Sprint Magic Box Gold User Guide

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UK WEEE Registration number: WEEE/AB0207WZ. For more information, see WEEE Information for Airspan Customers and Recyclers.

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1 Installation

> **Note:** Please refer to the included Quick Start Guide to find best location and how to install the Sprint Magic Box Gold.

> **Note:** The optimal window for the Sprint Magic Box Gold is the side of the building with a direct line of sight to Sprint's nearest cell tower

The Sprint Magic Box Gold unit is placed on the windowsill to receive the signal from outdoors and boost it indoors. The following steps instruct on the proper positioning and setup of the Sprint Magic Box Gold unit for optimal service.

1.1 Unpacking and Checking the Unit

1. Carefully unpack the Sprint Magic Box Gold unit from the box.
2. Inspect the unit for any damage and check that all the accessories are in the box.
3. Remove the Power Supply (included) from the packaging.

> **Note:**
> - Follow the instructions on the display to finish the initial setup.
> - The display screen takes approx. 1.5 sec to refresh. There is no need to press more firmly or repeatedly.

1.2 Finding the Best Location

➢ Choose an appropriate window at the suitable side of a building is vital to get the best performance
➢ The Magic Box Gold has a built-in capability to survey the 4G signal from suitable provider cell towers & also use GPS to accurately determine its location. It can do this for multiple windows in the same or on multiple floors, ideally in all four directions of the building.
   o Connect the power supply to the underside of the AU 587 and place it at the 1st window (ideally in the middle of the window).

> **Note:** After 1 minute, the unit will automatically commence the test, with a 30 sec countdown timer

   o Wait for the RF survey to complete
   o Go to the next window and repeat the survey process
   o Test as many windows as possible in all four directions as possible
   o Once you finish testing all locations, select the best location out of all surveyed locations and press "Install Here" in the location

> **Note:** After 1 minute (in good RF conditions - otherwise after 5 minutes) the unit will automatically commence the installation, with a 30 sec countdown timer.

2 Initial Setup

The Magic Box Gold turns on automatically when the power supply unit is connected to the underside of the unit.

1. Place the Magic Box Gold on a suitable windowsill and verify that the unit's rear side is positioned against the glass as close to the glass as possible (as in the figure 1 below).

Note: Choose windows that are in close proximity to an available power supply outlet.

Figure 1: Place on Windowsill
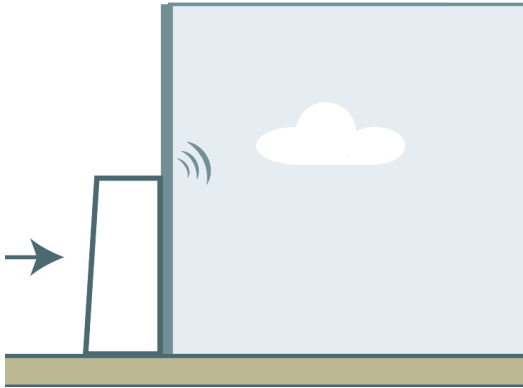
Note: When deploying the unit on a window with a window frame, the unit should be raised to prevent a "windowsill shadow".

2. Shortly the following will be displayed while the unit is starting up.

Figure 2: Start-up Screen

3. After few minutes the device starts measuring the signal. Wait while the service strength is measured. The Setup Wizard will indicate when to move the unit.

Note: This process can take between 5 and 15 minutes.

The following is displayed

Figure 3: Testing Signal
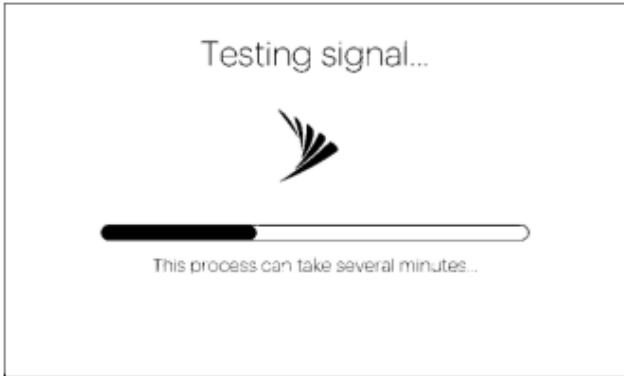
After several minutes, after testing is complete you will be given the option to accept the current location or test another location. At every test position you can choose to "Continue" to proceed with the installation, or "Retry" to test next window for better signal quality.

The following screen(s) will help you determine the final installation location.

Figure 4: Scan Rating: High

Note: This window provides sufficient signal quality, other factors such as proximity to power outlet might influence you to try another window position if needed.

4. Check the results and reposition if required.

Figure 5: Scan Rating: Medium

5. Check the results and reposition if required.

Note: Test another window for a better signal quality, if possible.

Figure 6: Scan Rating: Low

Note: Check the results, compare and place the unit on the best window position if needed.

6. Once you have determined the correct window placement based on the rankings move the Sprint Magic Box Gold to the selected window and connect to the power outlet. The device will start again, showing the startup screen.

Figure 7: Start-up Screen

7. Wait while connection and configuration process continues. The following is displayed:

Figure 8: Connection Process

Wait while the connection process progresses.

After (possibly) several minutes, the "Setup complete" screen will be displayed, as shown below:

Figure 9: Configuration Successful
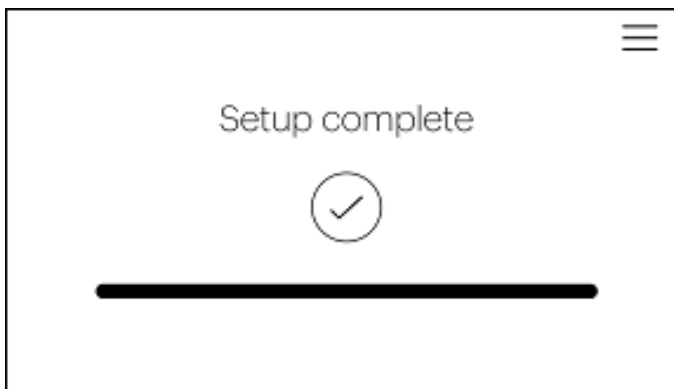
After a while, the "Setup complete" screen will disappear, showing the clock screen indicating the normal operation of the unit.

Figure 10: Clock Screen

3 Configuration

The following section describes how to access the configuration screens in order to:

- Change the Time Format

- Access More Information

- Access Other Actions

- Re-Run Setup Wizard

To access Configuration settings:

1. Press the clock screen to see the status screen

Figure 11: Status Screen
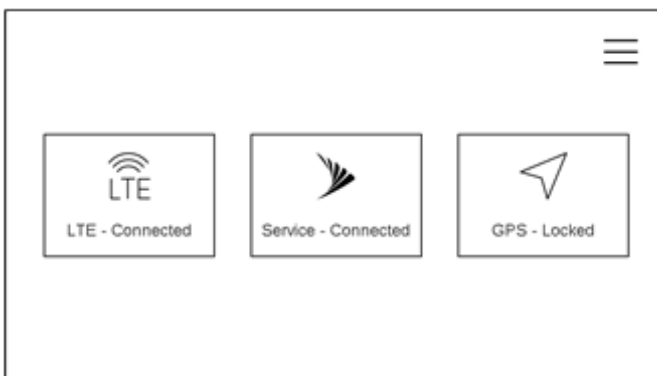
2. Select the Configuration icon to reveal the menu – found on the upper right-hand corner

Figure 12: Configuration Icon

3. Select "Change Time Format" – to change the time format and preview how it appears

Figure 13: Configuration
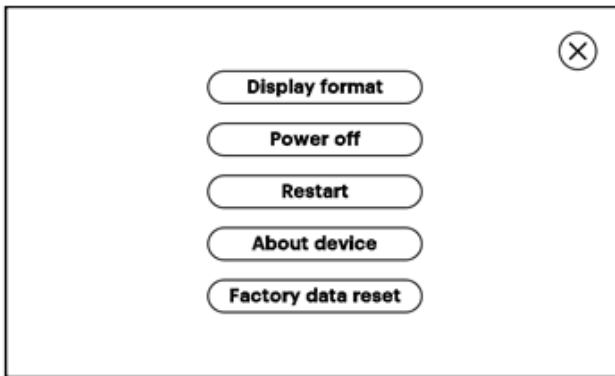
4. Select "Display format" – to change the time format and preview how it appears

Figure 14: Change the Time Display Format
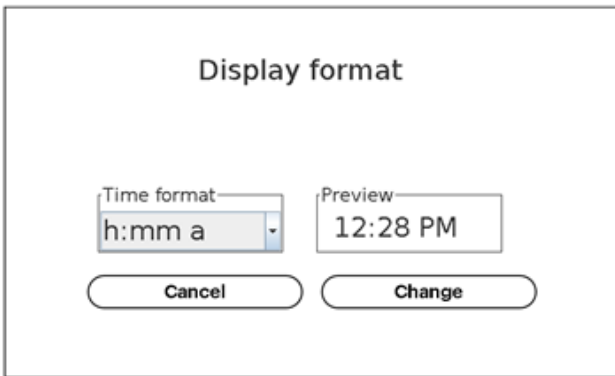
Select "Cancel" to go back

Select "Change" to save the change made to the time format

5. Select "About device" – this is how you can find out the current software version

Figure 15: About Device

6. Select "Got It" to go back

7. If you want to restart the unit press "Restart"

Figure 16: Restart


```
                    Rebooting shortly...

            Restart was pressed on touch screen.
```

8. If you want to power off the unit, press "Power off" first

Figure 17: Power Off


```
              Please disconnect main power

    Shutdown Info: User pressed shutdown button on the touch screen
```
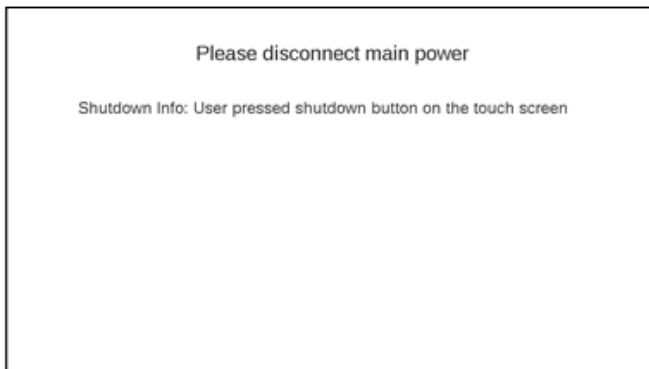
9. To repeat the installation of the device (e.g. to change the window where the device is installed) and re-run the setup wizard, press "Factory data reset"

Figure 18: Re-Run Setup Wizard


```
                    RE-RUN SETUP WIZARD

              Please CONTINUE to reset the configuration

            CANCEL                    CONTINUE
```

10. Select "Continue" – setup wizard is run again

11. Cancel – to go back

4 Status

The following section describes how to access the status screens to view additional status information. Closing the Status screen takes you back.

When there is an issue with any of the elements such as: GPS status, LTE connection or Relay status the Clock screen will display a "Status" warning.

Figure 19: Status Warning
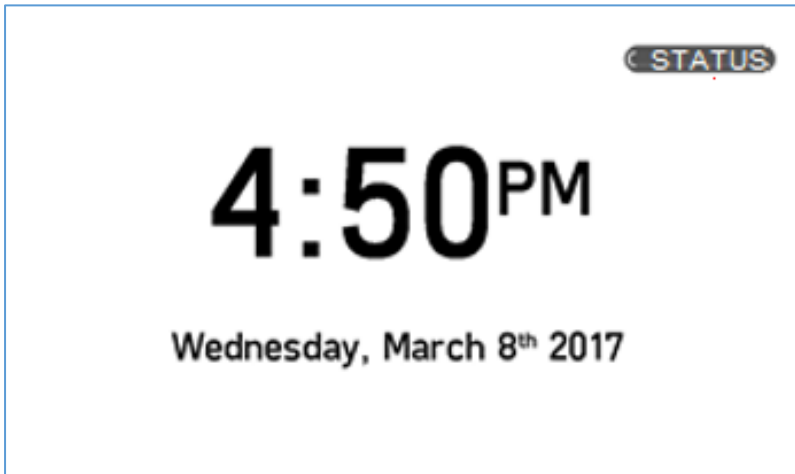
1. Select "Status" – opens the following:

Figure 20: Status Screen
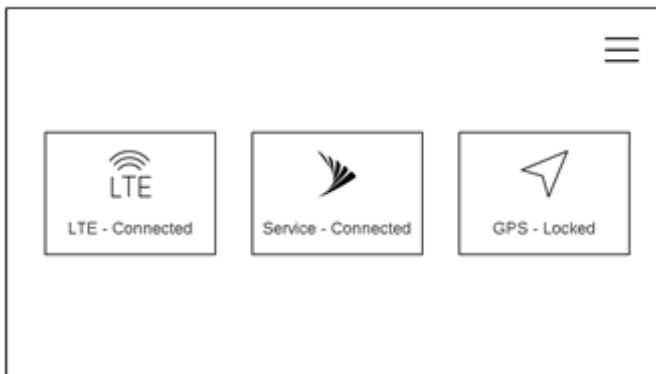
Select the specific icon to view additional information.

    2. Select **GPS** icon – GPS information

Figure 21: GPS Status
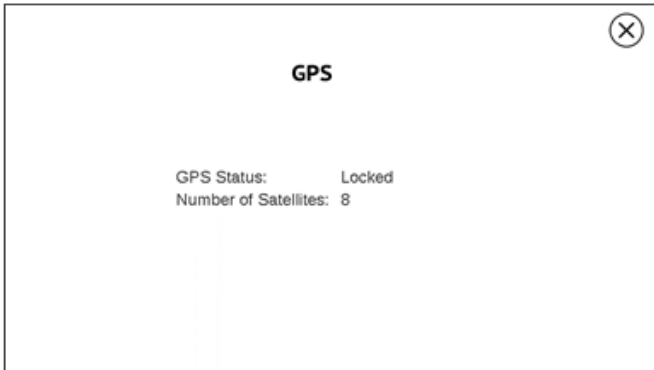
    3. Select **LTE** icon – LTE information

Figure 22: LTE Status
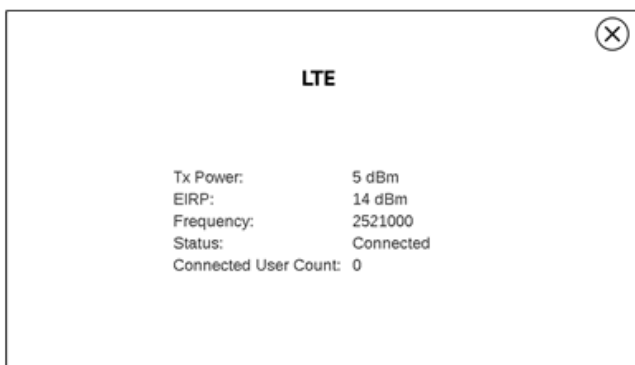
    4. Select **Service** icon – Relay information

Figure 23: Service Status
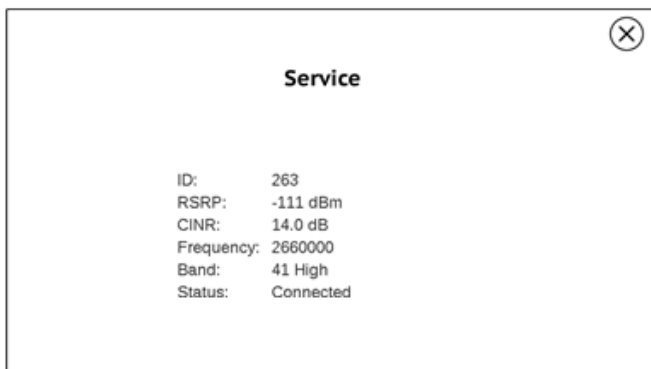
Note: When inactive for approx. 10 secs you are returned to the Clock.

5 Error Screens

The following Error and Warning screens are used to alert of possible issues.

Initialization Timeout

Figure 24: Time Out

- Setup Again – re-attempt setup
- Retry – attempt to connect to same cell or scan again if cell is not found

Restart Required

Figure 25: Restart
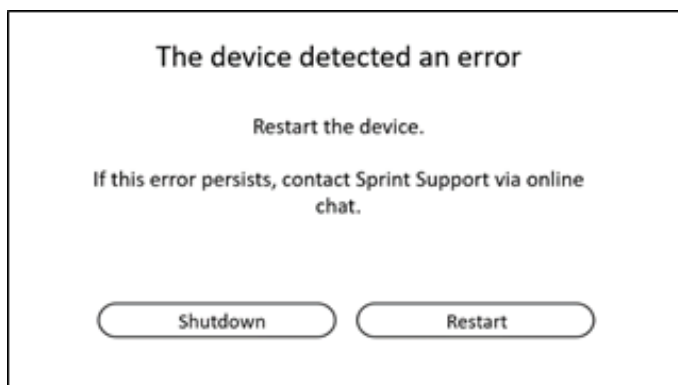
- Restart – restart the installation
- Shutdown – shut down the unit

Failed to Connect to Relay

Figure 26: Failed to Connect to Relay
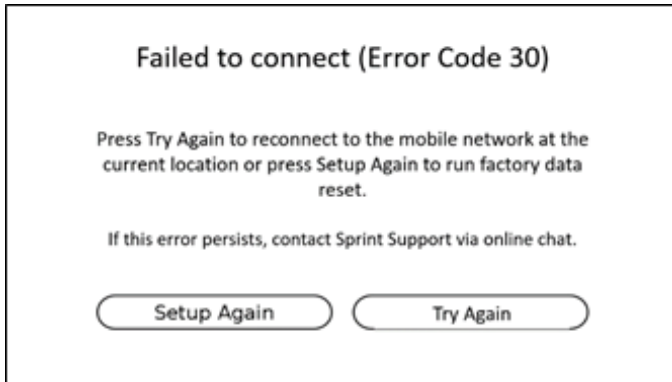
- Try Again – attempt to connect to same cell or scan again if cell is not found
- Setup Again – run setup wizard

Failed to Connect to Mobile Network – Reposition

Figure 27: Failed to Connect to Mobile Network – Reposition
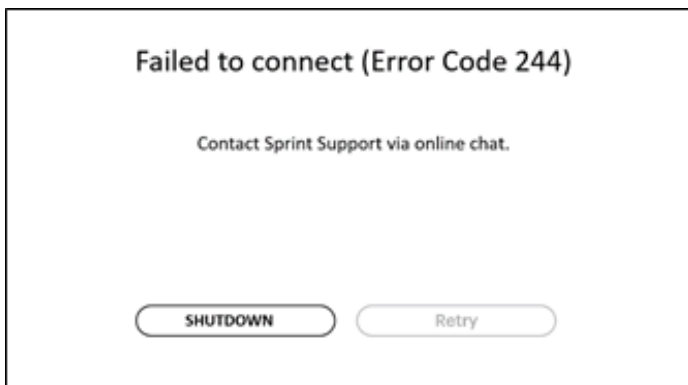
Place device in a different location.

- Shutdown – shutdown the unit

Failed to Connect to Mobile Network

Figure 28: Failed to Connect to Mobile Network

- Shutdown – shutdown the unit

Failed to Connect to Mobile Network
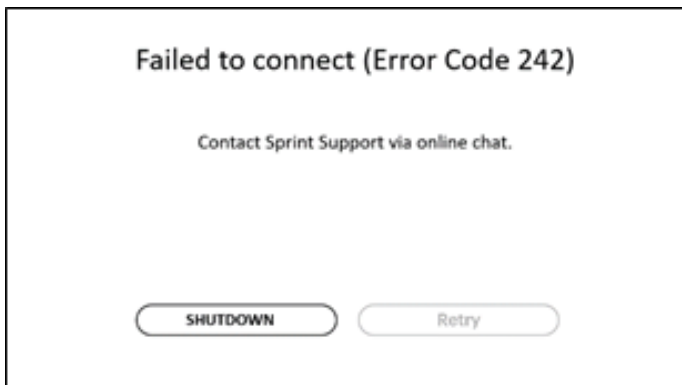
6 Document Information

Abstract

This document details a description of and initial configuration of Sprint Magic Box Gold (LTE) unit.

Revision History

Revision Details	Date	Summary of Changes
0.1	May 2018	• Initial draft document & comments
0.2	May 2018	• comments
A	May 2018	• Publish
A1	May 2018	• Tx & Gain updates

7 Warnings and Cautions

Human Exposure to Radio Frequencies

The Sprint Magic Box Gold antennas should be installed with a minimum distance of 20 CM from your body.

Radio Interference

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 internal vehicle radio communications.

Please ensure a maximum separation between the Sprint Magic Box Gold's antenna and other antennas.

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 Magic Box Gold unit should be installed ONLY by those 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.
- The Magic Box Gold unit does not provide protection from hazard energy in case of single fault condition.
- Power supply shall be limited up to 4A in normal and single fault condition.

⚠ Important Safety Instructions

- Read and Save these instructions
- This Installation Guide contains instructions and warnings that should be followed during installation, and operation.
- Failure to follow these instructions could cause bodily injury and/or product failure

Safety

1. Read this guide and follow all operating and safety instructions.

2. Supply cord is not shipped with the unit and is to be provided by user. Installation is to be performed by a qualified electrician according to local codes. Installation to be done in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part I, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2.

3.   Static sensitive components inside - do not remove the lid or base: No user serviceable parts inside.

4.   Position the power cord to avoid possible damage; do not overload circuits.

5.   Do not place this product on or near a direct heat source, and avoid placing objects on the terminal.

6.   Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.

7.   It is the user's responsibility to install this device in accordance with the local electrical codes.

8.   Installation of the Magic Box Gold unit should be performed by someone familiar with the product.

9.   The circuit breaker where connected should be easily accessible in case you have to disconnect the device.

10.   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.

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 1999/5/EC

European Council Recommendation 1999/5/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.

Airspan equipment is compliant with CE and R&TTE regulations and be operated in all EU (European Union) locations listed below:

Country Code			
BE	EL	LT	PT
BG	ES	LU	RO
CZ	FR	HU	SI
DK	HR	MT	SK
DE	IT	NL	FI
EE	CY	AT	SE
IE	LV	PL	UK

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.

| Caution, hot surface | Caution | Electro-Magnetic Radiation | DC |

Service Information

Refer all repairs to qualified service personnel. Do not 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 unit does not function after following the operating instructions outlined in this manual.

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

Locate the serial number of the terminal and record this on your registration card for future reference. Also record the MAC address, located on the product sticker.

UL Information

- The circuit where the equipment is connected 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.

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.

Român:

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

The United States Federal Communication Commission (FCC) and the Canadian Department of Communications have established certain rules governing the use of electronic equipment. Part 15, Class B.

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

 ➢ Reorient or relocate the receiving antenna.
 ➢ Increase the separation between the equipment and receiver.

> ➢ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
> ➢ Consult the dealer or an experienced technician for help.

Note: The Sprint Magic Box unit is intended for internal use.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

8 Maximum Output TX Total Power

Table 1: Sprint Magic Box Gold eNB FCC Maximum Output TX Total Power

Frequency Band (MHz)	TX (dBm)	EIRP (dBm)	Antenna Gain (dBi)	Variant
2496-2690	26.91	37.41	10.5	Magic Box Gold (AU587)

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

9 Power Consumption

Sprint Magic Box Gold has a Max nominal power consumption of WiFi BH <58W Max-Nominal and LTE BH: <61W Max-Nominal.

Sprint Magic Box Gold power consumption is described in the following table:

Table 2: Power Consumption

Duplex	Tx Total Power at RF Port (dBm)	Nominal Power Consumption (W)
TDD	27	55

Antenna Usage

Sprint Magic Box Gold unit has four (4) RF ports that are connected to two (2) dual-port antennas arrays. Each antenna array is mounted on opposite sides internally within the Airspan product housing. This is so that one antenna array faces forwards and one antenna array faces outwards for optimized coverage.

Antenna Types

There are internally mounted antennas connected to the Sprint Magic Box Gold unit which are designed specifically for this use and are specified below.

Table 3: Antenna Types - Technical

Antenna Array Type	LTE Band	Frequency Range (MHz)	Gain (dBi)	Part number
Dual Slant ±45° - Antenna A	41	2496 – 2690	10.5	AW3646-3-R1
Dual Slant ±45° - Antenna B	41	2496 – 2690	10.5	AW3646-1-R2

Note: The antennas are assembled and connected internally in the factory during installation into the unit.

10 About This Document

Purpose

This User Guide is intended as an instruction manual for professionals to provide step-by-step instructions for setting up and initial configuration of the Sprint Magic Box Gold unit.

Intended Audience

This guide is intended for persons who are responsible for installing and performing initial configuration of the Sprint Magic Box Gold unit.

Customer Care Help Desk

Airspan's *Customer Care Help Desk* offers prompt and efficient customer support services.

> **Note:** To avail Airspan's *Customer Care Help Desk* support, you must be a registered user and must have a valid support contract. To register, click here and fill the **Registration** form.

To create and update issue logs, send e-mails to Customer Care Help Desk. Once you submit your issue, the system generates a new issue and sends an issue number for your reference. The system uses this issue number to categorize and store e-mails under the appropriate issue.

To help *Customer Care Help Desk* identify your issue, include the issue number and your *Customer Care Helpdesk* account details in all further communications.

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Airspan Communications Ltd. Capital Point 33 Bath Road Slough, Berkshire SL1 3UF, United Kingdom Tel: +44-1895-467-100	Airspan Networks Inc. 777, Yamato Road, Suite 105 Boca Raton, FL 3341-4408, USA Tel: +1 561 893 8670

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11 Overview

The Magic Box Gold unit is a product in the Airspan product suite {AirUnity 587 (B41 HL) BH (B41HL_B25)}. Magic Box Gold is a combined LTE based backhaul, LTE small cell and WiFi Access Point within a single unit. The Wireless protocols that come with this product ensure data security and isolation from interference generated by other radio frequencies.

The Magic Box Gold unit supports MIMO antenna technology and high power output.

11.1 Management

➢ Software is upgraded locally and remotely.
➢ Designed for local and remote management via Netspan (WEB management).

11.2 Magic Box Gold eNB Frequency Ranges

The table below lists the frequency range of Magic Box Gold eNB units currently available. This table will grow as more models become available.

Table 4: Frequency Ranges

Frequency Band	Channel Bandwidth
41	10 & 20 MHz

12 Physical Description

This section provides a description of the components of the Magic Box Gold:

➢ Dimensions
➢ Power Supply

12.1 Sprint Magic Box Gold

The Sprint Magic Box Gold

Figure 29: Sprint Magic Box Gold
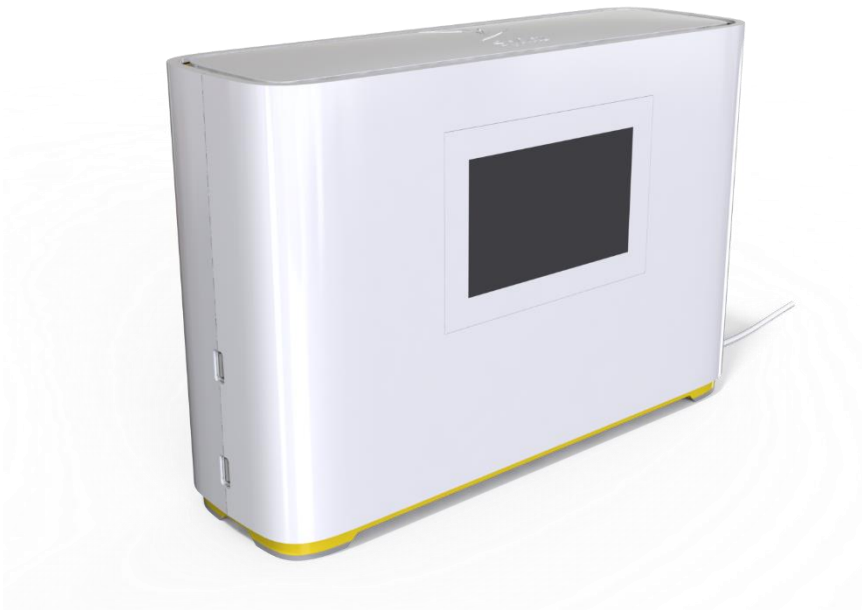
12.1.1 Physical Dimensions

The table below lists the physical dimensions of the Sprint Magic Box Gold.

Table 5: Magic Box Gold Physical Dimentions

Parameter	Value
H x W x D	214 mm (8.43 In) x 312 mm (12.28 in) x 95 mm (3.74 in)
Weight	<3.6Kg

12.1.2 Digital Display (Touch Screen)

The Sprint Magic Box Gold unit has 5.17" digital touch display to allow user to interact with the device and obtain following information:

- Power on

- RN-UE status

- eNB status

- Number of end user(s) connected

- Location (GPS)

- Macro received signal level

- Best Location Indicator / Installation Instructions

The user interface provides information to enable the end user to determine the optimal location for the Sprint Magic Box Gold operation.

12.1.3 eSIM Card

The Sprint Magic Box Gold provides an embedded eSIM and a standard SIM card holder for the operator-provided SIM, (installed during assembly).

12.1.4 USB Ports

Two USB 2.0 High-Speed host ports on the side of the unit. Each port supports charging of 1.5A + data.

12.1.5 Ethernet Port

RJ45 - 1 Gbps - Located on bottom of unit

12.2 Synchronization

The Sprint Magic Box Gold contains an integrated GPS receiver, which is used for location timing and synchronization.

12.2.1 Synchronization Compliance

The Sprint Magic Box Gold meets the synchronization requirements as they are defined in TS 36.104 and TS 36.133.

Inter eNodeB synchronization is supported to enable both 1PPS frame synchronization for TDD interference avoidance and frequency synchronization for ICI avoidance.

12.2.2 Frequency Accuracy

For Frequency stability, the same source is used for RF frequency and data clock generation. The modulated carrier frequency of the eNodeB has an accuracy of ±0.05ppm observed over a period of one subframe (1ms).

12.3 Phase Accuracy

Phase accuracy, (required for TD-LTE interference coordination and for both TD-LTE and FDD-LTE when considering MBSFN or ABS) is 1µs or better.

12.4 Power Supply

The Sprint Magic Box Gold is powered via an AC mains (line power) adapter which provides local DC power to the unit:

AC/DC power convertor supports:

- AC input voltage range US: 100-240V±10% at 50/60Hz

- DC output voltage range: 10V – 14V

- DC cable length: 1.5M (approx. 5 feet)

12.5 GPS Antenna

Table 6: GPS Antenna

Band	Function	Location
1575 MHz	GPS	Internal

Table 7: GPS Antenna Parameters

Parameter	
GPS Band	L1
Frequency	1575.42 ±3
Polarization	Right Hand Circular
Gain at 90° Elevation	4dBic

14 Hardware Security

14.1 Factory Generation of Device Key

Each device has a private key and associated certificate which is used to authenticate itself when initiating communications. This private key is generated in the factory, and so is the corresponding vendor certificate. This capability necessary in order to support large scale plug and play deployments.

This device key is stored on the Sprint Magic Box Gold to allow it to authenticate to the network. If the private key is compromised, then the device can be masqueraded by an attacker towards the operator's core network. Therefore, it is stored in an encrypted form.

In later releases a device-specific key will be introduced, this is a random number blown into on-SoC eFuses during manufacture. This offers two points of additional protection namely: the key is not discoverable by decompiling the code (an attacker will need to run code on the device in order to read the eFuses); and the key can only be used to obtain the private key of a single device (because each encryption key is unique).

14.2 eSIM

The system provides an embedded SIM (eSIM) to the board instead of using a removable SIM; this removes the temptation to steal the SIM. Additionally, the operator can ensure that these SIMs can only be used with the Relay APN, which would make them unusable with an ordinary mobile phone (because relay traffic uses nested GTP-U tunnels).

14.3 Unused Port Security

Unused interfaces on the SoCs within Sprint Magic Box Gold are protected against attack by ensuring that the corresponding pins are not connected to tracks on the circuit board. In addition to this hardware protection the device drivers within the SoCs which service these ports are disabled.

14.4 Tamper Detection

Simple tamper detection is provided in Sprint Magic Box Gold by the use of tamper-evident labels.

Hardware Ready for Secure Boot

The SoCs within the Sprint Magic Box Gold unit supports secure boot. This is to be enabled by a software download in a later release. Enabling secure boot ensures that only trusted software will run on the SoCs internal to Sprint Magic Box Gold.

Sprint Magic Box Gold supports FCAPS capabilities including the following:

- Configuration Management

- Inventory Management

- Fault Management

- Performance Management

- Software Management

- Diagnostics

Sprint Magic Box Gold is managed via remotely via Airspan's EMS (Netspan) using SNMP and supports management using a default IP address. The EMS is automatically detected via plug and play procedures implemented in the Sprint Magic Box Gold and Netspan software.

Airspan's Netspan element management system supports management of all Airspan products.

15   Standards Compliance

15.1 CE Marking

Sprint Magic Box Gold conforms to the European Union R&TTE Directive, and is therefore CE marked accordingly.

15.2 Environmental

Sprint Magic Box Gold meets the following environmental requirements:

- ETSI EN 300-019-1-3 Operational (weather protected locations)
- ETSI EN 300-019-1-1 Storage (weather protected, not temperature controlled locations)
- ETSI EN 300-019-1-2 Transportation

Table 8: Environmental Compliance

Type	Details	Standard Compliance
Operating temperature	-5°C to 45°C	ETSI 300 019 1-3 Class 3.1
Operating humidity	5% - 85% non-condensing	ETSI 300 019 1-3 Class 3.1
Storage temperature	-20°C to 70°C	N/A
Storage humidity	5% - 95% non-condensing	N/A
Rain and dust ingress protection	IP40	N/A
Operational altitude	70-106 kPa as well as: From -60m to 1800m @ 40°C From 1800m to 4000m @ 30°C	N/A
Solar radiation	700 W/m2	ETSI 300 019 1-3 Class 3.1

15.3 EMC

Complies with the EMC requirement as specified by ETSI EN 301 489-1 V1.9.2 (2011-09) Class A, as well as EN 301 489-4 V1.4.1 (2009-05) and IEC61000-4 series.

15.4 Safety

Conforms to IEC 60950, UL 60950, and EN 60950-1:2006.

In addition to this specification, the following specifications covering human exposure to radio frequency electromagnetic fields are also met:

- **EN 50385:2002** Product standard to demonstrate the compliances of radio base stations and fixed terminal stations for wireless telecommunication systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 - 40 GHz). General public.

- **EN 50401:2006** Product standard to demonstrate the compliance of fixed equipment for radio transmission (110 - 40 GHz) intended for use in wireless telecommunication networks with the basic restrictions or the reference levels related to general public exposure to radio frequency electromagnetic fields, when put into service.

15.5 ROHS & WEEE Compliance

- The chemical content of the equipment and its packaging meets the EU ROHS directive - 2002/95/EC (ROHS) – compliant with ROHS6 (up to 2009)

- The WEEE symbol is present on the product label as per the requirements of European directive 2002/96/EC

15.6 Reliability and Maintenance

The Sprint Magic Box Gold contains no user-serviceable parts. The following reliability data assumes worst case requirements. Overall reliability is improved when considering the dual transceivers as a redundancy factor (this consideration is not included in the quoted figures).

Average Mean Time between Failures (MTBF) = 10 years.

A Abbreviations

Term	Expansion
3GPP	3rd Generation Partnership Project, responsible for LTE
BER	Bit Error Rate
CN	Core Network
CP	Cyclic Prefix
dB	Decibel. A logarithmic unit used to describe a ratio (such as power ratio in radio telecommunications)
dBm	An abbreviation for the power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW). It is used as a convenient measure of absolute power because of its capability to express both very large and very small values in a short form
DL	Downlink
EMS	Element Management System
eNodeB	Evolved Node B, is the element in E-UTRAN of LTE
ESP	Encapsulating Security Payloads (ESP) provide confidentiality, data-origin authentication, connectionless integrity, an anti-replay service (a form of partial sequence integrity), and limited traffic-flow confidentiality
E-UTRAN	Evolved Universal Terrestrial Radio Access Network, is the air interface of 3GPP's Long Term Evolution
FDD	Frequency-Division Duplexing. A transceiver mode where the transmitter and receiver operate at different carrier frequencies
GPS	Global Positioning System
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
MAC	Medium Access Controller – responsible for several functions such Scheduling, Packet (De) Multiplexing, etc…
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
OFDMA	Orthogonal Frequency-Division Multiple Access (OFDMA) is a multiple access version of OFDM digital modulation scheme, used for eNodeB transmissions to UEs
PDCP	Packet Data Convergence Protocol. A Sub-Layer in LTE responsible for Security, IP Header (De) Compression, etc…
PTP	Precision Time Protocol is used to synchronize clocks throughout a network. In this document, PTP is referring to IEEE1588-2008 protocol
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
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
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
SDR	Software Defined Radio
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
UL	Uplink

Term	Expansion
WEEE	Waste Electrical and Electronic Equipment

Term	Expansion