Step 4 Mounting Installations

This section explains how to mount the Node B Rack Mount shelves into racks.

Mounting Rack

The figure below illustrates the 19inch mounting rack plus support shelves, some racks or cabinets can use support rails. This construction can be within an enclosure or cabinet.

The support shelves or rails are specific to the rack, enclosure or cabinet being installed, thus their specification shall be part of same selection.

Figure 6-6 : Mounting Rack + Support Shelves/Rails
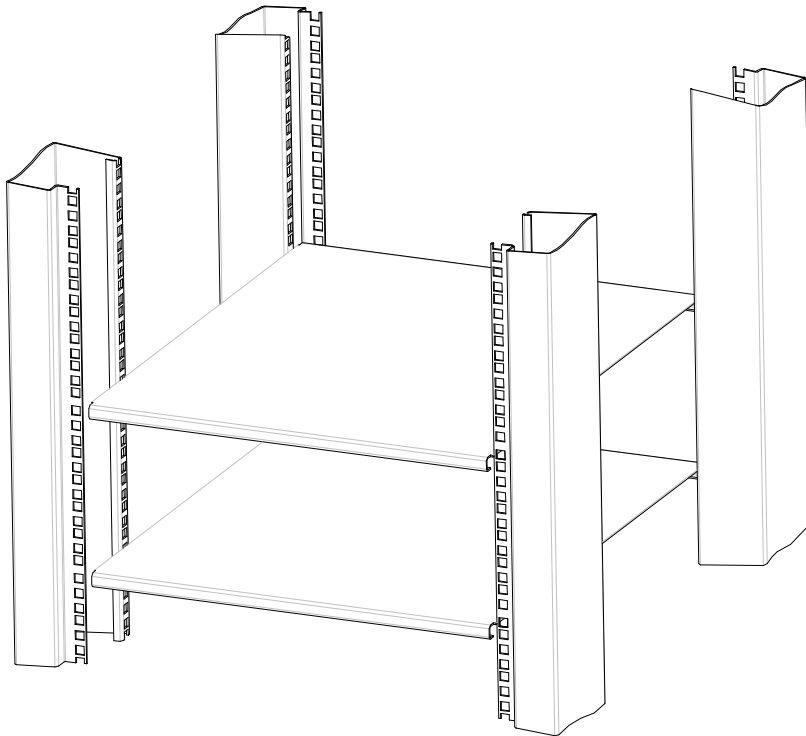
⚠️ **Precautions**

The following precautions and checks are applicable to all mounting types:-

❑ Connectors have been manufactured to fit their specific cables and funcition. Do not modify or force connectors.
❑ Check Site Plans for engineering approval.
❑ Ensure that good ground resistance is available at the installation site (≤10Ω)
❑ Where installed in an outdoor enclosure attention should be paid to cooling and water+dust sealing prevention refer to Table 5-1.
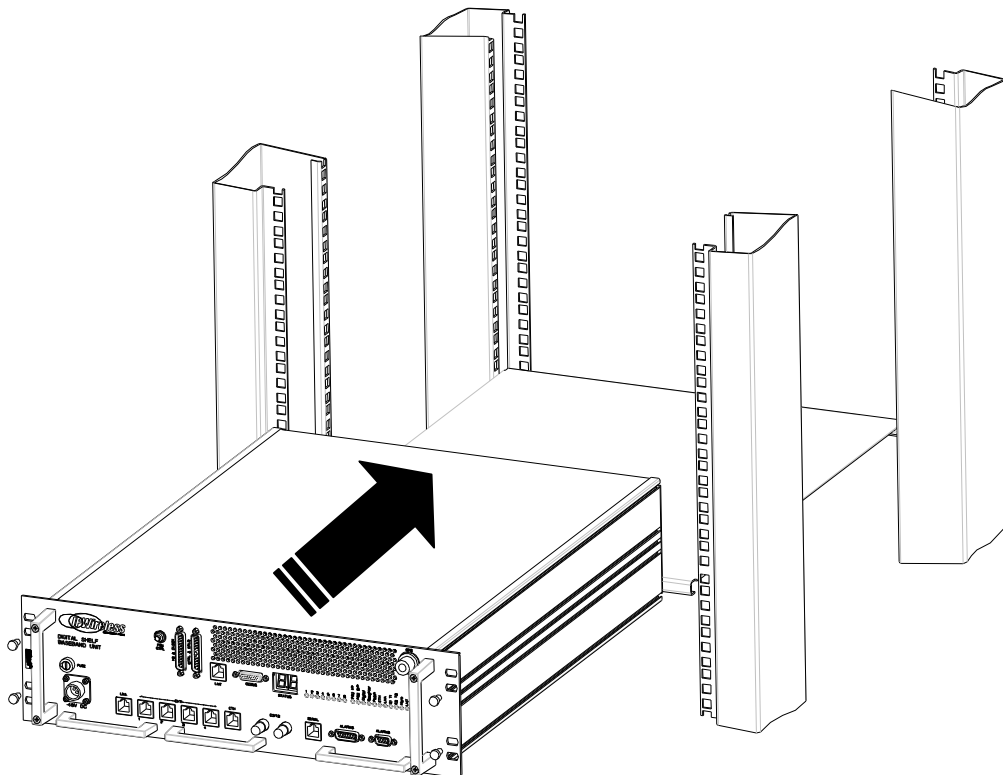
Rack Mounting – Installing Digital Shelf

Ensure the shelf or shelf supports are secure, then insert the digital shelf into the rack and secure from the front.

Notes:
❑ If there is no rear access it may be required to make the ground connection prior to inserting the shelf into the rack.
❑ Where additional securing is required at the rear this shall require custom brackets depending on the rack specifications/construction.

**Figure 6-7: Installing Digital Shelf**

Rack Mounting – Installing Radio Shelf

Ensure the shelf or shelf supports are secure, then insert the radio shelf into the rack and secure from the front.

Notes:
- ❑ If there is no rear access it may be required to make the ground connection prior to inserting the shelf into the rack.
- ❑ Where additional securing is required at the rear this shall require custom brackets depending on the rack specifications/construction.

Figure 6-8 : Installing Radio Shelf
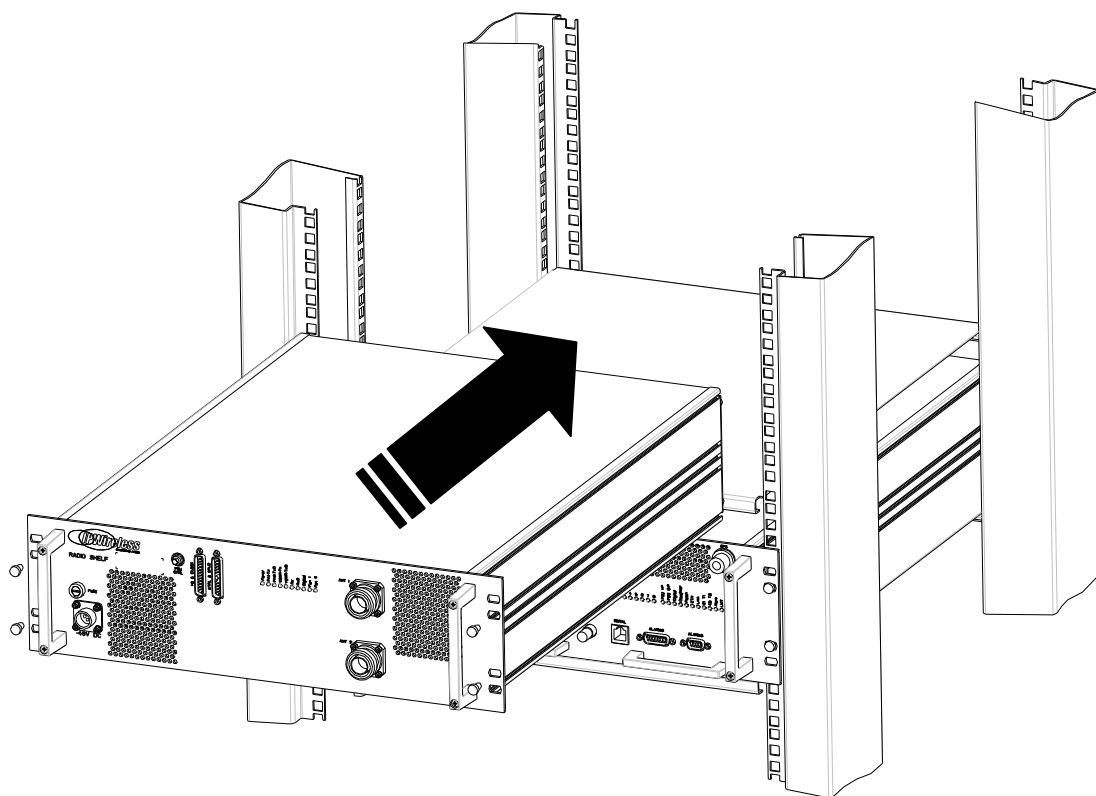
Step 5 Ground Installation

The main Node B ground cable shall use a minimum #2 AWG (Diameter 6.6mm or CSA 33mm2) stranded wire or equivalent earth braid.

The ground cable is terminated on the rear of both shelves of the Node B Rack Mount using terminal that shall fit the M8 (7/16") stud on the rear of each shelf.
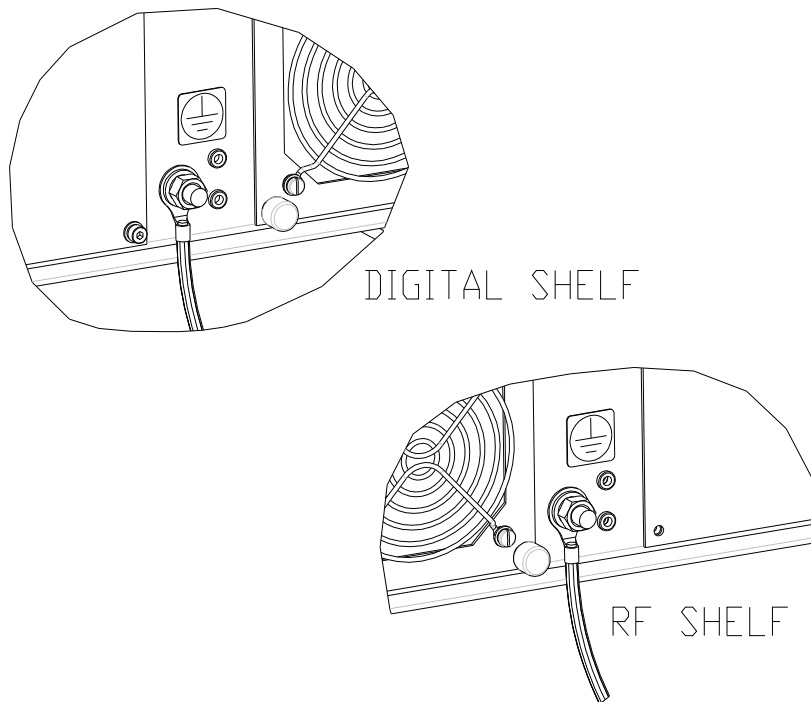
The grounding wire is terminated onto the site grounding ring.

It should be noted that each site shall be designed for specific site, country or local installation requirements.

CAUTION: Ensure that the earth braid or cable is bonded to a common earth with equipment that is co-located with the Node B.

Figure 6-9 : Earth Connection on the rear of each shelf

Step 6 DC Power Connection-Digital

The power supply input must be a nominal -48Vdc input, refer to Table 5-1.

The connection of the mains to DC supply is via the cable provided as part of the digital shelf package.

The provided cable assembly has 3 metres of cable with a connector to provide connection to the digital shelf. The tail ends of the cable are stripped and must be terminated to a permanent connection junction/terminal block. The length of the cable may be shortened to facilitate.

Notes:
❑ Only the cable provided with the digital shelf should be used.
❑ The connector is keyed to prevent wrong insertion.

Figure 6-10 : Power Connection to the digital shelf

Step 7 DC Power Connection-Radio

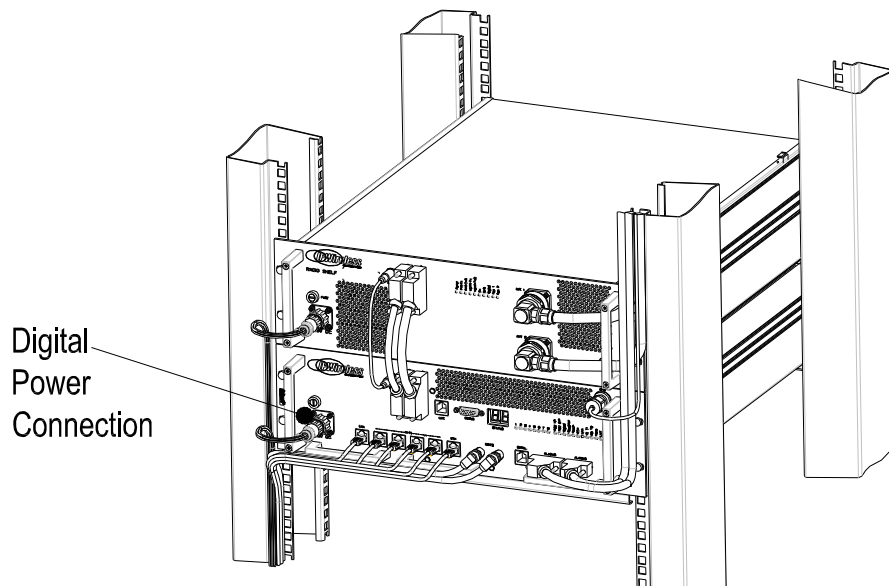The power supply input must be a nominal -48Vdc input, refer to Table 5-1

The connection of the mains to DC supply is via the cable provided as part of the radio shelf package.

The provided cable assembly has 3 metres of cable with a connector to provide connection to the radio shelf. The tail ends of the cable are stripped and must be terminated to a permanent connection junction/terminal block. The length of the cable may be shortened to facilitate.

Note: Only the cable provided with the radio shelf should be used.

Figure 6-11 : Power Connection to the radio shelf
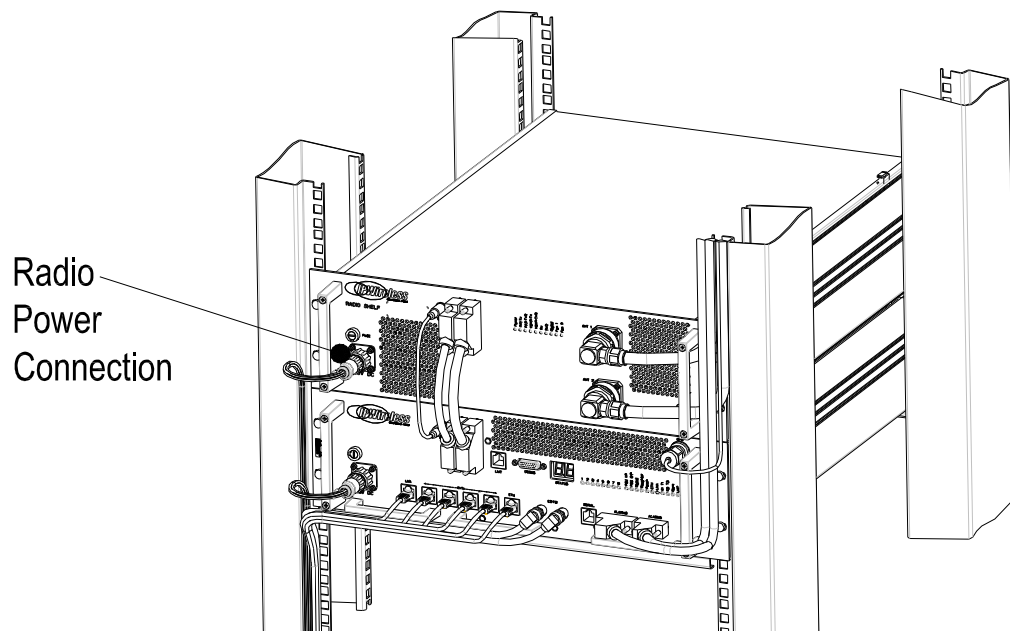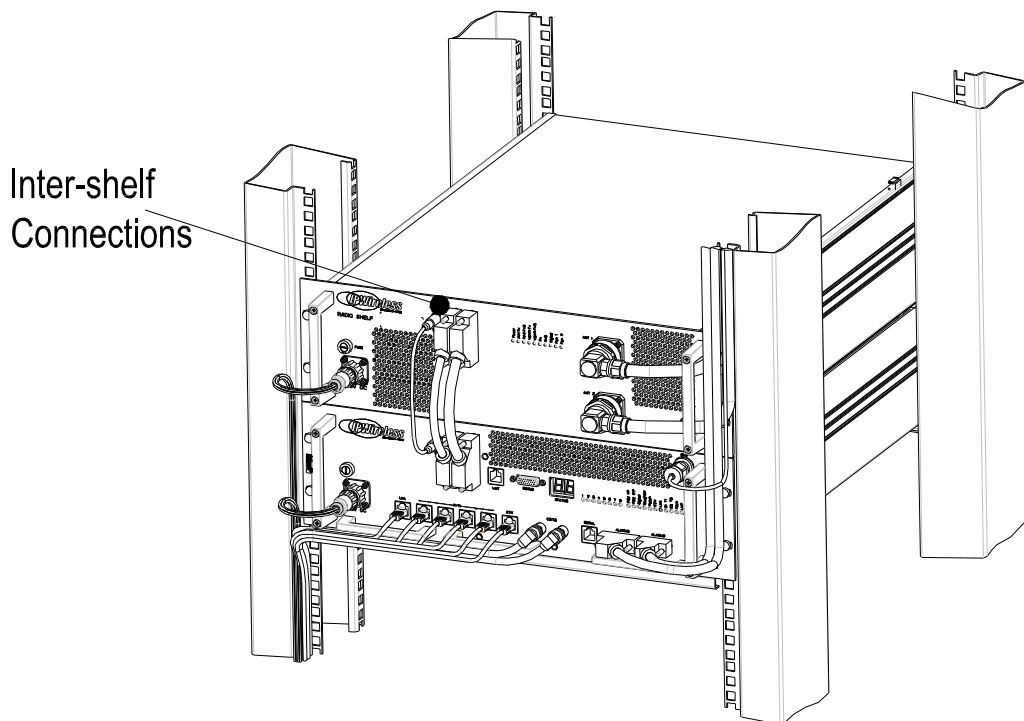
Step 8 Inter-Shelf Connections

The digital shelf is supplied with the shelf interface kit that contains the following items
- I/Q interface cable – 21wayD-hybrid
- Control interface cabe – 25wayD
- PSU control cable – 3way

The figure below illustrates the connection of each of these cables between the digital and radio shelf.

Figure 6-12: Interface Cable Connection

Step 9 Backhaul Connections (Iub) to INC

The Digital Shelf faceplate contains the backhaul connections. The installation can be selected from the following interfaces

- ➢ 100BaseT
- ➢ E3/T3
- ➢ E1/T1

The connections are labeled and shown in the figure below.

Note: If the Node B is in not in the same site location as the serving INC, there must be no greater than a 5 millisecond delay on the backhaul connection. This can be provided by microwave or land based facilities with a reliability rate of 99.9995%.

Figure 6-13 : Backhaul Connections
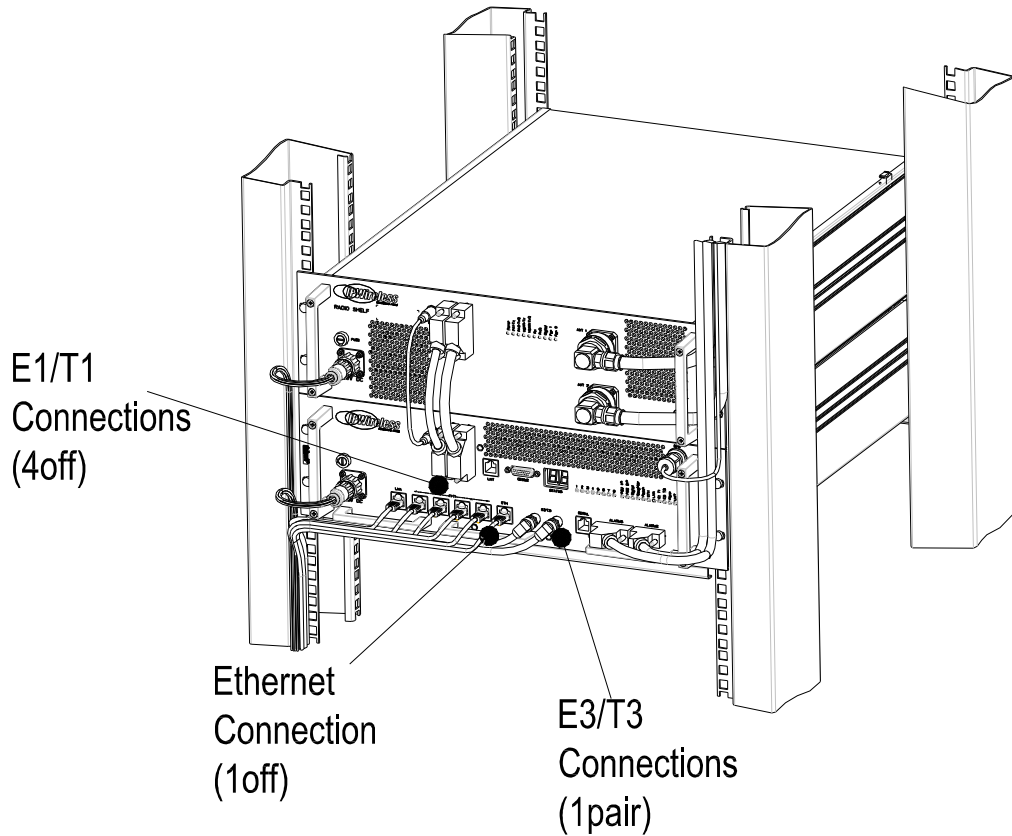
100BaseT Connection - (Eth)

Terminate the Ethernet cables with RJ45 connectors and the cables may be secured to the brackets on the face of the Digital Shelf (Figure 6-13). Test the continuity for the Ethernet cables with test equipment consisting of a main and a remote unit.

The termination for these interfaces is specified within the datasheets for the interfaces. The specification for both cables should be CAT5 - 4 pair, screened cable, recommended Alcatel LANmark-5 F2TP or equivalent.

Notes: Points to remember when installing Category 5 cables for the Node B 100Base T Ethernet Backhaul.

1. Do not kink the cable as the pairs are twisted to support 100Mhz operation and splitting the pairs could reduce the performance of the cable.

2. When installing the RJ45 plugs onto the cable ensure pairs are untwisted to the minimum and that the cable sheath is clamped within the connector. Again this is to ensure the performance of the cable is not reduced.

The pin-outs for the external Ethernet interfaces are given in the following table & figure. Source: http://www.dcbnet.com/notes/9611t1.html

Table 6-5 : Ethernet Pin-outs using RJ45

1	RX +	White w/Green
2	RX -	Green
3	TX +	White w/Orange
4		Blue
5		White w/Blue
6	TX -	Orange
7		White w/Brown
8		Brown

Figure 6-14 : Ethernet Pin-outs using RJ45
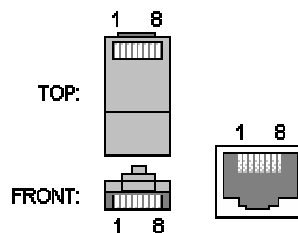
E3/T3 Connections – (Tx + Rx)

Terminate the E3/T3 cables with BNC connectors and the cables may be secured to the brackets on the face of the Digital Shelf (Figure 6-13). Test the continuity for the E3/T3 cables with test equipment consisting of a main and a remote unit.

The termination for these interfaces is specified within the datasheets for the interfaces. The specification for both cables should be 75Ω.

E1/T1 Connections – (1 to 4)

Terminate the E1/T1 cables with RJ45 connectors and the cables may be secured to the brackets on the face of the Digital Shelf (Figure 6-13).

Test the continuity for the E1/T1 cables with test equipment consisting of a main and a remote unit. The pinouts for this interface are shown in the table below.

The termination for these interfaces is specified within the datasheets for the interfaces. The specification for both cables should be CAT5 - 4 pair, screened cable, recommended Alcatel LANmark-5 F2TP or equivalent.

Table 6-6 : T1/E1 Pin-outs

T1 Pinouts		Cable	E1 Pinouts	
1	Rx (ring)	White w/Green	Rx (ring)	**1**
2	Rx (tip)	Green	Rx (tip)	**2**
3	Not used	White w/Orange	Not used	**3**
4	Tx (ring)	Blue	Tx (ring)	**4**
5	Tx (tip)	White w/Blue	Tx (tip)	**5**
6	Not used	Orange	Not used	**6**
7	Not used	White w/Brown	Not used	**7**
8	Not used	Brown	Not used	**8**

Step 10 Antenna Cabling - Installation

Antennas and coaxial cable should be available at the site, and are part of the construction checklist and general assumptions.

Two antennae per Node B Radio Shelf are optimum, allowing receiver diversity and transmit diversity (note: if option fitted), therefore two coaxial cables per Node B are needed. Diversity can be via polarization, in which case two feeder runs to the same antenna are needed, feeding oppositely polarised sectors in the same physical enclosure.

Cables should be properly marked to indicate what antenna the coaxial cables are to be connected to the Node B serving the sector or area.

In the case where only one feeder / antenna is being used, this must be connected to the top connector when viewed from the front of the Node B.

The following installation describes the position of the antenna ports and designations.

Figure 6-15 : Antenna Connections & Routing
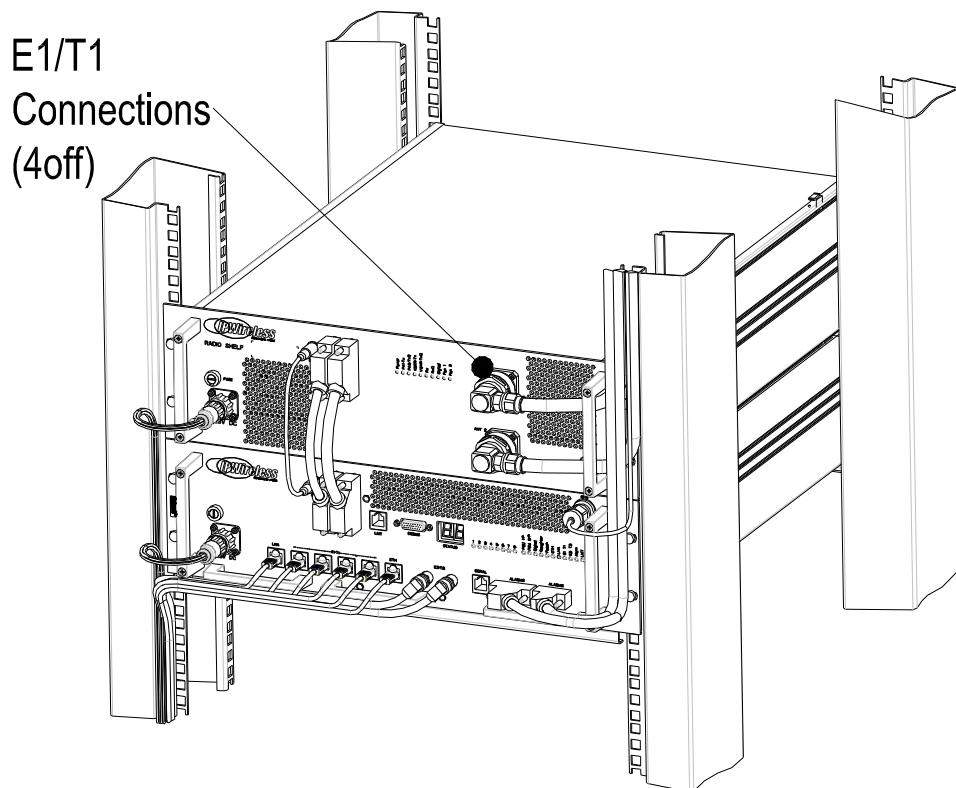
Step 11 Alarm Connections

If local alarms are to be utilised two Dtype connectors are been provided on the Node B digital shelf. The specifications for those interface requirements are below:-

The maximum input voltage is restricted to 39V for a 500A 8/20 uS pulse, with a minimum working voltage of 18V. All six input circuits are the same.

Figure 6-16 : Alarm Outputs & Inputs
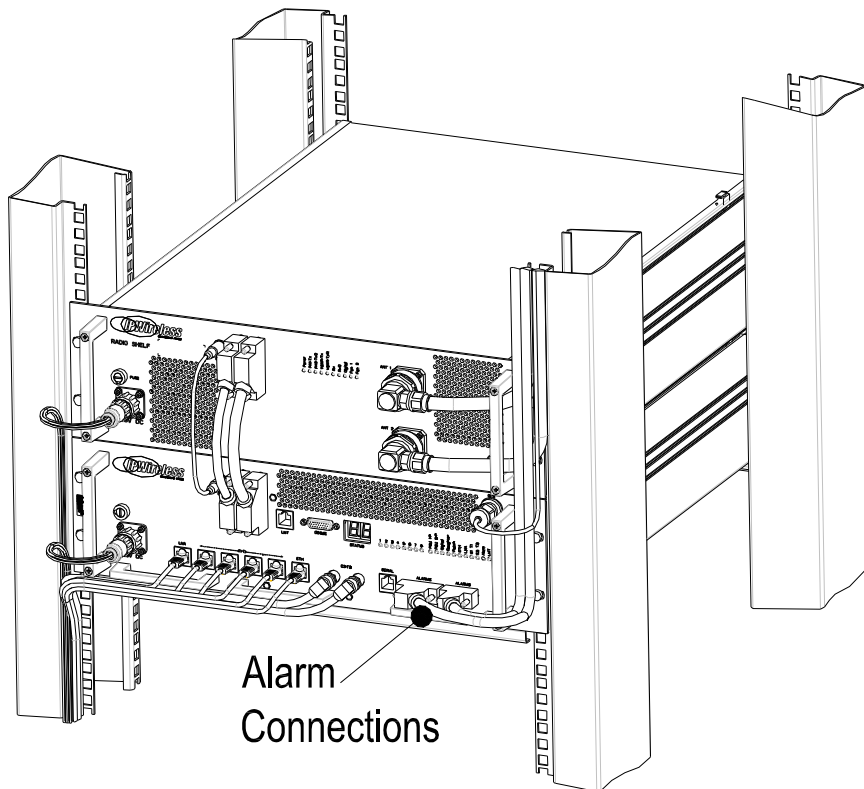
Alarm Inputs

The 6 external alarm inputs are connected via the 15wayD female type located on the right hand side of the digital shelf.

The external alarm inputs are opto-isolated current loops. The voltage and currents shall be supplied by the external source.

The pin-out for the alarm inputs are shown in the table below.

Table 6-7 : Alarm Inputs

Pin #	Signal
1	ALARM_IN_A0
2	ALARM_IN_B0
3	ALARM_IN_A1
4	ALARM_IN_B1
5	ALARM_IN_A2
6	ALARM_IN_B2
7	ALARM_IN_A3
8	ALARM_IN_B3
9	Earth
10	ALARM_IN_A4
11	ALARM_IN_B4
12	ALARM_IN_A5
13	ALARM_IN_B5
14	Earth
15	Earth

Alarm Outputs

The external alarm outputs are connected via the 9wayD female located on the right hand side of the digital shelf.

The external alarm outputs shall be isolated normally-open relay contacts capable of switching 100mA DC.

The pin-out for the alarm inputs are shown in the table below.

Table 6-8 : Alarm Outputs

Pin	Signal
1	ALARM_OUT0+
2	ALARM_OUT0-
3	Earth
4	ALARM_OUT0+
5	ALARM_OUT0-
6	Earth
7	Earth
8	Earth
9	Earth

Step 12 GPS Installation & Operation

The Node B has an external/remote GPS antenna and receiver. The connection for the antenna (N-Type) is located on the Digital Shelf, Figure 6-17.

The GPS timing signal is used by the Node B for the TDD frame timing, so that all Node B's in a network are synchronized. The GPS signal is also used by the master oscillator for a frequency reference. The Node B can operate for two hours after a loss of GPS timing but a gradual drift of the frame timing will result in system interference and a loss of Node B selection / reselection capability.

A suitable Node B GPS antenna is shipped with every Node B. This antenna should be used with a maximum of 15 metres cable of RG6 type cable plus male N-type connectors at each end. For longer runs, the cable losses will affect signal strength and could impede GPS signal performance.

For proper operation of the GPS receiver, the Node B GPS Antenna must have a clear southern view of the sky. A site survey should be done before Node B installation to verify that the Node B installation location is suitable for GPS reception.

A simple survey method is to take a handheld GPS receiver to the site and verify that GPS lock is obtained in the location of the Node B installation. The handheld GPS should be able to obtain a "locked" condition within 2 minutes of power-on, and should be able to see a minimum of 4 satellites at all times.

The GPS receiver, integral to the Node B Digital shelf, is automatically enabled when the Node B is powered and there are no adjustments or settings to be made by the user.

Note: When the Node B installation is on or near a tower or building wall, the GPS survey should replicate the configuration.

When tower space is at a premium, or when long cable runs are involved, it may be preferable to use a single GPS antenna to feed multiple Node Bs. It is possible to use one GPS antenna with up to three units, providing that a passive splitter is used.

Caution: It is essential that in a 'single GPS antenna supporting multi-Node B' installation only one of the Node B's is designated and configured to supply the GPS antenna with +5V via the GPS antenna cable as in a standard single installation.

The remaining subordinate Node Bs are provided their GPS signal through a DC block device. Failure to do this may result in damage to the Node B. It should also be noted that in the event of power failure to the DC supplying Node B, GPS reception to all Node B's will be affected.
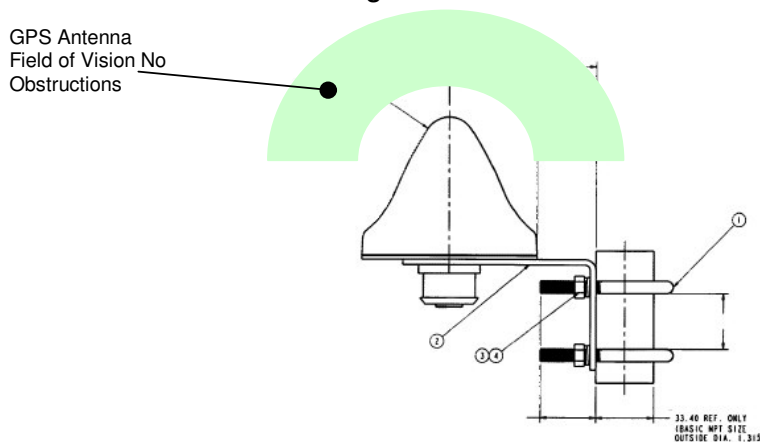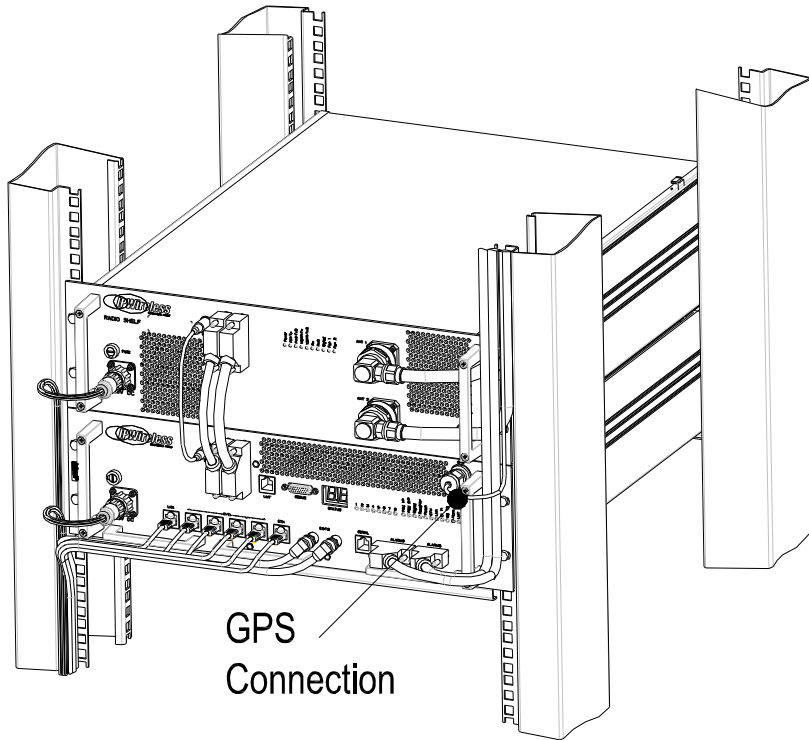
Figure 6-17 : GPS Antenna

Figure 6-18 : GPS Antenna Connection

GPS
Connection

IPWireless

7.   APPENDIX

Appendix A - Installation Check Card

Step	Action	Complete	Comment	Page
1	Perform pre-installation site check			
2	Parts shipped/tools required			
3	Site Preparation			
4	Mounting rack/cabinet installation			
5	Grounding installation			
6	DC Power Connection-Digital Shelf			
7	DC Power Connection-Radio Shelf			
8	Inter-shelf interface connections			
9	Backhaul Connections to INC			
10	Antennas Cabling - Installation			
11	Alarm Connections			
12	GPS Installation & Operation			

Appendix B - Glossary

GLOSSARY	
ADC	Analog to Digital Converter
ARP	Address Resolution Protocol
BTS	Base Transceiver Station
DAC	Digital to Analog Converter
Downlink	From Network to the User Equipment
DSCH	Downlink Shared Channel
ESD	Electro Static Discharge
EM	Element Manager
EIA	Engineering Industry Association
Ethernet	10BaseT or 100baseT
ETSI	European Telecommunications Standardization Institute
FCC	Federal Communication Commission
FPGA	Field Programmable Gate Array
GPS	Global Positioning System
HTTP	Hyper-Text Transfer Protocol
INC	Integrated Network Controller
IP	Internet Protocol
ISP	Internet Service Provider
ITFS	Instructional Television Fi xed Service
IUB	Interface Between the INC & NodeB
LMT	Local Maintenance Terminal
LNA	Low Noise Amplifier
MCP	Multimedia Communications Port
MAC	Media Access Control
Mcps	Mega Chips per Second
MMDS	Multichannel Multipoint Distribution Service
MSPS	Mega Samples Per Second
MTU	Maximum Transmission Unit
Node B	A UMTS Radio Base Station
PDU	Protocol Data Unit
PLL	Phase Locked Loop
QPSK	Quadrature Phase Shift Keying
RAM	Random Access Memory
RLC	Radio Link Control
SRAM	Static RAM
T1/E1	1536kbps/ 2048Kbps pipe
T3/E3	45Mbps or 34Mbps
UE	User Equipment
UMTS	Universal Mobile Telecommunications System

GLOSSARY	
Uplink	From User Equipment to the Network
USB	Universal Serial Bus
USCH	Uplink Shared Channel
UPS	Uninterruptible Power Supply Unit
UTRAN	UMTS Terrestrial Radio Access Network
VSWR	Voltage Standing wave ratio
VCXO	Voltage Controlled Crystal Oscillator

END OF DOCUMENT