



Part List and Required Tools

This chapter discusses the following:

- Unpacking and verifying contents
- Required tools

3.1. Unpacking and Verifying Contents



Warning: Examine the WipLL shipping container. If you notice any damage, or missing items, immediately notify the carrier that delivered the unit and contact the Airspan representative.

The WipLL hardware equipment can be divided into two parts:

- Base station equipment
- CPE equipment

3.1.1. Base Station Equipment

Certain base station equipment is required while others are optional equipment, depending on the type of configuration and includes the following:

- Base Station Radio (BSR)—required
- Base Station Distribution Unit (BSDU)—optional
- Base Station Power System (BSPS)—optional
- GPS antenna—optional

3.1.1.1. BSR

The BSR kit includes the following components:

- BSR chassis
- Mounting equipment that includes:
 - Mounting brackets
 - Mounting screws:
 - Washers
 - 4 x screws
 - Bolts
- Connectors:
 - 15-Pin D-type (for data and serial interface, and power)
 - N-type (optional for third-party external antenna)

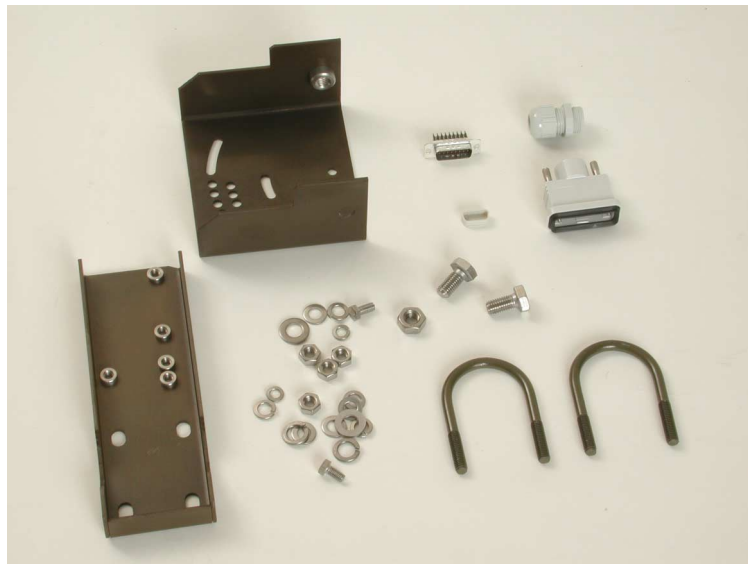


Figure 3-1: BSR kit

3.1.1.2. BSDU (optional)

The BSDU interfaces between the BSR and the backhaul network, as well as used for daisy-chaining BSR units. The BSDU kit includes the following connectors:

- Mounting: four off M5 screws and plastic-cup washers
- 6 x RJ-45: two each for 100Base-T, 10Base-T, and clock synchronization
- 2 X 9-Pin D-type (for monitor and management)
- 7 x 15-Pin D-type (for power, Ethernet, daisy-chaining BSRs, and GPS)
- Power cable



Figure 3-2: BSDU kit

3.1.1.3. BSPS (optional)

The BSPS is an optional power redundancy unit (DC-UPS). The BSPS includes the following parts:

- Rectifier
- DC Distribution
- System Controller

3.1.1.4. GPS (optional)

The GPS antenna synchronizes base stations by providing a universal satellite clock signal.

- 5,15, or 50 meter mating cable
- 5/8" adapter
- Magnet mount



Figure 3-3: GPS kit

3.1.2. Customer Premises Equipment

WipLL hardware installed at the customer's site includes the following:

- Subscriber Premises Radio (SPR)
- RSSI LED Plug (optional - for measuring SPR's RSSI levels)
- Subscriber Data Adapter (SDA)
- Indoor Unit (IDR)—optional, instead of the SPR and SDA

3.1.2.1. SPR

The SPR consists of the following parts:

- SPR chassis
- Mounting equipment that includes:
 - Mounting bracket
 - 2 x Screws
 - 2 x Bolts
 - 4 x Washers
- 15-Pin D-type connector



Figure 3-4: SPR kit

3.1.2.2. RSSI LED Plug

The RSSI LED Plug can be connected to the SPR for measuring SPR received signal strength indication level.

The RSSI LED Plug kit includes the following parts:

- RSSI LED plug providing LED lights and two 15-pin D-type ports
- 1-meter straight-through cable

3.1.2.3. SDA

The SDA is an Ethernet hub that connects to the main power supply and provides data connection to the SPR. The SDA is available in three main models:

- SDA-1
- SDA-4H
- SDA-4S

3.1.2.3.1. SDA-1

The SDA-1 provides one 10Base-T connection to a host PC or network. The SDA-1 includes the following parts:

- SDA-1 chassis
- Power cable



Figure 3-5: SDA-1 kit

3.1.2.3.2. SDA-4H

The SDA-4H includes four interfaces: three for PC connection; one for daisy-chaining to another hub or a LAN switch. The SDA-4H includes the following parts:

- SDA-4H chassis
- Power cable



Figure 3-6: SDA-4H kit

3.1.2.3.3. SDA-4S

The SDA-4S includes four 10/100Base-T interfaces for PC connection. The SDA-4S kit includes the following parts:

- SDA-4S chassis
- Power cable



Figure 3-7: SDA-4S kit

3.1.2.4. IDR kit

The IDR unit is an optional customer premises equipment that replaces the SPR and SDA. The IDR combines the SPR and SDA in one unit.

The IDR is available in two models: IDR with external antenna; IDR with internal antenna. These two IDR models have the same parts, except that the IDR with external antenna model has a connector for attaching a third-party antenna.

The IDR unit includes the following parts:

- Chassis
- Power cable
- Power supply unit
- Ethernet cable
- Mounting stand



Figure 3-8: IDR kit

3.2. Required Tools

The following tools are required for installing the WipLL system:

- Pin crimper tool for CAT-5e cables for 15-Pin D-type and N-type connectors, and for GPS connectors
- Cable stripping tool
- Philips screw driver
- Flat-blade screwdriver
- Adjustable wrench
- ESD-prevention wrist strap
- Torque wrench for N-type connectors
- IDR unit:
 - Flat blade screwdriver
 - Pozidriv screwdriver
 - 3 mm A/F Allen key
 - 10 mm A/F open ended spanner



Part I

Installing WipLL Base Station Equipment

Part I describes the procedures for installing the WipLL base station equipment, and includes the following chapters:

- Chapter 4, “Installing the BSR”
- Chapter 5, “Installing the BSDU”
- Chapter 6, “Installing the GPS”
- Chapter 7, “Installing the BSPS”

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Installing the BSR

This chapter describes the installation of the WipLL **Base Station Radio** (BSR), which is installed at the base station.

This chapter includes the following sections:

- Overview
- Physical Dimensions and Basic Design
- Cable Installation Guidelines
- Connecting BSR for Serial Configuration
- Connecting BSR to the Backhaul Network
 - Through the SDA
 - Through the BSDU
- Connecting a Third-Party External Antenna (Optional)
- Connecting BSR to Power
- Mounting the BSR
 - Minimum Distance Between BSRs
 - Wall Mounting
 - Pole Mounting

4.1. Overview

The BSR is the center of the WipLL system. The BSR provides last-mile wireless connectivity by connecting the provider's backhaul network to the subscriber's wireless unit (Subscriber Premises Radio [SPR]). In addition, the BSR is responsible for synchronizing the WipLL network (i.e., synchronizing SPRs/IDRs).

For base stations consisting of a single BSR, the BSR is typically powered and connected to the provider's backhaul network by the WipLL Subscriber Data Adapter (SDA). For base stations consisting of multiple BSRs, the BSRs are powered and connected to the provider's backhaul by the WipLL Base Station Distribution Unit (BSDU).

The BSR is available in three models:

- BSR with a built-in antenna
- BSR with an N-type port for connection to an optional third-party external antenna
- BSR with an two N-type ports for connection to two optional third-party external antennas for dual antenna diversity

4.2. Physical Dimensions and Basic Design

The BSR is encased in a chassis providing access to the BSR's communication port on the front panel (see Figure 4-1). The BSR's bottom panel provides holes for mounting the BSR to, for example, a pole or wall (see Figure 4-11).

Serial port

Data, power, and synchronization port



Figure 4-1: BSR front panel (internal antenna model)

The BSR's physical dimensions are described in Table 4-1

Table 4-1: BSR Physical Dimensions

Parameter	Value
Height	400 mm (15.74 inches)
Width	317 mm (12.48 inches)
Depth	65.5 mm (2.58 inches)
Weight	4.7 kg



Notes:

- 1) The BSR's physical dimensions exclude the mounting kit.
- 2) A BSR model with an N-type receptacle for attaching a third-party external antenna is also available (see Section 4.6, "Connecting a Third-Party External Antenna (Optional)").

4.3. Cable Installation Guidelines

This section defines the procedures to be adhered to when installing data cables at the base station.



Warning: Pre-terminated cables should be fitted with protective poly bags during cable installation processes.

Metal cable trays shall be earthed to a central earth point within the customers' equipment room.



Note: A minimum separation of 200 mm should exist between power and data cables.

The following points are to be considered:

- When installing network cables, ensure they are not damaged by friction or sharp edges. Spacing of installation personnel at regular distances during any cable drawing-in process will avoid contact with potential hazards.
- Data cables providing connection to the customers network shall be run in suitable conduits. Cable conduits should be secured to the wall in accordance with manufacturers instructions.
- Cables should be carefully fed through conduits and not pulled by means of any attached connector.
- Sufficient space should be provided in cable ducts, trunking or trays (where possible) to allow for future cabling growth.
- External data cables are to be protected in protective conduit, which is to be secured to the building structure in accordance with manufacturers recommendations. Trunking must not be located as to provide a trip hazard at the base station premises (e.g. roof walkways)
- BSR cables are to be dressed tidily to the mounting pole or bracket using strategically placed cable ties.

- Observe recommended minimum bend radii when installing copper cables. Wherever a cable changes direction, ensure that it does so in a smooth curve with a radius of at least 50 mm to prevent damage.
- A maintenance loop is to be left in the cable just before the cable reaches the BSR or GPS to prevent strain on the connector.
- Data cables entering holes drilled in walls are to be dressed to provide a loop that will prevent water ingress into the building along the cable.
- Silicone sealant should be used to plug any holes on both internal and external wall surfaces once cables are in place.
- All data cables should be labeled with both the source and destination at each end.



Note: The maximum cable length between the BSR and terminating equipment is 100 meters.

4.4. Connecting BSR for Serial Configuration

The BSR provides a serial port for RS-232 serial interface to a PC. This serial communication connection allows you to perform BSR initial configuration.



Notes:

- 1) For serial configuration, the BSR must remain connected to the BSDU/SDA (i.e., the BSR's 15-pin D-type port remains connected to the BSDU's/SDA's 15-pin D-type port).
 - 2) For a detailed explanation on performing BSR initial configuration using WipLL's management applications, refer to *WipConfig User's Guide* and *WipConfig PDA User's Guide*.
-

The BSR-to-PC management station serial cable connections include the following

■ **Cable:** Crossover serial cable

■ **Connectors:**

- **BSR:** 9-pin D-type male

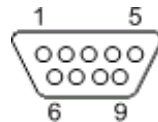


Figure 4-2: 9-pin D-type male connector

- **PC:** 9-pin D-type female (RS-232)

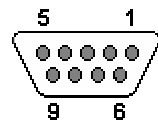
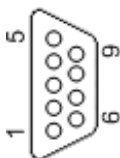
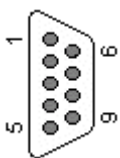


Figure 4-3: 9-pin D-type female connector

■ Connector pinouts:

Table 4-2: BSR-to-PC serial connector pinouts

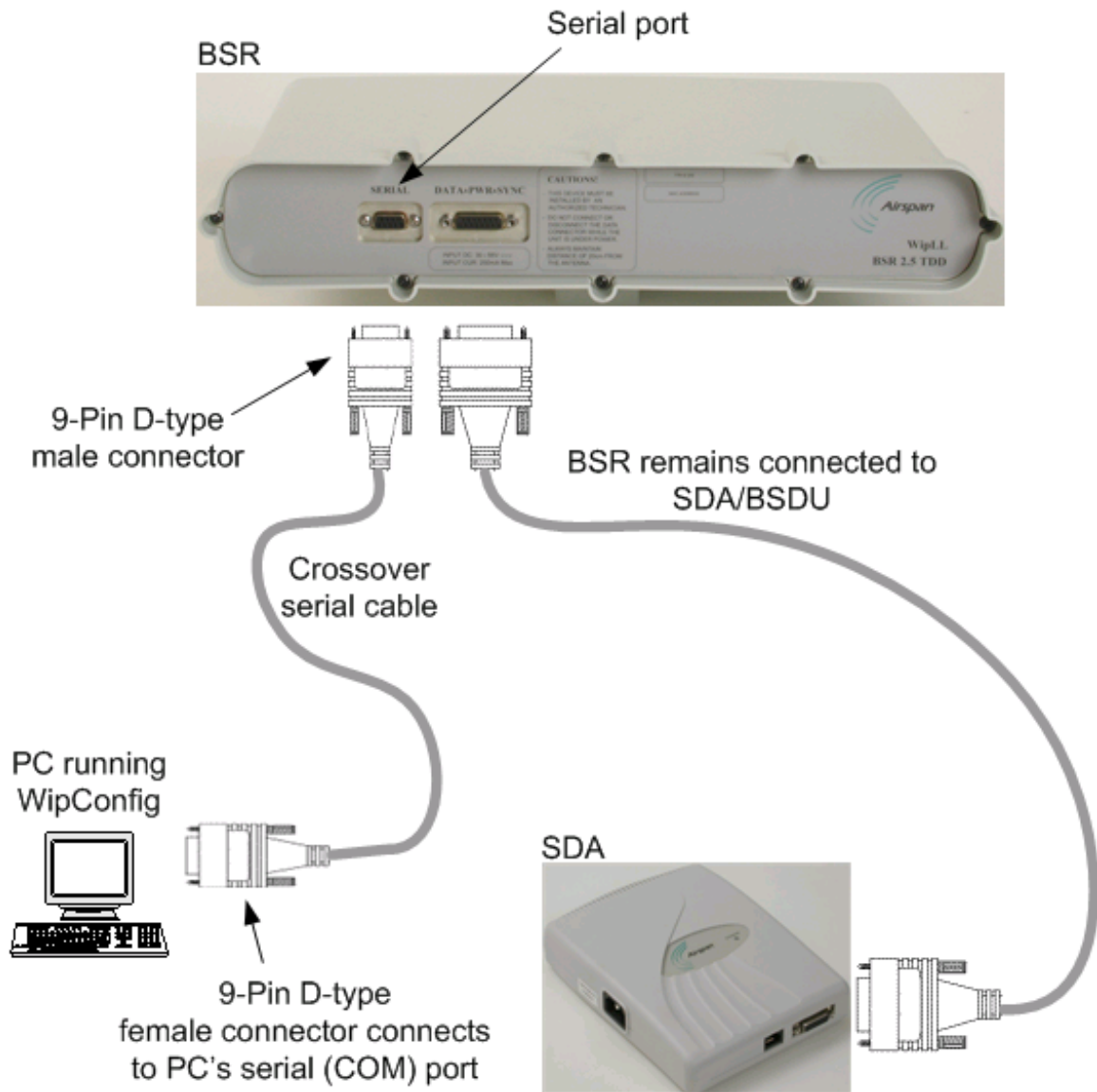
BSR			PC		
9-pin D-type male	Pin	Function	Pin	Function	9-pin D-type female
	1	Not connected (NC)	1	NC	
	2	RS232 Rx	3	Tx	
	3	RS232 Tx	2	Rx	
	4	NC	6	NC	
	5	GND	5	GND	
	6	NC	4	NC	
	7	NC	8	NC	
	8	NC	7	NC	
	9	NC	9	NC	

To connect the BSR to the PC and SDA/BSDU for serial configuration:

1. Connect the serial cable's **9-pin D-type male** connector to the BSR's 9-pin D-type port labeled **SERIAL**, as displayed in Figure 4-4.
2. Connect the serial cable's **9-pin D-type female** connector to the PC's serial port, as displayed in Figure 4-4.



Note: Ensure that the BSR remains connected to the BSDU/SDA (i.e., the BSR's 15-pin D-type port remains connected to the BSDU's/SDA's 15-pin D-type port).

**Figure 4-4: BSR-to-PC serial connection**

4.5. Connecting BSR to the Backhaul Network

The BSR connection to the provider's backhaul network depends on the base station's configuration:

- **Base station consisting of a single BSR:** connection to the backhaul is through the SDA
- **Base station consisting of multiple BSRs:** connection to the backhaul is through the BSDU.

4.5.1. Through the SDA

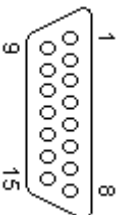
For a base station consisting of a single BSR, the BSR's power supply and connectivity to the backhaul network is provided by the SDA. The SDA is typically installed at the subscriber's premises, but in such a scenario, the SDA can also be used at the base station. For a detailed description of the SDA, see Chapter 9, "Installing the SDA".

The BSR-to-SDA cable connection configurations are as follows:

- **Connectors:**
 - **BSR:** 15-pin D-type male (only 8 pins are used)
 - **SDA:** 15-pin D-type male (only 8 pins are used)
- **Cable:** straight-through CAT-5

■ **Connector pinouts:**

Table 4-3: BSR-to-SDA 15-pin D-type connector pinouts

15-pin D-type male	BSR		Wire color	Wire pair	SDA	
	Pin	Function			Pin	Function
	1	+48 VDC	Blue / white	1	1	+48 VDC
	2	-48 VDC	Blue		2	-48 VDC
	3	Tx+	Orange / white	2	3	Rx+
	4	Tx-	Orange		4	Rx-
	5	Rx+	Green / white	3	5	Tx+
	6	Rx-	Green		6	Tx-
	7	Sync.+	Brown / white	4	7	Sync.+
	8	Sync.-	Brown		8	Sync.-



Notes:

- Pins 9 through 15 of the 15-pin D-type connector are not used.
- The wire color-coding described in the table is WipLL's standard for wire color-coding. However, if you implement your company's wire color-coding scheme, ensure that the wires are paired and twisted according to the pin functions listed in Table 4-3 (e.g., Rx+ with Rx-).

WipLL uses the following wire color-coding standards for CAT 5 cables with 15-pin D-type to 15-pin D-type connectors on either ends (8 wires used):

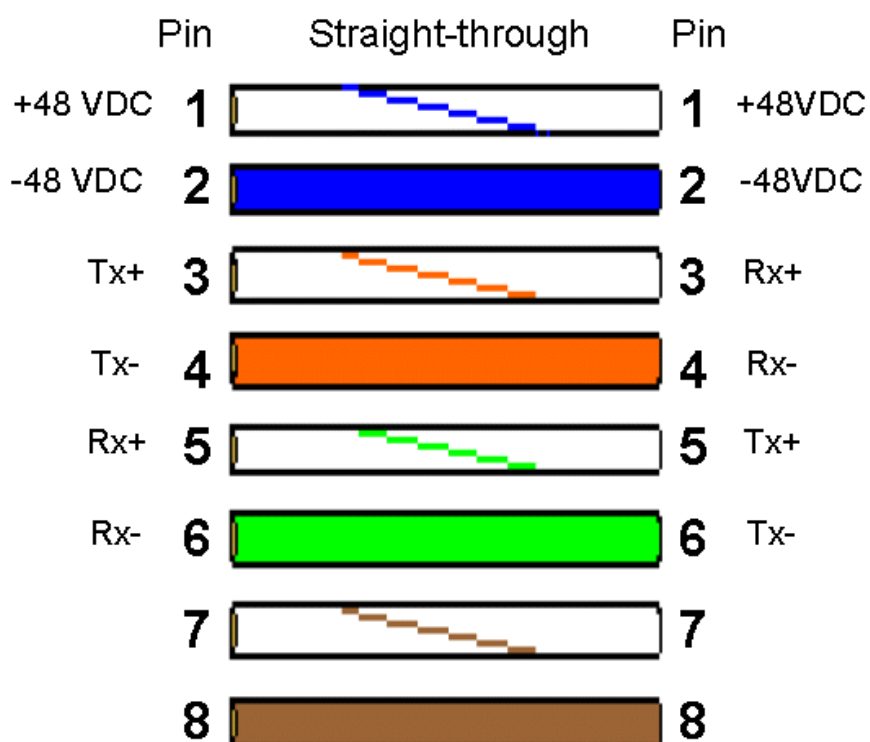


Figure 4-5: WipLL wire color-coding for 15-pin D-type connectors



Note: The wires are twisted together in pairs, for example, blue/white with blue, and orange/white with orange. This prevents electrical interference between the transmitter pins. For example, pin 3 (Tx+; orange / white) is paired and twisted with pin 4 (Tx-; orange).



Note: Airspan supplies unterminated cables for 15-Pin D-type connectors. Refer to the cable crimping procedures for 15-Pin D-type connectors detailed in Appendix B, "Cable Crimping".

To connect the BSR to the backhaul through the SDA:

1. Attach the **15-pin D-type** connector, at one end of the cable, to the BSR's 15-pin D-type port labeled **DATA POWER SYNC**, as displayed in Figure 4-6.
2. Attach the **15-pin D-type** connector, at the other end of the cable, to the SDA's **15-pin D-type** port, as displayed in Figure 4-6.
3. Connect the SDA's RJ-45 Ethernet port to the backhaul.



Note: For a detailed description of the SDA models, see Chapter 9, "Installing the SDA".

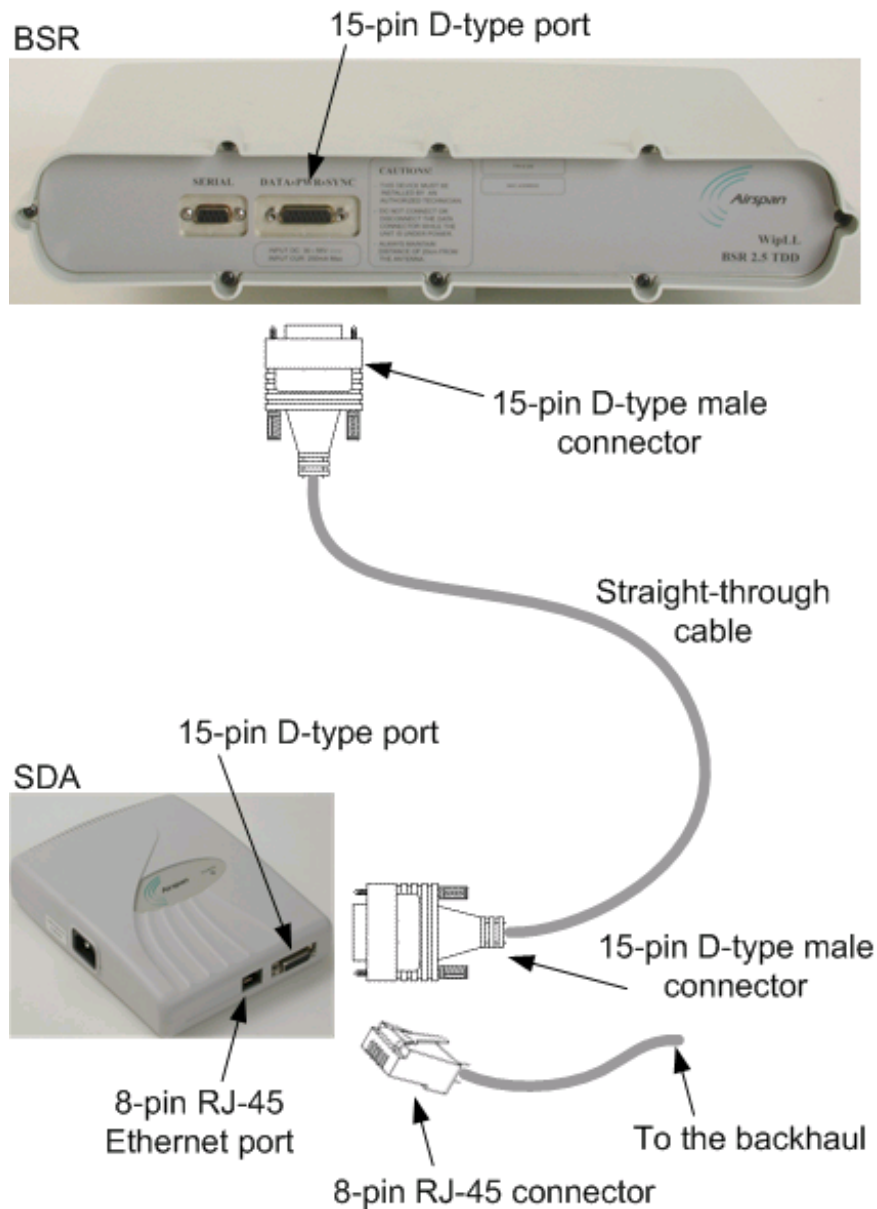


Figure 4-6: Connecting BSR to the backhaul through the SDA

4.5.2. Through the BSDU

For base stations consisting of multiple BSRs, the power supply and connectivity to the backhaul network is provided by the BSDU. The BSR's 15-pin D-type port is connected to the BSDU's rear panel 15-pin D-type port (labeled **BSR #**).

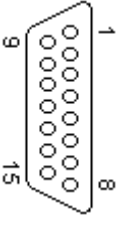


Note: For a detailed description of the BSDU, see Chapter 5, "Installing the BSDU".

The BSR-to-BSDU cable connection configurations is as follows:

- **Connector:**
 - **BSR:** 15-pin D-type male (only 8 pins are used)
 - **BSDU:** 15-pin D-type male (only 8 pins are used)
- **Cable:** straight-through 10Base-T Ethernet 4 Pair Cat 5 outdoor type – 24 AWG
- **Connector pinouts:**

Table 4-4: BSR-to-BSDU 15-pin D-type connector pinouts

15-pin D-type male	BSR		Wire color	Wire pair	BSDU	
	Pin	Function			Pin	Function
	1	+48 VDC	Blue / white	1	1	+48 VDC
	2	-48 VDC	Blue		2	-48 VDC
	3	Tx+	Orange / white	2	3	Rx+
	4	Tx-	Orange		4	Rx-
	5	Rx+	Green / white	3	5	Tx+
	6	Rx-	Green		6	Tx-
	7	Sync.+	Brown / white	4	7	Sync.+
	8	Sync.-	Brown		8	Sync.-

**Notes:**

- Pins 9 through 15 of the 15-pin D-type connector are not used.
- The wire color-coding described in the table is WipLL's standard for wire color-coding. However, if you implement your company's wire color-coding scheme, ensure that the wires are paired and twisted according to the pin functions listed in Table 4-3 (e.g., Rx+ with Rx-).

WipLL uses the following wire color-coding standards for CAT 5 cables with 15-pin D-type to 15-pin D-type connectors on either ends (8 wires used):

	Pin	Straight-through	Pin	
+48 VDC	1		1	+48VDC
-48 VDC	2		2	-48VDC
Tx+	3		3	Rx+
Tx-	4		4	Rx-
Rx+	5		5	Tx+
Rx-	6		6	Tx-
	7		7	
	8		8	

Figure 4-7: WipLL wire color-coding for 15-pin D-type connectors



Note: The wires are twisted together in pairs, for example, blue/white with blue, and orange/white with orange. This prevents electrical interference between the transmitter pins. For example, pin 3 (Tx+; orange / white) is paired and twisted with pin 4 (Tx-; orange).

To connect the BSR to the backhaul through the BSDU:

1. Attach the **15-pin D-type** connector, at one end of the cable, to the BSR's 15-pin D-type port labeled **DATA POWER SYNC**, as displayed in Figure 4-8.
2. Attach the **15-pin D-type** connector, at the other end of the CAT-5 cable, to the BSDU's **15-pin D-type** port labeled **BSR**, located at the rear of the BSDU, as displayed in Figure 4-8.
3. Connect one of the BSDU's 100Base-T ports, located at the front panel, to the backhaul (see Chapter 5, "Installing the BSDU" for a detailed description of connecting the BSDU to the backhaul).



Note: Airspan supplies unterminated cables for 15-Pin D-type connectors. Refer to the cable crimping procedures for 15-Pin D-type connectors detailed in Appendix B, "Cable Crimping".

Figure 4-8 displays the cable connections between the BSR and BSDU.

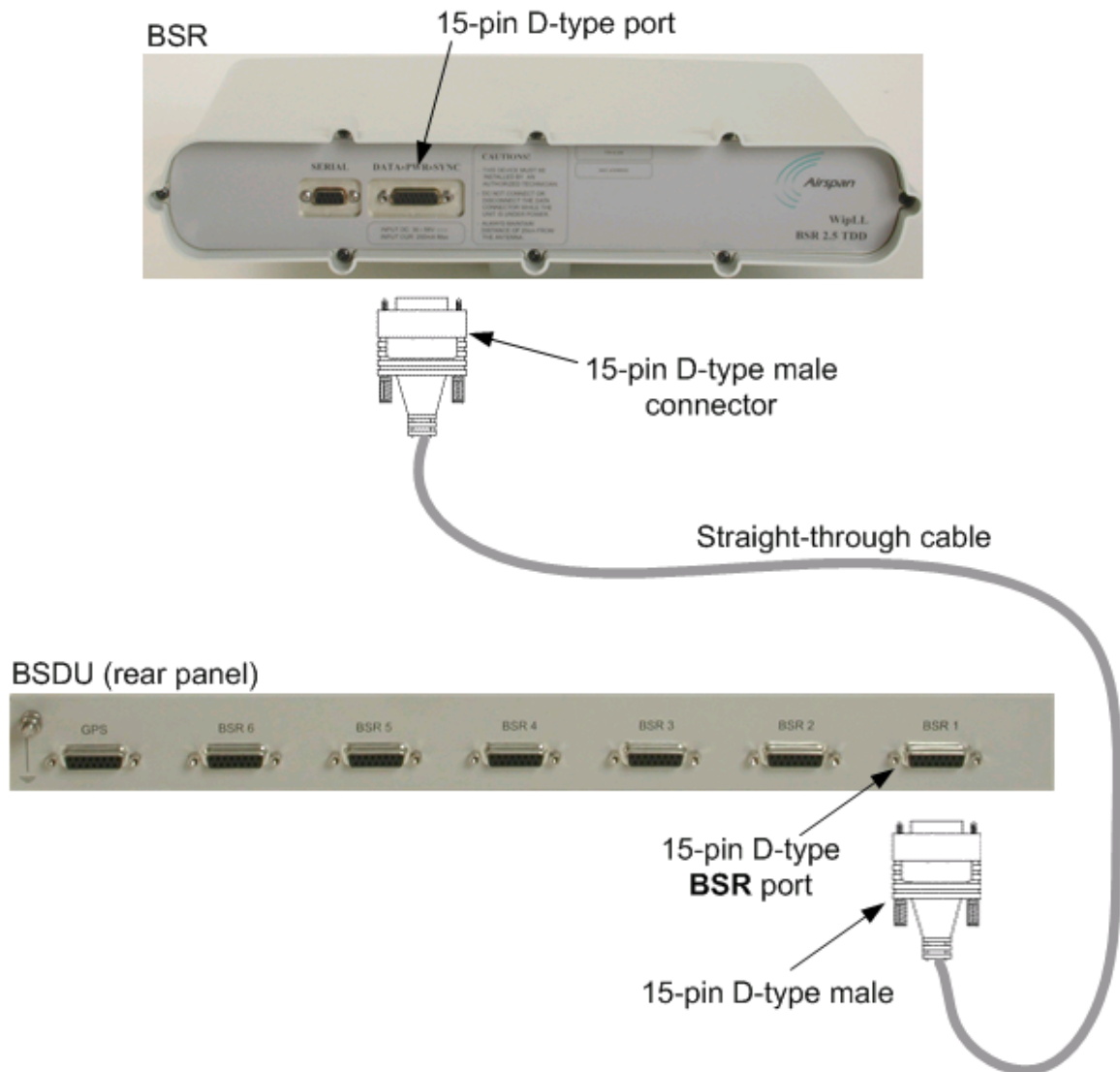


Figure 4-8: BSR-to-BSDU cable connection

4.6. Connecting a Third-Party External Antenna (Optional)

The BSR model with an N-type connector can be connected to an external antenna. The addition of an external antenna allows greater RF sector coverage than the standard BSR Internal Antenna model (i.e., 60°). The BSR with an external antenna is especially suited for base stations with one BSR, where sector coverage can be increased to 360° by using an omni-antenna. The BSR model for the 900 MHz band provides two N-type connectors for attaching two external antennas. This provides dual antenna diversity.

- **Connector (third-party):** N-type male (two N-type connectors for BSR model for 900 MHz band. The N-type socket labelled **Primary** is used only if one antenna is connected.)



Figure 4-9: Example of an N-type connector

- **Cable (third-party):** RF coaxial



Warnings:

- 1) Before connecting the external antenna, ensure that the BSR is NOT connected to the power source.
 - 2) Before powering on the BSR, ensure that some type of equipment such as an antenna or an RF attenuator is connected to the N-type receptacle. This eliminates the risk of burning the BSR device.
-

To connect the BSR to an external antenna:

- Attach the third-party **N-type male** connector to the N-type receptacle located on the BSR's front panel, as displayed in Figure 4-10.

**Notes:**

- 1) For crimping cables for N-type connectors, see Appendix B, "Cable Crimping".
- 2) Ensure that the third-party antenna cable is of sufficient high quality to reduce/eliminate loss when operating in the required frequency band.

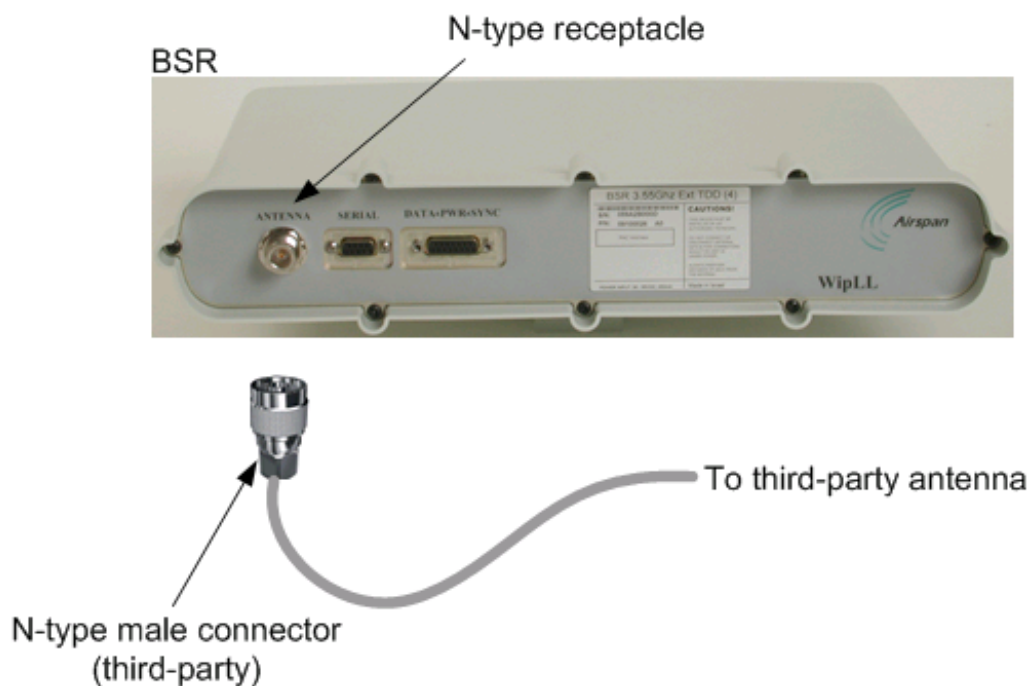


Figure 4-10: Connecting BSR to N-type external antenna connector (third-party)



Warning: It is the responsibility of the person installing the WipLL system to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), that only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden in accordance with FCC rules CFR47 part 15.204. The installer should configure the output power level of antennas according to country regulations and per antenna type.

4.7. Connecting BSR to Power

The BSR is powered by the SDA or BSDU (depending to which unit the BSR is connected). The power is supplied through the BSR's 15-pin D-type port, which is connected to the SDA or BSDU.

The BSR's power requirements are described in Table 4-5.

Table 4-5: BSR Power Requirements

Parameter	Value	Comment
Voltage: • Minimum • Maximum	48 VDC nominal • 30 VDC • 55 VDC	Voltage is received from the BSDU or SDA
Maximum Amperes:	500 mA	



Warning: If you are using an external antenna, ensure that you connect the antenna before connecting the BSR to the power source.



Note: For details on connecting the SDA or BSDU to the mains power supply, see Chapter 5, "Installing the BSDU" and Chapter 9, "Installing the SDA".

4.8. Mounting the BSR

The BSR can be mounted on a wall or pole. The BSR is mounted using the mounting holes located on the BSR's bottom panel (see Figure 4-11) and the mounting bracket (provided by Airspan).

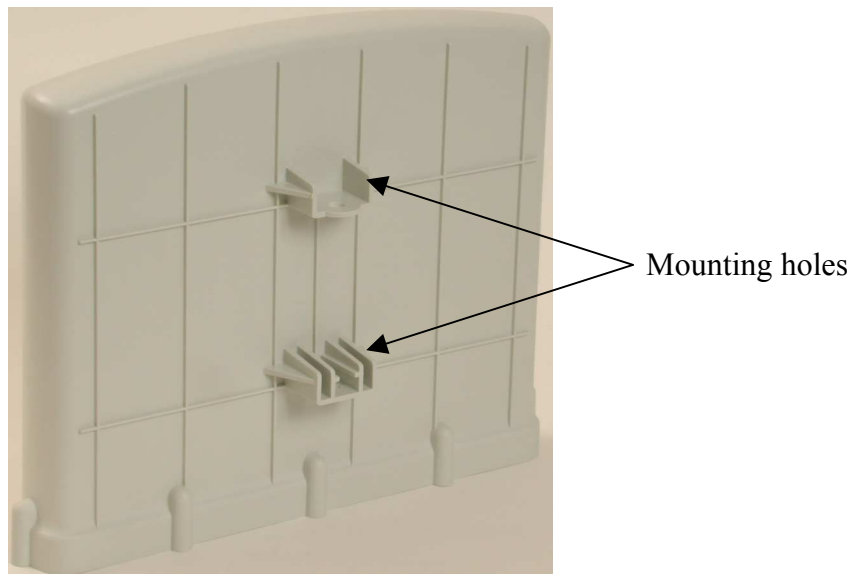


Figure 4-11: BSR bottom panel providing holes for mounting

The mounting brackets for BSR wall- and pole-mounting are different.



Note: The antenna used for this transmitter must be installed to provide minimum separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter.

4.8.1. Minimum Distance Between BSRs

To prevent system interference, each BSR requires a minimum of 1-metre separation between adjacent BSRs (see Figure 4-12).

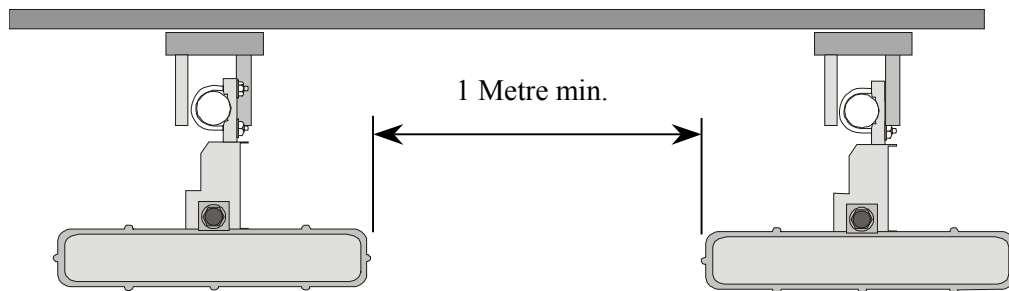


Figure 4-12: Minimum distance between mounted BSRs



Warning: The BSR emits microwave radiation; a minimum distance of 200 mm must be maintained from the front of the BSR.

4.8.2. Wall Mounting

BSR wall mounting is performed in two chronological stages:

- Attaching the mounting bracket to the BSR's mounting holes
- Attaching the mounting bracket (attached to the BSR) to the wall

To mount the BSR on a wall:

1. Attach the mounting bracket to the BSR using two stainless steel bolts, as shown in Figure 4-13.

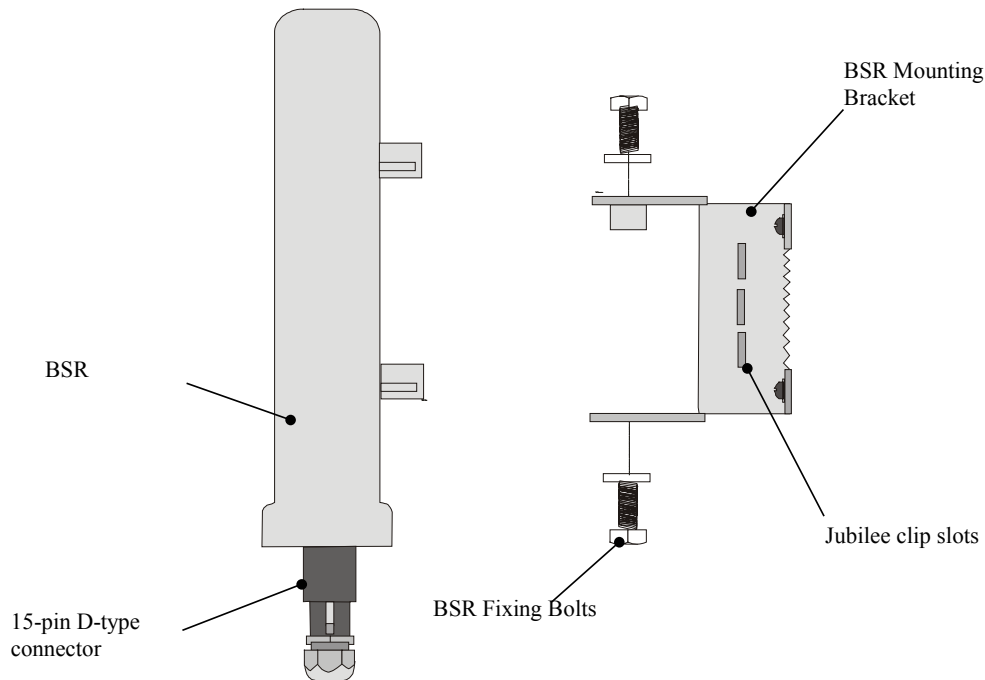


Figure 4-13: Attaching the mounting bracket to the BSR

2. Attach the mounting bracket to the wall using four screws. The fixing dimensions for the mounting bracket is illustrated in Figure 4-14



Note: Airspan does not provide screws for attaching the mounting bracket to the wall. The screw size depends on the structure of the building to which the bracket is to be attached. When selecting screw sizes, consideration must be given to the weight of the BSR and load that may be induced in windy conditions.

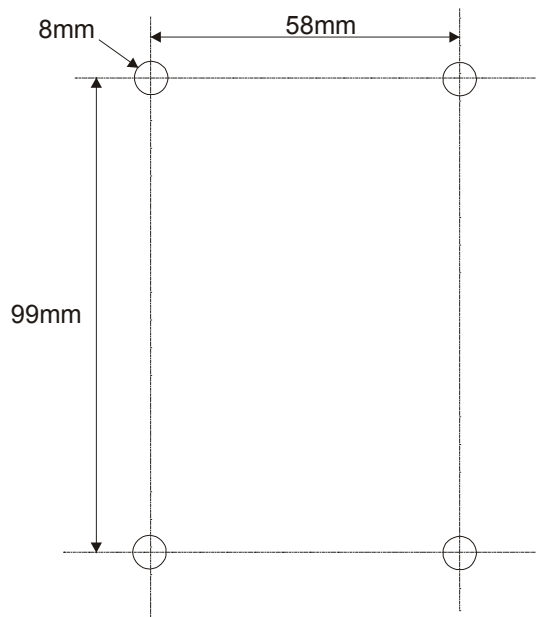


Figure 4-14: BSR mounting bracket dimensions for the four fixing holes

3. Adjust the horizontal positioning of the BSR, and then fasten tight the two stainless-steel bolts.

Rotation is restricted to the horizontal plane only. The permissible rotation is shown in Figure 4-15.

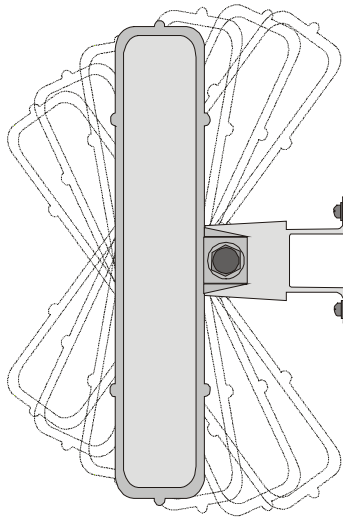


Figure 4-15: Horizontal rotation of the BSR



Note: A thread-locking compound is to be used to prevent the bolts working loose.

4.8.3. Pole Mounting

The BSR can be mounted on a pole (see Figure 4-16). Pole mounting allows the BSR to be adjusted in the horizontal as well as the vertical plane. The pole-mounting bracket assembly is designed to support the BSR on a round pole of 45 mm in diameter.



Figure 4-16: Mounted BSR

To mount the BSR on a pole:

1. Attach the mounting bracket to the BSR using two stainless steel bolts.

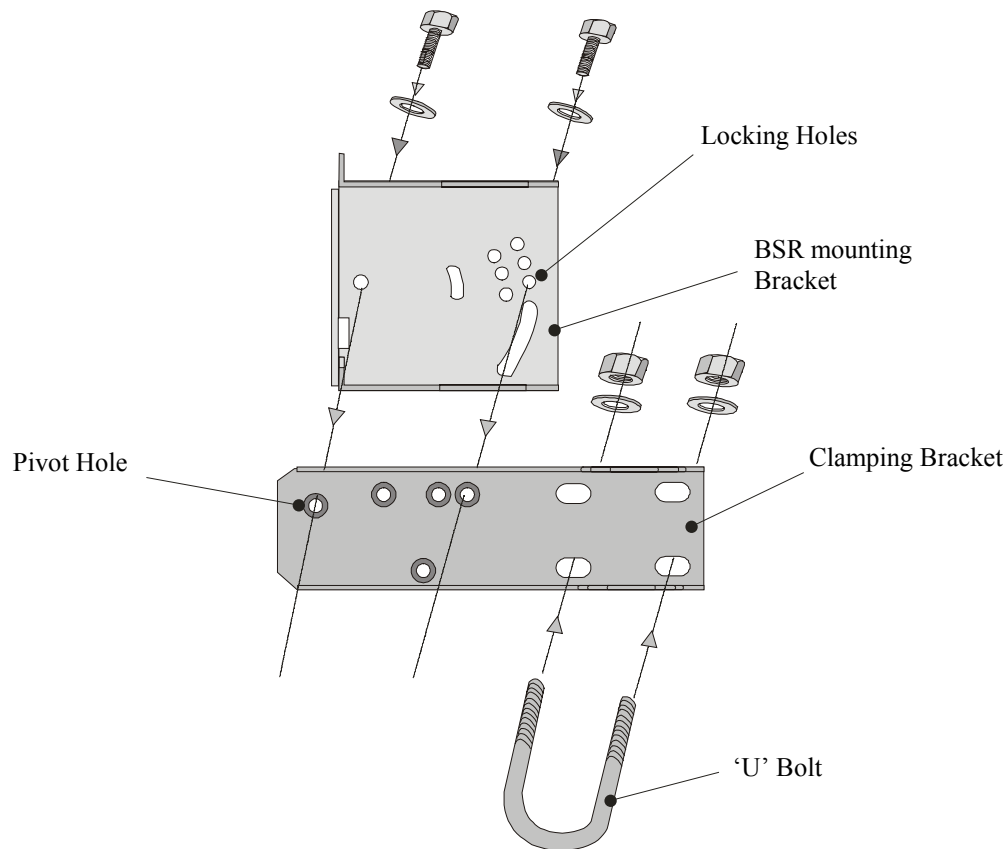


Figure 4-17: BSR mounting bracket assembly

2. Attach the clamping bracket to the mounting bracket using two M8 stainless bolts.
3. Attach the Clamping bracket to the pole by placing the U-bolt around the pole, and then inserting the U-bolt through the Clamping bracket and securing it by screwing the two bolts on the U-bolt.

4. Adjust the vertical position of the BSR. Lock the BSR at the desired position by inserting the locking bolt in the desired position. Once the correct angle has been set both bolts must be tightened to lock the BSR bracket in place.
5. Adjust the horizontal position of the BSR by rotating the BSR about the pole, and then tighten the U-bolt.

BSR positioning is obtained in two planes by adjustment of the mounting bracket assembly as shown in Figure 4-18.

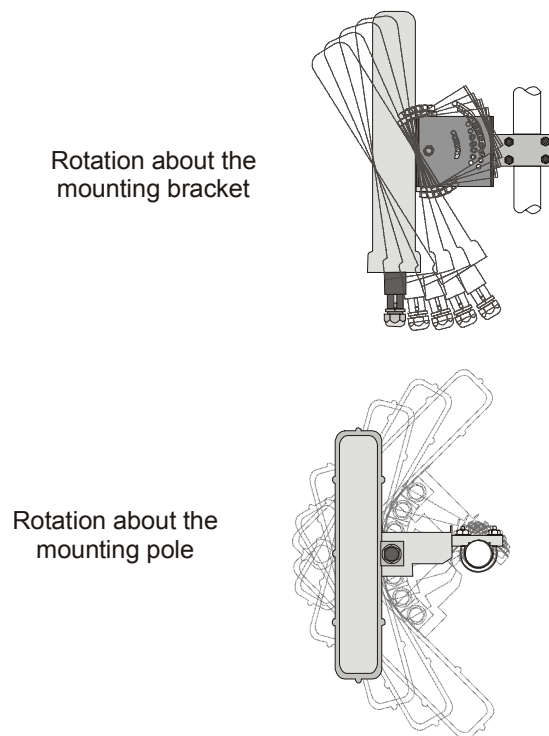


Figure 4-18: BSR GPS orientation in vertical (top figure) and horizontal plane (lower figure)



Note: A thread-locking compound is to be used to prevent the bolts working loose. A loop should be left in the cable for maintenance purposes and to prevent the cable weight being taken directly on the connector.



Installing the BSDU

This chapter describes the installation of the WipLL **Base Station Distribution Unit (BSDU)**, which is installed at the base station.

This chapter includes the following sections:

- Overview
- Physical Dimensions and Basic Design
- Rack-Mounting
- Connecting to BSRs
- Connecting to GPS Antenna
- Connecting to 100Base-T Networks
- Daisy-Chaining BSDUs
- Connecting Sync IN/OUT ports
- Connecting to BPS for Power Management
- Connecting to PC for Serial Management
- Connecting to PC for Network IP Management
- Connecting to Power
- LED Indicators

**Warning:**

To avoid electrical shock and fire hazard ensure that all data and power connections are made prior to connecting the BSDU to the DC power supply.

When installing the BSDU, it is required that you wear the wrist strap for ESD prevention.



Note: Airspan supplies unterminated cables for 15-Pin D-type and N-type connectors. Refer to the cable crimping procedures for these connectors in Appendix B, "Cable Crimping".

5.1. Overview

The WipLL **BSDU** is an optional WipLL device that connects multiple BSRs at a base station. The BSDU is installed in a cabinet at the customer's base station.

The BSDU provides the following functionality:

- Serves up to six BSRs. Up to four BSDUs can be daisy-chained at a single base station to support up to 24 BSRs.
- Power supply of –48 VDC to BSRs.
- Wide Area Network (WAN) interface to the provider's backhaul network.
- Frequency-hop synchronization.

5.2. Physical Dimensions and Basic Design

The BSDU is encased in a chassis providing access to the BSDU's communication ports on the front and rear panels. The BSDU can be mounted in a standard 19" rack with 1-U vertical space requirement.

Figure 5-1 displays the BSDU's front panel.

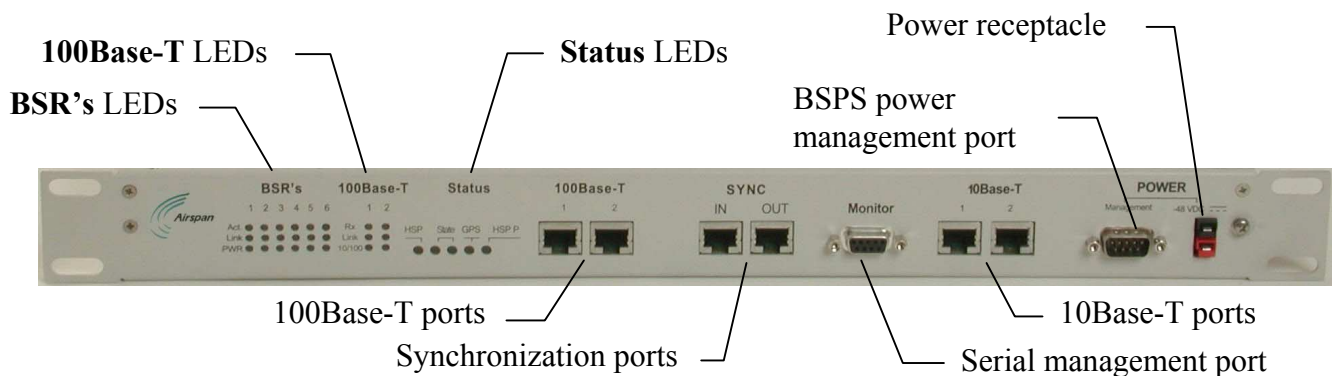


Figure 5-1: BSDU front panel

The BSDU's front panel provides the following ports:

- Two RJ-45 100Base-T ports
- Two RJ-45 10Base-T ports
- One RJ-45 port (input) for synchronization with previous BSDU in ring
- One RJ-45 port (output) for synchronization with next BSDU in ring
- One 9-Pin D-type (female) monitor serial port for WipConfig interface
- One 9-Pin D-type (male) port for management interface with the Base Station Power System (BSPS)
- DC power input connector –48 VDC
- Various LEDs

Figure 5-2 displays the BSDU's rear panel.

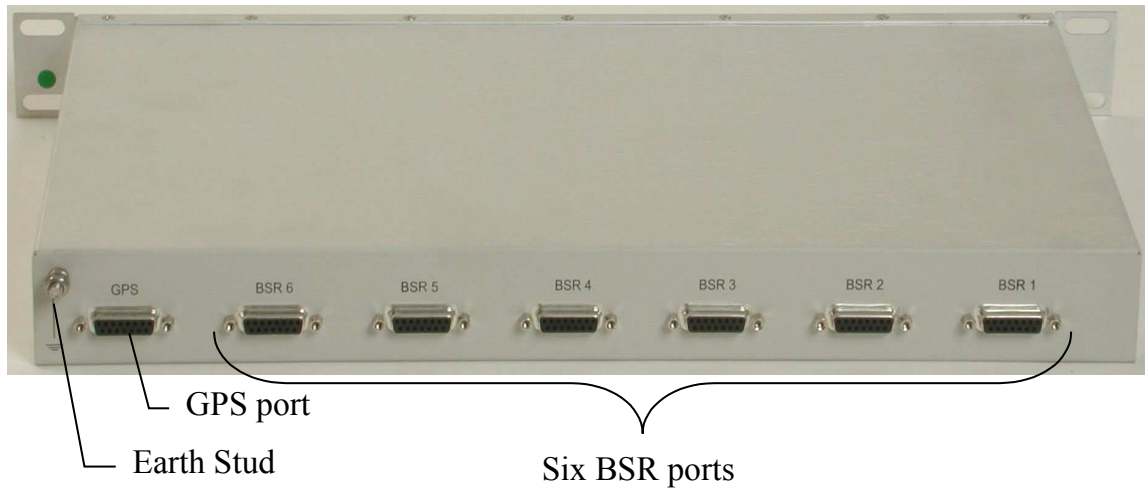


Figure 5-2: BSDU rear panel

The BSDU's rear panel provides the following ports:

- Six 15-Pin D-type connectors which provide DC power, Ethernet connection, synchronization and serial interface to the BSR (up to six BSRs)
- One 15-Pin D-type connector for the Global Positioning System (GPS) antenna
- One 5-mm diameter grounding lug

The BSDU's physical dimensions are described in Table 5-1.

Table 5-1: BSDU physical dimensions

Parameter	Value
Height	43.2 mm (1.7 inches)
Width	482.6 mm (19 inches)
Depth	228.6 mm (9 inches)
Weight	2.9 kg

5.3. Rack-Mounting

The BSDU is a 1U-chassis, which is installed in a standard 19" (inch) cabinet, and is provided with front-rail mounting brackets. The mounting brackets are part of the BSDU chassis. Therefore, all that is required for mounting the BSDU is to attach the BSDU mounting brackets to the cabinet. The BSDU is secured to the cabinet's mounting rails using the supplied four M5 mounting screws and plastic cup washers.

To rack-mount the BSDU:

1. Determine which mounting rail holes of the cabinet—left and right side—will be used for attaching the chassis.
2. Insert four nuts into the holes you specified in Step 1. These nuts are housed in Tinnerman clips, which allow you to fasten them into the holes. To insert the Tinnerman clips, hold the clips, squeeze them, and then insert them into the hole.
3. Carefully insert the BSDU into the cabinet, aligning the BSDU's mounting brackets with the holes.
4. Insert the M5-mounting screws, with plastic washers, in the BSDU mounting bracket screw holes, on each side, as shown Figure 5-3. In this way, the chassis is supported until you tighten the chassis screws.

5. Tighten the M5 mounting screws to fasten the chassis to the cabinet.

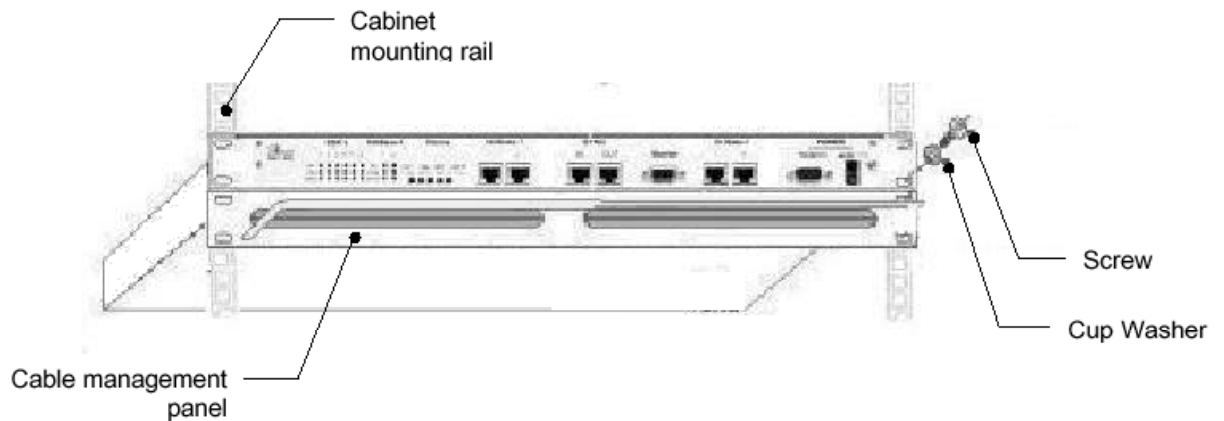


Figure 5-3: BSDU rack mounting



Note: When mounting multiple BSDUs in a cabinet, vertical space—above and below—is required for threading cables to the rear.

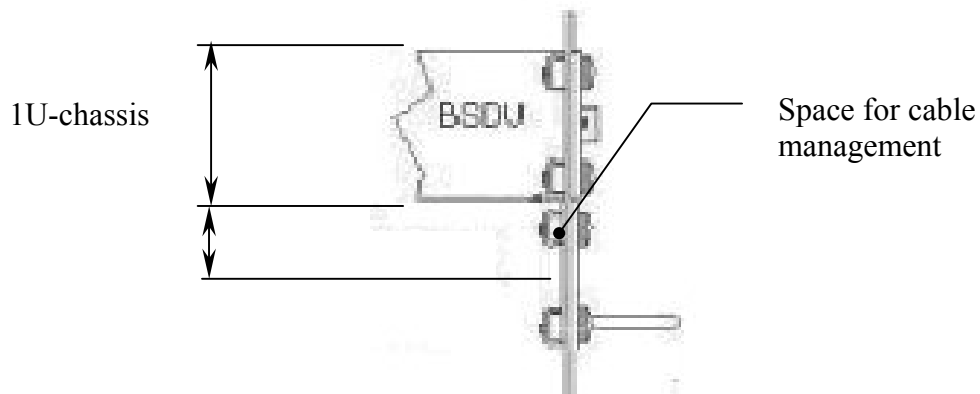


Figure 5-4: BSDU and vertical space for cables

5.4. Connecting to BSRs

The BSDU rear panel provides six 15-Pin D-type connectors for connecting a maximum of six BSRs. For a detailed description of connecting BSRs to the BSDU, see Chapter 4, “Installing the BSR”.



Note: A maximum of 4 BSDUs can be installed at a base station, allowing maximum connection of up to 24 BSRs.

- **Connector:** 15-Pin D-type (male)
- **Connector pinouts:** see Chapter 4, “Installing the BSR”.

For a description of the BSDU’s **BSR** ports LED indicators, see Section 5.13.1, “BSR’s LED”.

5.5. Connecting to the GPS Antenna

The rear panel of the BSDU provides a 15-Pin D-type connector port, labeled **GPS** for connection to the GPS antenna for clock synchronization. The GPS allows synchronization between base stations.



Note: For a detailed explanation on connecting the GPS to the BSDU port, see Chapter 6, “Installing the GPS”.

5.6. Connecting to 100Base-T Networks

The BSDU's front panel provides two RJ-45 ports for connection to 100Base-T (labeled **100Base-T**) ports. The 100Base-T ports are used for connection to the WipLL management station and the service provider's backbone (Ethernet).

■ **Connector:** 8-Pin RJ-45 (male)

■ **Connector pinouts:**

Pin	Name	Description
1	Tx+	Transmit Data+
2	Tx-	Transmit Data-
3	Rx+	Receive Data+
4	NC	Not connected
5	NC	Not connected
6	Rx-	Receive Data-
7	NC	Not connected
8	NC	Not connected

5.7. Daisy-Chaining BSDUs

You can daisy chain up to four BSDUs at each base station. When you daisy chain BSDUs, you need to connect the 100Base-T ports between BSDUs using a crossover cable.

- **Connector:** 8-pin RJ-45
- **Cable:** RJ-45-to-RJ-45 crossover
- **Connector pinouts:** The following table describes the pinouts of the RJ-45 connectors on opposite sides of the crossover cable:

RJ-45 (one end)		Description	RJ-45 (other end)
Pin	Name		Pin
1	Tx+	Transmit Data+	3
2	Tx-	Transmit Data-	6
3	Rx+	Receive Data+	1
4	NC	Not connected	4
5	NC	Not connected	5
6	Rx-	Receive Data-	2
7	NC	Not connected	7
8	NC	Not connected	8

To daisy-chain BSDUs:

1. On the first BSDU, connect the RJ-45 connector, on one end of the crossover cable, to one of the two 100Base-T ports (labeled **100Base-T 1** or **100Base-T 2**) located on the BSDU's front panel (see Figure 5-5).
2. On the second BSDU, connect the RJ-45 connector, at the other end of the crossover cable, to one of the BSDU's 100Base-T ports (labeled **100Base-T 1** or **100Base-T 2**) located on the BSDU's front panel (see Figure 5-5).
3. If there are additional BSDUs, simply continue connecting the BSDUs using the 100Base-T ports (see Figure 5-5).