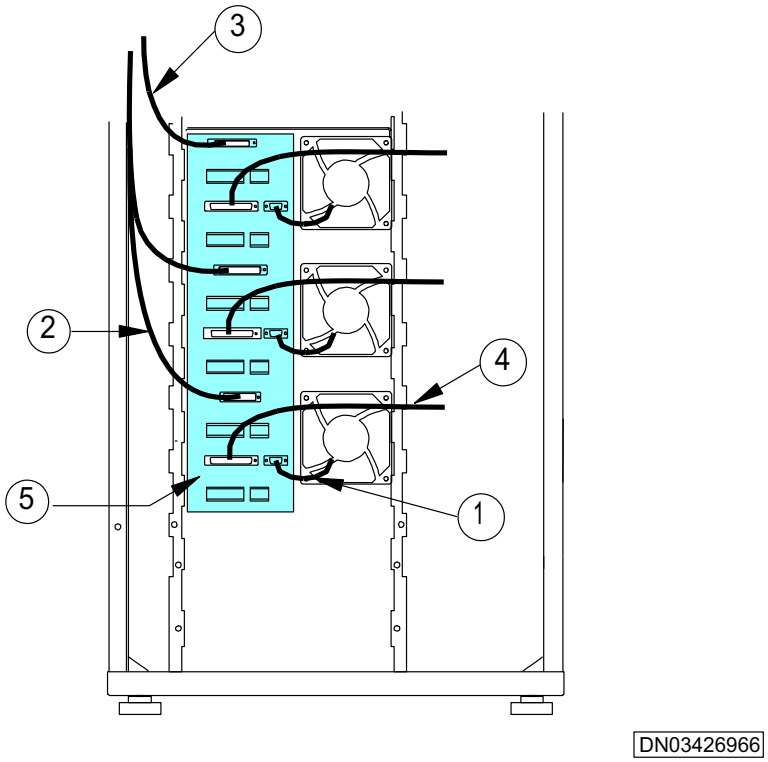


Figure 18. Disconnecting cables from the lower RFU backplane

| | |
|---|---|
| 1 | Unit fan cable (3 pcs) Lower RFU backplane |
| 2 | Power cable (2 pcs) |
| 3 | Bus cable between common backplane and RFU backplane |
| 4 | D-37, DVxx or RTxx power control cable (3 pcs) |
| 5 | Lower RFU backplane |

## Steps

1. **Disconnect the unit fan cables from the lower RFU backplane.**

Note

Do not remove the unit fans located in the cabinet core.

2. **Disconnect power cables coming from the voltage distribution bar.**
3. **Attach caps over the power cables.**
4. **Bend the cables through the cable entry so that they do not get in the way, if installing the WCDMA Upgrade Kit.**
5. **Disconnect the bus cable between the lower RFU backplane and common backplane from the RFU backplane.**
6. **Attach a cap over the bus cable.**
7. **Disconnect the DVxx or RTxx power and control cables from the X5, X14, or X23 connectors on the lower RFU backplane and attach caps over the cable connectors.**
8. **Bend the cables behind the backplane so that they do not get in the way, if installing the WCDMA Upgrade Kit.**
9. **Unscrew the screws in the lower RFU backplane cover plate and remove the cover plate.**
10. **Unscrew the screws in the backplane and remove the backplane.**

# 13.7 Cutting open the ventilation hole in the BTS

**Summary**

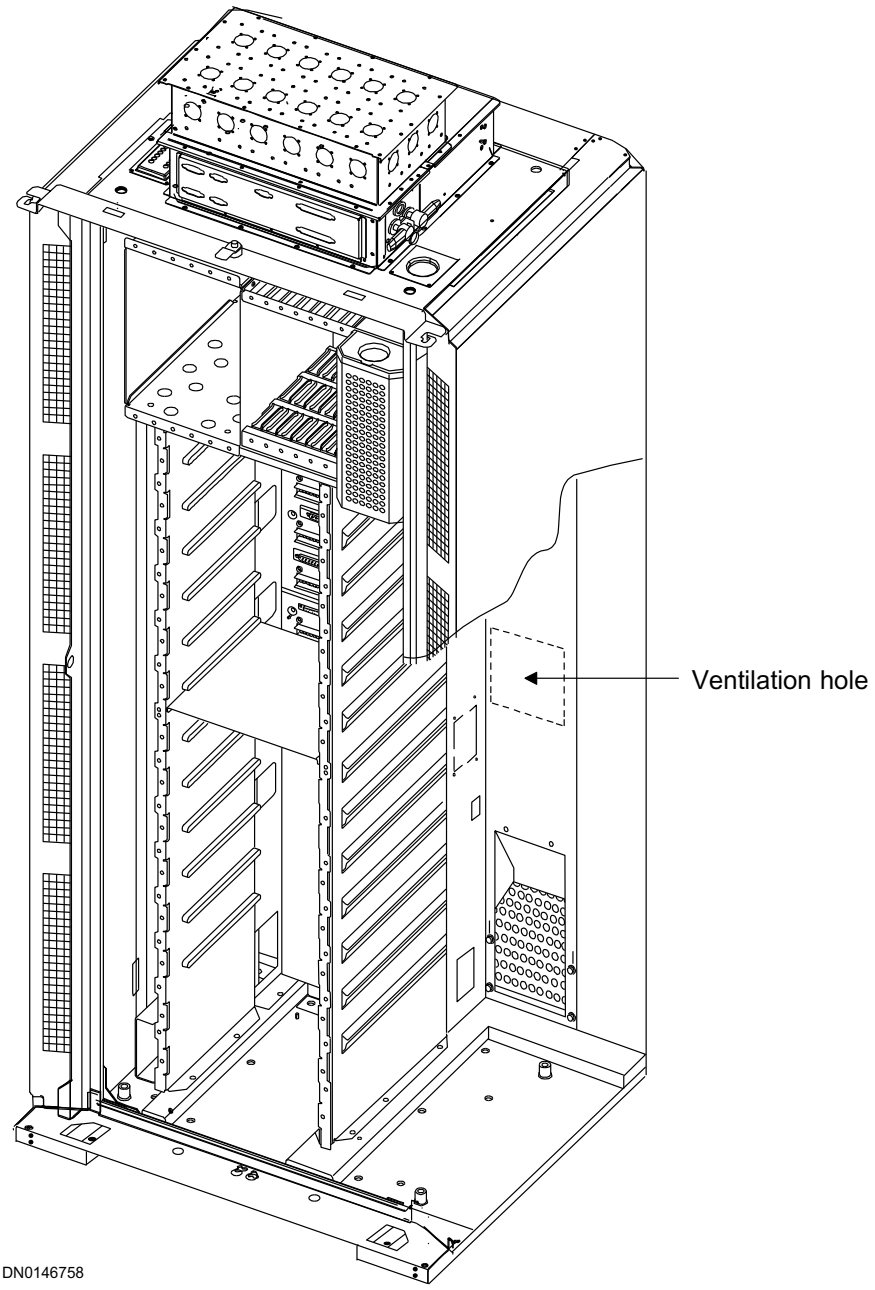


Figure 19. Location of the ventilation hole (perforated)

## Steps

1. **Locate the perforated area on the cabinet wall.**
2. **Cut open the perforated area with side cutters.**