NOKIA

Planning UltraSite EDGE BTS

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Contents

1 Statutory information

1.1 CE Marking

Standard	Description
CE 0168 !	Hereby, Nokia Corporation, declares that this Nokia UltraSite EDGE Base Station is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC.

1.2 FCC Statement

Standard	Description
FCC Statement	Hereby, Nokia Corporation declares that this Nokia UltraSite EDGE Base Station is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC. The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC. 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The term "IC:" before the radio certification number only signifies that Industry Canada technical specifications were met.

2 Overview of planning UltraSite EDGE BTS

2.1 Overview of planning UltraSite EDGE BTS installation

Before you start

Pay careful attention to all Warnings and Cautions in this section.

Warning

The equipment generates electromagnetic radiation that can exceed safety levels when an installer is working near the antennas. Observe the minimum distance precautions.

Warning

Do not install Nokia UltraSite EDGE BTS or its antennas in areas where there is a potential risk for interference with inadequately shielded medical equipment, such as life support devices, hearing aids, or other electrically or magnetically sensitive devices.

Warning

Before installing Nokia UltraSite EDGE BTS or its antennas, identify the emission of nearby antennas to properly manage ambient emissions.

Warning

Follow national regulations when working with power supply and power cables.

Warning

Empty CRMA and CRMC cabinet cores weigh 79 kg (155 lb) and 52 kg (115 lb) respectively. Nokia recommends that a lifting device be used when moving a cabinet core.

Caution

To prevent damage to the equipment, transport Nokia UltraSite EDGE BTS to the installation site in the original transportation package.

Caution

The typical transportation time to the installation site is 30 days or less. If the total transportation time exceeds 30 days, consider additional storage or packaging precautions.

Caution

A power plug with a PE connection is not sufficient for Nokia UltraSite EDGE BTS. Grounding must have a fixed, non-removable connection.

Caution

To prevent damage to units, grounding must be connected to the cabinet before installing any of the units.

Note

Site requirements for the Indoor cabinet can vary depending on the country of installation and the operator.

Note

If space is limited for an outdoor installation, Nokia recommends installing the Outdoor Application Kit (OAKx) to the cabinet core first. Installation personnel can then lift, mount, and anchor the cabinet to the plinth.

Summary

Planning for the installation of UltraSite EDGE BTS, whether at a new or existing site, requires familiarising yourself with all site requirements and technical aspects of the BTS and its units.

Steps

1. **Review configuration options.**
2. **Review technical aspects of the BTS.**
3. **Review technical aspects of the units.**
4. **Review planning checklist.**
5. **Plan the site.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.
   - Review *required cabinet base for indoor installation*.

- Review *required cabinet base for outdoor installation*.
- Review *required tools*.

6. **Review required torque settings.**

7. **Review software compatibility.**

8. **Review power requirements.**

9. **Review RF properties.**
   - *800 MHz BTS*
   - *900 MHz BTS*
   - *1800 MHz BTS*
   - *1900 MHz BTS*

10. **Review physical properties.**

11. **Review acoustic sound parameters.**

12. **Plan the cabinet installation.**

13. **Plan the internal configuration.**

14. **Plan for specific installation needs.**
    - *Installation at a new site*
    - *Installation at an existing UltraSite EDGE BTS site*
    - *Installation at an existing Talk-family site*
    - *Installation with WCDMA upgrade at a new site*
    - *Installation with WCDMA upgrade at an existing site*
    - *Installation with IBBU at a new site*
    - *Installation with IBBU at an existing site*
    - *Installation of upgrade from GSM to GSM/EDGE*

2.2 Overview of planning UltraSite EDGE BTS cabinet installation

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Ensure that site planning is complete.**
2. **Ensure that required tools and equipment are available.**
3. **Review preparations requirements.**
4. *If* mounting an outdoor UltraSite EDGE BTS cabinet,

   Then

   Review these instructions.
5. *If* mounting an indoor UltraSite EDGE BTS cabinet,

   Then

   Review these instructions.
6. **Review procedures for installing UltraSite EDGE BTS core mechanics.**
7. *If* installing optional kits of outdoor UltraSite EDGE BTS,

   Then

   Review these instructions.

2.3 Overview of planning for UltraSite EDGE BTS installation at an existing Talk-family BTS site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.

- Review *required space for outdoor installation*.
- Review *required grounding (earthing)*.
- Review *required cabinet base for indoor installation*.
- Review *required cabinet base for outdoor installation*.
- Review *required tools*.

2. **Determine the internal configuration.**

3. **Plan installation of BTS at an existing Talk-family site.**

4. **Plan cabling.**

5. **Plan for commissioning of new BTS.**

6. **Complete the planning checklist.**

2.4 Overview of planning an UltraSite EDGE BTS internal configuration

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Define BTS configuration.**

2. **Evaluate system and performance requirements.**

3. **Review technical aspects of UltraSite EDGE BTS.**

4. **Review technical aspects of UltraSite EDGE BTS units.**

5. **Determine requirements for any upgrade.**
   - *GSM to GSM/EDGE*
   - *EDGE to WCDMA*

6. **Determine requirements for IBBU.**

7. **Review commissioning procedures.**

8. **Order units required to meet your system and performance objectives.**

3 Planning

3.1 Planning for UltraSite EDGE BTS installation at a new site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.
   - Review *required cabinet base for indoor installation*.
   - Review *required cabinet base for outdoor installation*.
   - Review *required tools*.
2. **Determine the internal configuration.**
3. **Plan installation of BTS at the new site.**
4. **Plan cabling.**
5. **Plan for commissioning of new BTS.**
6. **Complete the planning checklist.**

3.2 Planning for UltraSite EDGE BTS installation at an existing UltraSite EDGE BTS site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.
   - Review *required cabinet base for indoor installation*.
   - Review *required cabinet base for outdoor installation*.
   - Review *required tools*.
2. **Determine the internal configuration.**
3. **Plan installation of BTS at the existing site.**
4. **Plan cabling.**
5. **Plan for commissioning of new BTS.**
6. **Complete the planning checklist.**

3.3 Planning for UltraSite EDGE BTS with WDCMA Upgrade installation at a new site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.
   - Review *required cabinet base for indoor installation*.
   - Review *required cabinet base for outdoor installation*.
   - Review *required tools*.
2. **Determine the internal configuration.**
3. **Plan installation of BTS with WCDMA upgrade at a new site.**
4. **Plan cabling.**
5. **Plan for commissioning of new BTS with WCDMA upgrade.**
6. **Complete the planning checklist.**

3.4 Planning for UltraSite EDGE BTS with WDCMA Upgrade installation at an existing site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.

- Review *required cabinet base for indoor installation*.
- Review *required cabinet base for outdoor installation*.
- Review *required tools*.

2. Determine the internal configuration.

3. Plan installation of BTS with WCDMA upgrade at an existing UltraSite EDGE BTS site.

4. Plan cabling.

5. Plan for commissioning of new BTS.

6. Complete the planning checklist.

3.5 Planning for UltraSite EDGE BTS with IBBU installation at a new site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. Determine the site requirements.

- Review *required storage conditions*.
- Review *required transportation conditions*.
- Review *required safety distance*.
- Review *required operating conditions*.
- Review *required space for indoor installation*.
- Review *required space for outdoor installation*.
- Review *required grounding (earthing)*.
- Review *required cabinet base for indoor installation*.
- Review *required cabinet base for outdoor installation*.
- Review *required tools*.

2. Determine the internal configuration.

3. Plan installation of BTS with IBBU at the new site.

4. **Plan cabling.**

5. **Plan for commissioning of new BTS.**

6. **Plan for commissioning IBBU in new BTS.**

7. **Complete the planning checklist.**

3.6 Planning for UltraSite EDGE BTS with IBBU installation at an existing site

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Determine the site requirements for the new BTS.**
   - Review *required storage conditions*.
   - Review *required transportation conditions*.
   - Review *required safety distance*.
   - Review *required operating conditions*.
   - Review *required space for indoor installation*.
   - Review *required space for outdoor installation*.
   - Review *required grounding (earthing)*.
   - Review *required cabinet base for indoor installation*.
   - Review *required cabinet base for outdoor installation*.
   - Review *required tools*.

2. **Determine the internal configuration.**

3. **Plan installation of BTS at an existing site.**

4. **Plan cabling.**

5. **Plan for commissioning of new BTS.**

6. **Complete the planning checklist.**

3.7 Planning for UltraSite EDGE BTS upgrade to include EDGE capability

Before you start

Review the *Overview of planning UltraSite EDGE BTS installation*. Pay careful attention to all Warnings and Cautions.

Steps

1. **Evaluate the impact of UltraSite EDGE BTS upgrade.**
2. **Review upgrade requirements.**
3. **Plan cabling.**
4. **Plan for commissioning GSM/EDGE upgrade in BTS.**
5. **Order GSM/EDGE units required for the upgrade.**

3.8 Checklist for planning of UltraSite EDGE BTS

Table 1. Planning checklist

Check	Expected outcome	Check mark
Plan the site preparation for installation	*Site preparation checklist for UltraSite EDGE BTS installation complete*	
Plan the cabinet installation	*Cabinet installation plan complete*	
Plan the internal configuration	*Internal configuration plan complete*	
Plan the installation preparations.	*Plan for installation preparation complete*	
Plan the installation at a new site	*Plan for installation at a new site complete*	

Table 1. Planning checklist (cont.)

Check	Expected outcome	Check mark
Plan the installation at an existing UltraSite EDGE BTS site	*Plan for installation at an existing UltraSite EDGE BTS site complete*	
Plan the installation at an existing Talk-family BTS site	*Plan for installation at an existing Talk-family BTS site complete*	
Plan for WCDMA Upgrade at a new site	*Plan for WCDMA upgrade at a new site complete*	
Plan for WCDMA Upgrade at an existing site	*Plan for WCDMA Upgrade at an existing site complete*	
Plan for IBBU installation at a new site	*Plan for IBBU installation at a new site complete*	
Plan for IBBU installation at an existing site	*Plan for IBBU installation at an existing site complete*	
Plan for upgrade to include EDGE capability	*Plan for upgrade to include EDGE capability complete*	

4 Site requirements for UltraSite EDGE BTS

4.1 Storage conditions for the UltraSite EDGE BTS delivery

Before you accept delivery of the UltraSite EDGE BTS, you must ensure acceptable climatic and mechanical conditions for its storage until installation. The UltraSite EDGE BTS is not operational under these conditions.

Table 2. Climatic conditions

Condition	Parameter
Temperature range	-45° C to +45° C (-49° F to +113° F)
Relative humidity	8% to 100%
Absolute humidity	0.03 to 30 g/m^3
Rain intensity	15 mm/min. maximum
Change rate of temperature	0.5° C/min. maximum
Air pressure	70 to 106 kPa
Solar radiation	1120 W/m^2 maximum
Movement of surrounding air	<50 m/s
Low rain temperature	5° C (41° F) minimum
Water from sources other than rain	Splashing water

Table 2. Climatic conditions (cont.)

Condition	Parameter
Icing and frosting	Yes

Table 3. Mechanical conditions

Condition	Parameter
Stationary vibration, sinusoidal (peak value of displacement amplitude) at frequency range 9 to 200 Hz	10 mm
Non-stationary vibration, including shock: peak value of acceleration	100 m/s^2
Static load	5 kPa

4.2 Transportation conditions for the UltraSite EDGE BTS delivery

Before transporting the UltraSite EDGE BTS, you must ensure acceptable climatic and mechanical conditions while loading and unloading. The BTS is not operational under these conditions.

Caution

To prevent damage to the equipment, transport UltraSite EDGE BTS to the installation site in the original transportation package.

Caution

The typical transportation time to the installation site is 30 days or less. If the total transportation time exceeds 30 days, consider additional storage or packaging precautions.

Table 4. Climatic conditions

Condition	Parameter
Temperature range	-40° C to +70° C (-40° F to +158° F)
Change of temperature:	
• air/air	-40° C to +30° C (-40° F to +86° F)
• air/water	+40° C to +5° C (+104° F to +41° F)
Relative humidity, not combined with rapid temperature changes	95% at: +45° C (+113° F)
Relative humidity, combined with rapid temperature changes; air/air at high relative humidity	95% at: -45° C to +30° C (-49° F to +86° F)
Absolute humidity, combined with rapid temperature changes: air/air at high water content	60 g/m^3 at: +70° C to +15° C (+158° F to +59° F)
Low air pressure	70 kPa minimum
Change in air pressure	Not applicable
Movement of surrounding air	20 m/s maximum
Rain intensity	6 mm/min. maximum
Solar radiation	1120 W/m^2 maximum
Heat radiation	600 W/m^2 maximum
Conditions of water from sources other than rain	1 m/s maximum
Conditions of wetness	Wet surfaces

Table 5. Mechanical conditions

Conditions	Parameter
Stationary vibration, sinusoidal (peak value of displacement amplitude) at the following frequency range:	
• 2 to 9 Hz	3.5 mm
• 9 to 200 Hz	10 m/s^2
• 200 to 500 Hz	15 m/s^2
Stationary vibration, random: acceleration spectral density at the following frequency range:	
• 10 to 200 Hz	1 m^2/s^3
• 200 to 2000 Hz	0.3 m^2/s^3
Peak acceleration for non-stationary vibration, including shock:	
• Duration 11 ms	100 m/s^2
• Duration 6 ms	300 m/s^2
Free fall:	
• Mass < 20 kg	1.2 m
• Mass 20 to 100 kg	1.0 m
• Mass > 100 kg	0.25 m
Toppling:	
• Mass < 20 kg	Around any edges
• Mass 20 to 100 kg	Around any edges
• Mass > 100 kg	Not allowed
Rolling, Pitching:	
• Angle	35°
• Period	8 s

Table 5. Mechanical conditions (cont.)

Conditions	Parameter
Steady state acceleration	20 m/s^2
Static load	10 kPa

4.3 UltraSite EDGE BTS safety distance requirements (compliance boundaries)

Base Station equipment generates radio frequency (RF) energy, which has a thermal effect when absorbed by the human body. For this reason, compliance boundaries specific to this equipment have been established. The thermal effects of radio frequency energy can exceed safety levels, when a person is inside the established compliance boundaries. Observing the compliance boundary, and eliminating access to areas inside the established boundaries, will ensure that the general public has no exposure to levels in excess of the safety limits.

Installation engineers must be aware of the potential risk of the thermal effects of radio frequency energy and how to protect themselves against undue risk.

Warning

The equipment generates electromagnetic radiation that can exceed safety levels when an installer is working near the antennas. Observe the minimum distance precautions. To calculate minimum safe distance refer to the formula presented in ANNEX B: Far-field calculation method.

Warning

Do not install Nokia UltraSite EDGE BTS or its antennas in areas where there is a potential risk for interference with inadequately shielded medical equipment, such as life support devices, hearing aids, or other electrically or magnetically sensitive devices.

Warning

Before installing Nokia UltraSite EDGE BTS or its antennas, identify the emission of nearby antennas to properly manage ambient emissions.

Warning

Observe the six-hour maximum time limit for safety when working with antennas.

Warning

Do not go any closer to a live antenna than the compliance boundary. The radio frequency energy generated by the antenna poses a serious health risk.

Warning

If performing installation or maintenance procedures on the BTS, make sure that all transmitters in the area are switched off.

Warning

The BTS safety distance calculation in our example is for reference only. Ensure the measurements for the actual site are used during installation or maintenance.

When assessing the applicable compliance boundaries, European standards EN 50383, EN 50384, EN 50385 and Council Recommendation 1999/519/EC for occupational and general public electromagnetic exposure limits, apply *ANNEX A: Council recommendation 1999/519/EC for occupational and general public electromagnetic exposure limits*.

4.3.1 Assessment applying SAR measurements

European standards EN 50383, EN 50384, and EN 50385 do not include specifications for whole body SAR measurements. Whole body SAR measurements are not required for transmitters that have maximum output power levels too low to result in exposure levels that can reach the whole body SAR compliance limits under any conditions. Whole body SAR exclusion power levels have been based on worst-case assumptions.

Table 6. Whole body SAR exclusion power levels

Exposure category	Maximum output power (rms)
General public	Max power [W] = general public whole body SAR limit 0.08 [W/kg] * 4-year old child mass 12.5 [kg] = 1 W
Occupational	Max power [W] = occupational whole body SAR limit 0.4 [W/kg] * 16-year old worker 42 [kg] = 16.8 W

Localised SAR measurement can be used only when:

1. The separation between the phantom and the outer surface of the energy generating element is 40 cm or less.
2. The surface area of the energy-generating element is less than 60 cm by 30 cm.
3. The frequency is in the range of 800 to 3000 MHz.

For the reasons above, SAR measurements are not applicable to Nokia UltraSite EDGE Base Station.

4.3.2 Assessment of compliance boundary

The compliance boundary is defined as the area around the antenna. The centre of the antenna is located at the origo. Distances from the antenna are shown in the figure, *Area around the antenna*. The top and side views are shown in the figure, *Antenna side and top view.*

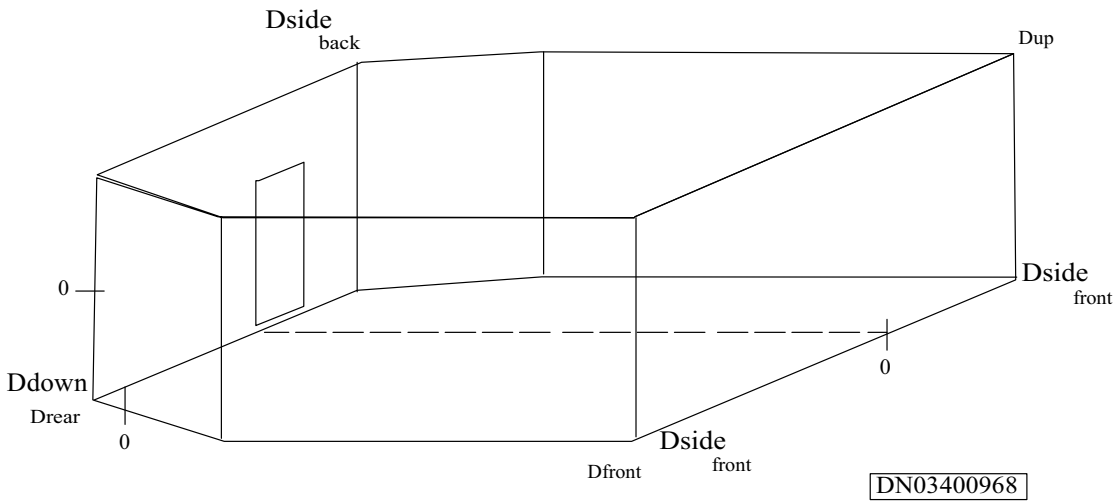

Figure 1. Area around the antenna

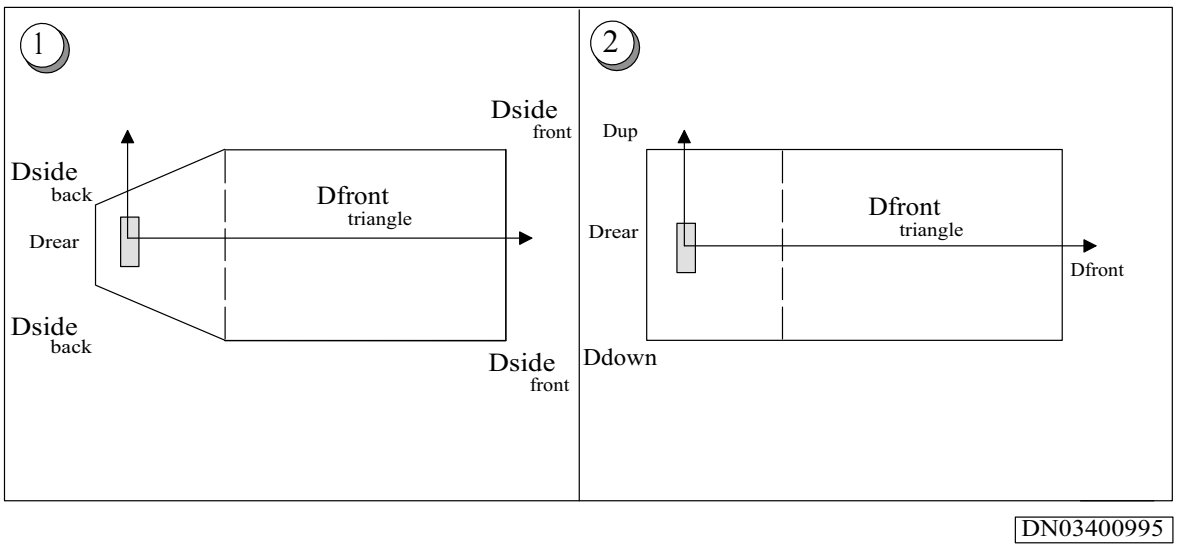

Figure 2. Antenna side and top view

The compliance boundaries for the Nokia UltraSite EDGE Base Station are given in the table, *Dimensions of compliance boundary in metres*, for different power levels at the antenna input. Typical and worst-case power level configurations for **general public (GP)** and **occupational (O)** exposure limits are included.

Table 7. Dimensions of compliance boundary in metres

		Dfront		**Dfront triangle**		**Drear**		**Dside-back**		**Dside-front**		**Dup**		**Ddown**	
Freq. (MHz)	Power at antenna input (W)	GP	O	GP	O	GP	O	G-P	O	G-P	O	G-P	O	G-P	O
900	16	4.5	0.4	2.4	0	0.2	0.-05	0.-4	0-.2	1.-15	0-.2	0-.9	0-.-6-5	0.-9	0.-65
900	95	10.-7	4.9	3.5	2.2	0.4	0.-25	0.-7	0-.3	3.-1	1-.3	1-.3	0-.9	1.-3	0.-9
1800	16	2.9-5	1.-15	1	0	0.-14	0	0.-2	0-.1	0.-95	0-.-15	0-.5	0-.5	0.-5	0.-5
1800	95	7.0-5	3.3	2	1	0.-45	0.-35	0.-7	0-.3	2.-25	1-.-05	0-.-65	0-.5	0.-65	0.-5
900-1800[1]	32	6.2-5	2.-25	2.4	0	0.3	0.-05	0.-5	0-.-3-5	1.-75	0-.-35	0-.-95	0-.8	0.-95	0.-8
900-1800[1]	190	14.-9	6.-95	3.5	1.9	0.-45	0.-35	0.-7	0-.3	4.-4	1-.-95	1-.-55	0-.-9-5	1.-55	0.-95
900-1800-2100[1]	20	4.9-5	0.-55	2.4	0	0.3	0.-05	0.-5	0-.-2-5	1.-3	0-.-25	0-.9	0-.-6-5	0.-9	0.-65
900-1800-2100[1]	100	10.-9	5.-05	3.5	2.2	0.4	0.-25	0.-7	0-.3	3.-15	1-.-35	1-.3	0-.9	1.-3	0.-9

[1]For dual and triple mode operation, a conservative approach has been chosen and lower frequency limit-lower limit has been used.

Note

The component specifications for 900 MHz and 1800 MHz also apply to 800 MHz and 1900 MHz products and can be used to demonstrate compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields contained in FCC document *OET Bulletin 65 (August 1997).*

4.3.3 Typical configuration

The antenna is connected through a connector and cable(s) to the BTS as shown in the figure, *Antenna connection to the BTS*.

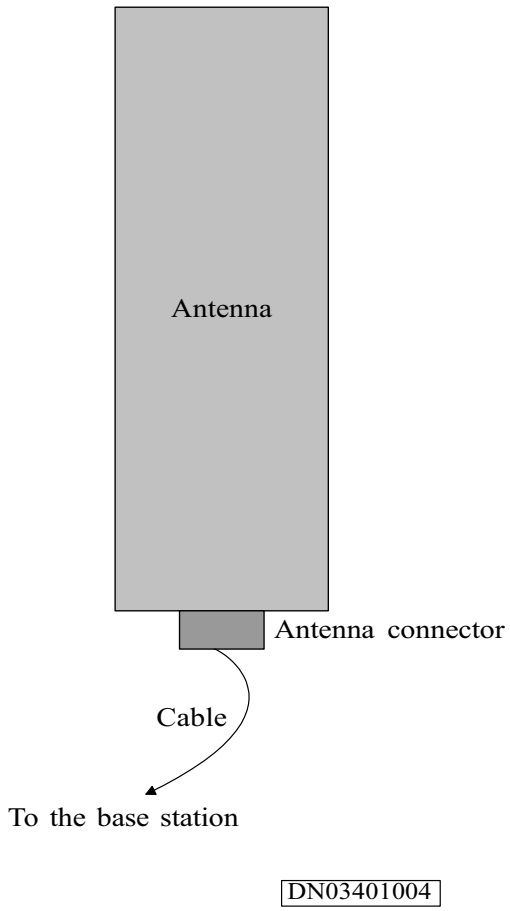

Figure 3. Antenna connection to the BTS

Table 8. Detailed description of components - Nokia UltraSite GSM/EDGE 900

Nokia UltraSite GSM/ EDGE 900	**Typical Case**	**Worst Case**
Power (P_{out})	12.6 W	15.8 W
Total connector loss	0.0 dB	0.0 dB
Total cable loss	2.0 dB	0.0 dB
Total Loss (L) = Total connector loss + Total cable loss	2.0 dB	0.0 dB
Number of transmitter units (N)	2	6
Power at antenna input = $P_{out}N10^{-L/10}$	16 W	95 W

Table 9. Detailed description of components - Nokia UltraSite GSM/EDGE 1800

Nokia UltraSite GSM/ EDGE 1800	**Typical Case**	**Worst Case**
Power (P_{out})	12.6 W	15.8 W
Total connector loss	0.0 dB	0.0 dB
Total cable loss	2.0 dB	0.0 dB
Total Loss (L) = Total connector loss + Total cable loss	2.0 dB	0.0 dB
Number of transmitter units (N)	2	6
Power at antenna input = $P_{out}N10^{-L/10}$	16 W	95 W

Table 10. Detailed description of components - Nokia UltraSite GSM/EDGE Dual Band 900/1800

Nokia UltraSite GSM/ EDGE Dual Band 900/ 1800	**Typical Case**	**Worst Case**
Power (P_{out})	12.6 W/band	15.8 W
Total connector loss	0.0 dB	0.0 dB
Total cable loss	2.0 dB/band	0.0 dB
Total Loss (L) = Total connector loss + Total cable loss	2.0 dB/band	0.0 dB
Number of transmitter units (N)	2/band (4 total)	6/band (12 total)
Power at antenna input = $P_{out}N10^{-L/10}$	32 W	190 W

Note

The component specifications for 900 MHz and 1800 MHz also apply to 800 MHz and 1900 MHz products and can be used to demonstrate compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields contained in FCC document *OET Bulletin 65 (August 1997).*

Table 11. Detailed description of components - Nokia UltraSite GSM/EDGE WCDMA

Nokia UltraSite GSM/ EDGE WCDMA	**Typical Case**	**Worst Case**
Power (P_{out})	12.6 W (GSM/EDGE), 5W (WCDMA)	15.8 W (GSM/EDGE), 5W (WCDMA)
Total connector loss	0.0 dB	0.0 dB
Total cable loss	2.0 dB/band	0.0 dB

Table 11. Detailed description of components - Nokia UltraSite GSM/EDGE WCDMA (cont.)

Nokia UltraSite GSM/ EDGE WCDMA	Typical Case	Worst Case
Total Loss (*L*) = Total connector loss + Total cable loss	2.0 dB	0.0 dB
Number of transmitter units (*N*)	2 (GSM/EDGE), 1 (WCDMA)	6 (GSM/EDGE), 1 (WCDMA)
Power at antenna input = $P_{out}N10^{-L/10}$	20 W	100 W

Table 12. Typical antenna configuration

	900 MHz	1800-2100 MHz	900-1800-2100 MHz
Gain	18 dBi	17.2 dBi	18 dBi
Half-power beam width	H-plane: 60 deg.	H-plane: 68 deg.	H-plane: 60 deg.
	E-plane: 8 deg.	E-plane: 10 deg.	E-plane: 8 deg.
Electrical downtilt	0 deg	0 deg	0 deg
Height/width/depth	2300 / 500 / 200 mm	1000 / 200 / 100 mm	2300 / 400 / 200 mm

When using different configurations

In the table, *Dimensions of compliance boundary in metres*, the compliance boundaries are given for different power levels, including the typical and worst-case levels. If an exposure limit, antenna and/or configuration is used that does not correspond to the levels or frequencies given in the table, *Dimensions of compliance boundary in metres*, the compliance boundary must be recalculated according to EN 50383.

The formula for calculating the compliance boundary using the far-field model, which is referenced in EN 50383, is given in *ANNEX B: Far-field calculation method*.

4.3.4 ANNEX A: Council recommendation 1999/519/EC for occupational and general public electromagnetic exposure limits

Table 13. Basic restrictions

Exposure characteris-tics	Frequency range	Whole body average SAR (W kg^{-1}	Localised SAR (head and trunk) W kg^{-1}	Localised SAR (limbs) W kg^{-1}
Occupational exposure	10 MHz - 10 GHz	0.4	10	20
General public exposure	10 MHz - 10 GHz	0.08	2	4

Note

All SAR values are to be averaged over any period of 6 minutes.

Note

Localised SAR averaging mass is any 10g of contiguous tissue. The maximum SAR obtained should be the value that is used for the estimation of exposure.

Note

Basic restrictions between 10 GHz and 300 GHz are given in power densities. For occupational exposure, it is 50 Wm^{-2} and for general public exposure, it is 10 Wm^{-2}.

Table 14. Reference values calculated from basic restrictions

Exposure characteristics	Frequency range	Electric field strength V/m	Equivalent plane wave power density S (W m^{-2})
Occupational exposure	10 - 400 MHz	61	10
	400 - 2000 MHz	$3f^{1/2}$	f/40
	2 - 300 GHz	137	50
General public exposure	10 - 400 MHz	28	2
	400 - 2000 MHz	$1.375f^{1/2}$	f/200
	2 - 300 GHz	61	10

f = frequency in MHz

Note

For frequencies between 100 KHz and 10 GHz, S is to be averaged over any period of 6 minutes.

Note

For frequencies exceeding 10 GHz, S is to be averaged over any period of $68/f^{1.05}$ minutes (f in GHz).

4.3.5 ANNEX B: Far-field calculation method

This model is applicable for calculating the compliance boundary for the far-field region and over-estimates the compliance boundary for the radiating near-field region. It is not applicable for calculating the compliance boundary for the reactive near-field region where the distance from the antenna is less than or equal to λ /4, which is 3.75 cm at 2000 MHz. Therefore, all the calculations are valid when the compliance boundary is greater than or equal to the antenna dimensions plus λ /4.

The compliance boundary in metres from an antenna, or r_{min}, is calculated according to the *Formula for safety distances*.

$$r_{min} = \sqrt{\frac{N10^{\frac{(G-L)}{10}} P_{out}}{4\pi S}}$$

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Figure 4. Formula for safety distances

The meaning of each formula component is as follows:

- N is the number of transmitters per one antenna
- G is the antenna gain (dBi)
- L is the minimum cable losses (dB)
- P_{out} is the maximum power of one transmitter unit (W)
- S is the power density limit (W/m^2)

Note

In the far-field, the field calculation does not take into account the antenna size, which is assumed to be a point source. Therefore, when calculating the compliance boundary, the far-field data, antenna size and reactive field criteria must be taken into account.

4.4 Operating conditions for UltraSite EDGE BTS

This section describes the climatic and mechanical conditions acceptable for operation of Indoor/Outdoor UltraSite EDGE BTS. The BTS is not for portable use. However, short periods of handling during installation, down time and maintenance are acceptable.

For detailed information on UltraSite EDGE BTS, see *Technical overview of UltraSite EDGE BTS*.

4.4.1 Climatic conditions

Table 15. Climatic conditions for operation

Condition	Indoor	Outdoor
Temperature range without heater	-5° C to +50° C (+23° F to +122° F)	-10° C to +50° C (+40° C with OFKx installed) (14° F to +122° F (+ 104° F))
Temperature range with heater	Not applicable	-33° C to +50° C (+40° C with OFKx installed) (-27.4° F to +122° F (+ 104° F))
Change rate of temperature	0.5° C/min. maximum	0.5° C/min. maximum
Relative humidity	5% to 95%	15% to 100%
Absolute humidity	1 g/m^3 to 29 g/m^3	0.26 g/m^3 to 25 g/m^3
Air pressure	70 kPa to 106 kPa	70 kPa to 106 kPa
Movement of surrounding air	5 m/s maximum	50 m/s maximum
Solar radiation	700 W/m^2 maximum	1120 W/m^2 maximum
Rain intensity	Not applicable	6 mm/min. maximum
Low rain temperature	Not applicable	5° C minimum (41° F minimum)
Water from sources other than rain	Not applicable	Splashing water
Wind driven rain, snow, or hail	Not applicable	Yes
Icing and frosting	Not applicable	Yes
Condensation	Yes	Yes

4.4.2 Mechanical conditions

Table 16. Maximum mechanical conditions for operation

Condition	Indoor	Outdoor
Stationary vibration, sinusoidal (peak value of displacement amplitude) at frequency range:		
• 2 to 9 Hz	3.5 mm	Not Applicable
• 9 to 200 Hz	10 m/s^2	Not Applicable
• 200 to 500 Hz	15 m/s^2	Not Applicable
Peak acceleration for non-stationary vibration, including shock:		
• Duration 22 ms	40 m/s^2	Not Applicable
• Duration 6 ms	Not Applicable	250 m/s^2
Peak values of base acceleration in earthquake conditions at the following frequencies:		
• 0.3 Hz	2 m/s^2	2 m/s^2
• 0.6 Hz	20 m/s^2	20 m/s^2
• 5.0 Hz	20 m/s^2	20 m/s^2
• 15.0 Hz	6 m/s^2	6 m/s^2
• 50.0 Hz	6 m/s^2	6 m/s^2

4.5 Space requirements for Indoor UltraSite EDGE BTS

4.5.1 Dimensions and weights of cabinets and units

Warning

Empty CRMA and CRMC cabinet cores weigh 79 kg (155 lb) and 52 kg (115 lb) respectively. Nokia recommends that you use a lifting device when moving a cabinet core.

Dimensions and weights of UltraSite EDGE BTS indoor cabinets

Table 17. Dimensions and weights of indoor cabinets

Parameter	Indoor (CRMA with IAKA)	Midi Indoor (CRMC with IAKC)
Height	1800 mm 70.9 in.	1180 mm 46.5 in.
Depth	620 mm[1] 24.4 in.	620 mm[1] 24.4 in.
Width	600 mm 23.6 in.	600 mm 23.6 in.
Maximum cabinet weight (with units)	270 kg 594 lb	170 kg 374.8 lb
Maximum cabinet weight (without units)	84 kg 185.2 lb	62.4 kg 137.5 lb

[1]Includes 52 mm air space required at rear of cabinet.

Weights of UltraSite EDGE BTS units

Table 18. Weights of units

Unit	Value (metric)	Value (imperial)
Base Operations and Interfaces (BOIx)	1.6 kg	3.6 lb
Dual Band Diplex Filter Unit (DU2A)	2.0 kg	4.42 lb

Table 18. Weights of units (cont.)

Unit	Value (metric)	Value (imperial)
Transceiver Baseband Unit (BB2x)	1.2 kg	2.7 lb
Dual Variable Gain Duplex Filter (DVxx)	13 kg	28.7 lb
Integrated Battery Backup (IBBU)	110 kg	242.5 lb
Masthead Amplifier (MNxx)	8.5 kg (900 MHz) 5.6 (1800/1900 MHz)	18.7 lb 12.4 lb
Bias Tee (BPxx)	0.4 kg	0.88 lb
Receiver Multicoupler:		
• M2xA (2-way)	0.7 kg	1.5 lb
• M6xA (6-way)	2.0 kg	4.4 lb
Power Supply:		
• PWSA	11 kg	24 lb
• PWSB	7 kg	15.4 lb
• PWSC	11 kg	24 lb
Remote Tune Combiner (RTxx)	20 kg	44.09 lb
Temperature Control System (TCS):		
• Unit Cooling Fans	.36 kg	0.8 lb
• Heater Unit (HETA)	3.0 kg	6.6 lb
• Cabinet Cooling Fan	2.6 kg	5.8 lb
Transceiver (TSxx)	5.5 kg	12.1 lb
FC E1/T1	1.4 kg	3.0 lb
FXC E1 and FXC E1/T1	1.4 kg	3.0 lb
FXC RRI	1.4 kg	3.0 lb

Table 18. Weights of units (cont.)

Unit	Value (metric)	Value (imperial)
Wideband Combiner (WCxx)	3.5 kg	7.7 lb

4.5.2 Cabinet clearances

Caution

Do not block air intake to the back of the Indoor cabinet. The recommended back clearance of 52 mm (2.0 in.) ensures proper air intake for the Unit Cooling fans of the cabinet core.

Note

There may be additional clearance requirements for co-siting with other Nokia BTS families.

Indoor cabinet

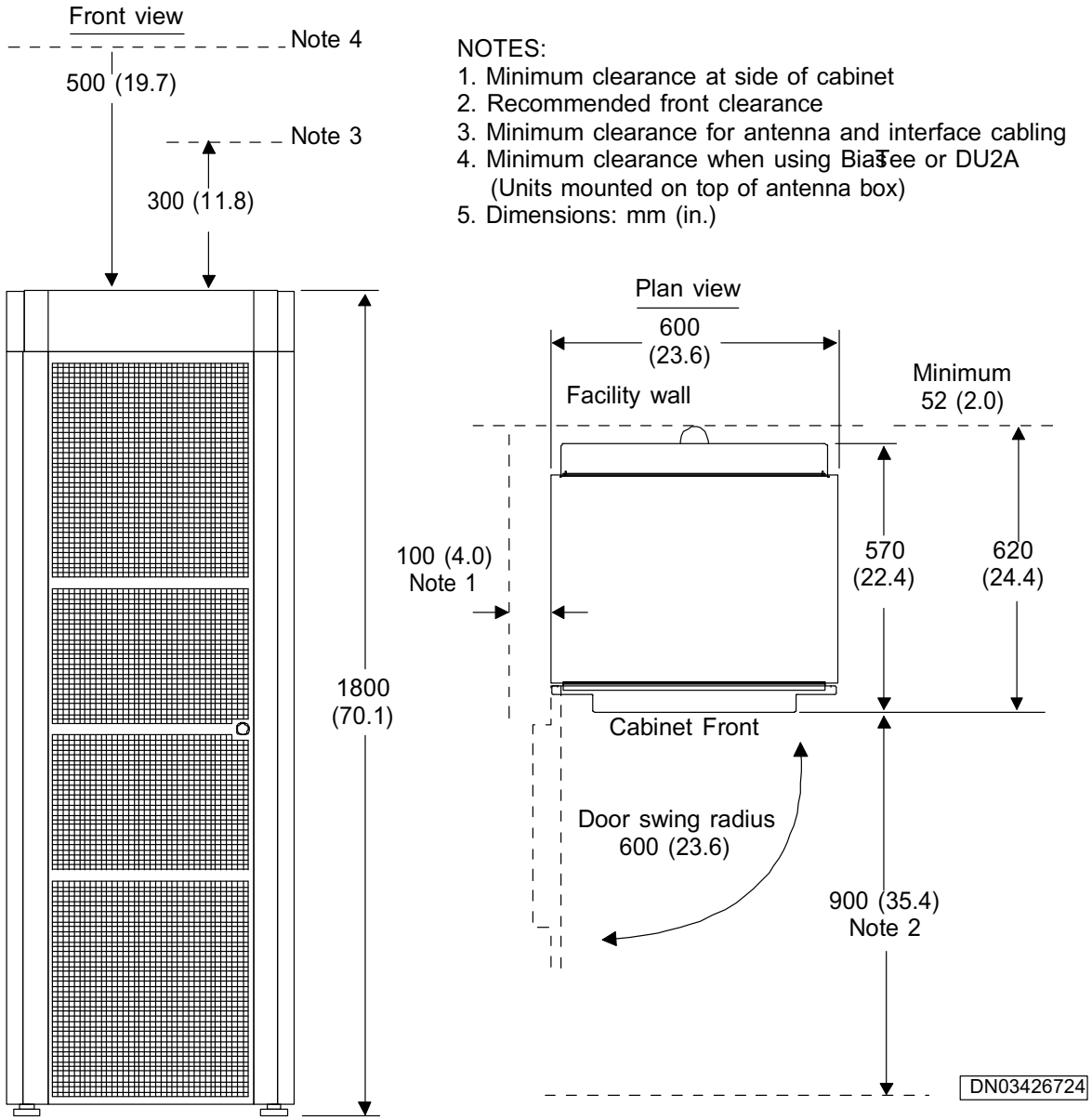


Figure 5. Clearance recommendations for indoor cabinet installation

Midi Indoor cabinet

NOTES:
1. Minimum clearance at side of cabinet
2. Recommended front clearance
3. Minimum clearance for antenna and interface cabling
4. Minimum clearance when using Bias Tee or DU2A
   (Units mounted on top of antenna box)
5. Dimensions: mm (in.)

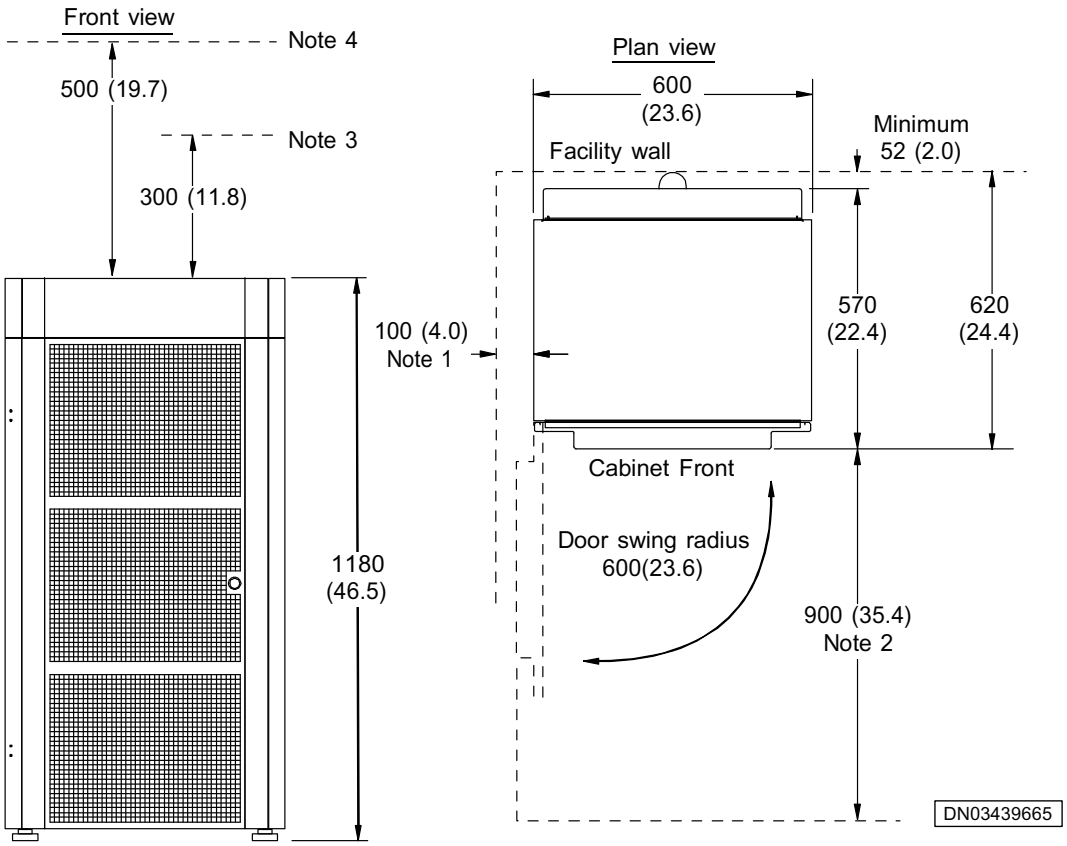


Figure 6. Clearance recommendations for Midi Indoor cabinet installation

4.6 Space requirements for Outdoor UltraSite EDGE BTS

Note

If space is limited for an outdoor installation, Nokia recommends installing the Outdoor Application Kit (OAKx) to the cabinet core first. Installation personnel can then lift, mount, and anchor the cabinet to the plinth. For more information, see *Mounting UltraSite EDGE BTS Outdoor cabinets*.

4.6.1 Dimensions and weights of cabinets and units

Warning

Empty CRMA and CRMC cabinet cores weigh 79 kg (155 lb) and 52 kg (115 lb) respectively. Nokia recommends that you use a lifting device when moving a cabinet core.

Dimensions and weights of UltraSite EDGE BTS outdoor cabinets

Table 19. Dimensions and weights of outdoor cabinets

Parameter	Outdoor (CRMA with OAKA)	Midi Outdoor (CRMC with OAKC)
Height	1940 mm 76.4 in.	1320 mm 52.0 in.
Depth	750 mm 29.5 in.	750 mm 29.5 in.
Width	770 mm 30.0 in.	770 mm 30.0 in.
Maximum cabinet weight (with units)	350 kg 770 lb	233 kg 513.7 lb

Table 19. Dimensions and weights of outdoor cabinets (cont.)

Maximum cabinet weight (without units)	150 kg 330.7 lb	125.1 kg 275.7 lb

Weights of UltraSite EDGE BTS units

Table 20. Weights of units

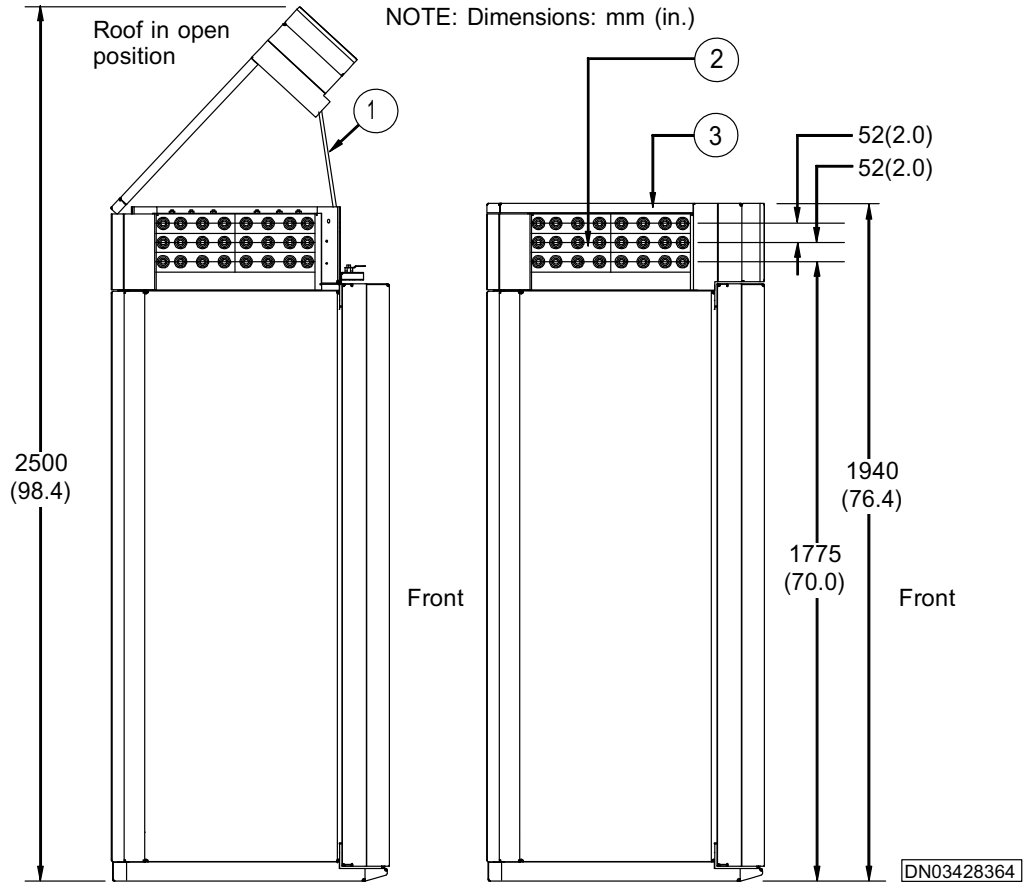
Unit	Value (metric)	Value (imperial)
Base Operations and Interfaces (BOIx)	1.6 kg	3.6 lb
Dual Band Diplex Filter Unit (DU2A)	2.0 kg	4.42 lb
Transceiver Baseband Unit (BB2x)	1.2 kg	2.7 lb
Dual Variable Gain Duplex Filter (DVxx)	13 kg	28.7 lb
Integrated Battery Backup (IBBU)	110 kg	242.5 lb
Masthead Amplifier (MNxx)	8.5 kg (900 MHz) 5.6 (1800/1900 MHz)	18.7 lb 12.4 lb
Bias Tee (BPxx)	0.4 kg	0.88 lb
Receiver Multicoupler:		
• M2xA (2-way)	0.7 kg	1.5 lb
• M6xA (6-way)	2.0 kg	4.4 lb
Power Supply:		
• PWSA	11 kg	24 lb
• PWSB	7 kg	15.4 lb
• PWSC	11 kg	24 lb
Remote Tune Combiner (RTxx)	20 kg	44.09 lb

Table 20. Weights of units (cont.)

Unit	Value (metric)	Value (imperial)
Temperature Control System (TCS):		
• Unit Cooling Fans	0.36 kg	0.8 lb
• Heater Unit (HETA)	3.0 kg	6.6 lb
• Cabinet Cooling Fan	2.6 kg	5.8 lb
Transceiver (TSxx)	5.5 kg	12.1 lb
FC E1/T1	1.4 kg	3.0 lb
FXC E1 and FXC E1/T1	1.4 kg	3.0 lb
FXC RRI	1.4 kg	3.0 lb
Wideband Combiner (WCxx)	3.5 kg	7.7 lb

4.6.2 Cabinet clearances

Outdoor cabinet



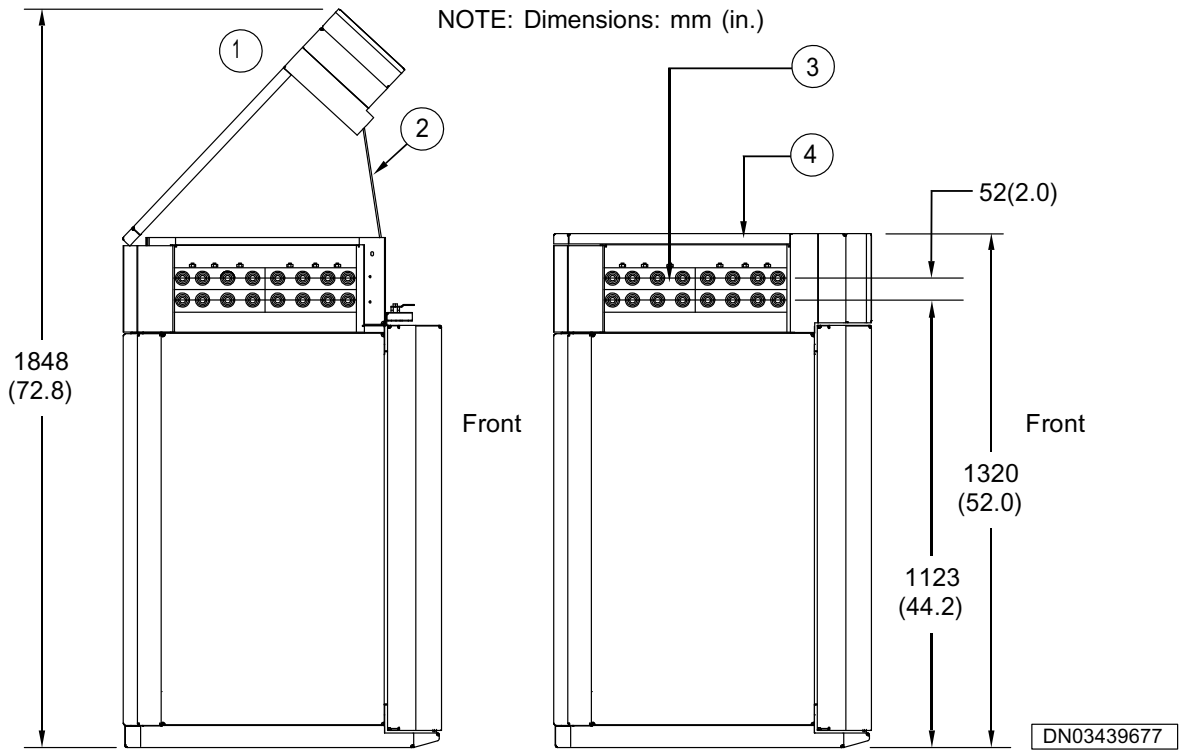
1	Roof stay
2	Cable Entry Block (In optional side position)
3	Roof

Figure 7. Top clearance recommendations for outdoor cabinet

Note

The maximum clearance for a completely open roof on the Outdoor cabinet is 2690 mm (106 in.).

Midi Outdoor cabinet



1	Roof in open position
2	Roof stay
3	Cable Entry Block (in optional side position)
4	Roof

Figure 8. Top clearance recommendations for Midi Outdoor cabinet

Note

The maximum clearance for a completely open roof on the Midi Outdoor cabinet is 2038 mm (80.2 in.).

Clearance recommended for outdoor cabinets

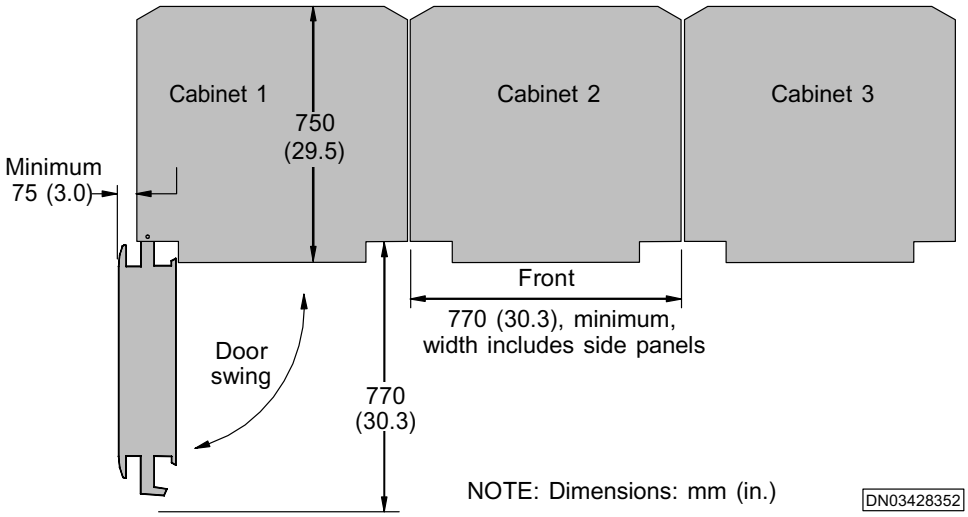


Figure 9. Clearance recommendations for outdoor cabinets

4.7 Power requirements for AC UltraSite EDGE BTS

4.7.1 Mains power

Warning

Permanently wire UltraSite EDGE BTS to a disconnect device, such as a circuit breaker.

Warning

Disconnect UltraSite EDGE BTS from the mains power network with a dedicated switch. Turn OFF UltraSite EDGE BTS with the BTS power supply switch to leave it in STAND BY mode.

Warning

Follow national regulations when working with power supply and power cables.

Nokia recommends that you protect the AC mains with a lightning and transient overvoltage protector (mains wire-in protector).

Note

The protector for the AC mains does not come with UltraSite EDGE BTS delivery. To order a mains protector, contact your local Nokia representative.

Table 21. Minimum wire size for power conductors

Configuration	Power Conductor Wire Size[1]
PWSA (AC)	13.3 mm^2 (6 AWG)

[1] Reference NFPA-70, 1999, Article 310

Table 22. Fuse rates for different configurations with AC 230V nominal voltage

Configuration	Fuse rate[1]
PWSA	3 x 16A (3-phase, not triple pole) 1 x 32A (single-phase)
PWSA with Heater unit	3 x 16A (3-phase, not triple pole) 1 x 32A (single-phase)
PWSB with Heater unit	1 x 10A (single-phase)
PWSC with Heater unit	1 x 10A (single-phase)
IBBU with 6 TSxx units	3 x 10A (3-phase, not triple pole) 1 x 30A (single-phase)

Table 22. Fuse rates for different configurations with AC 230V nominal voltage (cont.)

Configuration	Fuse rate[1]
IBBU with 6 TSxx units and Heater unit	3 x 10A (3-phase, not triple pole) 1 x 30A (single-phase)

[1] Fuse rating for lowest input voltage and maximum power consumption at 25% derating

4.7.2 Operating ranges and power consumption

This section provides operating ranges and power consumption calculations that indicate the actual power input from the electrical network and include the operating efficiency of the power supply unit.

The power consumption of UltraSite EDGE BTS is defined by the following conditions:

- nominal input voltage
- nominal power consumption at 25° C (77° F)

Determine total power consumption for specific BTS configurations by combining the power consumption of the installed cabinet and all associated units.

The typical and worst-case power consumption figures are for some common configurations, based on TSxx's average power consumption when measured in production with full GMSK-modulated RF power in all timeslots. The difference between the average and worst-case figures is due to the allowed component variations.

Note

The following assumptions apply to the maximum and typical power demand figures in the *Electrical properties for UltraSite EDGE BTS* table:

- Power consumption is for BTS cabinet only and does not take into account the efficiency of the battery back-up system (external or IBBU)
- GSM TRXs are TSxA, GSM/EDGE TRXs are TSxB
- Full GMSK-modulated RF power in all timeslots

- Combiner bypass (6 DVxx's in 12 TRX configuration and 3 DVxx's in 6 TRX configuration)
- Transmission is one FXC unit in all cases
- No external units supplied by BTS (for example, masthead amplifiers, microwave radios)
- If optional HETA is used in outdoor configurations, then 1.5 kW load must be added to the figures.

Table 23. Electrical properties for UltraSite EDGE BTS 800, 900, 1800, and 1900

Property	Voltage	12 TRX Indoor	12 TRX Outdoor	Midi 6 TRX Indoor	Midi 6 TRX Outdoor
Nominal input voltage	AC	230 VAC, 50/60 Hz			
Operating voltage range	AC	184 to 276 VAC, 45-66 Hz			
Maximum power demand GSM HW	230V AC, kW	3.4	3.5	1.7	2.1
Typical power demand GSM HW	230V AC, kW	3.1	3.3	1.6	1.7
Maximum power demand GSM/ EDGE HW	230V AC, kW	3.8	3.9	2.0	2.1
Typical power demand GSM/ EDGE HW	230V AC, kW	3.6	3.7	1.8	2.0

Table 24. Cabinet/unit power consumption

Cabinet/Unit power consumption	Value
CRMA with 11 unit fans	110 W
CRMC with 7 unit fans	70 W
BOIA	10 W
TSxA	230 W
TSxB	265 W
BB2A	10 W
BB2E	15 W
BB2F	10W
DVxx	25 W
RTxx	40 W
MNxx	15 W
E1/T1 Transmission unit	10 W
Radio Transmission	60 W

Table 25. Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)

Heater unit	Value
Voltage	230 VAC (184 to 276 VAC)
Power consumption	1500 W
Operating range	
• Cold start - heater only	-33° C to -5° C (-27.4° F to +23° F)
• Heater and BTS on	-10° C to +5° C (+14° F to + 41° F)

4.8 Power requirements for +24 VDC UltraSite EDGE BTS

4.8.1 Mains power

Warning

Permanently wire UltraSite EDGE BTS to a disconnect device, such as a circuit breaker.

Warning

Disconnect UltraSite EDGE BTS from the mains power network with a dedicated switch. Turn OFF UltraSite EDGE BTS with the BTS power supply switch to leave it in STAND BY mode.

Warning

Follow national regulations when working with power supply and power cables.

Nokia recommends that you protect the DC mains with a lightning and transient overvoltage protector (mains wire-in protector).

Note

The protector for the DC mains does not come with UltraSite EDGE BTS delivery. To order a mains protector, contact your local Nokia representative.

Note

If optional HETA is used in outdoor configurations, a separate AC supply cable for the HETA needs to be routed. See *Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)* for the electrical properties of the AC supply.

Table 26. Minimum wire size for power conductors

Configuration	Power Conductor Wire Size[1]
PWSC (+24 VDC)	95 mm^2 (3/0 AWG)

[1] Reference NFPA-70, 1999, Article 310

Table 27. Fuse rates for different configurations with +24 VDC nominal voltage

Configuration	Fuse rate[1]
PWSC	250A / cabinet
PWSC with Heater unit	250A / cabinet 16A / HETA

[1] Fuse rating for lowest input voltage and maximum power consumption at 25% derating

4.8.2 Operating ranges and power consumption

This section provides operating ranges and power consumption calculations that indicate the actual power input from the electrical network and include the operating efficiency of the power supply unit.

The power consumption of UltraSite EDGE BTS is defined by the following conditions:

- nominal input voltage
- nominal power consumption at 25° C (77° F)

Determine total power consumption for specific BTS configurations by combining the power consumption of the installed cabinet and all associated units.

The typical and worst-case power consumption figures are for some common configurations, based on TSxx's average power consumption when measured in production with full GMSK-modulated RF power in all timeslots. The difference between the average and worst-case figures is due to the allowed component variations.

Note

The following assumptions apply to the maximum and typical power demand figures in the *Electrical properties for UltraSite EDGE BTS* table:

- Power consumption is for BTS cabinet only and does not take into account the efficiency of the battery back-up system (external or IBBU)
- GSM TRXs are TSxA, GSM/EDGE TRXs are TSxB
- Full GMSK-modulated RF power in all timeslots
- Combiner bypass (6 DVxx's in 12 TRX configuration and 3 DVxx's in 6 TRX configuration)
- Transmission is one FXC unit in all cases
- No external units supplied by BTS (for example, masthead amplifiers, microwave radios)
- If optional HETA is used in outdoor configurations, a separate AC supply cable for the HETA needs to be routed. See *Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)* for the electrical properties of the AC supply.

Table 28. Electrical properties for UltraSite EDGE BTS 800, 900, 1800, and 1900

Property	Voltage	12 TRX Indoor	12 TRX Outdoor	Midi 6 TRX Indoor	Midi 6 TRX Outdoor
Nominal input voltage	+24 V DC	+24 VDC			

Table 28. Electrical properties for UltraSite EDGE BTS 800, 900, 1800, and 1900 (cont.)

Property	Voltage	12 TRX Indoor	12 TRX Outdoor	Midi 6 TRX Indoor	Midi 6 TRX Outdoor
Operating voltage range	+24 V DC	+20 to +32 VDC			
Maximum power demand GSM HW	+24V DC, kW	3.4	3.5	1.7	1.9
Maximum power demand GSM HW	+24V DC, kW	3.4	3.5	1.7	1.9
Typical power demand GSM/ EDGE HW	+24V DC, kW	3.6	3.7	1.8	2.0
Typical power demand GSM/ EDGE HW	+24V DC, kW	3.6	3.7	1.8	2.0

Table 29. Cabinet/unit power consumption

Cabinet/Unit power consumption	Value
CRMA with 11 unit fans	110 W
CRMC with 7 unit fans	70 W
BOIA	10 W
TSxA	230 W
TSxB	265 W
BB2A	10 W
BB2E	15 W
BB2F	10 W
DVxx	25 W

Table 29. Cabinet/unit power consumption (cont.)

Cabinet/Unit power consumption	Value
RTxx	40 W
MNxx	15 W
E1/T1 Transmission unit	10 W
Radio Transmission	60 W

Table 30. Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)

Heater unit	Value
Voltage	230 VAC (184 to 276 VAC)
Power consumption	1500 W
Operating range	
• Cold start - heater only	-33° C to -5° C (-27.4° F to +23° F)
• Heater and BTS on	-10° C to +5° C (+14° F to + 41° F)

4.9 Power requirements for -48 VDC UltraSite EDGE BTS

4.9.1 Mains power

Warning

Permanently wire UltraSite EDGE BTS to a disconnect device, such as a circuit breaker.

Warning

Disconnect UltraSite EDGE BTS from the mains power network with a dedicated switch. Turn OFF UltraSite EDGE BTS with the BTS power supply switch to leave it in STAND BY mode.

Warning

Follow national regulations when working with power supply and power cables.

Nokia recommends that you protect the DC mains with a lightning and transient overvoltage protector (mains wire-in protector).

Note

The protector for the DC mains does not come with UltraSite EDGE BTS delivery. To order a mains protector, contact your local Nokia representative.

Note

If optional HETA is used in outdoor configurations, a separate AC supply cable for the HETA needs to be routed. See *Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)* for the electrical properties of the AC supply.

Table 31. Minimum wire size for power conductors

Configuration	Power Conductor Wire Size[1]
PWSB (-48 VDC)	33.6 mm^2 (2 AWG)

[1] Reference NFPA-70, 1999, Article 310

Table 32. Fuse rates for different configurations with -48 VDC nominal voltage

Configuration	Fuse rate[1]
PWSB	125A / cabinet
PWSB with Heater unit	250A / cabinet 16A/ HETA

[1] Fuse rating for lowest input voltage and maximum power consumption at 25% derating

4.9.2 Operating ranges and power consumption

This section provides operating ranges and power consumption calculations that indicate the actual power input from the electrical network and include the operating efficiency of the power supply unit.

The power consumption of UltraSite EDGE BTS is defined by the following conditions:

- nominal input voltage
- nominal power consumption at 25 °C (77° F)

Determine total power consumption for specific BTS configurations by combining the power consumption of the installed cabinet and all associated units.

The typical and worst-case power consumption figures are for some common configurations, based on TSxx's average power consumption when measured in production with full GMSK-modulated RF power in all timeslots. The difference between the average and worst-case figures is due to the allowed component variations.

Note

The following assumptions apply to the maximum and typical power demand figures in the *Electrical properties for UltraSite EDGE BTS* table:

- Power consumption is for BTS cabinet only and does not take into account the efficiency of the battery back-up system (external or IBBU)
- GSM TRXs are TSxA, GSM/EDGE TRXs are TSxB
- Full GMSK-modulated RF power in all timeslots
- Combiner bypass (6 DVxx's in 12 TRX configuration and 3 DVxx's in 6 TRX configuration)
- Transmission is one FXC unit in all cases
- No external units supplied by BTS (for example, masthead amplifiers, microwave radios)
- If optional HETA is used in outdoor configurations, a separate AC supply cable for the HETA needs to be routed. See *Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)* for the electrical properties of the AC supply

Table 33. Electrical properties for UltraSite EDGE BTS 800, 900, 1800, and 1900

Property	Voltage	12 TRX Indoor	12 TRX Outdoor	Midi 6 TRX Indoor	Midi 6 TRX Outdoor
Nominal input voltage	-48 V DC	-48 VDC			
Operating voltage range	-48 V DC	-38 to -60 VDC			
Maximum power demand GSM HW	-48V DC, kW	3.0	3.1	1.5	1.7
Typical power demand GSM HW	-48V DC, kW	2.8	2.9	1.4	1.6
Maximum power demand GSM/ EDGE HW	-48V DC, kW	3.4	3.5	1.7	1.9

Table 33. Electrical properties for UltraSite EDGE BTS 800, 900, 1800, and 1900 (cont.)

Property	Voltage	12 TRX Indoor	12 TRX Outdoor	Midi 6 TRX Indoor	Midi 6 TRX Outdoor
Typical power demand GSM/ EDGE HW	-48V DC, kW	3.2	3.3	1.6	1.8

Table 34. Cabinet/unit power consumption

Cabinet/Unit power consumption	Value
CRMA with 11 unit fans	110 W
CRMC with 7 unit fans	70 W
BOIA	10 W
TSxA	230 W
TSxB	265 W
BB2A	10 W
BB2E	15 W
BB2F	10 W
DVxx	25 W
RTxx	40 W
MNxx	15 W
E1/T1 Transmission unit	10 W
Radio Transmission	60 W

Table 35. Voltage, power consumption, and operating range of HETA unit (optional in Outdoor BTS)

Heater unit	Value
Voltage	230 VAC (184 to 276 VAC)
Power consumption	1500 W
Operating range	
• Cold start - heater only	-33° C to -5° C (-27.4° F to +23° F)
• Heater and BTS on	-10° C to +5° C (+14° F to + 41° F)

4.10 Grounding (earthing) requirements for UltraSite EDGE BTS

To avoid interference, Nokia recommends planning large protective earthing (PE) systems on a case-specific basis.

To protect the cabinet against overvoltage through antenna equipment, communication cables or power supply lines, install the grounding cables before you install UltraSite EDGE BTS.

Caution

A power plug with a PE connection is not sufficient for UltraSite EDGE BTS. Grounding must have a fixed, non-removable connection.

Caution

Avoid unnecessary loops and sharp bending of the grounding cable. Do not run the grounding cables parallel with power cables.

Caution

To prevent damage to units, you must connect grounding to the cabinet before installing any of the units.

Note

Follow national, state and local regulations when planning the grounding of an UltraSite EDGE BTS site.

4.10.1 Guidelines for grounding UltraSite EDGE BTS

- Route the grounding cables as directly as possible from the equipment to the grounding point.
- Select one of two UltraSite EDGE BTS grounding point alternatives according to local regulations. See *Overview of connecting grounding cables to UltraSite EDGE BTS*.

Note

For instructions for installing ground cables for Network Equipment Building Systems (NEBS) compliant sites, see *Connecting the grounding cable of UltraSite EDGE BTS for a NEBS installation*.

- Connect the grounding cable to the cabinet grounding points depending on which grounding point alternative you select.
- Connect all cabinets, Main Distribution Frame (MDF) cable ladders and DC supply frames to the main grounding busbar at the site.
- Conductor sizes for earthing cables must be in accordance with all national, state and local regulations.

Note

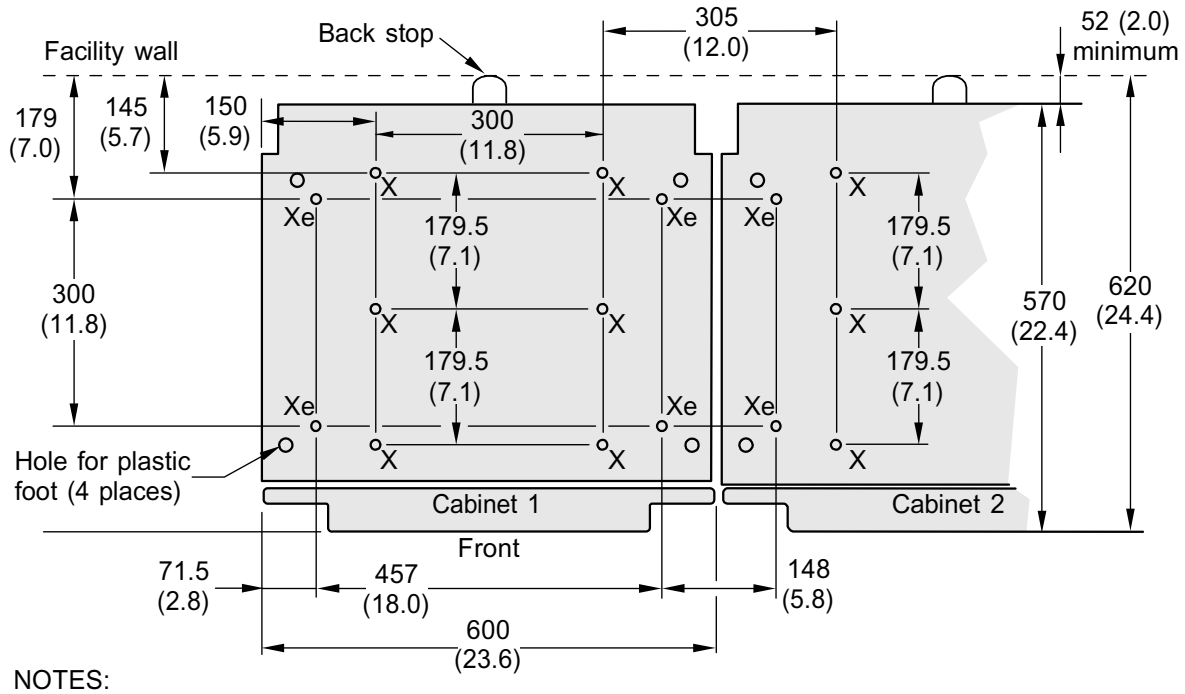
For recommended fuse ratings, see *Power requirements for AC UltraSite EDGE BTS*, *Power requirements for +24 VDC UltraSite EDGE BTS* and *Power requirements for -48 VDC UltraSite EDGE BTS*.

- Do not exceed a resistance of 0.1 Ω for the connection between the grounding point and the earthing contact and parts.
- Use an 8 mm single-hole lug, a 5 or 6 mm two-hole lug (NEBS) PE connector.
- Ground antenna feeders as required by climatic condition and in accordance with local regulations.

4.11 Cabinet base requirements for Indoor UltraSite EDGE BTS

Note

Ensure that the backstop is oriented toward the rear wall for proper airflow.



NOTES:
1. Xe - Location of earthquake anchor holes
2. X - Location of additional anchor holes
3. Dimensions: mm (in.)

Figure 10. Cabinet base measurements for multiple Indoor cabinets

4.12 Cabinet base requirements for Outdoor UltraSite EDGE BTS

Note

The anchor holes used for mounting outdoor cabinets comply with requirements for earthquake zone installation.

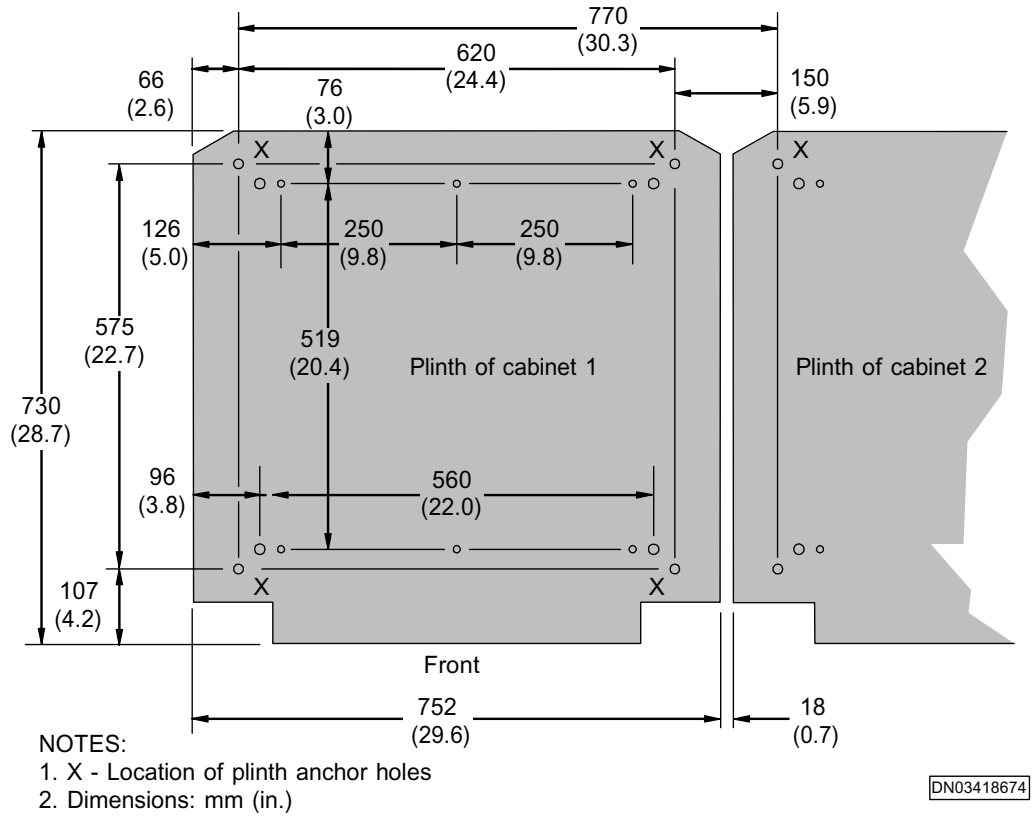


Figure 11. Plinth measurements for multiple outdoor cabinets

5 Glossary

5.1 Glossary for UltraSite EDGE BTS

5.1.1 Abbreviations and acronyms

This section lists abbreviations and acronyms used throughout Nokia UltraSite EDGE Solution documentation.

AC	Alternating Current
ACFU	AC Filter Unit
A/D	Analog/Digital
ADC	Analog to Digital Converter
ADUA	AC/DC control and distribution unit for Integrated Battery Backup (IBBU)
AGC	Automatic Gain Control
ALS	Automatic Laser Shutdown
AMR	Adaptive Multi-Rate coding
ANSI	American National Standards Institute
ANT	Antenna connector
ARFN	Absolute Radio Frequency Channel Number
ASIC	Application Specific Integrated Circuit
ATM	Asynchronous Transfer Mode

AWG	American Wire Gauge
AXC	ATM cross-connect
AXU	ATM cross-connect unit
BAPT	Bundesamt für Post und Telekommunikation Telecommunications advisory agency of Federal Republic of Germany
BATx	Rectifier for battery backup
BBAG	12 V battery for Integrated Battery Backup (IBBU)
BB2x	Transceiver Baseband unit • BB2A for GSM • BB2E for GSM/EDGE
BCCH	Broadcast Control Channel
BCF	Base Control Function
BER	Bit Error Ratio The ratio of the number of bit errors to the total number of bits transmitted in a given time interval.
BIST	Built-In Self Test A technique that provides a circuit the capability to carry out an implicit test of itself.
BOIx	Base Operations and Interfaces unit
BPxN	Bias Tee without VSWR monitoring • BPDN for GSM 900/1800/1900 • BPxV Bias Tee with VSWR monitoring • BPGV for GSM 900 • BPDV for GSM 1800/1900
BS	British Standards
BSC	Base Station Controller

BSS	Base Station Subsystem
BTS	Base Transceiver Station (Base Station)
CC	Cross-Connection
CCCH	Common Control Channel
CCITT	Comité Consultatif International Télégraphique et Téléphonique International Telegraph and Telephone Consultative Committee (Telecommunications advisory agency of France)
CCUA	Cabinet Control Unit
CDMA	Code Division Multiple Access A technique in which the radio transmissions using the same frequency band are coded in a way that a signal from a certain transmitter can be received only by certain receivers
CE	Cable Entry; Consumer Electronics; Conformit Européen (European Conformity) CH Channel
CHDSP	Channel Digital Signal Processor
CN	Change Note A short trouble management document in a specified form sent to a customer about a modification in a product
CRC	Cyclic Redundancy Check A method for detecting errors in data transmission.
CRMx	Core Mechanics for Nokia UltraSite EDGE Base Station Indoor and Outdoor cabinet • CRMA for Indoor and Outdoor cabinets • CRMB for Site Support cabinets • CRMC for Midi Indoor and Outdoor cabinets
CSC	Customer Services Centre
D/A	Digital/Analog

DC	Direct Current
DCS	Digital Cellular System
DDS	Direct Digital Synthesis The frequency synthesis in which logic and memory are used to digitally construct the desired output signal, and a digital-to-analogue converter is used.
DL	(Downlink) The direction of transmission in which the BTS is the transmitting facility and the mobile station is the receiving facility.
DIP	Dual In-line Package
DRAM	Dynamic Random Access Memory
DRX	Discontinuous Reception
DSP	Digital Signal Processor
DTX	Discontinuous Transmission
DU2A	Dual Band Diplex Filter unit for GSM 900/1800
DVxx	Dual Variable Gain Duplex Filter unit • DVTB for GSM/EDGE 800 • DVTC for GSM/EDGE 800 co-siting • DVGA for GSM/EDGE 900 • DVHA for GSM/EDGE 900 customer-specific H band • DVJA for GSM/EDGE 900 customer-specific J band • DVDC for GSM/EDGE 1800 • DVDA for GSM/EDGE 1800 A band • DVDB for GSM/EDGE 1800 B band • DVPA for GSM/EDGE 1900
E1	European Digital Transmission Format Standard (2.048 Mbit/s)
EAC	External Alarms and Controsl

EC	European Community
EDGE	Enhanced Data rates for Global Evolution
EEC	European Economic Community
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EN	European Norm
EQDSP	Equaliser Digital Signal Processor
ESD	Electrostatic Discharge
ET	Exchange Terminal
ETSI	European Telecommunications Standards Institute
Ext.	External
FACCH	Fast Associated Control Channel
FACH	Forward Access Channel
FCC	Federal Communications Commission The United States federal agency responsible for the regulation of interstate and international communications by radio, television, wire, satellite, and cable.
FC E1/T1	Wireline transmission unit (75 [ohm] E1, 120 [ohm] E1, or 100 [ohm] T1) of Nokia UltraSite EDGE Base Station without cross-connection capability.
FCLK	Frame Clock
FET	Field Effect Transistor
FHS	Frequency Hopping Synthesiser

FIFP	Forwarded Intermediate Frequency Power
FIKA	+24 VDC Installation Kit
FPGA	Field Programmable Gate Array
FXC E1	Wireline transmission unit (75 [ohm] E1) with four line interfaces to the 2 Mbit/s (E1) transmission line; cross-connection capability at 8 kbit/s level.
FXC E1/T1	Wireline transmission unit (120 [ohm] E1 or 100 [ohm] T1) with four line interfaces to the 2 Mbit/s (E1) or 1.5 Mbit/s (T1) transmission line; cross-connection capability at 8 kbit/s level.
FXC RRI	Radio link transmission unit (radio indoor unit) with cross-connection capability at 8 kbit/s level. Used with MetroHopper Radio and FlexiHopper Microwave Radio.
Gb	Interface between RNC and SGSN
GMSK	Gaussian Minimum Shift Keying
GND	Ground; Grounding (protective earthing). See Grounding and PE.
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications • GSM 800 GSM 800 MHz frequency band • GSM 900 GSM 900 MHz frequency band • GSM 1800 GSM 1800 MHz frequency band • GSM 1900 GSM 1900 MHz frequency band
GUI	Graphical User Interface
HDLC	High-level Data Link Control
HETA	Base station cabinet heater
HO	Handover

	The action of switching a call in progress from one radio channel to another, to secure the continuity of the established call
HSCSD	High-Speed Circuit Switched Data
HV	High Voltage
HW	Hardware Specfically, electronic equipment supporting data transmission and processing tasks, and the electrical and mechanical devices related to their operation
IAKx	Indoor Application Kit for Nokia UltraSite EDGE Base Station • IAKA for UltraSite Indoor cabinet • IAKC for UltraSite Midi Indoor cabinet
IBBU	Integrated Battery Backup
IC	Integrated Cell
ICE	Intelligent Coverage Enhancement
ID	Identification; Identifier IE Information Element The basic unit of a transaction capabilities application part (TCAP) message.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IF	Intermediate Frequency
IFM	Interface Module
IFU	Interface unit
ILKA	Indoor Lock Kit
ILMT	Integrated Local Management Tool

IMA	Inverse Multiplexed ATM
IP	Ingress Protection
IRPA	International Radiation Protection Association
ISDN	Integrated Services Digital Network
ISHO	Inter-system handover The handover from one system to another.
ISO	International Organization for Standardization
ITU	International Telecommunication Union
L2	AC Phase 2
L3	AC Phase 3
Iu	The interconnection point between the RNC and the Core Network
Iub	Interface between the RNC and node B
Iubis	Interface between the RNC and the BTS
Iur	The logical interface for the interconnection of two radio network controller (RNC) components of the UMTS terrestrial radio access network (UTRAN) system
JIS	Japanese Industrial Standard
LAN	Local Area Network A data transmission network covering a small area.
LAPD	Link Access Protocol on D-channel between the BSC and BTS
LED	Light Emitting Diode
LMB	Local Management Bus
LMP	Local Management Port

LNA	Low-Noise Amplifier
LO	Local Oscillator
LTE	Line Terminal Equipment
LV	Low Voltage
LVD	Low Voltage Disconnect
LVDS	Low Voltage Differential Signalling
LVTTL	Low Voltage Transistor Transistor Logic
M2xA	2-way Receiver Multicoupler unit • M2LA for GSM/EDGE 800/900 • M2HA for GSM/EDGE 1800/1900 • M6xA 6-way Receiver Multicoupler unit • M6LA for GSM/EDGE 800/900 • M6HA for GSM/EDGE 1800/1900
MAC	Medium Access Control function, handles the channel allocation and multiplexing, that is, the use of physical layer functions.
MCLG	Master Clock Generator
MDF	Main Distribution Frame
MHA	Masthead Amplifier
MMI	Man-Machine Interface
MML	Man-Machine Language A text-based command language with a standardised structure, designed to facilitate direct user control of a system.
MNxx	Masthead Amplifier specific to Nokia UltraSite EDGE Base Station • MNGA for GSM/EDGE 800/900 • MNDA for GSM/EDGE 1800 A band • MNDB for GSM/EDGE 1800 B band

- MNPA for GSM/EDGE 1900 A band
- MNPB for GSM/EDGE 1900 B band
- MNPC for GSM/EDGE 1900 C band

MPT — Ministry of Posts and Telecommunications

Telecommunications regulatory agency of Great Britain.

MS — Mobile Station

User equipment which uses a radio connection, and which can be used in motion or at unspecified points. This is usually a mobile phone.

MSC — Mobile Switching Centre

The mobile network element which performs the switching functions in its area of operation, and controls cooperation with other networks.

MTBF — Mean Time Between Failure

NCRP — National Council on Radiation Protection and Measurements

NCU — Node Control Unit

NEBS — Network Equipment Building Systems

NED — Nokia Electronic Documentation

NMS — Network Management System

O&M — Operation and Maintenance

OAKB — Cable entry kit for BTS co-siting

OAKx — Outdoor Application Kit for Nokia UltraSite EDGE Base Station

- OAKA for UltraSite Outdoor cabinet
- OAKC for UltraSite Midi Outdoor cabinet
- OAKD for UltraSite Midi Outdoor to Talk-family Co-siting

OBKA — Outdoor Bridge Kit

OCXO	Oven Controlled Crystal Oscillator An oscillator in which the crystal and critical circuits are temperature-controlled by an oven.
OEKA	Outdoor (cable) Entry Kit
OFKA	Outdoor Air Filter Kit
OFKC	MIDI Outdoor Air Filter Kit
OMU	Operation and Maintenance Unit
OMUSIG	OMU Signalling
OVP	Over-Voltage Protection
PC	Personal Computer
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PE	Protective earthing (grounding) See GND and Grounding.
PFC	Power Factor Correction
PLL	Phase-Locked Loop
Point-to-point	Transmission between two fixed points
PSM	Power System Management
PWM	Pulse Width Modulation
PWSx	AC/DC Power Supply unit • PWSA for 230 VAC input • PWSB for -48 VDC input • PWSC for +24 VDC input
Q1	Nokia proprietary transmission management protocol

RACH	Random Access Channel
RAKE	A receiver capable of receiving and combining multipath signals
RAM	Random Access Memory
RAN	Radio Access Network A third generation network that provides mobile access to a number of core networks of both mobile and fixed origin.
RCD	Residual Current Device
RF	Radio Frequency
RFF	Radio Frequency Fingerprinting
RIFP	Reflected Intermediate Frequency Power
RLE	Radio Link Equipment
RNC	Radio Network Controller The network element in a radio access network which is in charge of the use and the integrity of radio resources.
ROM	Read Only Memory
RRI	Radio Relay Interface
RSSI	Received Signal Strength Indicator
RTC	Remote Tune Combining
RTxx	Remote Tune Combiner • RTGA for GSM/EDGE 900 • RTHA for GSM/EDGE 900 H band • RTJA for GSM/EDGE 900 J band • RTDC for GSM/EDGE 1800 • RTDA for GSM/EDGE 1800 A band • RTDB for GSM/EDGE 1800 B band • RTPA for GSM/EDGE 1900

RTN	Return
RX	Receiver; Receive
SCF	Site Configuration File
SCT	Site Configuration Tool
SDCCH	Stand-alone Dedicated Control Channel
SDH	Synchronous Digital Hierarchy
SMB	Sub-Miniature B Connector
SMS	Short Message Service
SSS	Site Support System
STM	Synchronous Transport Module
STM-1	Synchronous Transport Module (155 Mbit/s)
SW	Software
Sync	Synchronization The process of adjusting corresponding significant instances of signals, in order to obtain the desired phase relationship between these instances.
T1	North American Digital Transmission Format Standard (1.544 Mbit/s)
TC	Transcoder
TCH	Traffic Channel The logical radio channel that is assigned to a base transceiver station and is primarily intended for conversation.
TCP/IP	Transport Control Protocol/Internet Protocol
TCS	Temperature Control System
TDMA	Time Division Multiple Access

TE	Terminal Equipment Equipment that provides the functions necessary for user operation of the access protocols.
TMS	Transmission Management System The network system for managing equipment settings, and for centralised retrieval of statistics and alarm information from transmission equipment connected to the system.
TS	Time Slot A cyclic time interval that can be recognised and given a unique definition.
TRE	Transmission Equipment
TRX	Transceiver
TRXSIG	TRX Signalling
TS	Time Slot
TSxx	Transceiver (RF unit), specific to Nokia UltraSite EDGE Base Station • TSTB for GSM/EDGE 800 • TSGA for GSM 900 • TSGB for GSM/EDGE 900 • TSDA for GSM 1800 • TSDB for GSM/EDGE 1800 • TSPA for GSM 1900 • TSPB for GSM/EDGE 1900
TTL	Transistor Transistor Logic
TX	Transmitter; Transmit
UC	Unit Controller
UI	User Interface
UL	Underwriters Laboratories

UL (Uplink) The direction of transmission in which the mobile station is the transmitting facility and the BTS is the receiving facility.

- 2-way uplink diversity - The function by which a BTS uses two antennas and two receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.
- 4-way uplink diversity - The function by which a BTS uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

UMTS Universal Mobile Telecommunications System

UTRAN / UMTS
Terrestrial Radio Access Network

A radio access network (RAN) consisting of radio network controllers (RNCs) and base transceiver stations (BTSs). It is located between the Iu interface and the wideband code division multiple access (WCDMA) radio interface.

UPS Uninterruptible Power Supply

VC Virtual Channel

VCO Voltage Controlled Oscillator

An oscillator for which a change in tuning voltage results in a predetermined change in output frequency.

VLL Line-to-Line Voltage

VP Virtual Path

The unidirectional transport of ATM cells belonging to virtual channels that are associated by a common identifier value.

VPCI Virtual Path Connection Identifier

An identifier which identifies the virtual path connection between two B-ISDN ATM exchanges, or between a B-ISDN ATM exchange and a B-ISDN user.

VPI — Virtual Path Identifier

An identifier which identifies a group of virtual channel links at a given reference point that share the same virtual path connection.

VSWR — Voltage Standing Wave Ratio

The ratio of maximum to minimum voltage in the standing wave pattern that appears along a transmission line. It is used as a measure of impedance mismatch between the transmission line and its load.

VXxx — Transmission unit, specific to Nokia UltraSite EDGE Base Station

- VXEA for FC E1/T1
- VXRA for FC RRI
- VXRB for FXC RRI
- VXTA for FXC E1
- VXTB for FXC E1/T1

WAF — Wideband Antenna Filter unit

WAM

Wideband Application Manager unit

WBC — Wideband Combining unit

WCC — Wideband Cabinet Core

WCDMA — Wide band Code Division Multiple Access

A spread spectrum CDMA technique used to increase the capacity and coverage of wireless communication networks.

WCH — Wideband Cabinet Heater

WCxA — Wideband Combiner, specific to Nokia UltraSite EDGE Base Station

- WCGA for GSM/EDGE 800/900
- WCDA for GSM/EDGE 1800
- WCPA for GSM/EDGE 1900

WEK	Wideband Extension Kit
WFA	Wideband Fan
WHX	Wideband Heat Exchanger
WIC	Wideband Input Combiner
WIK	Wideband Indoor Kit
WOC	Wideband Output Combiner
WOK	Wideband Outdoor Kit
WPA	Wideband Power Amplifier unit
WPS	Wideband Power Supply unit
WSC	Wideband System Clock
WSM	Wideband Summing and Multiplexing unit
WSP	Wideband Signal Processor unit
WTR	Wideband Transmitter and Receiver

5.1.2 Terms

This section provides definitions for terms used throughout Nokia UltraSite Solution documentation.

Abis Interface
: Interface between a Base Transceiver Station (BTS) and the Base Station Controller (BSC) and between two BTSs.

Absolute radio frequency channel number
: See absolute radio frequency number.

Absolute radio frequency number; absolute radio frequency channel number; ARFN; ARFCN
: Radio frequency used in connection with, for example, mobile originating and terminating test calls.

Adaptive multi-rate speech codec; AMR speech codec; AMR codec; AMR
: Speech codec which adapts its operation optimally according to the prevailing channel conditions.

Air Interface — Interface between MS and BTS.

Alarm — Announcement given to the operating personnel about abnormal functioning of the system or about a failure, or an indication of the degradation of the service level or reliability.

Alarm Status — Classification of the severity of an alarm, such as Critical, Major, Minor, and Information.

Alternating current; AC
A periodic current having a mean value zero.

Analogue-to-digital converter; Analog-to-digital converter /US/; A/D converter; ADC
A device which converts an analogue input signal to a digital output signal carrying equivalent information.

Application-specific integrated circuit; custom circuit; custom IC; ASIC
Integrated circuit which is designed for a specific application and a specific customer and which is not available to other customers.

ATM connection control; connection control; CC
Function that keeps track of connection resources and based on those handles the operations related to different kind of cross-connections.

ATM inverse multiplexing
See inverse multiplexing for ATM.

Backplane — Connector board at the back of Nokia UltraSite cabinets to which plug-in units are directly connected. See also BATA backplane and RFU backplane.

Base station — See base transceiver station.

Base station controller; BSC
Network element in the public land mobile network (PLMN) for controlling one or more base transceiver stations (BTS) in the call set-up functions, in signalling, in the use of radio channels and in various maintenance tasks.

Base station system; BSS
System of base stations (BSs) and base station controllers which is viewed by the mobile services switching centre (MSC) through a single interface.

Base transceiver station; base station; BTS; BS
: Network element in a mobile network responsible for radio transmission and reception to or from the mobile station.

BATA backplane
: Additional backplane required in a Site Support cabinet when using 12 rectifiers.

Bias Tee
: Unit that provides DC power for an associated MHA unit.

Cabinet Control Unit
: Module of the ADUA or ADUB that manages battery control, climatic control, alarm reporting, and serial and version number reporting for the IBBU or Nokia UltraSite Support cabinet. The CCU connects to the BOIx with Q1-bus.

Cell
: Coverage area of a given BTS where transmission is acceptably received.

Cell breathing
: Variation of the cell coverage area; depends on the interference and power requirements.

Cellular Network
: Two or more base stations connected together to provide an area of coverage for Mobile Stations (MS).

CENELEC
: Comité European de Normalisation ELECtrotechnique. European Committee for Electrotechnical Standardization.

Chain Connection
: Transmission solution in which the BTSs are interconnected through a chain, and the first BTS in the chain is connected to the BSC. See Loop Connection, Multidrop Connection, and Star Connection.

Chip
: Signal element.

Chip rate
: Number of chips transmitted in one second.

Commissioning
: Tasks performed to enable the BTS to be connected to the network. Includes operational tests and configuring of the transmission equipment.

Coverage Area
: See Cell.

Cross-connection
: Connection between input and output ports of a network element.

Cross-connection bank
: Information base that defines the cross-connections of a network element. The network element contains two or more banks, one of which is always active.

Custom circuit
: See application-specific integrated circuit.

Custom IC
: See application-specific integrated circuit.

D-bus
: Bus used for traffic communication between the transmission units and BB2x units (D1-bus) and for internal O&M communication with the BOIx, BB2x, and RTxx units (D2-bus).

Despreading
: The received wideband signal is modulated with the spreading code to get a narrowband signal after the multipath propagation in spread spectrum systems.

Digital signal processor; DSP
: A processor designed for signal handling, resembling an ordinary microprocessor.

Discontinuous reception; DRX
: Means of saving battery power (for example in hand-portable units) by periodically and automatically switching the mobile station receiver on and off.

Discontinuous transmission; DTX
: Feature which enables saving battery power (for example in hand-portable units) and reducing interference by automatically switching the transmitter off when no speech or data are to be sent.

Downlink Diversity
: See Frequency Hopping.

Earthing
: See Grounding.

F-bus
: Frequency Hopping bus. See Frequency Hopping.

Finger; rake finger; RAKE finger
: Receiver unit that despreads one multipath signal.

Four-way uplink diversity; 4-way uplink diversity
: Function by which a base transceiver station (BTS) uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

Forward link
: See downlink.

Flash memory
: Nonvolatile, electronically writable memory, similar to EEPROM in function, but which must be erased in blocks.

Flexbus
: Bidirectional coaxial cable that carries up to 16 x 2 Mbit/s signals and power between transmission equipment, such as a radio outdoor and indoor unit.

Frequency-change oscillator
: See local oscillator.

Frequency Hopping
: Function in which a BTS swaps two transmitters on a single channel to obtain improved overall MS receiver sensitivity in a system that is subject to random fading.

Gain
: Signal amplification, expressed in dBi—decibels over a theoretic, isotropic, and uniformly radiating antenna.

Grounding
: Protecting the equipment and the users against lightning and surges through the external connections.

I^2C-bus
: Integrated Inter Cell communication bus used for polling, autodetection, version and serial number management, temperature polling, and alarm collection in units without a microprocessor.

Handover
: The handover occurs between two cells; the signal goes through one base station or base station sector at a time.

Human-machine interface; man-machine interface; HMI; MMI
: A subsystem or function which provides user interface functions in a man-machine language.

Installation
: Tasks performed to enable the BTS to be mounted at the site.

Integration
: Tasks performed to make the BTS functional in the cellular network. Includes making test calls.

Inter-frequency handover
: Handover where the new carrier frequency is different from the current one.

Inter-system handover
: Handover from one system to another, e.g. between a 3rd generation system and GSM.

Inverse multiplexing for ATM; ATM inverse multiplexing; inverse multiplexing; IMA
: The transmission method in which ATM cells in a cell stream are divided across several physical E1 links on a cell-by-cell basis, and then reassembled at the receiving end without affecting the original cell order.

Loop connection
: Transmission solution in which BTSs are interconnected in a loop. For example, the first and last BTSs are connected to the BSC. See Chain Connection, Multidrop Connection, and Star Connection.

Macrocellular
: Application that covers large areas with a cell radius of 1 to 10 km (0.6 to 6 miles). The coverage area is achieved when the antenna is installed high and off the ground.

Maximum ratio combining
: A signal combining technique in which each signal is multiplied by a weight factor that is proportional to the signal amplitude: the strong signals are further amplified, while the weak signals are attenuated.

Microcellular
: Application that typically covers areas with a cell radius of 100 m to 1 km (327 feet to 0.6 miles). The antennas are installed below rooftop level.

Microwave radio
: Radio equipment for establishing an aligned and fixed radio connection between two points.

Midi
: Indoor or Outdoor cabinet with up to six TRXs.

Multidrop Connection
: Transmission solution in which one or more BTS chains are connected to one BTS that is connected to the BSC. See Chain Connection, Loop Connection, and Star Connection.

Network Element

Any equipment that can be managed, monitored, or controlled in a telecommunications network.

Network Topology

Method of transmission between the cells of a network. Examples of transmission solutions are chain, loop, multidrop, and star connections.

Node Manager

A feature of Power System Management (PSM), the Node Manager software called PSMMan is used to control network elements, or nodes, of the Site Support System.

Nokia FlexiHopper

Nokia family of Flexbus-compatible microwave radios for the 13, 15, 18, 23, 26, and 38 GHz frequency bands, in which the radio transmission capacity can be selected using software. The radio transmission capacity of Nokia FlexiHopper can be 2 x 2, 4 x 2, 8 x 2, or 16 x 2 Mbit/s.

Nokia FlexiHopper outdoor unit can be used with different indoor units: FIU 19, RRIC, FC RRI, and FXC RRI.

Nokia Hopper Manager

PC software application used for controlling and monitoring Nokia FlexiHopper and Nokia MetroHopper radios connected to FIU19 or RRIC indoor units.

Nokia MetroHopper

Nokia Flexbus-compatible radio for the 58 GHz frequency band that does not require coordinated frequency planning. The main use of Nokia MetroHopper is to provide 4 x 2 Mbit/s, point-to-point wireless access for Nokia MetroSite BTS and Nokia MetroHub.

Nokia MetroHopper outdoor unit can be used with different indoor units: FIU 19, RRIC, FC RRI, and FXC RRI.

Nokia MetroHub

Nokia’s compact transmission node with cross-connection and grooming functions, such as FXC RRI. Nokia MetroHub contains up to five transmission units.

Nokia MetroSite GSM BTS

Nokia’s compact four-TRX GSM base station for Nokia MetroSite capacity solution. Nokia MetroSite GSM BTS can contain one transmission unit.

Nokia Q1 Connection Tool
: Program that makes connection and node definitions for identifying objects on a Nokia Q1 managed network. See Q1.

Nokia UltraSite
: Multimedia coverage and capacity macrocellular base station.

Omnidirectional Cell
: Cell with a 360× sector; also known as standard cell.

Operator
: Telecommunications company running telecommunications services in a specific geographical area.

PCM time slot
: 1.5 Mbit/s PCM circuit is divided into twenty-four 64 kbit/s time slots.

  2 Mbit/s PCM circuit is divided into thirty-two 64 kbit/s time slots.

Peltier elements
: Elements that absorb or emit heat when an electric current passes across a junction between two materials. Used for heating and cooling IP20 protection class equipment.

Point-to-point
: Transmission between two fixed points.

Q1-bus
: Bus in Nokia UltraSite EDGE BTS, used for local transmission management (Q1int) and for extending the management to external equipment.

Radio interface; air interface; AI
: The interface between the mobile station (MS) and the radio equipment in the network. This is defined by functional characteristics, common radio (physical) interconnection characteristics, and other characteristics as appropriate.

Radio Relay
: Microwave radio unit that replaces a fixed cable with a microwave radio link in the Abis Interface.

Rectifier
: Device for converting alternating current to direct current. See BATx.

RFU backplane
: Backplane in Nokia UltraSite EDGE BTS cabinet to which RF units are attached.

Sectored BTS Site
: A site with multiple cells positioned to supply the desired radiation.

Sectored Cell — A cell with a conical coverage area achieved by means of a directional aerial.

Single Sector — A part of the BTS's physical equipment that serves a single cell in the network radio topology.

Site — Location where telecommunication equipment has been installed. For example, a site can contain a base station and transmission equipment with an equipment shelter and antenna tower.

Several network elements can be located at a site.

Soft handover — Handover where the signal goes through two base stations or base station sectors at a time.

Softer handover — Handover where the signal goes through two sectors in one base station area at a time.

Software Package — Software collection consisting of the components of the BTS operating system.

Spreading — A process in which the signal is modulated with the pseudo noise code to get a wideband signal for multipath propagation in spread spectrum systems.

Spreading code — A code that is used to despread a signal in spread spectrum communications.

Star Connection — Transmission solution in which three branches with one BTS in each are connected to a common node. See Chain Connection, Loop Connection, and Multidrop Connection.

Synchronisation (Sync) — Process of adjusting the corresponding significant instances of signals (between adjacent and serving cells) to obtain the desired phase relationship between these instances.

Uplink — Direction of transmission in which the mobile station is the transmitting facility and the BTS is the receiving facility.

Uplink Diversity

2-way uplink diversity – Function in which a BTS uses two antennas and two receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

4-way uplink diversity – Function in which a BTS uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

See Frequency Hopping.

Related Topics

Overview of planning UltraSite EDGE BTS installation

Reference

UltraSite EDGE BTS assembly tree

Overview of planning UltraSite EDGE BTS cabinet installation

Descriptions

Technical overview of UltraSite EDGE BTS

Planning for UltraSite EDGE BTS installation at a new site

Instructions

Overview of UltraSite EDGE BTS installation at a new site

Planning for UltraSite EDGE BTS installation at an existing UltraSite EDGE BTS site

Instructions

Overview of UltraSite EDGE BTS installation at an existing UltraSite EDGE BTS site