UGD-D01001 Rev A

AirSynergy 2000
Installation Guide

Copyright

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Human Exposure to Radio Frequencies

The AirSynergy antennas should be installed and operated from a minimum distance from your body of:

- AirSynergy with External Antenna - 1.5 meters
- AirSynergy with Front Mount Antenna - 1.0 meter
- AirSynergy with Smart Beam Antenna (SBA) - 0.5 meter

Radio Interference

This AirSynergy 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 technician is encouraged to try to correct the interference by performing one or more of the following measures:

- Re-orientate or relocate the antenna
- Increase separation between the eNodeBs and/or End Device
- Connect the equipment to an outlet on a circuit different from that to which the power source is connected

Avoiding Radio Interference

Ensure a minimum of 1-meter separation between co-located antennas of AirSynergy units.

Modifications

Any changes and modifications to this device that are not expressly approved by Airspan Networks may void the user's authority to operate the equipment.

General

- Only qualified personnel should be allowed to install, replace, and service the equipment.
- The device cannot be sold retail, to the general public or by mail order. It must be sold to operators.
- Installation must be controlled.
- Installation must be performed by licensed professionals.
- Installation requires special training. The AirSynergy radio and antenna 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 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.

Note: Outdoor units 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 the XXX product warranty and may expose the end user or the service provider to legal and financial liabilities. XXX 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: It is the responsibility of the installer to insure that when using the outdoor antenna kits in the United States (or where FCC rules apply), 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 to FCC rules CFR47 part 15.204.

The installer should configure the output power level of antennas, according to country regulations and per antenna type.

Safety

1. Read this guide and follow all operating and safety instructions.
2. Keep all product information for future reference.
3. This product is supplied with a grounding power plug. Do not defeat this important safety feature.
4. **Warning**: High voltages exist inside the product - do not remove the lid or base: No user serviceable parts inside.
5. Position the power cord to avoid possible damage; do not overload wall outlets.
6. Do not place this product on or near a direct heat source, and avoid placing objects on the terminal.
7. Do not operate this device near water or in a wet location.
8. Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.
9. The units should not be located near power lines or other electrical power circuits.
10. The radio transceiver must be properly grounded to protect against power surges and accumulated static electricity. It is the user's responsibility to install this device in accordance with the local electrical codes.
11. Installation of the AirSynergy must be contracted to a professional installer.
12. Disconnect Device. The socket outlet should be easily accessible in case you have to disconnect the device.
13. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

Warning of Hazardous Voltages

On AC installations, hazardous voltages exist. Use caution when verifying or working with AC power. Remove metal jewelry that could come into contact with AC power.

On DC sections, short circuiting the low voltage, low impedance circuits can cause severe arcing that may result in burns or eye damage. Remove rings, watches etc. to avoid shorting DC circuits.

Note: Airspan products do not contain hazardous substances (as defined in UK Control of Substances Hazardous to Health Regulations 1989 and the Dangerous Substances Regulations 1990). At the end of any Airspan products life cycle, the customer should consult with Airspan to ensure that the product is disposed of in conformance with the relevant regulatory requirements.

Adherence to European Directive 1999/519/EC

European Council Recommendation 1999/519/EC details basic restrictions and reference levels on human exposure to electromagnetic fields as advised by the ICNIRP. Adherence to these

recommended restrictions and reference levels should provide a high level of protection as regards the established health effects that may result from exposure to electromagnetic fields.

Warning Symbols

The following symbols may be encountered during installation or troubleshooting. These warning symbols mean danger. Bodily injury may result if you are not aware of the safety hazards involved in working with electrical equipment and radio transmitters. Familiarize yourself with standard safety practices before continuing.

Electro-Magnetic Radiation

High Voltage

Service Information

Refer all repairs to qualified service personnel. Do not remove the covers or modify any part of this device, as this will void the warranty.

Disconnect the power to this product and return it for service if the following conditions apply:

a. The terminal does not function after following the operating instructions outlined in this manual.

b. Liquid has been spilled, a foreign object is inside, or the terminal has been exposed to rain.

c. The product has been dropped or the housing is damaged.

Locate the serial number of the terminal, antenna, and transceiver and record these on your registration card for future reference. Use the space below to affix serial number stickers. Also record the MAC address, located on the back of the terminal.

UL Information

- The equipment must be properly grounded according with NEC and other local safety code requirements.

- Reminder to all the BWA system installers: Attention to Section 820-40 of the NEC which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as is practical.

Lightning Protection

WARNING: The following notes are general recommendations for the system. The wireless equipment should be installed by a qualified professional installer and must follow local and national codes for electrical grounding and safety. Failure to meet safety requirements and/or use of non-standard practices and procedures could result in personal injury and damage to equipment. A direct lightning strike may cause serious damage even if these guidelines are followed.

All outdoor wireless equipment is susceptible to lightning damage from a direct hit or induced current from a near strike. Lightning protection and grounding practices in local and national electrical codes serve to minimize equipment damage, service outages, and serious injury. Reasons for lightning damage are summarized as:

- Poorly grounded tower/antenna sites that can conduct high lightning strike energy into equipment.

- Lack of properly installed lightning protection equipment that can cause equipment failures from lightning induced currents.

A lighting protection system provides a means by which the energy may enter earth without passing through and damaging parts of a structure. A lightning protection system does not prevent lightning from striking; it provides a means for controlling it and preventing damage by providing a low resistance path for the discharge of energy to travel safely to ground. Improperly grounded connections are also a source of noise that can cause sensitive equipment to malfunction.

A good tower grounding system disperses most of the surge energy from a tower strike away from the building and equipment.

To limit the equipment damage due to a lightning strike, the following practices are recommended for the wireless system:

- Provide direct grounding from the antenna mounting bracket, the radio and antenna and the lightning/surge protectors to the same ground point at the base of the tower or a ground bus on the building. Use the grounding screws on the antenna bracket and the radio and antenna for terminating the ground wires.

- The AC wall outlet ground must be connected to the same grounding system as the eNodeB.

DECLARATION OF CONFORMITY

European Community, Switzerland, Norway, Iceland, and Liechtenstein

Declaration of Conformity with Regard to the R&TTE Directive 1999/5/EC

English:

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Deutsch:

Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprecheneden Vorgaben der Richtlinie 1999/5/EU.

Dansk:

Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Directiv 1999/5/EF.

Español:

Este equipo cumple con los requisitos esenciales asi como con otras disposiciones de la Directive 1999/5/EC.

Greek:

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Airspan ΔΗΛΩΝΕΙ ΟΤΙ Ο ΕΞΟΠΛΙΣΜΟΣ ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

Français:

Cet appareil est conforme aux exigencies essentialles et aux autres dispositions pertinantes de la Directive 1999/5/EC.

Íslenska:

Þessi búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipunar 1999/5/ESB.

Italiano:

Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 1999/5/EC.

Nederlands:

Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijn 1999/5/EC.

Norsk:

Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-directiv 1999/5/EC.

Português:

Este equipamento satisfaz os requisitos essenciais e outras provisões da Directiva 1999/5/EC.

Suomalainen:

Tämä laite täyttää direktiivin 1999/5/EY oleelliset vaatimukset ja on siinä asetettujen muidenkin ehtojen mukainen.

Svenska:

Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 1999/5/EC.

Román:

Acest echipament este în conformitate cu cerinţele esenţiale şi alte prevederi relevante ale Directivei 1999/5/CE.

The Declaration of Conformity related to this product can be obtained from PLM@Airspan.com.

FCC Notice

Federal Communication Commission Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP.

GPS Compliance

The GPS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC."

The GPS complies with the following EMC Common Regulatory Testing standards:

- EN55022: Radiated and Conducted Emissions
- CISPR 22: Class B
- EN 50081-1: Generic Emissions Class B
- EN 50082-1: Generic Immunity Class B
- EN 61000-4-2: Electrostatic Discharge Immunity
- EN 61000-4-3: Radiated RF EM Field Immunity Test
- EN 61000-4-4: Electrical Fast Transient/Burst Test
- EN 61000-4-6: Conducted Immunity
- EN 61000-4-8: Magnetic Field Immunity

Note: A GPS is required for synchronizing between TDD sectors.

Note: A GPS Lightning/Surge protector is required. (ordered separately)

Maximum Output TX Power

Table 1 - AirSynergy FCC Maximum Output TX Power

Frequency Band	FCC TX	FCC EIRP	Antenna Gain
2.62 – 2.69 GHz	33.36dBm	51.36dBm	18dBi

Table 2 - AirSynergy ETSI Maximum Output TX Power

Frequency Band	ETSI TX	ETSI EIRP	Antenna Gain
698-746 MHz	33 dBm	46.5dBm	13.5dBi
2290-2350 MHz	33dBm	51dBm	18.0dBi
2340-2400 MHz	33dBm	51dBm	18.0dBi
2496-2570 MHz	33dBm	51dBm	18.0dBi
2560-2630 MHz	33dBM	51dBm	18.0dBi
2620-2690 MHz	33dBm	51dBm	18.0dBi
3300-3400 MHz	33dBm	51dBm	18.0dBi
3400-3500 MHz	33dBm	51dBm	18.0dBi
3500-3600 MHz	33dBm	51dBm	18.0dBi
3600-3700 MHz	33dBm	51dBm	18.0dBi
3650-3675 MHz	33dBm	35dBm	2dBi
3700-3800 MHz	33dBm	51dBm	18.0dBi

Caution: Do not set maximum output TX power to higher than local regulations.

Power Consumption

AirSynergy has a Max nominal power consumption of 78W.

Antenna Types

The following antennas are designed specifically for AirSynergy deployments. Externally mounted antennas are available for use as well, but are specified separately.

Note: For a list of compatible external antennas, please contact your nearest Airspan sales representative.

Note: For currently supported antenna types see Appendix F .

Switched Beam Antenna

Switched Beam antenna (with built-in GPS antenna) variant include a top mounted steerable antenna with the following specification. The antenna is a multi-element cross polarized (dual slant) design which can be used in directional or omni modes of operation.

Table 3 - Switched Beam Antenna Parameters - Directional Mode

Parameter	2.3 GHz	2.6 GHz	3.x GHz
Frequency	2.3 - 2.5 GHz	2.5 - 2.7 GHz	3.4 - 3.7 GHz
Polarization	Dual Slant ±45°	Dual Slant ±45°	Dual Slant ±45°
Polarization discrimination	14-15 dB	14-15 dB	14-15 dB
Boresight gain	8 dBi	8 dBi	9 dBi
Azimuth HPBW	90°±10°	90°±10°	90°±10°
Elevation HPBW	25°	25°	25°
Co & X-Pol RPE	EN302-326-3 Class DN1	EN302-326-3 Class DN1	EN302-326-3 Class DN1
Grounding	DC Grounded	DC Grounded	DC Grounded

Table 4 - Switched Antenna Parameters - Omni Mode

Parameter	2.3 GHz	2.6 GHz	3.x GHz
Frequency	2.3 - 2.5 GHz	2.5 - 2.7 GHz	3.4 - 3.7 GHz
Polarization	Dual Slant ±45°	Dual Slant ±45°	Dual Slant ±45°
Polarization discrimination	10-16 dB	10-16 dB	10-16 dB
Average gain	2 dBi	2 dBi	3.5 dBi
Maximum gain ripple	4.5 dB	4.5 dB	4.5 dB
Elevation HPBW	20°	20°	20°
Co & X-Pol RPE	EN 302-326-3	EN 302-326-3	EN 302-326-3
Grounding	DC Grounded	DC Grounded	DC Grounded

Front Mount Sector Antenna

The front mounted sector antenna is a cross polarized fixed antenna which mounts on the front of the unit in place of the sun-shield.

Note: When using a front mounted antenna, external antennas cannot be used.

Table 5 - Front Mounted Sector Antenna Parameters

Parameter	2.x GHz	3.x GHz
Frequency	2.3 – 2.7 GHz	3.3 – 3.8 GHz
Polarization	Dual Slant ±45°	Dual Slant ±45°
Polarization discrimination	>18 dB	>15 dB
Boresight gain	12 dBi	11.5 dBi
Azimuth HPBW	63°	65°

Elevation HPBW	21°	22°
Grounding	DC Grounded	DC Grounded

Supported Frequencies

AirSynergy currently supports the following frequency bands and Downlink/Uplink ratios:

Table 6 - Supported Frequency Types

Band	Downlink Freq. (MHz)	Uplink Freq. (MHz)	Duplex	Duplexers / Filters
2	1930-1990	1850-1910	FDD	Internal
3	1805-1880	1710-1785	FDD	Internal
4	2110-2155	1710-1755	FDD	Internal
7	2620-2690	2500-2570	FDD	Internal
10	2110-2170	1710-1770	FDD	Internal
12	728-746	698-716	FDD	External
13	746-756	777-787	FDD	External
14	758-768	788-798	FDD	External
17	734-746	704-716	FDD	External
20	791-821	832-862	FDD	External
25	1930-1995	1850-1915	FDD	Internal
38	2570-2620	2570-2620	TDD	Internal
40	2300-2400	2300-2400	TDD	Internal
41	2496-2690	2496-2690	TDD	Internal
42	3400-3600	3400-3600	TDD	Internal
43	3600-3800	3600-3800	TDD	Internal

AirSynergy Antenna Usage Options

AirSynergy comes in a range of frequency variants that can be mounted with different antenna options and formats.

Figure 1 - AirSynergy with sunshield

A typical sector installation will have a cross-polar sector antenna fitted directly to the front of the AirSynergy main unit. (This is attached instead of the sun-shield).

Figure 2 - AirSynergy with front sector antenna

A switched beam antenna version (factory built option) with built in GPS antenna allows for flexible backhaul functionality where the strongest signal from any direction is automatically selected.

The same antenna can also be configured in omni mode for support of access.

Figure 3 - AirSynergy with switched beam antenna

AirSynergy units may be mounted together in a dual arrangement on the same mounting plate utilizing a special joining kit (supplied as a separate accessory).

Figure 4 - AirSynergy dual unit with GPS attached

Note: Appropriate mounting kit (included) for the various external antennas are required.

1 About this Guide

This section discusses the purpose, intended audience, conventions, referenced documentation and organization for this guide.

1.1 Purpose

This guide provides the workflow and step-by-step procedures for Installing the AirSynergy. These procedures include:

- Verify Prerequisites
- Install the AirSynergy Radio equipment
- Install the PSU equipment
- Connect and Manage Cables
- Commission and discovery via Netspan, prior to full configuration

1.2 Intended Audience

This guide is intended for persons who are responsible for installing the AirSynergy equipment. These persons should have a working knowledge of the equipment.

1.3 Conventions

This document uses the following informational conventions.

Icon	Description
	***Checkpoint:*** Marks a point in the workflow where there may be an exit or branch to some other procedure. At each ***Checkpoint*** the reason for an exit or branch is given along with specific directions to locate the entry point in the other procedure.
	***Reference:*** Gives a resource in the workflow that may be needed to complete a procedure along with specific directions to use the resource.
	***Caution:*** Describes a possible risk and how to lessen or avoid the risk.
	***Advice:*** Provides a recommendation based on best practice.
	***Note:*** Provides useful information.

1.4 Referenced Documentation

- AirSynergy Product Specification
- AirSynergy Overview Guide (pending)

1.5 Organization of this Guide

This guide is organized into the following Sections:

- About this Guide
- Introduction
- Getting Started
- Verify Prerequisites

- Install the AirSynergy Radio equipment
- Install the PSU equipment
- Connect and manage cables
- Set eNodeB Management IP & BSID via Web Page
- Connect and manage cables
- Appendixes

2 Introduction

This section provides a descriptive overview of the Airspan's AirSynergy Pico eNodeB variant and its place in the product suite.

2.1 AirSynergy

AirSynergy is part of Airspan's carrier-class 4G Pico eNodeB family. AirSynergy supports 3GPP's Long Term Evolution (LTE) eNodeB, providing high-speed data and mobility, in order to meet the demands of the Broadband Wireless Access market.

AirSynergy is a compact, easy to install pico-cell, allowing an operator to deploy LTE broadband services using existing Street Furniture (e.g. street lamps, power poles, etc…)

AirSynergy supports a wide array of frequencies and channel sizes, able to operate in both licensed and unlicensed bands with more frequencies and channel sizes added regularly.

AirSynergy implements dual 30dBm (2 x 1W) transmitters, with several optional integral antennas and external antennas connectivity.

AirSynergy fully supports the standard LTE (Uu/S1/X2) interfaces, and can also operate in "Standalone" mode, without the need for an LTE Core network - providing an ideal cost effective solution for fixed applications.

AirSynergy is managed by an SNMP-based network management system (Netspan) using standard and proprietary MIBs. Basic management can be performed using any standard Web browser.

Note: For management refer to AirSynergy Commissioning documentation.

2.1.1 Deployment Description

A highly flexible and scalable 4G Base Station, the AirSynergy is capable of supporting LTE profiles across multiple frequency bands.

Note: The following is for illustration only; actual layout may differ as infrastructure is installation-specific.

Note: AirSynergy must be properly grounded according with NEC and other local safety code requirements.

Note: Installation of the GPS Lightning/Surge protector (ordered separately) is necessary to protect the GPS antenna. The Lightning/Surge protector must be properly grounded with NEC and other local safety code requirements.

Note: (U.S.A. - WCS market only) A Cavity filter is required for the 2.3 GHz variant (ordered separately).

Note: An External Duplexer is required for some FDD variants (supplied with AirSynergy, where required).

Figure 5 - AirSynergy 2000

Note: Auto-negotiation must always be enabled on the core network side.

Note: Illustration above display the GPS connected directly to the top of the unit, there is also a remote GPS antenna option.

3 Getting Started

3.1 Workflow of Installation

The Workflow to install the AirSynergy is shown in the following diagram:

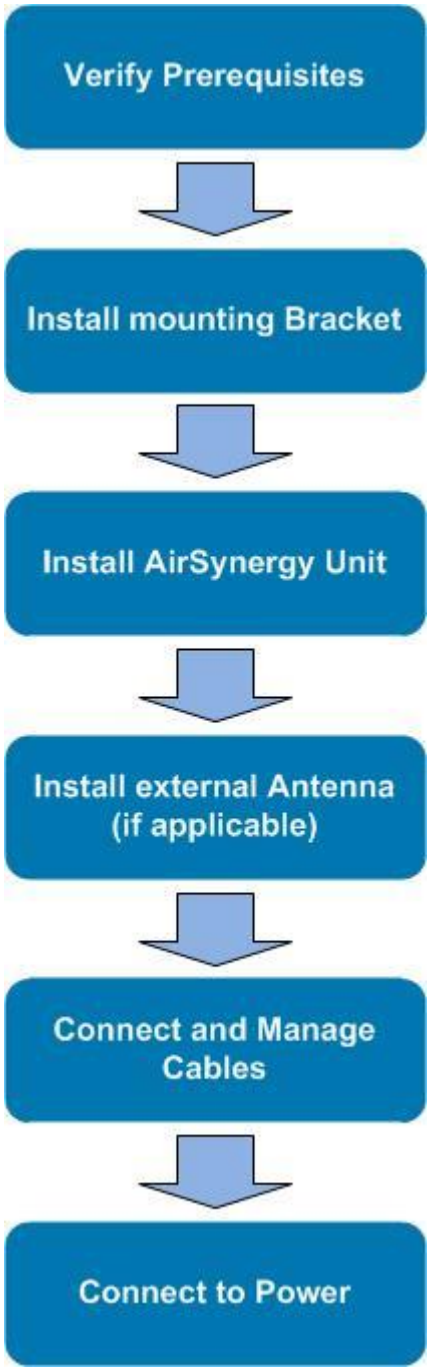

Figure 6 - Workflow of Installation

Caution: Antennas must be connected and attached before AirSynergy is powered on.

3.2 AirSynergy Installation Checklist

Plan the installation of the AirSynergy by using the Installation Checklist, which you can find as a removable job aid in Appendix A for this guide.

4 Verify Prerequisites

Prior to installing the AirSynergy, verify the required safety, power, tools, parts and components.

Reference: Set up requirements for the installation is detailed in the *Job Sheet*, see Appendix A for this guide.

4.1 Verify Site Requirements

To set up the AirSynergy a connection to a Netspan server PC will be required.

4.2 Verify Installation Requirements

4.2.1 Verify the Tools

Table 7 - AirSynergy installation tools

Tool	Use
Small flat blade screwdriver	screw terminals inside PoE injector
Large flat bladed screwdriver	securing the pole straps
Medium Phillips (crosshead) screwdriver	PoE injector lid and mounting screws
13mm wrench x 2	heavy-duty pole clamp option only
10mm or 13/32 inch wrench	AirSynergy securing flange nuts
Large pliers	Tightening cable glands - To fit 15mm
Knife	For stripping insulation
Large pliers	Tightening cable glands on the US PSU - To fit 15mm across flats
Wire cutters	
Wire strippers	Cutting of insulation
Ring terminal crimp tool	
Tilt-meter	If accurate down-tilt of antenna needs to be set

4.2.2 Verify the Parts and Kits

Table 8 - AirSynergy installation parts and kits

Installation Kit / Part	Consisting of	Note:
Main AirSynergy parts	1 x AirSynergy Universal Mounting Plate and pole strap kit	(Includes 2 pole straps for poles up to 200mm diameter)

Installation Kit / Part	Consisting of	Note:
	AirSynergy unit(s)	Frequency band specific and available with and without integral switched beam antenna. ***Verify order and requirement to ensure the correct unit type is being installed.***
	Either of the following	
	1 x Sun Shield (for single unit installation where a separately mounted external antenna is deployed)	Sun shield with included hardware (6 Flathead screws)
	OR (for front mount antenna option)	
	1 x Sector Antenna mounting plate with fixing kit	4 M4 nuts 4 M4 flat washers 4 M4 spring washers 4 Cable ties 4 M5 SEM
	1 x Sector Antenna (front mount)	
	Additionally required for non-switched beam antenna versions of AirSynergy	
	GPS Antenna	
	GPS Antenna mounting kit	Bracket M6 screw M6 plain washer M6 spring washer TNC to TNC cable (25cm)
	Additionally required for back to back unit installations	
	Note: Dual radio units are usually pre-assembled from the factory.	
	1 x back to back joining kit	4 joining straps with mounting studs and flange nuts pre-fitted. 16 M5 countersink screws
	1 x Extended sun shield	(If no front mount antenna is to be fitted to the front face of the back to back AirSynergy units)

Installation Kit / Part	Consisting of	Note:
OPTIONAL Heavy-duty mounting (for specific mounting locations)	1 heavy-duty pole clamp mounting kit	4 clamps 4 M8x150 bolts 4 M8 plain washer 4 M8 spring washer
Connecting cables	CAT5e	External grade 25m with weather hood pre-fitted. One for each AirSynergy unit
	Grounding cable	M6 Lug at each end
Power Supply and power cable	48V PSU module	1 per AirSynergy unit
	Power drop cable	1 per AirSynergy unit (or dual radio unit) with external grade 30m power cable with compatible power weather-proof connector .
	Cable Join kit	1 per AirSynergy unit (or dual radio unit)
	48V PSU in weatherproof enclosure (NEMA approved)	Alternative to the standard 48V PSU (required for all North American installations)

Table 9 - External Antenna and feeder kits (Optional)

Installation Kit / Part	Note
External Antenna **Several variants - Verify the correct unit type is being installed.**	Typically a 2 port cross-polar antenna Pole mounting kits (supplied with antenna)
Short Feeder cable	0.5M feeder tails x 2 (for mounting antenna directly above the AirSynergy unit)
Long Feeder tail	1.5M feeder tails x 2 (for mounting antenna on the same pole immediately behind the AirSynergy unit or where the Antenna needs to be mounted away from the AirSynergy unit)

Table 10 - Input Power for AirSynergy

	AirSynergy	
	(2.3-2.7 GHZ) & (698-746 MHz)	3x (3.3-3.38 GHZ)

	AirSynergy	
	(2.3-2.7 GHZ) & (698-746 MHz)	3x (3.3-3.38 GHZ)
Input Voltage to AirSynergy (1)	TBD	TBD
PS output Voltage - 30 meter cable (2)	TBD	TBD
PS output Voltage - 75 meter cable (2)	TBD	TBD
PS output Voltage - 100 meter cable (2)	TBD	TBD

Table 11 - AirSynergy additional items

Additional Common Accessories (not provided by Airspan)
Cable ties
Self-amalgamating tape
Black PVC tape
Ring terminal for ground cable. M6
Ground cable (4-6 mm) (yellow and green cable)

4.2.3 Verify Components

The following figures display AirSynergy components and accessory kits.

Table 12 - AirSynergy components

Parts	Images
AirSynergy Unit in typical packing box	
AirSynergy unit (connectorised)	

Parts	Images
AirSynergy unit with Switched Beam antenna (factory assembled)	
Universal mounting plate and pole straps	
Sun-Shield and hardware	
Sector Antenna plate and hardware	
Sector antenna (Check frequency variants)	

Parts	Images
PSU (power supply unit)	
Enclosed PSU (U.S. requirement)	
GPS antenna	
GPS antenna mounting kit	

AirSynergy is shown below from the Ethernet termination and RF port end views respectively.

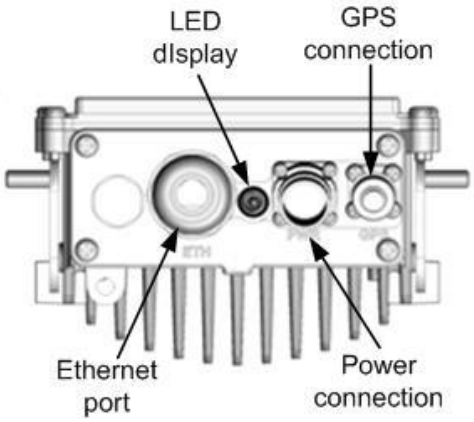

Figure 7 - AirSynergy Unit, bottom termination

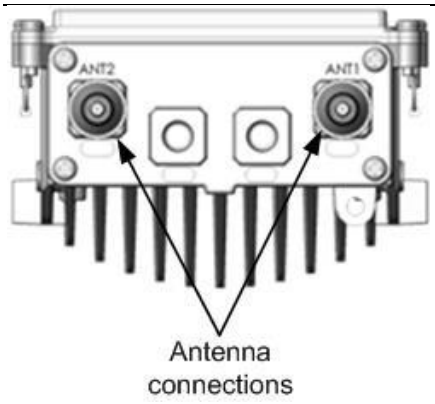

Figure 8 - AirSynergy Unit, RF ports, Internal Duplexers

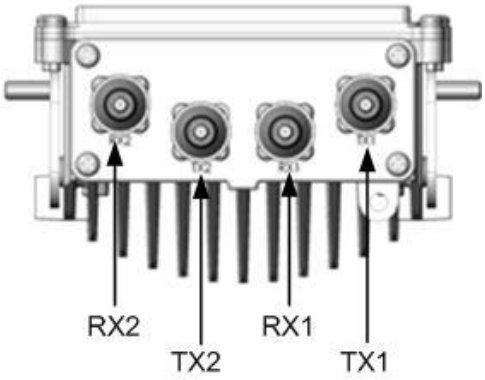

Figure 9 - AirSynergy Unit, RF ports, External Duplexers

4.2.3.1 Physical Dimensions

AirSynergy is in an all outdoor enclosure.

Table 13 - AirSynergy physical dimensions

Parameter	Value	Comment
Height	530 mm (20.9 in)	The physical dimensions exclude and connectors.
Width	144 mm (4.49 in)	
Depth	106 mm (4.17 in)	
Weight		
	Main unit (Connectorized)	4.65 kg (10.25 lb)
	Universal mounting bracket (Including pole straps)	925 g (2.04 lb)
	Sun-shield	575 g (1.27 lb)
	Front mount antenna & plate	1.35 kg (2.98 lb)

RF Ports for antenna connections are N-Type Female connectors located on the top of the AirSynergy enclosure.

4.2.3.2 External Duplexer (FDD Variant Only)

An External Duplexer is required for some AirSynergy FDD variants, and is pre-installed adjacent to the AirSynergy unit. The Duplexer is shown below (in different views) with the pre-assembled brackets. The external Duplexer measures TBD mm (TBD in.), TBD mm (TBD in.) and TBD mm (TBD in.).

TBD

Figure 10 - pre-assembled External Duplexer

TBD

Figure 11 - External Duplexer bottom panel

TBD

Figure 12 - External Duplexer top panel

Table 14 - External Duplexer variants

Variant	Band	Weight
AirSynergy-TBD	12, 17	TBD Kg (TBD Lbs.)
AirSynergy-TBD	20	TBD Kg (TBD Lbs.)

5 Install AirSynergy

Install the AirSynergy base station by pole mount, wall mount, or single point. The AirSynergy can be connected to various types of antennas via standard RF coaxial cables. Antennas are positioned with up to 10 wavelengths horizontal separation to give optimal Downlink and Uplink MIMO performance.

AirSynergy is normally mounted on a pole (in close proximity to its external antenna when not using the AirSynergy front mounted Antenna. Take care to install the mounting plate the correct way up so that the AirSynergy unit will fit with the PoE connector pointing downwards. This is with the slot openings in the bracket at the top edges as shown.

Caution: Proper local rigging and hoisting practices should be followed when installing the AirSynergy.

5.1 Pole Mount Assembly

The following images show the pole mount assembly.

1. Position mounting plate with slots facing up.

Figure 13 - AirSynergy mounting plate and hardware

2. Feed clamp bands through the quick release locking mechanisms and wrap around pole.

Figure 14 - Assemble clamp bands (2 required)

3. Wrap the band to properly fit on the pole. Press down locking mechanism with band excess fed through the mechanism.

Figure 15 – press down locking mechanism

4. Align and position each of the 2 pole clamps. Tighten the clamp bands with large flat screwdriver in place.

Figure 16 – tighten clamp bands

5. Mounting plate is installed and ready for AirSynergy mounting.

Figure 17 – mounting plate installed on large diameter pole

5.2 Front Sector Antenna Assembly

The AirSynergy unit can be used either with a sector antenna mounted directly on the front or with a remotely attached antenna. The following describes the installation procedure for the front mounted antenna.

For installation of a remotely mounted antenna follow the instructions manufacturer's instructions and connect the antenna to the AirSynergy using the appropriate cables. (N-type RF connections must be weather-proofed).

Note: A Sun-shield should be attached when a front mounted antenna is not attached to the unit.

To mount the front antenna, perform the following:

1. Fit the antenna to the (antenna) mounting plate. The four (4) studs on the back of the antenna pass through the front face of the mounting plate and are secured with the 4 sets of M4 nuts and washers (flat and split) included in the kit. Carefully position the lead RF cables as shown in the figure below and secure them in place to the eyelets on the back of the mounting plate with the provided cable ties. The cables are formed with a cross-over at the bottom.

Note: It is recommended to place some packing material under the unit while assembling to protect it from scratches.

Figure 18 - attaching front mounted antenna to mounting plate

2. Attach the assembled front mounted antenna with the bracket to the AirSynergy unit using the M5 SEMs (2 on each side) and connect the RF cables to the N type RF ports on the top of the AirSynergy.

Note: The plate is mounted with the side slots towards the top so that the required tilt-down can be set.

Figure 19 – Attaching front mount antenna assembly to AirSynergy

5.3 Connecting GPS Antenna to AirSynergy

The GPS antenna should be installed far from:

- High-voltage power cables.
- Strong radiation area of any TV transmission stations.
- Radiation area of the main lobe of the RF Antenna.
- Radiation area of the microwave antenna.
- Other areas with inter-frequency interference or strong electromagnetic interference.

Cable Fastening Good Practices:

- No more than 5m between cable fastening spaces.

- No more than 1m between cable termination and first fastener.
- Fastenings should be to a robust construction (i.e. mast pole, unit mount…).
- Fasteners should be weather and UV resistant.
- Cables should have some slack for thermal expansion/contraction between fastenings.

An 25cm, cable connects the GPS directly to the top of AirSynergy. When mounting the GPS antenna remotely from the unit, the GPS antenna should be used in conjunction with the Remote GPS Antenna Mounting Bracket (TBD) and appropriate length GPS Cable RG58 TNC-TNC by way of TNC connectors.

Note: All cables should be properly secured to prevent undue strain on any of the cable terminations.

Note: AirSynergy units without a factory assembled Switched Beam Antenna all require a GPS antenna which comes in a kit with a mounting bracket and a 25cm cable. A primary consideration for a GPS antenna is a clear view of the sky, preferably 360 degrees.

1. Assemble the GPS antenna to the mounting bracket supplied in the GPS antenna mounting kit. The large black nut should be tightened with a pipe wrench.

Caution: take care not to over tighten the nut so as not to damage the plastic threads.

Figure 20 - attaching GPS antenna to mounting bracket

2. Attach the short TNC to TNC cable from the GPS antenna to the TNC connecter on the top of the AirSynergy unit.

Note: For extreme weather conditions weather-proofing of the TNC connections is recommended. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape. The weather-proofing is best done at this stage to give easier access to the connections.

Figure 21 - GPS antenna cable connected

3. Attach the GPS antenna assembly to the body of the AirSynergy unit using the single M6 screw and lock washer provided in the kit. There is a threaded hole on the top corner of the AirSynergy unit for this purpose.
   The TNC to TNC cable loop can be carefully positioned behind the front mount antenna (or the sunshield) as shown below.

Note: weather-proofing (as described previously) should have already been applied.

Figure 22 - Assembling GPS antenna with bracket to AirSynergy

5.4 Securing AirSynergy to the Mounting Plate

Note: If the installation is for a back to back assembly with two (2) AirSynergy units sharing the same mounting bracket refer to additional steps in Appendix B..

To mount AirSynergy to the universal mounting plate, perform the following:

1. Loosely fit the flange nuts on the studs protruding from the sides of the unit.

Figure 23 - Lift unit to top of mounting plate

2. Hook the studs into the top slots of the mounting plate.

Figure 24 - unit engages into slots on the top of mounting plate

3. With the studs engaged in the top slots raise the unit slightly until the bottom studs also drop into their respective slots.

Figure 25 - Gently lift the unit until the bottom studs fit into the bottom slots

Figure 26 - AirSynergy unit engaged into the bottom slots

4. Tighten the flange nuts (4 places) to the required degree of down-tilt.
5. Check and tighten all flange nuts.

5.5 LED Display

A single tri-color LED (Green/Red/Orange) appears at the bottom of the unit, providing unit status indication.

When powering up refer to the following table for indication of current status:

Table 15 - LED Display

LED	Name	Color	Status	Description

Green	TBD	Green	On	TBD
Red	TBD	Red		TBD
Orange	TBD	Orange		TBD

6 Connect and Manage Cables

6.1 Connecting the Ground Cable

There is an option to connect an ground cable to the M6 screw threaded connection at the bottom of the main body casting. This should be connected to a protection ground bar or clamped directly to the steel structure of the power or pole. This is required in areas of high lightning activity or when the AirSynergy unit is mounted on high exposed roofs or tower structures. A direct earth ground connection is required for the surge protection devices inside the AirSynergy to be effective.

1. Remove grounding screw and slip the ring terminal end of the ground cable onto the screw prior to re-setting into the threaded hole.

Figure 27 – attaching ground cable to AirSynergy

2. Connect the ground cable to the to the protection ground bar using a suitable crimp lugs. Alternatively use a clamp to bond the ground cable to the mounting pole or to the tower structure.

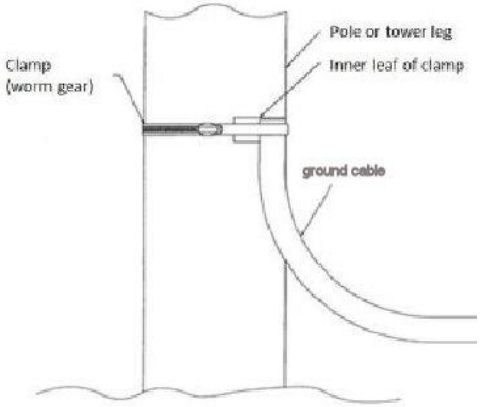

Figure 28 - attach ground cable to pole

Note: When installing a protection ground take care to use suitable metal combinations to avoid or minimize galvanic corrosion.

6.2 Connecting RF Jumper Cables to External Antenna

1. Attach, connect and secure the RF cable between the external antenna and the appropriate RF connection on the top of the unit.

Figure 29 - Connecting RF cable

Caution: Do not over-tighten the RF connector. RF failures can result when the RF connector is over-tightened.

Figure 30 - weather-proof the connection - front mount antenna

2. Weather-proofing of the RF N type connections is recommended. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape.
3. Verify the RF connector is completely weather-sealed.

6.3 Connecting the Power Drop Cable to AirSynergy

1. Plan the position of the power drop cable run from the AirSynergy unit to the power supply. The recommended maximum run length is 30m (98.44 ft). (For run lengths greater than 30m please contact your Airspan representative)
2. Uncoil the cable and secure the connector just below the AirSynergy unit.

Note: When securing the cable make sure there is not tension on the connector so that it is easy to disconnect and re-connect for future maintenance actions.

3. Position the pins correctly, the connector is secured to the unit with a locking ring that is screwed into place. Use firm hand pressure only, the connector has a built in sealing ring.

Caution: The internal plastic parts of the mating connector are keyed. Take care to align these by visual inspection or by gently rotating the connector body until the key way sections align and the pins go in before tightening the locking ring.

Figure 31 - attaching power cable to AirSynergy

7 Power System Connection

Hazardous voltage! Before working, ensure that the power is removed from the power connection cables. When the system is powered on, ***do not touch the power terminals***.

7.1 Required Tools

The tools required for the connection of the PSU are:

- knife
- small flat blade screw driver (electrical insulated shaft recommended)
- medium Philips head screwdriver
- pliers
- small side cutters
- tweezers (or fine blade long nose pliers)

Figure 32 - required tools

7.2 Cable Connections

7.2.1 Power Drop Cable Installation

When the power drop cable is to be passed through glands and/or down the center of a lamp post or other structure, the power drop cable can be cut leaving sufficient length for ease of termination. With the power supply placed at the selected installation location, trim the cable to the length for proper installation while allowing sufficient length to strip and prepare the cable ends.

Note: Standard cable supplied is 30m in length, other length options are available.

Advice: It is good practice to label both ends of the cable to identify which AirSynergy unit it is connected to. This is especially important where numerous AirSynergy units are installed on the same pole/tower.

Advice: It is good practice to leave a spare loop of cable (approximately 0.5m). This will allow for easier wiring to the power supply and will allow the cable to be re-terminated if necessary in the future.

7.2.2 Network Cable Installation

For installations that require a network connection a separate cable must be run to the network Ethernet switch. The standard length of pre-made cable is 30m. For other lengths up to a maximum of 100m cables can be made up on site.

Advice: It is good practice to label both ends of the Network cable to identify which AirSynergy unit it is connected to. This is especially important where numerous AirSynergy units are installed on the same pole/tower.

Advice: It is good practice to leave a spare loop of network cable (approximately 0.5m). This will allow for easier wiring to the Network switch and will allow the cable to be re-terminated if necessary in the future.

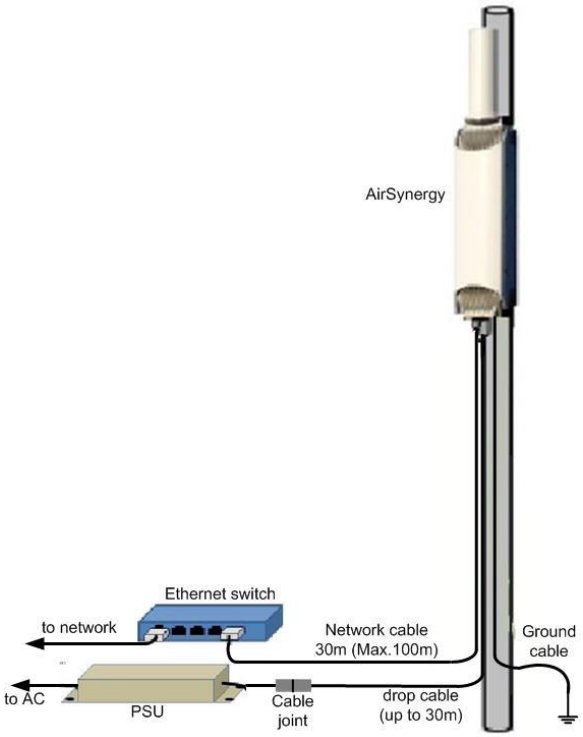

Figure 33 - power and network cable overview

7.3 Wiring Power Drop Cable to the PSU

The power drop cable supplied is a standard 30m (98.42 ft) length with the power connector end for the AirSynergy unit pre-fitted. (Longer lengths are available).

Figure 34 - Waterproof connector exploded view

1. Choose the location PSU and the route of the power cable. Pass the cable through any building walls or cable entry glands and bring the unterminated end to the location of the PSU.
2. With the power drop cable from the AirSynergy cut to the required length prepare the cable to fit the waterproof power connector.
3. Strip back and remove the outer sheath to expose the inner blue and black insulated wires to a length of 3cm (1.18 in). Then strip back 6mm (0.24 in) of the inner core insulation.

Figure 35 - power cable preparation

Figure 36 - waterproof connector separated

4. Thread the prepared cable end through the gland, washer, sealing ring and body of the connector.

Figure 37 - gland and connector on cable

5. Secure the prepared ends of the power cable into the head part of the connector (male part with visible pins).

Figure 38 - secure cable to connector

6. Insert and secure the **black** wire into position **1**and the **blue** wire into position **2**.

Figure 39 – power cable wires assembled

Note: Individual connection numbers are marked on each part of the connector.

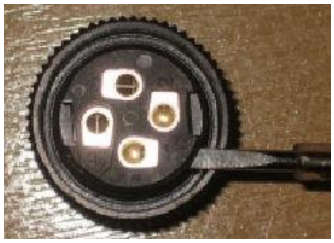

Figure 40 - numbered connector contacts

7. Assemble the parts of the connector and tighten the gland to provide a waterproof seal.

Figure 41 - assemble and tighten

8. Prepare the ends of the PSU low voltage cable and thread the connector parts over the cable.
9. Secure the prepared ends of the drop cable into the head part of the connector (female part).

Figure 42 - PSU cable connector assembly

10. Insert and secure the **red** wire into position **1** and the **black** wire into position **2**

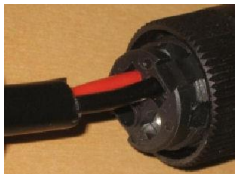

Figure 43 - PSU wires assembled

11. Assemble the parts of the connector and tighten the gland to provide a waterproof seal.

Figure 44 - assemble and tighten

12. Fasten the 2 parts of the connector together and tighten to make a watertight seal.

Figure 45 - connector assembled and tightened

7.4 Connecting the PSU to Power Supply

The power (mains) connection should be connected to a fused or protected mains supply (100 to 240 Volts AC). The Brown wire is the Live, the Blue wire is the Neutral and the Green/Yellow wire is the ground wire.

Figure 46 - High power (240W) PSU

Figure 47 - Standard power (100W) PSU

The PSU module can be screwed into position using the self-tapping screws provided (4 places).

Figure 48 - attaching PSU

Note: For USA deployments an alternative PSU and enclosure arrangement is required – Refer to Appendix E.

Figure 49 - PSU for USA deployment

Caution: **Safety - Disconnection of AC supply**.

- When AirSynergy is connected directly to building or lamp post wiring a suitably rated and easily accessible disconnect device shall be incorporated external to the equipment.
- When AirSynergy is connected to the AC power supply using a plug and socket, the socket-outlet shall be installed near the equipment and shall be easily accessible.

8 Initial WEB Configuration

To set AirSynergy base station Management IP & BSID via Web Page. This prepares the equipment for connection to Netspan.

Verify that the Web browser with which you want to access the Web-based Management is active.

8.1 Initial configuration

To connect to AirSynergy via the WEB interface, perform the following:

Caution: The GPS antenna should be installed and attached before AirSynergy is powered on.

Caution: Wait two minutes before performing other actions.

1. Apply power to the AirSynergy and connect the PC to the Ethernet port.
2. In a browser, open web page with BS address
   IP address – 192.168.0.100 (255.255.255.0) (AirSynergy default IP address).
3. Enter the default username and password:
   Username = synergy
   Password = synergy
4. Click **Submit**
5. For WiMAX 16e applications Navigate to “General” menu to specify the BS ID. (**Format xxxxxx:yyyyyy**)
   Where xxxxxx is reserved for the Operator ID and yyyyyy is a unique Hexadecimal reference number within the network.

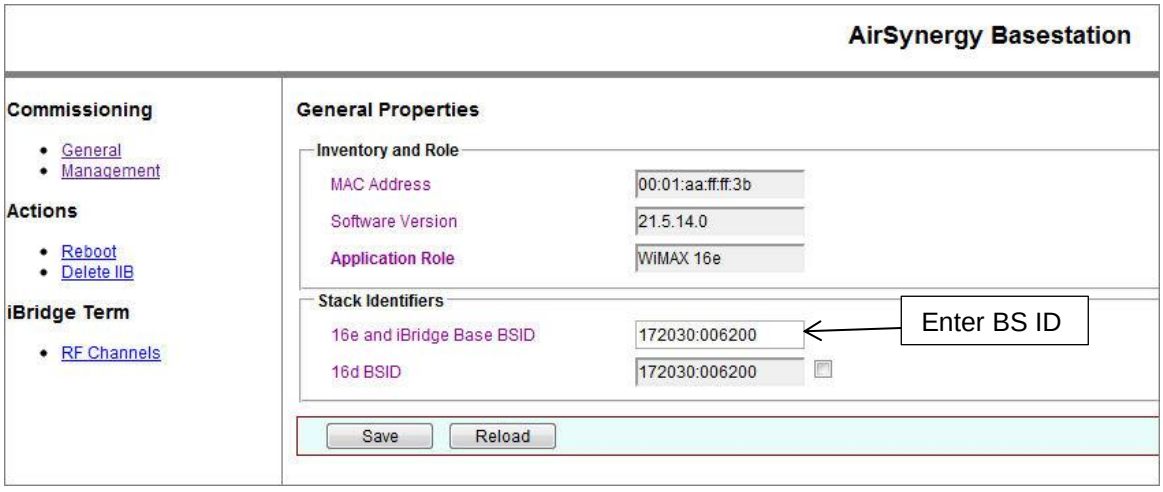

Figure 50 - General BS Configuration

6. Click **Save**

Notes: iBridge Term menu item is not applicable to 16e BS and must not be used. Configuration of “RF Channels” may lead to failed installation (failed commissioning and no discovery). **TBD**

7. Navigate to “Management” and modify the IP address according to your network.

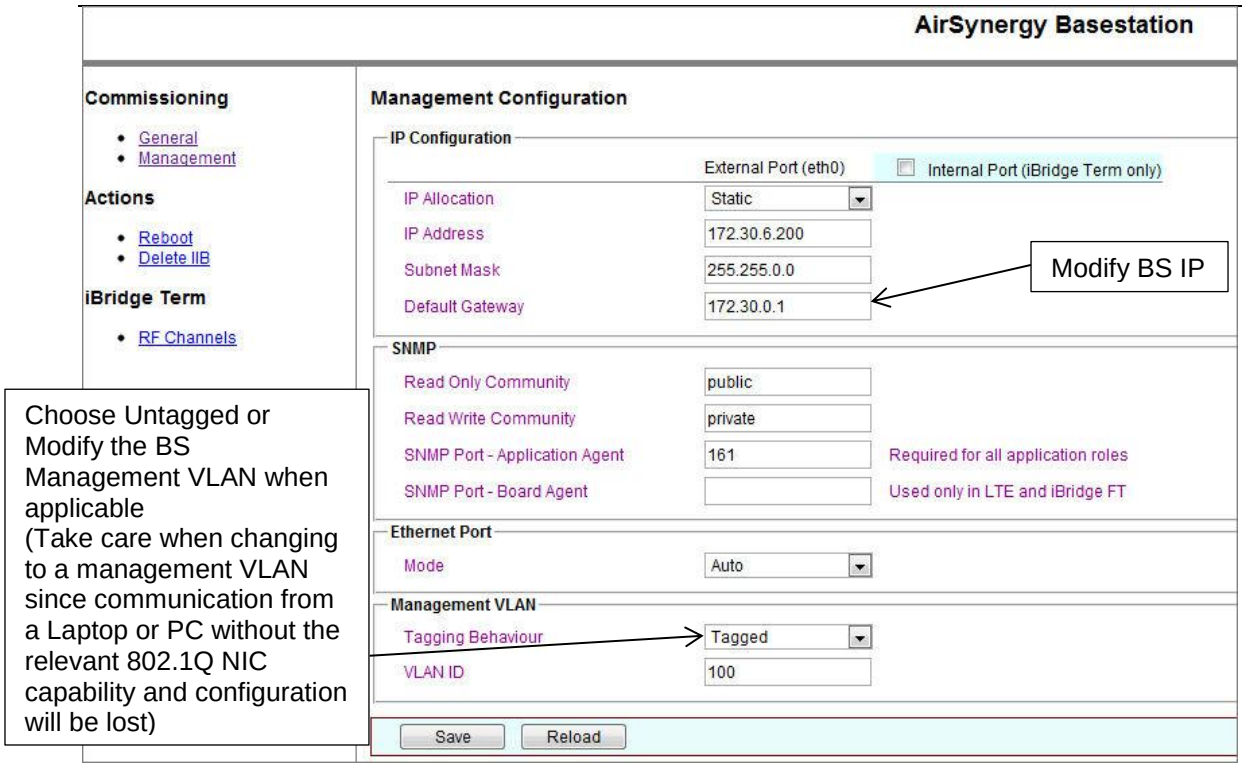

Figure 51 - Mgmt IP Config

Note:

- Dynamic" IP Allocation is not supported in the current release. Please select Static.
- Internal Port configuration is not applicable to 16e BS and must not be used. Configuration of the internal port may lead to management comms failure.
- Clicking the "Submit" your configuration is NOT implemented immediately in the BS. The BS needs to be rebooted for the new configuration to be applied.

8. Navigate to "**Reboot"** and click on "Yes" to reboot the BS.

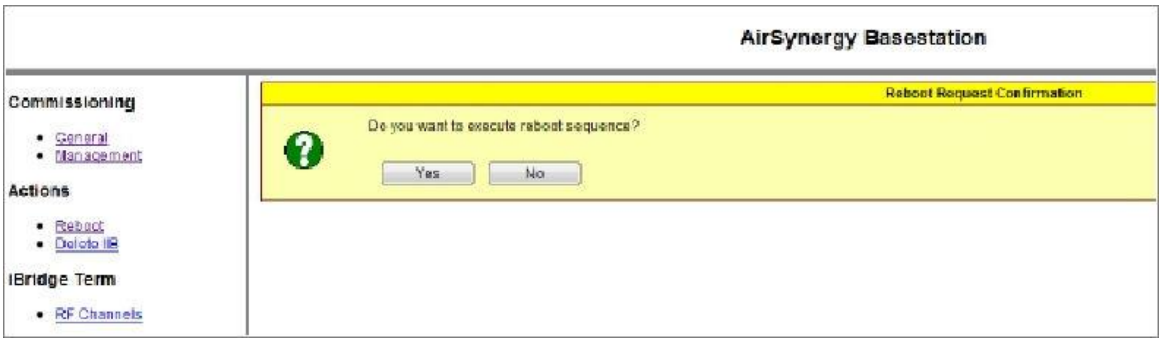

Figure 52 - reboot confirmation

8.2 Automatic Discovery via Netspan

Set the BS discovery profile in Netspan.

The following section explains the steps to take for the automatic discovery of AirSynergy via Netspan.

To connect AirSynergy BS via Netspan:

1. Log into Netspan
2. Navigate to **Server** > **Discovery Parameters**

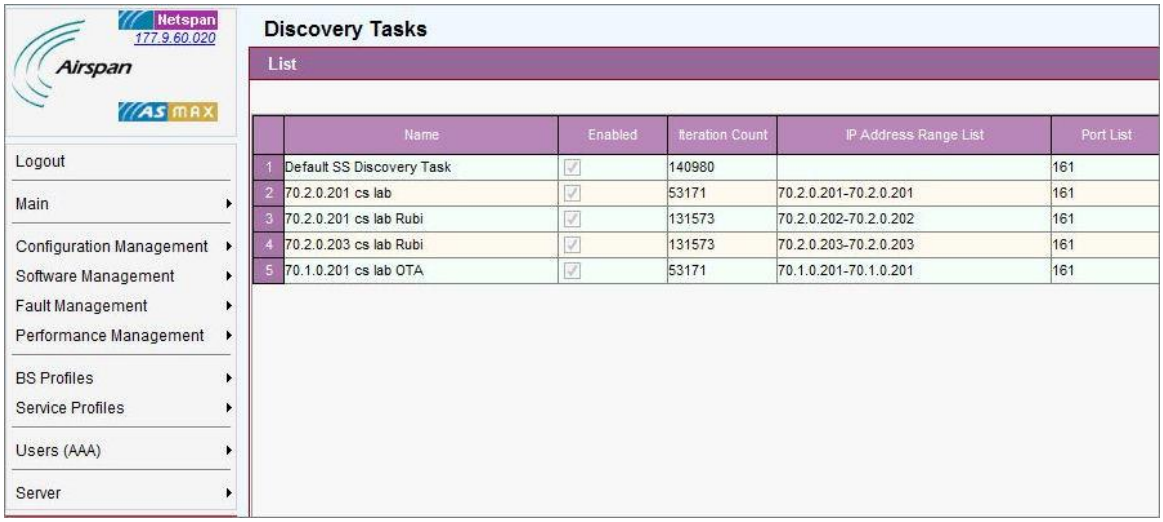

Figure 53 – Discovery Tasks

3. Click **Add**
4. Define:
   a. Name
   b. Write Community
   c. Read Write

Notes: This should be same as was configured before on the BS. **TBD**

5. Define the discovery Target IP Address Range. For example – Start address = 172.30.0.100 and End Address=172.30.0.101
6. Port – enter 161
7. Click **OK**, as displayed below:

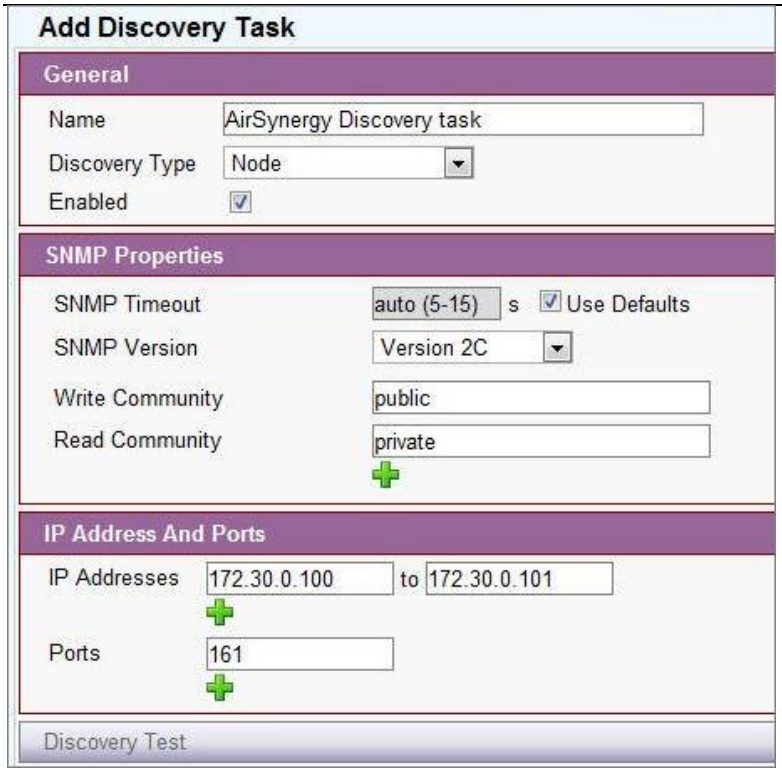

Figure 54 - Edit Discovery tasks parameters

8. Click **OK** and wait till you see the new BS in the configuration management > BS > BS TRx, as shown below:

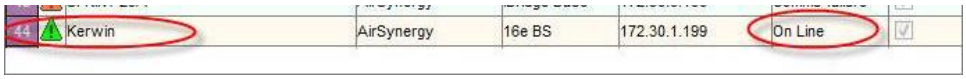

Figure 55 - Discovery Target

Your AirSynergy BS is now “discovered” by Netspan and is ready for additional configuration, provisioning and adaptations.

Notes: In case of discovery failure (BS not present on the list) Discovery Test can be used to diagnose the problem.

- Select Discovery Task created and Click Edit.
- Select the discovery parameters and press Test. The report appears.
- Correct the problem and try again.

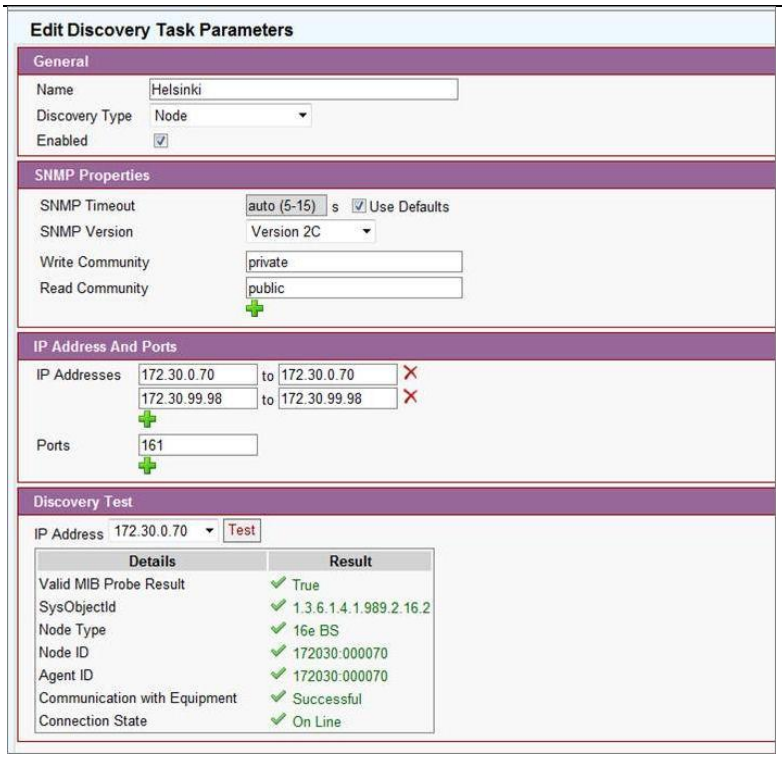

Figure 56 - Discovery Test

9 Appendix A

Review Job Sheet

The *Job Sheet* should include the following information:

- Pole for installation identified
- Position on pole identified
- Pole access restrictions (highway regulations, other services on pole, power pole)
- Method of reaching pole positions (ladders, Elevated work platform)
- AC main fuse block available for PSU
- Configuration programming details known
- Point of connection for Ethernet (if applicable)
- All equipment items available at the installation site
    - Main AirSynergy unit
    - Mounting bracket and pole clamps
    - PSU
    - Ethernet cable assembly
    - GPS Antenna
    - GPS antenna installation kit
    - Front sector Antenna (if applicable)
    - Front sector Antenna mounting bracket ad fixing kit (if applicable)
    - External panel antenna (if applicable)
    - RF feeder cable tails (if applicable)
- Required tools
    - Large flat screw driver for pole clamps
    - Small flat screwdriver for PoE power terminations
    - Small cross-head screwdriver for PoE box lid and fixings for PSU
    - 20mm wrench or small pipe wrench for RF connections
    - 10mm wrench for main unit mounting flange nuts
    - Side cutters
    - Wire strippers
    - Krone punch down tool
    - Tilt meter to set antenna down-tilt
    - Ring terminals crimp tool
- Required ancilliary equipment
    - Lap top PC for initial configuration
    - Ethernet cable for temporary connection of the lap top
- Other install materials
    - Self-amalgamating tape
    - Black PVC tape
    - Cable ties
- Labels
- Whether the system is required to be locked to a GPS timing reference.
- **A BSID is required for each AirSynergy**. This should be in a format xxxxxx:xxxxxx where x is a decimal digit.
- **Network configuration information for the SDR blade**. This shall include the following information for the front panel and the backplane.

- **IP Address:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
- **Netmask:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
- **Default Gateway:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
- **Management VLAN:** Specified as either Untagged or Tagged
- **Management VLAN Tag:** Should only be set if Management VLAN is set to Tagged
- **Management IP Mode:** Specified as Static IP Address or Obtain IP Address via DHCP
- **Ethernet Mode:** Specified as Auto-negotiate or Fixed
- **Ethernet Rate:** Need only be configured if Ethernet Mode is set to Fixed, specified as 10M or 100M.
- **Ethernet Duplex:** Need only be configured if Ethernet Mode is set to Fixed, specified as Full or Half.

- **SNMP configuration information**. This will allow events from the BS to arrive at the specified Netspan server. This will include the following information:
  - **Read Only Community:** This should be specified to the same value as in Netspan Discovery Parameters (found under Server on Netspan's left hand panel).
  - **Read Write Community:** This should be specified to the same value as in Netspan Discovery Parameters (found under "Server" on Netspan's left hand panel).

- **Community:** Normally specified to the same value as for Read Only Community.

10 Appendix B - Field Assembly of Back to Back AirSynergy units

In cases where 2 AirSynergy radios are to be installed on the same mounting bracket some additional installation steps are required which are as follows:

10.1 Removal of the Existing Stud Mounting Plates

1. Remove the existing stud mounting plates (4 places) from each AirSynergy unit. Each plate is secured with 2 countersunk head screws.

Figure 57 - stud mounting plates removal

Notes: The screws should be replaced with a new set (16 pieces) with new locking patches on the threads when re-assembling with the joining plates. A new set of screws is supplied with the back to back joining kit.

10.2 Reassembly with the Joining Plates

Re-assemble utilizing the joining plates. The studs with flange nuts must all be facing the same direction. A typical arrangement will be with the AirSynergy with connectorised RF ports to be mounted at the back. The mounting studs will then all be on the sides of the connectorised unit as shown in the figure.

2. Fit all 4 plates to one of the AirSynergy units then slide the 2nd unit into place between the brackets.

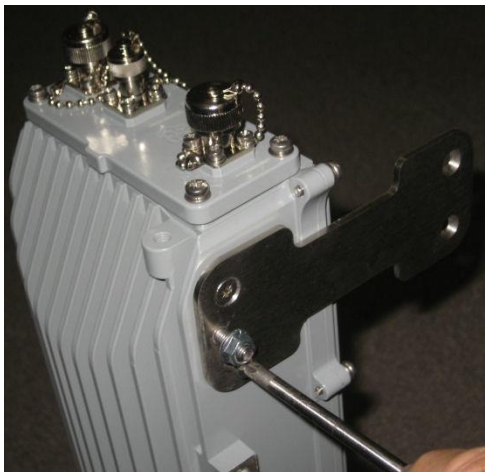

Figure 58 - stud mounting plates assembly

3. Position the back to back assembly on side in order to tighten all the joining plate screws.

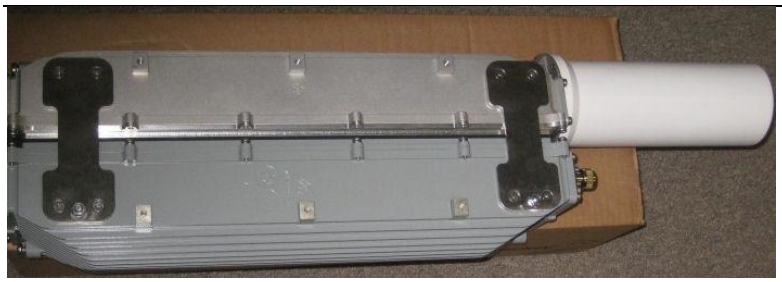

Figure 59 - tighten all fixing screws

Note: It is recommended to place some packing material under the units while tightening the screws to protect the units from scratches.

The recommended mounting method with pole clamps for back to back installations differs from the regular mounting due to the additional weight of the 2 units.

Figure 60 - back 2 back mounting

Note: To support the additional weight of a back to back system on a single universal mounting plate it is recommended that a pole clamp kit is used, as shown above. This provides a stronger mounting option on the standard telecom tower equipment pole. For larger diameter poles where pole straps are required due to the larger pole diameter, it is recommended that 4 straps are used. It is important that pole straps sit flat against the mounting plate as shown below.

Flatten each of the straps against the mounting plate, as shown. This way the mounting studs on the assembly can slide into the mounting bracket slots without restriction.

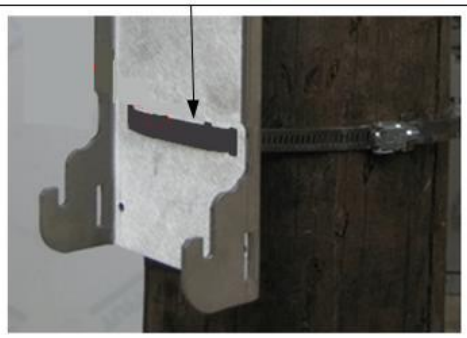

Figure 61 - back plate straps

Figure 62 - back to back mounted with 4 straps

Mount the assembly on the universal mounting bracket and secure the flange nuts. The GPS antenna and front mount antenna (if applicable) can be installed before or after mounting to the pole depending on ease of access.

In cases where no front mount antenna is installed, an extended sun shield is available as an accessory item and should be installed. The installation method is the same as the standard sun shield with 3 fastenings on each side of the front AirSynergy unit.

Follow the normal procedures for the connection of power supply units and drop cabling to each of the back to back mounted AirSynergy units.

Caution: When securing a back to back assembly to the mounting plate a safety line should be secured to the units. The 6mm threaded holes used for the protection ground at the bottom or the GPS mountings at the top of each Synergy unit provide strong anchor points for a safety line. (This is the same threaded hole used for protection ground connection in exposed areas or high lightening risk areas).

11 Appendix C - Glossary of Terms - Acronym, Abbreviations & Definitions

Table 16 - Glossary of Terms

Term	Definition
AAA	Authentication, Authorization and Accounting
ARQ	Automatic Repeat Request
ASN	Access Service Network
ASN GW	ASN Gateway
BS	Base Station
BWA	Broadband Wireless Access
CPE	Customer Premises Equipment
E-UTRAN	Evolved UMTS Terrestrial Radio Access Network, is the air interface of 3GPP's Long Term Evolution.
EVM/RCE	The Error Vector Magnitude or EVM (sometimes also called Receive Constellation Error or RCE) is a measure used to quantify the performance of a digital radio transmitter or receiver. It is measured in dB or percentage (%) - the lower the better.
FDD	Frequency Division Duplex. Frequency-Division Duplexing. A transceiver mode where the transmitter and receiver operate at different carrier frequencies.
GNSS	Global Navigation Satellite System is a term used to describe a satellite navigation system with global coverage. There are currently two fully operational GNSSs - the US GPS and the Russian GLONASS.
GTP-U	GPRS Tunneling Protocol for User data is a relatively simple IP based tunneling protocol which permits many tunnels between each set of end points
GUI	Graphical User Interface
HO	Handover/Handoff
HPBW	Half Power BandWidth is the angular separation in an antenna, in which the magnitude of the radiation pattern decreases by 50% (or -3 dB) from the peak of the main beam
IP	Internet Protocol
ICS	In-channel selectivity is a measure of the receiver's ability to receive a wanted signal at its assigned Resource Block locations in the presence of an interfering signal
IPSec	Internet Protocol Security is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session
LED	Light Emitting Diode
LTE	Long Term Evolution

Term	Definition
MAC	Medium Access Controller - responsible for several functions such Error Correction, Packet (De)Multiplexing, etc.
MBSFN	Multicast-Broadcast Single Frequency Network is an LTE feature designed to deliver services such as Mobile TV using the LTE infrastructure, and is expected to be a competitor to DVB-H-based TV broadcast
MCS	Modulation and Coding Scheme
MIMO	Multiple Input Multiple Output
MME	Mobility Management Entity is the key control-node for the LTE access-network. It is responsible, among other things for idle mode UE tracking and paging procedure including retransmissions
MTBF	Mean Time Between Failures
MS	Mobile Station
NEMA	National Electrical Manufacturers Association
NLOS	Non Line of Sight
NSP	Network Service Provider
OFDMA	Orthogonal Frequency-Division Multiple Access (OFDMA) is a multi-user version of OFDM digital modulation scheme, used for eNodeB transmissions to UEs
PDCP	Packet Data Convergence Protocol. A Sub-Layer in LTE responsible for IP Header (De)Compression, etc…
PDU	Protocol Data Unit
PHY	PHYsical Layer
PTP	Precision Time Protocol is used to synchronize clocks throughout a network. In this document, PTP is referring to IEEE1588-2008 protocol
RB	Resource Block
RLC	Radio Link Control. A Sub-Layer in LTE responsible for Ack/Nack, error correction, packet reordering, etc…
ROHS	Restriction Of Hazardous Substances
RRC	Radio Resource Control. A Sub-Layer in LTE responsible for Broadcast of system information, paging, security functions, radio bearer control, etc…
RRM	Radio Resource Management is used to cover all functions that are related to the assignment and sharing of radio resources among UEs
S-GW	Serving Gateway. A Core entity in the LTE EPC architecture responsible for routing and forwarding user data packets, while also acting as the mobility anchor for the user plane during inter-eNodeB handovers and as the anchor for mobility between LTE and other 3GPP technologies
SBA	Switched Beam Antenna

Term	Definition
SC-FDMA	Single-Carrier FDMA is a frequency-division multiple access scheme, dealing with the assignment of multiple users to a shared communication resource. Used in LTE for UE transmissions to the eNodeB
SCTP	Stream Control Transmission Protocol is a reliable transport layer protocol, ensuring in-sequence transport of messages with congestion control like TCP
SDR	Software Defined Radio
SyncE	Synchronous Ethernet. A method for maintaining synchronous communication over Ethernet using the physical layer (L1), as defined by ITU-T G.8262
TDD	Time-Division Duplexing. A transceiver mode where the transmitter and receiver operate on the same carrier frequency
UE	User Equipment. The end user in LTE
VoIP	Voice over IP
WEEE	Waste Electrical and Electronic Equipment

12 Appendix D - Installation Checklist

The Checklist below gives the high-level steps in the Workflow for this procedure. Detach or print this page to use as a job-aid for completing the actions this procedure requires.

Table 17 - Checklist for Procedure

Procedure	Actions	Outcome
1. Verify Prerequisites	Verify site requirements Verify safety requirements Verify installation requirements	All requirements are in place for a successful installation
2. Install AirSynergy universal mounting plate	Install the universal mounting plate Verify connection torque settings	
3. Install AirSynergy on the mounting plate		
4. Connect and manage cables	Connect power cable Connect GPS	
5. Connect power system	Connect Power Connect the ground cable Connect to Ethernet backhaul	

13 Appendix E – PSU for USA

To comply with US regulations that apply to outdoor deployments of mains power supplies, a special US version of the AirSynergy power supply has been produced with the PSU module and the electrical connecting blocks enclosed in a small NEMA approved enclosure. The electrical power cable and 48V power cables are brought through the weatherproof glands provided. This type of power supply (SYN-PSU-ODUL-AC-1) must be used for all deployments in the USA.

Figure 63 - PSU for USA

1. Remove the top cover of the PSU enclosure.

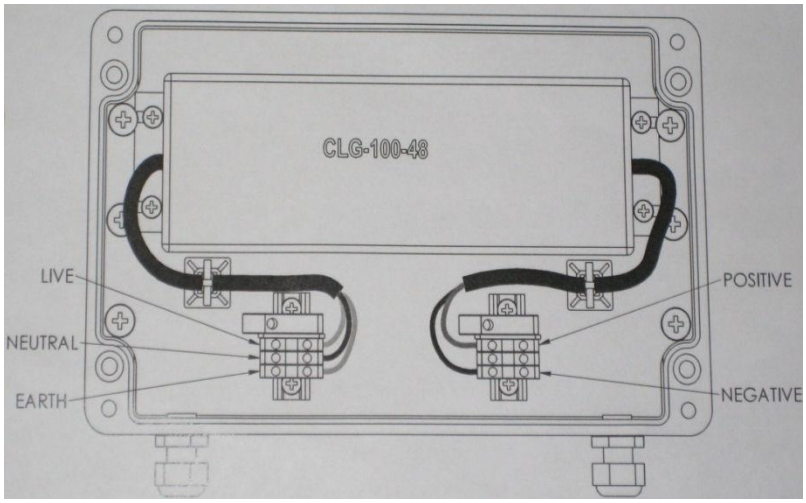

Figure 64 - Inside PSU with cable terminations

2. Feed the power drop cable through the gland nearest to the low voltage connection and connect to the terminal strip, observing the correct polarity. (Blue wire in drop cable to negative terminal and Black wire in the drop cable to positive)
3. Isolate the power supply and pass the power cable through the input gland and terminate on the connection blocks provided. The termination blocks are clearly labeled as Live, Neutral and Earth.
4. Choose a suitable position for the PSU enclosure. The PSU enclosure should be screwed to a firm surface with screws in 4 positions which are only accessible with the top cover removed.
5. Once the enclosure top cover has been re-fitted (4 screw positions) and the wiring completed the power can be connected.

14 Appendix F – Antenna (Currently Supported) Types

The currently supported antenna a listed in the table below:

Table 18 - 2.x GHz Antenna Types - Technical

Type	Frequency range	Gain	Part number
45° Dual Slant – mounting kit (50 > 115 mm) included – Front Mount	2.3-2.7 GHz	11.0 dBi Nom	SA12-2.5-DS/1915
+/-45° Polarized 65° Sector - Quad Port Fixed Tilt – mounting kit (50 > 115 mm) included - External	2.3-2.7 GHz	18.0 dBi	AW3007
+/-45° Polarized 65° Sector - Quad Port Fixed Tilt – mounting kit (50 > 115 mm) included - External	2.3-2.7 GHz	17.0 dBi	AW3008

15 Appendix G

15.1 Revision History

Revision	Originator	Date	Description
Rev A	M. Falik	08-2013	Initial document

15.2 Contact Information

Customer Service Help-Desk for customer service emergency

Airspan Networks have introduced the Airspan Tracker application to enable prompt and efficient Customer Support services.

If you do not have an Airspan Tracker account, please obtain login credentials by filling-in the form in the main page www.airspan.com/Support Register New Account

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