



ASWipLL and AS3010 Systems

Wireless IP-Based Local Loop System
Release 4.6

Hardware Installation Guide

Leading the World in Wireless DSL

The ASWipLL product bears the CE marking. This CE marking demonstrates ASWipLL's full compliance with applicable European Union (EU) directives:



The ASWipLL product bears the Underwriters Laboratories (UL) marking, demonstrating full compliance with UL's safety requirements:



ASWipLL products also bear the Federal Communications Commission (FCC) marking, demonstrating compliance with FCC Part 15 regulations.



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Safety Guidelines

This chapter outlines safety guidelines when installing the ASWipLL system.



Warning: The user and the installer should be aware that changes and modifications not expressly approved by Airspan Networks could void the user's authority to operate the equipment.



Warning: Never install equipment that is damaged.



Warning: Only qualified personnel should be allowed to install, replace, and service the ASWipLL equipment.

2.1. ASWipLL Radios and Third-Party External Antennas



Warning: Do not connect and disconnect antennas while the power is on. This can cause irreversible device damage.



Warning: The digital portion of the transceiver 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. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try correct the interference by performing one or more of the following measures:

- Reorientate or relocate the receiving antenna
 - Increase separation between the equipment and receiver
 - Connect the equipment to an outlet on a circuit different from that to which the receiver is connected
 - Consult the dealer or an experienced radio/TV technician for help
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Warnings:

- 1) The device cannot be sold retail, to the general public or by mail order. It must be sold to dealers.
 - 2) Installation must be controlled.
 - 3) Installation must be performed by licensed professionals.
 - 4) Installation requires special training.
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Warning: The ASWipLL radio devices and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may void Airspan's ASWipLL product warranty and may expose the end user or the service provider to legal and financial liabilities. Airspan and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.



Warning: For **unlicensed** bands, it is the responsibility of the person installing the ASWipLL 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.



Warning: For **unlicensed** bands, in accordance with FCC regulations, ensure that the external antennas provide an EIRP of less than or equal to **36 dBm** to prevent interference with other radios operating in the unlicensed band. The EIRP is defined by the following formula:

Max. Power Output + Antenna Gain - Cable Loss ≤ 36 dBm (EIRP)

Airspan does not supply cables for connecting external antennas. It is the responsibility of the installer to provide the cable and ensure cable characteristics (e.g. length and cable loss) enables adherence to FCC's regulations concerning maximum EIRP. When calculating output power based on cable loss, always assume the ASWipLL radio is configured for **maximum rate mode** (i.e. 1.33/4 Mbps), which provides greater Tx power than low rate modes (1/2/3 Mbps). For example, for 5.8 GHz, always assume max. Tx power at SPR's antenna connector as **21 dBm**.

The table below lists **examples** of cable loss per cable (not supplied by Airspan) for maximum antenna gains, based on the formula above. Note that the EIRP is either equal to or less than 36 dBm.

Cable type	Cable length (ft)	Tx power (dBm)	Cable loss (dB)	Max. Antenna gain (dBi)	Max. EIRP (dBm)
BELDEN - 9913	10	21.1	0.6	15.5	36
	30	22	1.5	15.5	36
	100	23	4.4	15.5	34.1
BELDEN - 89907	10	22.4	1.9	15.5	36
	30	23	5.2	15.5	33.3
	100	23	16.3	15.5	22.2



Warning: The ASWipLL transceivers emit microwave radiation. Therefore, a minimum distance must be maintained from the front of the ASWipLL radios:

- **Unlicensed bands (e.g. 5.8 GHz):** 200 mm
- **Licensed bands:**
 - 700 MHz (i.e. ASWipLL 700) = 800 mm
 - 2.5 GHz (i.e. ASWipLL 2.5) = 500 mm



Warning: To avoid RF interference between BSRs operating in the 700 MHz where four BSRs are installed at a Base Station, a 1-meter separation must be provided between the BSRs' antennas operating in the lower frequencies (i.e. 711.5 and 714.5 for 1 Msps mode; 712 and 714 for 1.33 Msps mode) and the BSRs' antennas operating in the upper frequencies (i.e. 741.5 and 744.5 for 1 Msps mode; 742 and 744 for 1.33 Msps mode).



Warning: When using external antennas, the external antennas must not be co-located or operating in conjunction with any other antenna or transmitter.



Warning: ASWipLL radios using an external antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.



Warning: Inherent risks exist in operating equipment in license-exempt bands (i.e. 900 MHz). Airspan recommends that you do not purchase or deploy any equipment that operates in license-exempt bands without first analyzing the interference environment at each of your proposed deployment locations. Please contact your Authorized Airspan System Integrator or Distributor if you have any questions or require assistance regarding interference analysis. Airspan Networks will not be held responsible for product performance issues related to interference.



Warning: In environments that produce disturbances such as paging systems, Airspan recommends using a narrow-band cavity filter and implementing the appropriate frequency bands (within the filter's capabilities), i.e. building an NVRAM frequency table using only these frequencies.



Warning: Mount outdoor radios so that their front panel ports face down to prevent water from settling on the ports. This avoids damage to the units such as corrosion and electrical short-circuiting.



Warning: Do not mount outdoor radios and external antennas in weather such as rain or lightening that may increase risk of electrocution.

2.2. Electrical Safety Guidelines



Warning: Connect the power only after all network and antenna cable connections are performed. Powering the device before connecting, for example, the external antenna, can lead to irreversible device damage.



Warning: To prevent short-circuiting and electrical shocks, cables with exposed ends (i.e. not yet crimped) should be covered with protective polythene bags during external cable installation processes.

2.2.1. Handling Electrostatic Devices



Warning: To prevent ESD damage to ASWipLL devices, always wear an ESD wrist strap when handling these devices or coming into contact with internal components.

Electrostatic devices are those devices that may be damaged by the inadvertent discharge of static electricity from a charged body. The risk of damage, due to electrostatic discharge (ESD) to a device, may cause the device to fail suddenly, or it may induce a partial defect within the device, which will cause subsequent premature failure. Static electricity can result from operators walking on floors, moving around on chairs, from the movement of operator's clothing or even casual brushing against racks, benches or walls.

Airspan recommends the following guidelines to be adopted to minimize the risk of component failure due to electrostatic discharge to the device:

- ASWipLL devices are provided typically in see-through anti-static bags. Wherever possible, checking and inspection of a unit should occur without removing it from the bag.
- All operators shall wear the approved conductive overall.
- Where operators come into direct contact with any piece of electronic hardware, operators must wear an **ESD-preventive wrist strap**. All straps and cords should be tested using a Wrist Strap Tester prior to use. The wrist strap cords shall have a 2 Meg Ohm resistor fitted at either end. Wrist straps should be worn in direct contact with bare skin and not over clothing.

2.2.2. Grounding

Only certain ASWipLL devices require additional grounding. ASWipLL devices that do not require additional grounding have grounding at the main supply outlet. The following table lists the ASWipLL devices' grounding requirements.

Table 2-1: ASWipLL grounding requirements

Site	ASWipLL device	Grounding
Base Station	BSR	Through the mains (via BSDU) i.e. no additional grounding required
	BSDU	Additional grounding required (grounding lug at rear end of chassis)
	BSPS	Additional grounding required (grounding lug at rear end of chassis)
CPE	SPR	Through the mains (via SDA), i.e. no additional grounding required
	IDR	Through the mains, i.e. no additional grounding required

2.2.3. Lightning Protection



Warning: Never install the equipment during stormy weather and lightning.

ASWipLL devices comply with the **Surge Immunity standard: EN 61000-4-5**. ASWipLL devices are protected from lightning surges as the outdoor devices (BSRs and SPRs) are encased in a plastic chassis. Therefore, if lightning strikes the device, an electrical circuit cannot be completed, and hence, no electrical surge can occur.

In addition, ASWipLL outdoor and indoor (SDA) devices provide high-speed data line protection against direct and induced transient over-voltages surges on the cables. This capability is provided by the fact that all ASWipLL devices are designed with TVS (transient voltage suppressor) components that maintain potential differences.

However, for geographical areas that have above normal lightening activity, Airspan can supply a surge protector composed of a 15-pin D-type adapter with a grounding wire.

2.3. Cabling



Warning: The maximum cable length between the radio transmitters (i.e. BSR and SPR) and terminating equipment is 100 meters.



Warning: Cables with exposed ends (i.e. not yet crimped) should be covered with protective polythene bags during external cable installation processes.



Warning: Prior to the commencement of any installation, commissioning work at 'live' sites it is the responsibility of the Airspan engineer to advise the customers representative before any activity commences. If in doubt assume equipment is 'live'.



Warning: Disturbance of cables on an In-Service exchange can cause loss of service. Extreme care must be taken when installing cables at any customer or subscriber premises.

2.3.1. Considerations

The following issues should be considered during cabling at the ASWipLL Base Station and customer premises:

- Cable routes are to be defined in the site-specific documentation.



Note: A minimum separation of 200 mm should exist between power and data cables. However, it is permissible to allow these cables to cross each other at right angles.

- 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.

- Plastic ties and wraps are to be used to secure cables at regular intervals to trays, guides, and mounting pole/bracket. Ensure all trimmed ends are disposed of safely and at regular intervals.
- Data cables of less than 20 pairs shall be mixed in bundles not exceeding 50 mm in diameter.
- Ensure cables are not trapped in cabinet doors, by slide-in equipment or support metalwork.
- Excessive stress on cable terminations caused by taught cables should be avoided. Connector strain relief, if not built into the connector used, shall be provided by means of a strategically located cable tie. A maintenance loop or a generous amount of cable slack shall be provided just before the cable reaches the ASWiPLL device to allow for equipment removal without disturbance to adjacent cables.
- When installing network cables, ensure they are not damaged by friction or sharp edges.
- Data cables providing connection to the customers network shall be run in protective conduits. Cable conduits should be secured to the wall in accordance with manufacturers instructions.
- External data cables are to be protected in metal conduits, which are to be secured to the building structure in accordance with manufacturers recommendations.
- Wiring conduits must be placed in areas to prevent a trip hazard (e.g. don't install on roof walkways)
- Cables should be carefully fed through conduits and not pulled by means of any attached connector.
- Sufficient space should be provided in cable conduits, trunking or trays (where possible) to allow for future cabling growth.
- Data cables threaded into holes drilled in walls are to be covered by a waterproof sheath to prevent water penetration.

- Silicone sealant should be used to plug any holes on both internal and external wall surfaces once cables are in place.
- Cables not housed in conduits must be placed in a manner to avoid a trip hazard. (Avoid trailing wires across passageways.)

2.3.2. Labeling

The following labels are required to be fitted to ASWipLL equipment:

- Voltage Warning
- High Earth Leakage Current
- Signal Cable Designation

2.3.2.1. Voltage Warning



Warning: Voltages over 30 Volts AC and 50 Volts DC are categorized as hazardous. Hazard warning labels should be fitted where required. Certain countries require equipment warning and instruction labels to appear in the local language. When installing ASWipLL equipment ensure that local requirements regarding labels are given consideration.

- Where mains power is fed from separate phases, appropriate warning labels must be fitted to warn of the increased danger.
- The AC equipment used in the BSPS cabinet must carry a relevant voltage warning label specific to the country in which it is being installed. The label will be fitted to the cabinet doors displaying an electrical hazard symbol, the local operating voltage and the letters 'AC'.
- A power feed identification label (e.g. PWR 'A') shall be applied in the following locations:
 - On the rear of the main power rack adjacent to the terminal block
 - Attached to BSPS AC mains power plug or lead
 - Attached to the customer mains power socket or distribution rail
 - On the BSPS power circuit connection at the fuse board

2.3.2.2. High Earth Leakage Current

If equipment earth leakage current exceeds 3.5 mA, a warning label as shown in Figure 2-1 must be fitted to the rear of the main power rack alongside the AC inlet terminal block.

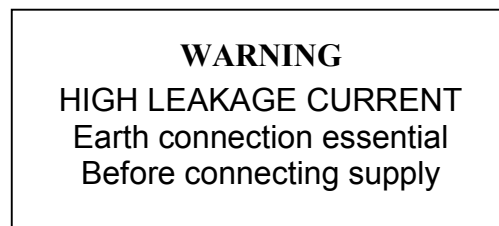


Figure 2-1: Warning label if earth leakage current exceeds 3.5 mA

2.3.2.3. Signal Cable Designation

All data cables should be labeled with both the source and destination at each end. A wrap around identification label, similar to that shown in Figure 2-2, is to be fitted to both ends of ASWipLL data cables. Care should be taken to ensure that the cable identification information is clearly visible. Fit the label 100 mm from the cable end. Wrap the label ensuring good adhesion to cable and itself.

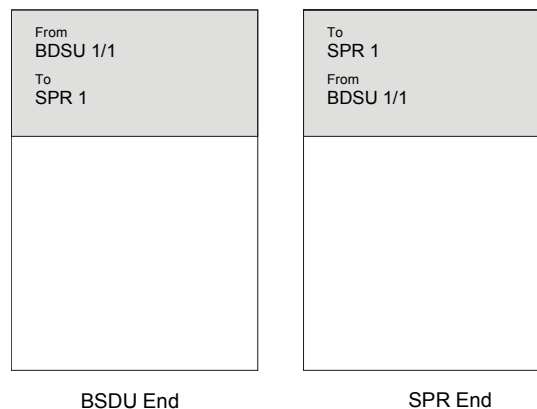


Figure 2-2: Typical signal cable identification label