



# nano3G AP Installation Manual

N3G\_INST\_300 7.0

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# 1 Introduction

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The ip.access nano3G AP is an indoor Access Point for enterprise applications.

This manual provides all the necessary information required to install an ip.access nano3G AP. The manual provides step-by-step instructions for hardware installation and configuration steps required to bring a nano3G AP into service.

The AP can be configured with a static IP address or it can obtain an IP address dynamically via DHCP. The AP-AC connection can be configured to be secure (via IPSec and a security gateway) or unsecured.

## 1.1 Overview

This manual is organised as follows:

- AP installation requirements
- AP configuration preparation
- AP hardware installation
- Commissioning configuration, for initial connection to an AC
- Configuration from the OMC-R
- Installation troubleshooting
- Regulatory warnings and safety information
- Supplementary information on licensing

## 1.2 User Requirements

It is assumed that any readers that will use the OMC-R Client already know how to:

- Start the OMC-R Client
- Navigate the Explorer Pane to find an AP object

Refer to [OPM\_410] for information on using the OMC-R Client.

## 1.3 Related Information

[INST_430]	3G OAM File Server Installation Manual (N3G_INST_430)
[OPM_300]	nano3G AP Operations Manual (N3G_OPM_300)
[OPM_410]	3G OMC-R Client Operations Manual (N3G_OPM_410)
[OPM_430]	nano3G OAM File Server Operations Manual (N3G_OPM_430)
[REF_105]	nano3G System Glossary (N3G_REF_105)
[REF_110]	nano3G System Configuration Management (CM) MIB Reference Manual (N3G_REF_110)
[REF_300]	nano3G AP License and Copyright Reference (N3G_REF_300)
[21.905]	Vocabulary for 3GPP Specifications (3GPP 3G TR 21.905)

## 1.4 Licenses and Copyright Notices

Portions of the AP are constructed from third-party software and open source code and ip.access ltd gratefully acknowledges the contributions that these libraries, technologies and components have made to the product. Each of these is supplied under the terms of a license agreement and these are either reproduced or referenced in [REF\_300], in line with the stipulations of their authors.

## 1.5 Terminology

Common nano3G System terminology is defined in [REF\_105].  
For additional 3G terminology, see [21.905].

## 2 **Installation Requirements**

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### 2.1 **Installation Overview**

There are three basic strategies for installing and commissioning a nano3G AP:

- Take a nano3G AP on site that is in the default factory state, install and commission the AP on site then configure it remotely from the OMC-R and enable it for service
- Take a previously commissioned nano3G AP on site and perform the physical installation only, then configure it remotely from the OMC-R and enable it for service
- Take a fully configured nano3G AP on site and perform the physical installation only

In all cases, once the AP is up and running, perform some basic tests to verify the AP can provide service. Also, after the AP has been running for 24 hours, use Network Listen to check the frequency offset from a macro neighbour, if any are available, and then apply a frequency correction if required.

#### 2.1.1 **Overview of Installation with On-Site Commissioning**

The principal activities for this are:

- 1) Unpack the nano3G AP hardware on site, verify it is undamaged and power it up. This is done by the installation engineer, as described in section 3.
- 2) Commission the nano3G AP for connecting to its serving AC. This is done by the installation engineer, using a commissioning laptop, as described in section 4.
- 3) Install the nano3G AP hardware in the required location, with power and its backhaul connection. This is done by the installation engineer, as described in section 3. The AP should now connect to its serving AC and be accessible in the OMC-R.
- 4) Use the OMC-R to upgrade the AP software and configure the AP, then bring the AP into service. This is described in section 6. Typically this is done remotely by an OAM engineer from the NOC, but could also be done by the on-site installation engineer, assuming it is possible to make a connection to the OMC-R from the provisioning laptop.

The benefits of this method are:

- Any nano3G AP in the default factory state can be taken on site.
- By corollary, if the nano3G AP is damaged or faulty, it can be replaced immediately by a spare.

#### 2.1.2 **Overview of Installation with Pre-Commissioned nano3G AP**

The principal activities for installing and commissioning any nano3G AP are:

- 1) Commission the nano3G AP, as described in section 4, before the on-site visit.
- 2) Once on site, unpack the nano3G AP hardware and verify it is undamaged. This is done by the installation engineer, as described in section 3.

- 3) Install the nano3G AP hardware in the required location, with power and its backhaul connection. This is done by the installation engineer, as described in section 3. The AP should now connect to its serving AC and be accessible in the OMC-R.
- 4) Use the OMC-R to upgrade the AP software and configure the AP, then bring the AP into service. This is typically done remotely by an OAM engineer from the NOC, as described in section 6.

The benefits of this method are:

- The site installation engineer does not need a commissioning laptop.
- By corollary, the site installation engineer does not need to know the user name and password for the AP commissioning web page.
- The nano3G AP is effectively plug-and-play, apart from requiring updates/configuration from the OMC-R.

The disadvantages of this method are:

- The Cell ID is part of the commissioning data, which means that each AP is destined for a specific location. If the nano3G AP is faulty, it is likely to take longer to deploy a replacement AP with the same Cell ID than it would for on-site AP commissioning.

### **2.1.3 Overview of Installation with Pre-Configured nano3G AP**

The principal activities for installing and commissioning any nano3G AP are:

- 1) Commission the nano3G AP, as described in section 4, before the on-site visit.
- 2) In addition, ensure the nano3G AP has the correct software, is fully configured and enabled to provide service, before the on-site visit.
- 3) Once on site, unpack the nano3G AP hardware and verify it is undamaged. This is done by the installation engineer, as described in section 3.
- 4) Install the nano3G AP hardware in the required location, with power and its backhaul connection. This is done by the installation engineer, as described in section 3. The AP should now connect to its serving AC and start providing service immediately. It will also be accessible in the OMC-R.
- 5) If the AP is not already configured, commission the AP for connecting to its serving AC, which will also make the AP accessible from the OMC-R (installation engineer on site, see section 4).
- 6) The installation engineer can immediately make test calls with the nano3G AP. Optionally also use Network Listen to verify the pre-configured neighbour list is optimal, or collect information about neighbour cells that can be used to populate the neighbour list.

The benefits of this method are:

- The site installation engineer does not need a commissioning laptop.
- By corollary, the site installation engineer does not need to know the user name and password for the AP commissioning web page.
- The nano3G AP is effectively plug-and-play.
- If the nano3G AP has also been enabled for service prior to the site visit, the installation engineer can make test calls immediately.



The disadvantages of this method are:

- If the nano3G AP is faulty due to damage in transit or some other failure, it may take time to deploy a replacement AP with the same configuration.

## 2.2 Requirements for All nano3G AP

This applies to all nano3G APs.

### 2.2.1 General Site Requirements

All nano3G AP models have the following general requirements for on-site installation:

- If the AP will be commissioned on site, a provisioning/commissioning laptop with:
  - OS: Windows XP
  - Web browser: Microsoft Internet Explorer 7
  - JavaScript enabled in the web browser
- Optionally, a short Ethernet cable for connecting the provisioning laptop to the AP
- A temporary means to provide power to the AP while it is connected to the provisioning laptop
- A permanent means to provide power to the AP once it is connected to the backhaul
- An Ethernet connection to the backhaul via CAT5 Ethernet cabling
- Access to a DNS service on the backhaul to resolve symbolic addresses
- Access to an NTP service on the backhaul to set the correct time and date
- If a firewall is in place on the network an AP will use for backhaul, this must be configured to allow traffic to and from the AP. See the port usage section below.

### Port Usage

All connections are outgoing. That is, they are initiated from the AP. Port usage has some dependency on whether or not the AP is using IPsec.

With IPsec, the standard two ports are used:

Protocol	Destination Port	Use
udp	500	IPsec initial connection
udp	4500	IPsec operations

Without IPsec, the following ports are used:

Protocol	Destination Port	Use
tcp	3052	SOIP connection to AC
udp	3000	CS RTP to AC
udp	3001	CS RTCP to AC
udp	3002	CS Mux to AC
udp	5000	PS RTP to AC
udp	5001	PS RTCP to AC

Protocol	Destination Port	Use
udp	5002	PS Mux to AC

The following ports are also used. When IPsec is used, they may be inside or outside the IPsec tunnel, depending on configuration:

Protocol	Destination Port	Use
tcp	80	PM upload, software download, CRL download
tcp	443	PM upload, software download, CRL download
udp	53	DNS
udp	67	DHCP - not needed for static IP configuration
udp	68	DHCP - not needed for static IP configuration
udp	123	NTP

## 2.2.2 Information Required for Commissioning

All nano3G AP models require the configuration details listed in this section. This information will typically be used on-site to commission an AP from the provisioning laptop, so that the AP can subsequently connect to its serving AC.

**Note:** It is possible to commission an AP before taking it on site. However, this means that the Cell ID for the AP must be known and correctly configured before it is taken on site, as the Cell ID is one of the initial commissioning parameters.

For connecting to the AP from the provisioning laptop:

- User name and password for the AP web server - contact customer support at ip.access for the current user name and password

For commissioning the AP:

- IP Address or FQDN of the serving nano3G AC
- Cell ID (also used as the ID of this AP on the serving nano3G AC)
- IP Address or FQDN of an NTP server
- DHCP or static IP
- If static IP is required:
  - IP address for the AP
  - Netmask
  - IP Address or FQDN of the default gateway
  - IP Address or FQDN of the Primary DNS
- IPsec is optional, but if IPsec is required:
  - IP Address or FQDN of the IPsec Security Gateway
  - IP Address or FQDN of a CRL server

- Optionally, Traffic Selector information (IP address and subnet mask)  
A traffic selector defines a range of IP addresses that are sent through the IPSec tunnel. This allows an extra degree of control over the traffic that is passed down the IPSec tunnel. Normally, the security gateway controls this range and no other configuration is needed.

### 2.2.3 Information Required for Configuration from the OMC-R

All nano3G AP models require the configuration details listed in this section. This information will be used to configure an AP from the OMC-R Client, typically by a NOC engineer.

- User name and password for the OMC-R Client. To be able to configure an AP from the OMC-R Client, the user name must have Full Access to the AC serving the AP and Full Access granted to its APs. See [OPM\_410] for full details about user permissions.
- The URL to the latest AP software image on the OAM File Server.
- If available, the location of the configuration file(s) that has been pre-provisioned with the attribute settings for the AP. This will be used to rapidly configure the AP via the OMC-R Load Attributes Wizard. As a minimum, it is recommended to create a generic configuration file that contains attribute settings that are common to all APs in the network. Optionally create a separate attributes file for each AP to be commissioned (see section 5).
- The minimum set of configuration data for the AP is:
  - MCC
  - MNC
  - LAC
  - RAC
  - SAI SAC
  - SAI LAC
  - UARFCN
  - Scrambling code
  - RNC ID
  - RSSI scan bands
  - Latitude and longitude of the APs installation site, for RANAP location reporting
- Additional configuration that may be required includes:
  - Static neighbour list - see [OPM\_300] for neighbour list configuration
  - URLs for the PM reporting and diagnostic services on the OAM File Server

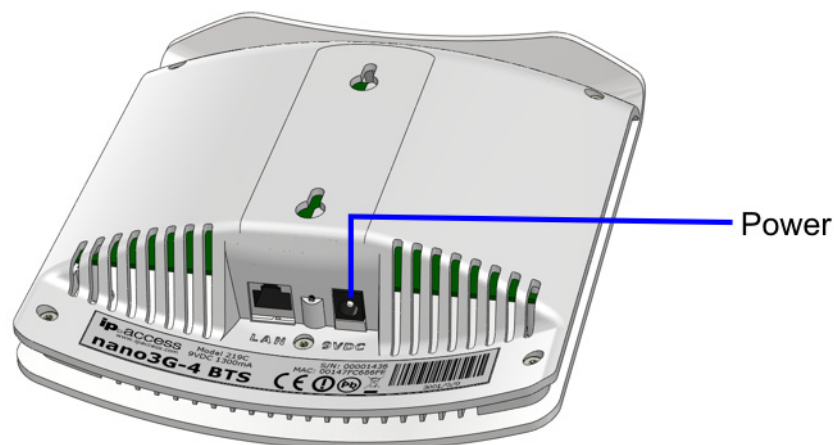
**Note:** It is possible to configure an AP before taking it on site.

## 2.3 nano3G S4 AP Site Requirements

The nano3G S4 APs are typically installed in retail or small office environments. In summary, each AP will require:

- Power supplied in one of the following ways:
  - From the mains adaptor unit supplied with the AP, which requires a suitable mains power supply point near the AP that is within reach of the adaptor's cabling
- or
- From the supplied POE splitter, which requires a Power over Ethernet connection to the splitter
- A site for the AP:
  - Wall mount location
- or
- Stable surface for free standing installation

### 2.3.1 Power



Maximum expected power consumption:

- 13 Watts (Rated 9VDC 1450mA)

The nano3G S4 AP supports the following power and Ethernet cabling options:

- Direct power from the supplied power adaptor
- Power over Ethernet from the supplied POE injector, via the supplied POE splitter
- Power over Ethernet from a POE switch, via the supplied POE splitter

A POE cable must not be inserted directly into the AP.

The power adaptor, as well as the POE inserter and splitter supplied by ip.access comply with LPS requirements in accordance with IEC/EN 60950-1.

## Power Adapter

A suitable mains power supply point into which the power adapter for the AP can be plugged.

Only use the power adapter supplied by ip.access to power the AP:

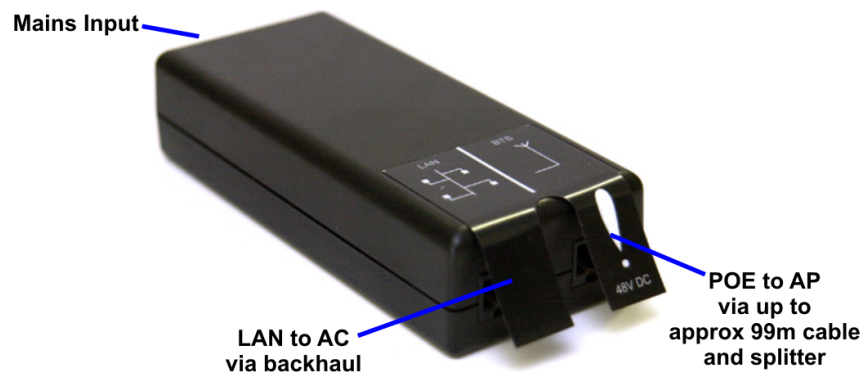
ip.access part number	EPS1173R
Input	100-240V ~ 50/60Hz 0.7A
Output	+9VDC 1.67A

## Power over Ethernet

POE requires the use of a power inserter and a splitter. The power inserter is positioned close to the backhaul network connection and mains supply, while the splitter is positioned close to the AP.

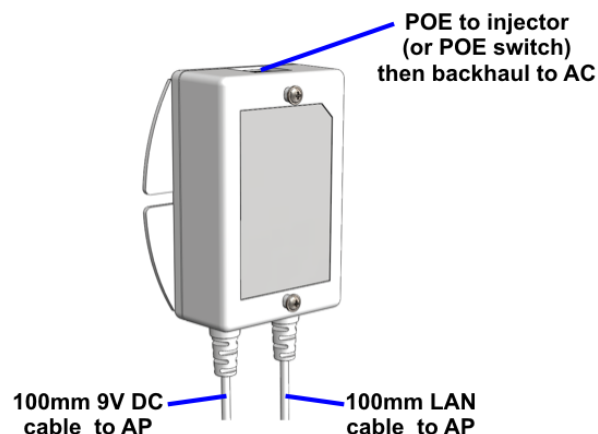
This is the POE inserter supplied by ip.access:

ip.access part number	109A
Input	100/230V ~ 60/50Hz 0.5/0.25A
Output	48VDC 0.38A



Only use the POE splitter supplied by ip.access:

ip.access part number	222A
Input	48VDC 0.35A
Output	9VDC 1.33A



## 2.3.2 Physical

A nano3G S4 AP may be installed in one of the following ways (see section 3.2.4):

- Free-standing on a flat stable surface.
- Attached to a wall or partition using two screws that engage in keyhole slots in the rear surface of the AP.
- Attached to a POE splitter using the two screws that engage in keyhole slots in the rear surface of the AP. The POE splitter in turn attaches to a wall or partition using two screws.

The unit **must** be vertical to ensure that air can circulate freely around it.

It is recommended to install the AP with its front surface facing the area requiring cellular coverage, unobstructed by walls or partitions that may have significant RF attenuation.

Dimensions and weight	Height	176mm (without stand) 193mm (with stand)
	Width	170mm
	Depth	51mm
	Approximate Weight	0.42 kg (AP only)
Environmental	Cooling	Vents on the back at top and bottom
	Operating Temperature	0°C to 40°C
	Operating Humidity	10 to 70% non-condensing

## 2.3.3 IP Bandwidth Requirements

At maximum capacity, a nano3G S4 AP will require:

- Downlink: at least 5Mbps
- Uplink: at least 512Kbps

This will deliver up to 4 voice calls and HSDPA services up to 3.6Mbps.

## 2.3.4 Sundry Installation Equipment

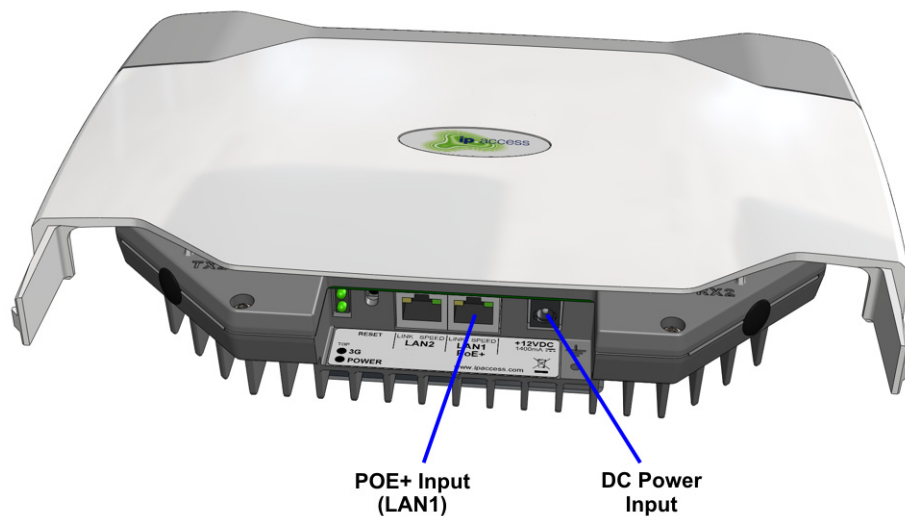
- To mount the POE splitter or the nano3G S4 AP onto the wall:
  - 2 self tapping pan head screws, size No. 6 (approx 3.5mm (0.14in) in diameter)
  - Wall plugs if required
  - Suitable drills and screwdriver

## 2.4 nano3G E8 AP Site Requirements

In addition to the site requirements for all APs, each E8 AP will require:

- A site for wall mounting
  - Power supplied in one of the following ways:
    - From the supplied POE injector, which requires a suitable mains power supply point near the injector - the AP must be within reach of a 100m Ethernet cable
- or
- From a mains adaptor unit, supplied separately, which requires a suitable mains power supply point near the AP that is within reach of the adaptor's cabling

### 2.4.1 Power



Maximum expected power consumption:

- 20 Watts (Rated +12V or -48V DC)

The nano3G E8 AP supports the following power options:

- Power over Ethernet from a IEEE 802.3at compliant POE+ power source equipment - a suitable POE+ inserter is supplied with the AP
- Direct power from a suitable DC source (+12V, 2.5A rated centre positive 2.1mm jack) - a suitable mains adaptor is available separately

These power options are mutually exclusive. When POE+ is used, a DC power adapter must not be plugged in to the AP and vice versa.

The nano3G E8 AP can be used with any IEEE 802.3at compliant POE+ power source.

**Note:** The Ethernet cable carrying POE+ must be plugged into the LAN 1 port. The LAN 2 port, next to LAN 1, is not used and does not support POE.

## POE+ Injector



The POE+ injector unit is supplied as standard with each nano3G E8 AP. The POE+ injector has two Ethernet connections, one for connection to the main LAN, the other for connection to the AP. The POE+ injector can be located anywhere on the cable run between the network switch and the AP, including locally at the AP or remotely at the network switch.

The POE+ injector is a pass-through connector for the LAN. Its function is to add POE+ to provide power to the AP. Therefore, the maximum cable run from the network switch to the AP is 100m, regardless of the placement of the POE+ injector.

The POE+ injector supplied by ip.access complies with LPS requirements in accordance with IEC/EN 60950-1.

### 2.4.2 Physical

A nano3G E8 AP is installed by attaching it to a wall or partition using the two screws which engage in keyhole slots in the rear surface of the AP (see section 3.3.6).

Pay attention to ensure that air can circulate freely around the unit. The unit must be vertical.

It is recommended to install the AP with its front surface facing the area requiring cellular coverage, unobstructed by walls or partitions that may have significant RF attenuation.

Dimensions and weight	Height	211mm
	Width	274mm
	Depth	58.6mm
	Approximate Weight	1.75 kg
Environmental	Cooling	Vents on the back at top and bottom
	Operating Temperature	0°C to +45°C
	Operating Humidity	10 to 70% non-condensing



### 2.4.3 IP Bandwidth Requirements

At maximum capacity, a nano3G E8 AP will require:

- Downlink: at least 7Mbps
- Uplink: at least 1Mbps

This will deliver up to 8 voice calls and HSDPA services up to 7.2 Mbps.

**Note:** The HSDPA rate of 7.2Mbps is the air-interface rate on Uu. The downlink rate needed to support this is lower. The uplink assumes a maximum load of 8 UEs each with 64Kbps PS bearers. Voice traffic has negligible impact.

### 2.4.4 Installation Tool Requirements

- To mount the bracket onto the wall:
  - 6 pan head screws, size No. 6 (approx 3.5mm (0.14in) in diameter) – 4 for the nano3G E8 AP, 2 for the POE+ adapter

**Note:** No screws are supplied to mount the AP or the POE+ unit.

- Wall plugs if required.
- Suitable drills and screwdriver.

### 3 nano3G AP Hardware Installation

This section documents the procedure used to install the nano3G AP hardware and physical connections together with applying the base software configuration.

**Note:** If possible, the engineer should stay on site until the AP is brought into service, ready to make test calls to verify the AP has been configured correctly from the OMC-R.

#### 3.1 Warnings and Regulatory Information


For all warnings and regulatory information, see section 8.

#### 3.2 Hardware Installation - nano3G S4 AP

##### 3.2.1 Unpack the nano3G S4 AP

- 1) Unpack the nano3G S4 AP and its accessories.

Box contents may vary, but typically the box should contain the following, as pictured:

<p>Upper layer:</p> <ul style="list-style-type: none"><li>• nano3G S4 AP unit</li><li>• nano3G S4 AP stand</li></ul>	
<p>Lower layer:</p> <ul style="list-style-type: none"><li>• POE injector unit</li><li>• POE splitter unit</li><li>• Mains adaptor unit</li><li>• Mains cable for POE injector</li></ul>	

**Note:** No screws are supplied to mount the AP or the splitter unit.

- 2) Check that the serial number on the nano3G S4 AP unit matches the label on the box.
- 3) Check that the items have not been damaged in transit.

For any damaged units, contact the supplier immediately for returns advice.

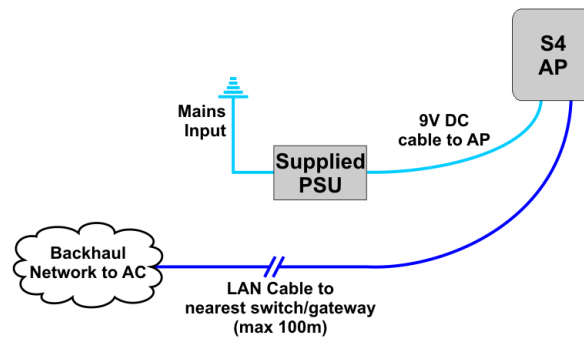
### 3.2.2 Commission the nano3G S4 AP

Configure the AP so that it will connect to its serving AC. If this has not been done already, do this now, before installing the AP in its final location. For instructions, see section 4.

### 3.2.3 Cable Connections

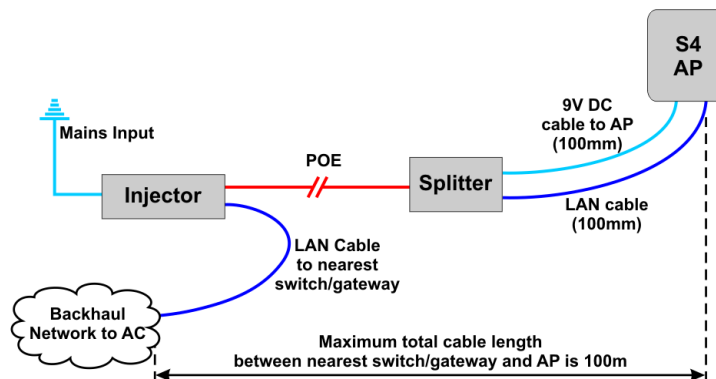
Use one of the cable connection schemes described below, to provide power and the LAN connection.

#### Supplied PSU and LAN



When the supplied PSU is used to power the AP, the POE injector and splitter units are not needed. However, this means that the mains socket providing power to the AP must be within reach of the cabling included with the supplied PSU (less than 2m).

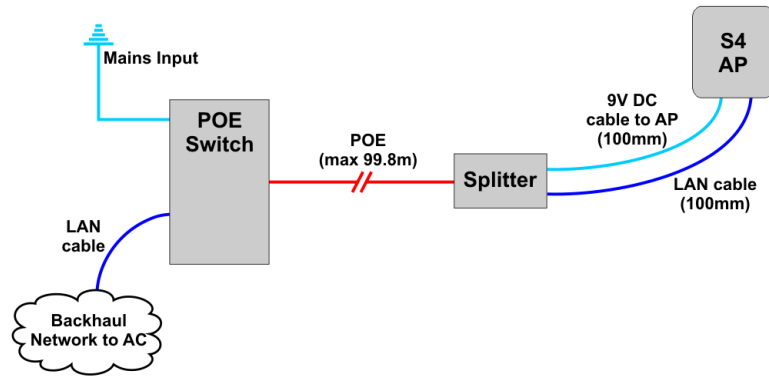
#### POE Injector and Splitter



This improves flexibility for locating the AP, as the AP can be up to approximately 100m from a mains power supply, depending on the placement of the POE Injector.

In this case, the PSU for the AP is not used. The injector takes a direct mains input using the supplied mains cable.

## POE Switch and Splitter



In this case, the POE switch is a third-party item. This has similar benefits to using the POE injector, but a POE switch will typically only be used if there are multiple APs on site and/or there is other equipment that can take advantage of POE. The supplied POE splitter must be used with the AP.

Notice that the POE cable to the splitter should not exceed 99.8m in length. This will ensure that the total cable run from the POE switch to the AP is within the Ethernet limit of 100m.

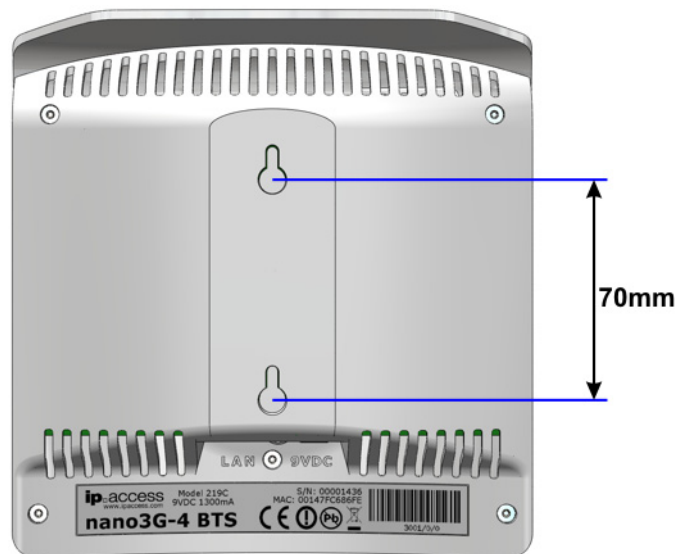
### 3.2.4 Mount the nano3G S4 AP

**Note:** The nano3G S4 AP should be installed in a position so that it is at least 2m away from the area where handsets are normally used.

The nano3G S4 AP **must** be mounted vertically in a location that allows air circulation around the unit. The AP can be mounted in the following ways:

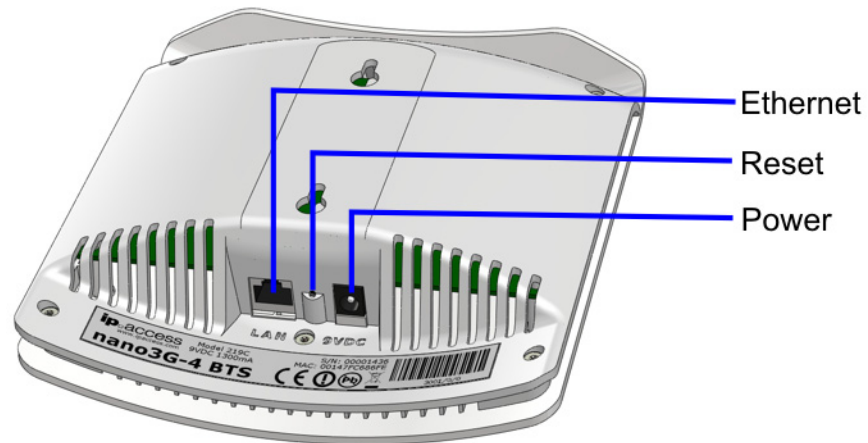
- On a stand
- Directly onto the wall at or above head height
- Onto the splitter unit on the wall at or above head height

The nano3G S4 AP has two holes at the back for direct wall mounting or mounting on the POE splitter:



## Mount the nano3G S4 AP on a Stand

- 1) Plug the Ethernet cable and the power cable into the AP or plug the cables from the POE splitter into the AP.



- 2) Slide the AP onto the stand.



- 3) Place the AP on its stand on a stable flat surface.

## Mount the nano3G S4 AP directly onto the wall

- 1) Drill two holes 70mm (2.76in) apart vertically for the two screws.
- 2) Insert wall plugs (if required) and secure the screws leaving approximately 3mm (0.12in) clearance between the screw heads and the wall.
- 3) Plug the Ethernet cable and the power cable into the AP.

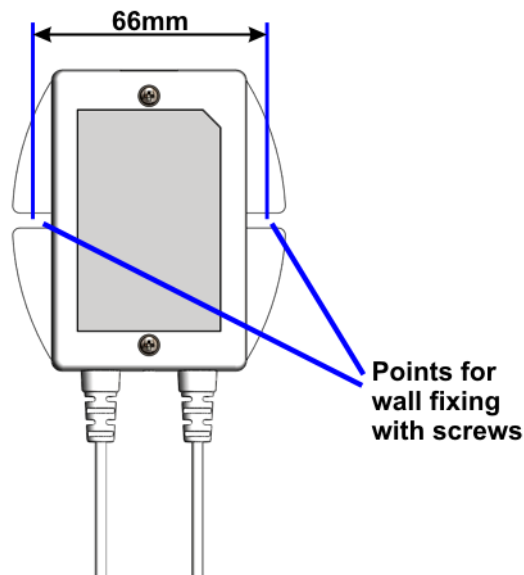
**Note:** If using the POE splitter when wall mounting the AP, it is recommended to mount the AP directly on the POE splitter, as in the following section. In some cases, it may be necessary to mount the AP and the POE splitter on the wall separately to minimise how far the AP projects from the wall. In this case, position the POE splitter below the AP where the 100mm cables will reach the AP.

- 4) Slide the AP onto the 2 screws.



## Mount the nano3G S4 AP onto the splitter unit on the wall

- 1) Drill two holes 66mm (2.6in) apart horizontally for the two screws.



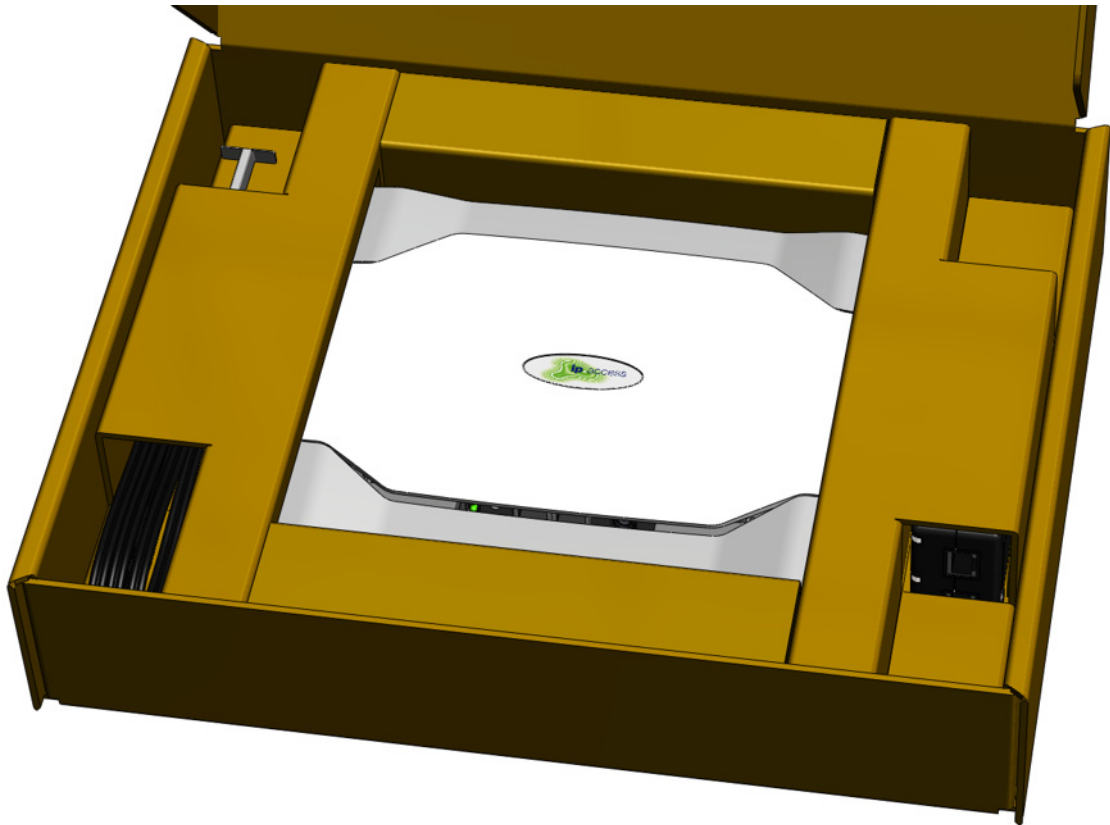
- 2) Secure the splitter unit to the wall using two screws.  
Ensure that the Ethernet socket is at the top.
- 3) Plug the Ethernet cable into the top of the splitter unit.
- 4) Plug the captive Ethernet cable and the power cable from the splitter unit into the AP.
- 5) Mount the AP onto the 2 screws that are already fixed onto the splitter unit.



## 3.3 Hardware Installation - nano3G E8 AP

### 3.3.1 Unpack the nano3G E8 AP

- 1) Unpack the nano3G E8 AP and its accessories.



Box contents may vary, but typically the box should contain the following:

- nano3G E8 AP unit with wall bracket attached
  - Extraction tool for removing the AP from its wall bracket
  - Injector unit for POE+
  - Mains cable for the POE+ injector
- 2) Check that the serial number on the nano3G E8 AP unit matches the label on the box.
  - 3) Check that the items have not been damaged in transit.

For any damaged units, contact the supplier immediately for returns advice.

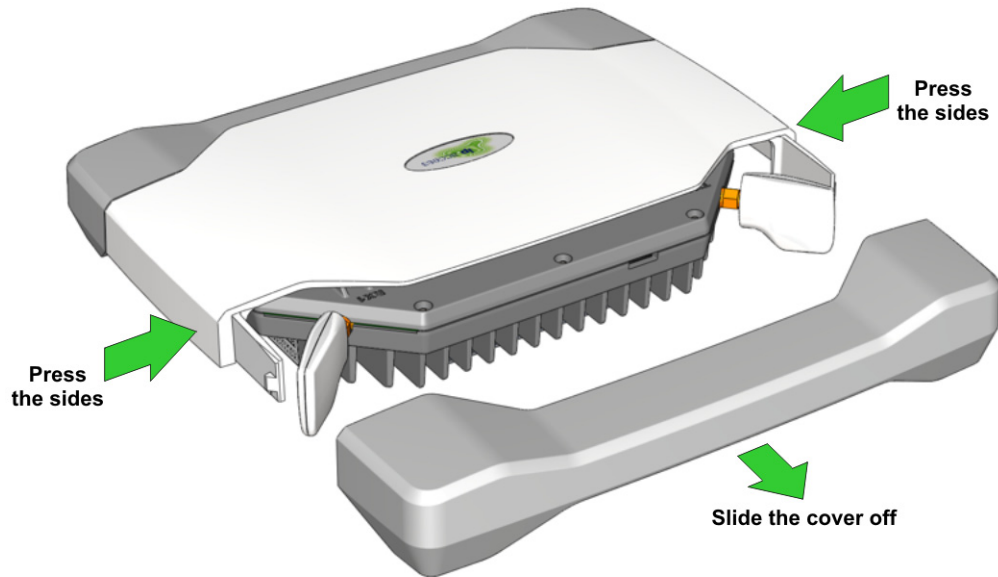
### 3.3.2 Removable Cable and Antenna Covers

The nano3G E8 AP has two removable covers. The top cover goes over the antennae, and the bottom cover goes over the cable sockets.

- 1) Place the unit on a flat surface.

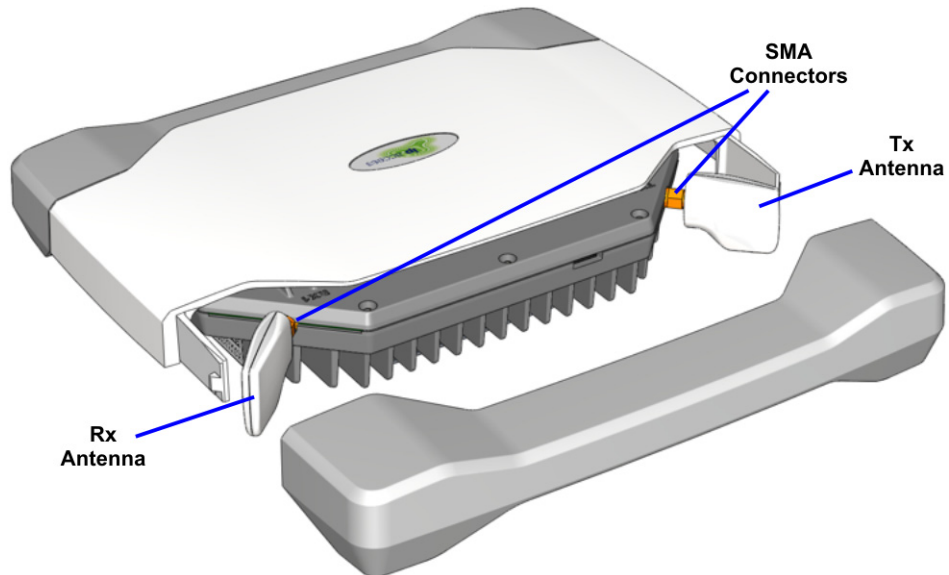


- 2) Press the sides of the unit next to the cover to be removed. Do not apply excessive force.



- 3) Slide the cover off.
- 4) To refit the cover, simply slide it back onto the tabs on the main cover until it snaps into place.

### 3.3.3 Antennas



The antennas must be oriented perpendicular to the unit, as shown, so that the cover fits correctly without stressing the connectors.

To fit external antennas, first remove the plastic cover from the antenna side of the unit. Unscrew the antennas to expose the SMA connectors. Connect external antennas directly to the SMA connectors. Route the cables out of the way of the antenna cover, then refit the cover.

### 3.3.4 Commission the nano3G E8 AP

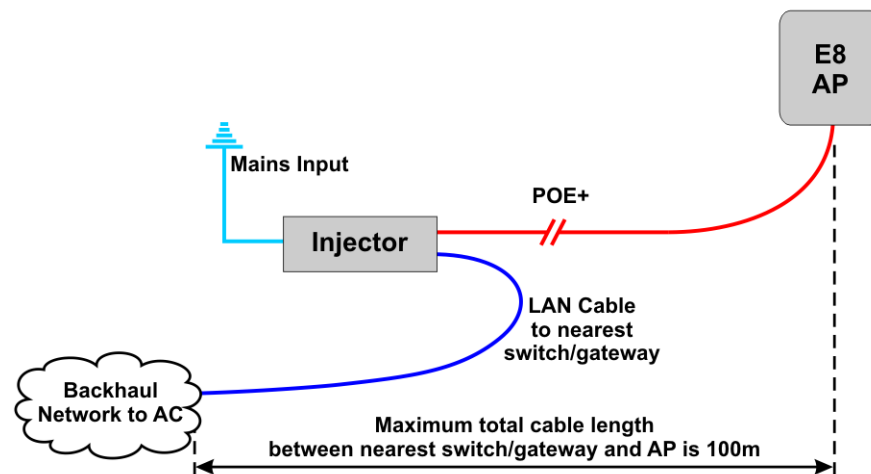
Configure the AP so that it will connect to its serving AC. If this has not been done already, do this now, before installing the AP in its final location. For instructions, see section 4.

### 3.3.5 Cable Connections

Two power supply modules are available from ip.access, designed for use with the ip.access nano3G E8 AP and are compliant with the IEEE 802.3at standard:

- The POE+ injector, as supplied, is commonly used for single site installations
- Direct power from the mains via an optional power adapter

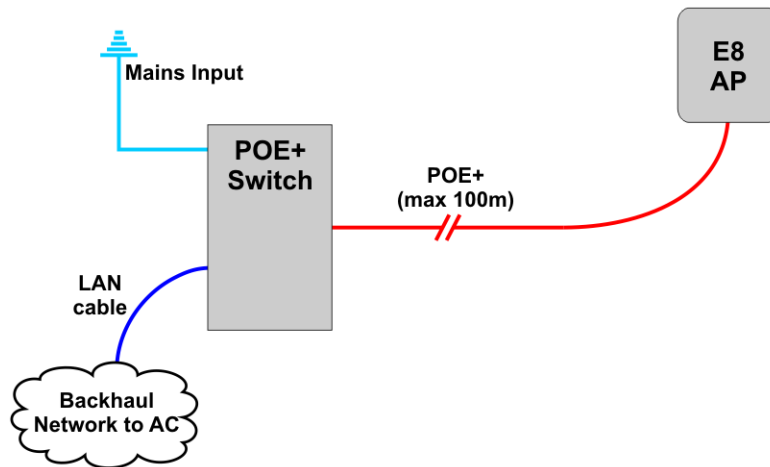
#### POE+ Injector



The AP can be up to 100m from the switch/gateway to the backhaul, but allow approximately 0.1m for routing through the injector. The injector can be positioned anywhere on this cable run. Hence the injector can be at the most convenient point for providing power, without restricting the location of the AP.

The injector takes a direct mains input using the supplied mains cable. Use a CAT5 Ethernet cable that is capable of carrying POE from the injector to the AP.

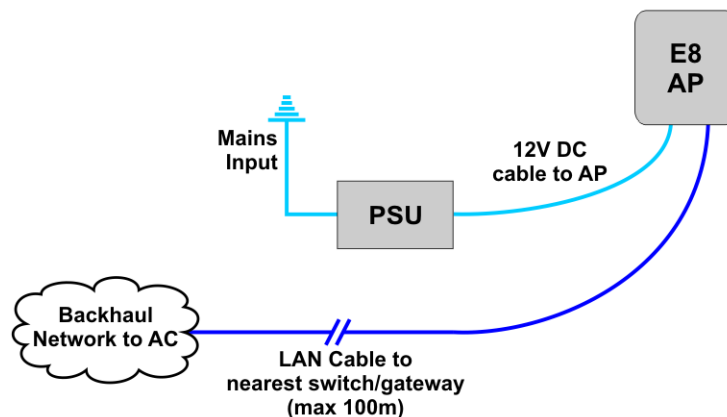
## POE+ Switch



In this case, the POE+ switch is a third-party item. The cable run from the switch to the AP can be a full 100m.

A POE+ switch will typically only be used if there are multiple APs on site and/or there is other equipment that can take advantage of POE+.

## PSU and LAN



When a suitable PSU is used to power the AP (see section 2.4.1) the POE+ injector unit is not needed. However, this means that a mains socket providing power to the AP must be within reach of the cabling included with the PSU. This is typically less than 2m. The PSU for the E8 AP is an optional extra.

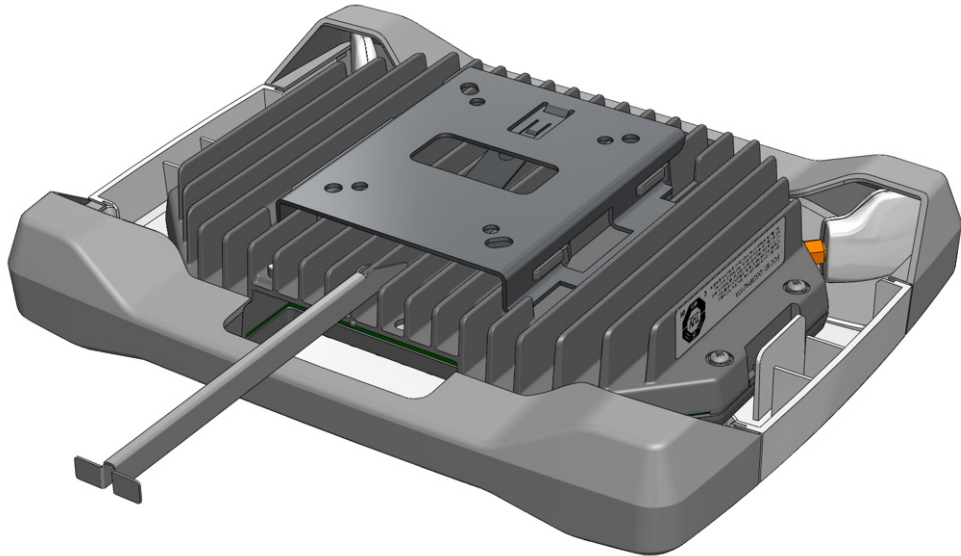
### 3.3.6 Mount the nano3G E8 AP on a Wall

**Note:** The nano3G E8 AP should be installed in a position so that it is at least 2m away from the area where handsets are normally used.

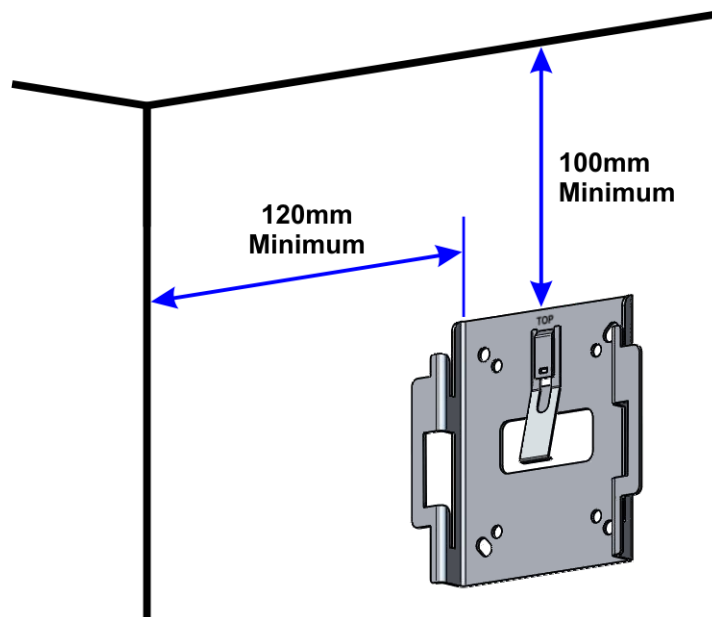
The nano3G E8 AP must be mounted vertically to ensure air circulation around the unit.

The location of each nano3G E8 AP is shown on the installation floor plan produced at the network planning stage. For example, it must take into account that all APs must be at least 2m from any mobile equipment. The network wiring must be complete before the nano3G E8 AP can be installed and commissioned. The nano3G E8 AP should be placed on a wall at or above head height.

- 1) Remove the nano3G E8 AP from the wall bracket. Lay the AP on a flat surface with the wall bracket upwards. Slide the removal tool over the central fin between the bracket and the body of the unit to disengage the locking spring, then slide the bracket to separate it from the AP. The removal tool may be inserted from the top or bottom of the nano3G E8 AP.

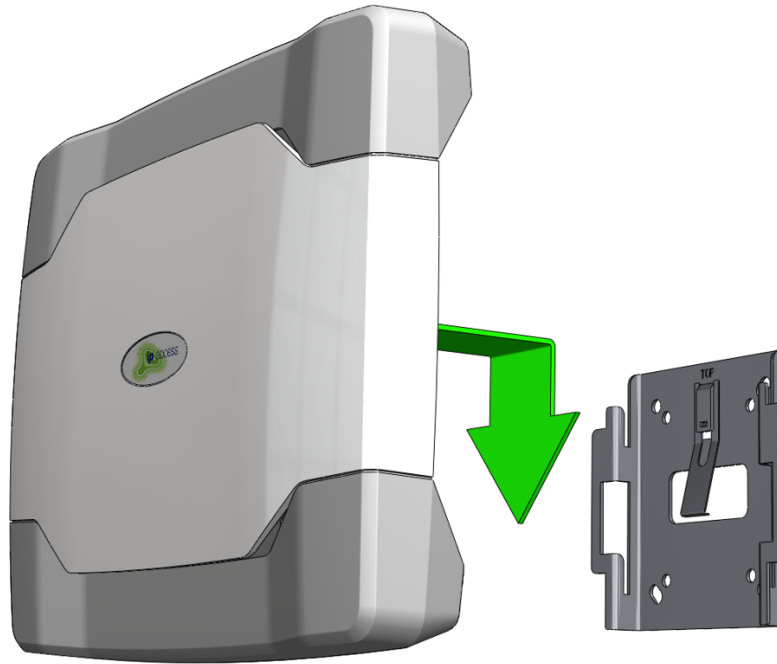


- 2) Position the bracket on the wall with its flat surface against the wall and the clip part towards the top. Ensure the bracket is level and sufficient clearance is maintained to allow the AP to be fitted to the bracket. Allow at least 100mm from the bracket to the top of wall, and 120mm from the side of the bracket to a side wall.

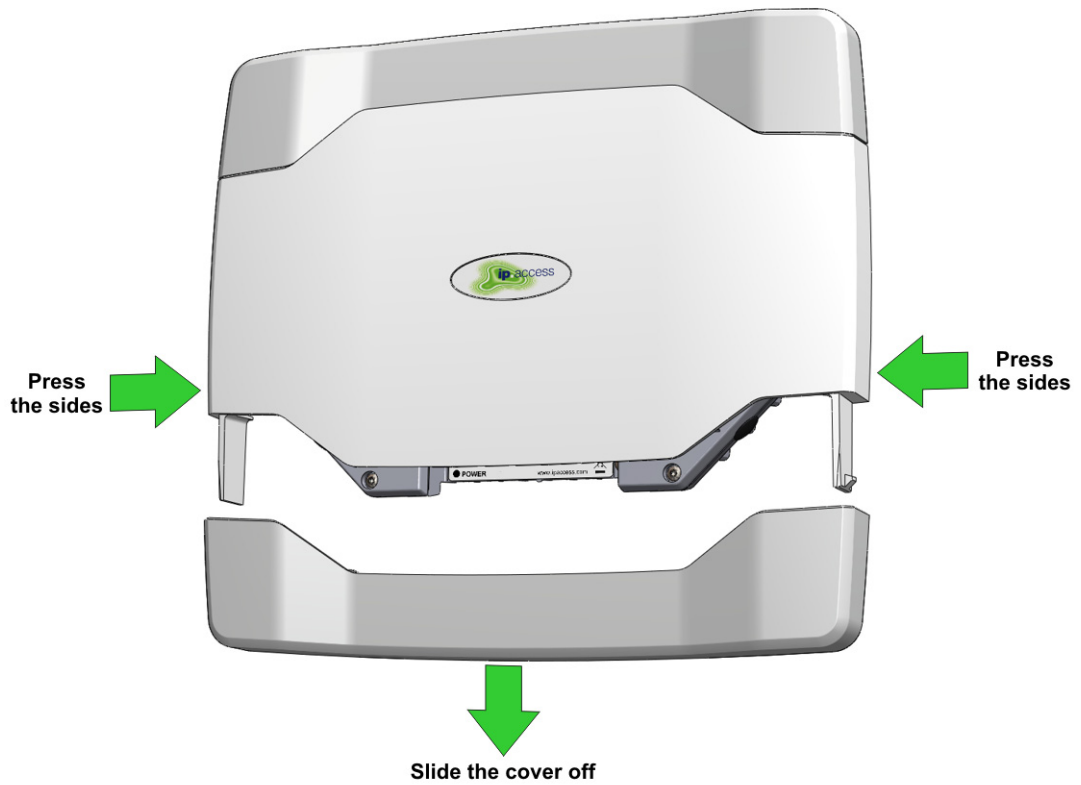


- 3) Mark the position of the four screw holes.
- 4) Drill the four holes in the positions marked previously and insert wall plugs (if required) and fix the mounting bracket securely to the wall. The bracket is designed to allow the nano3G E8 AP unit to be mounted with the connections either at the top or at the bottom of the unit.

- 5) Slide the nano3G E8 AP onto the bracket and ensure that the retaining spring engages into the indent at the rear of the unit.



- 6) Remove the lower cover to reveal the cable ports and LEDs.

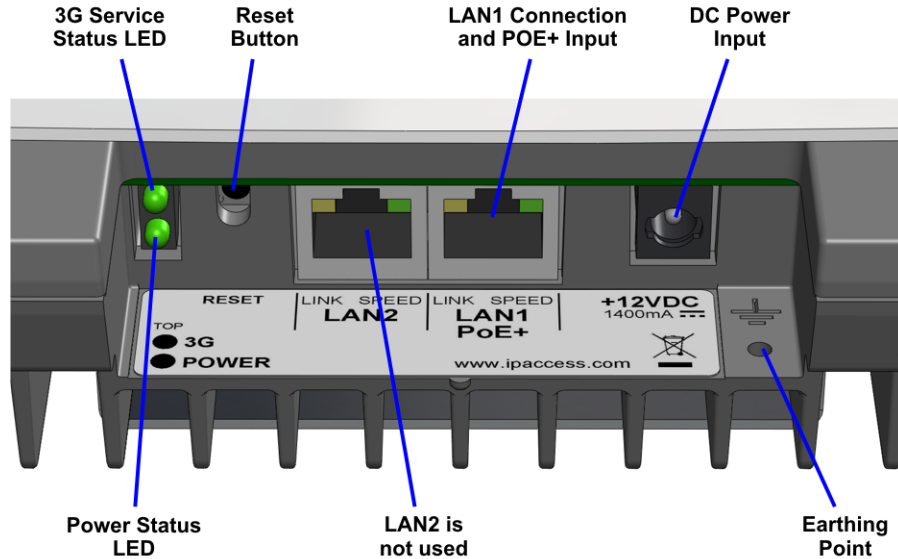


7) Plug in the required cables. Either:

- Plug an Ethernet cable from the POE+ injector or POE+ switch into LAN1

or

- Plug an Ethernet cable from a switch/gateway (no POE+) into LAN1 and an optional power supply into the +12V DC input



**Note:** Do not connect an Ethernet cable to LAN2. This will have no effect.

8) To refit the lower cover, slide it onto the tabs on the main cover until it snaps into place.

## 4 Commission a nano3G AP

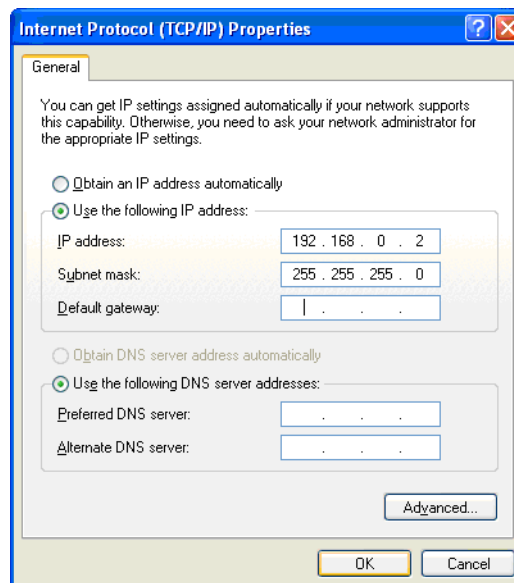
This procedure provisions the nano3G AP with the settings it needs to establish a connection with its serving nano3G AC. Once commissioning is complete, use the OMC-R Client for further configuration and to bring the AP into service.

An AP can be commissioned in advance of the site visit or can be commissioned on site via a provisioning laptop. This procedure assumes on-site provisioning with a laptop.

The nano3G AP must be in the factory reset state for this procedure. If a factory reset is required, see section 7.2 for instructions.

### 4.1 Configure a Provisioning Laptop to Connect to the AP

- 1) Connect the AP and the provisioning laptop with an Ethernet cable.
- 2) Open the Windows Control Panel on the laptop.
- 3) Go to **Network Connections**.
- 4) Right-click the relevant **Local Area Connection** and select Properties.
- 5) In the list of items on the General tab, select **Internet Protocol (TCP/IP)** and then click **Properties**. The following dialogue appears:



- 6) If it is not possible to leave this network connection permanently configured for AP commissioning, make a note of the current settings.
- 7) Click the **Use the following IP address** radio button.
- 8) Set the IP Address to **192.168.0.2**.
- 9) Set the Subnet Mask to **255.255.255.0**.
- 10) There is no default gateway, so ensure the default gateway address is cleared.
- 11) Click **OK** to close and save the changes in each of the two dialogues. Also close the Control Panel.

## 4.2 Configure the AP-AC Connection

12) Power up the AP.

For the nano3G S4 AP, either:

- Use the power supply provided with the AP

or

- Connect the short power cable from the POE Splitter unit - this will also require power into the splitter unit from a POE source

For the nano3G E8 AP, typically do one of the following:

- Connect the laptop to the LAN input on the POE+ injector unit, connect a cable to carry POE+ from the injector to the LAN1 port on the AP, then plug the POE+ injector into the mains

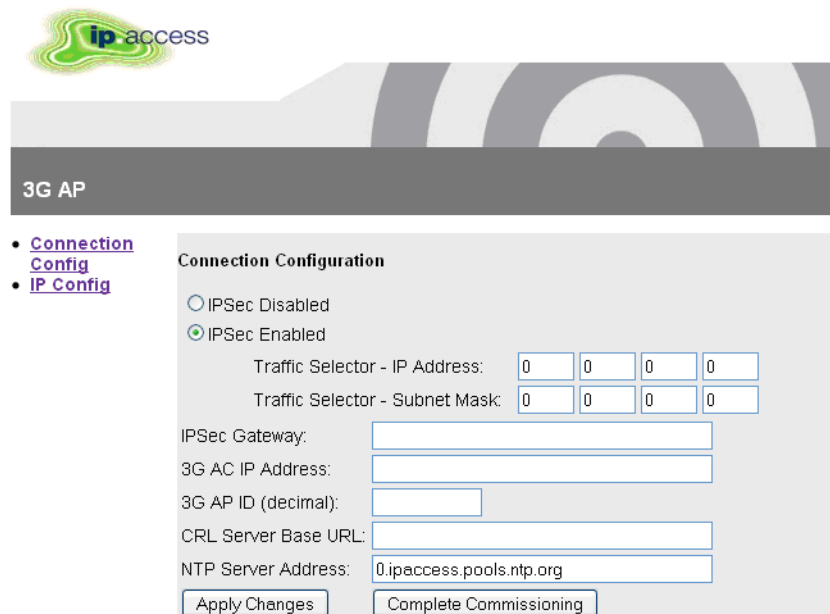
or

- Connect the optional power supply for the AP to the AP's 12V DC input, and connect the laptop to the LAN1 port on the AP

13) Start a web browser on the laptop.

14) In the address bar, enter the pre-defined static IP address and port number for the web server: `http://192.168.0.1:8089`. A login screen appears.

15) Enter the commissioning user name and the password (supplied separately for security reasons). The Connection Config page appears:



The screenshot shows the 'ip access' logo at the top left. Below it is a header bar with '3G AP'. On the left side, there are two menu items: 'Connection Config' (highlighted) and 'IP Config'. The main content area is titled 'Connection Configuration' and contains the following fields and options:

- IPSec Disabled
- IPSec Enabled
- Traffic Selector - IP Address:
- Traffic Selector - Subnet Mask:
- IPSec Gateway:
- 3G AC IP Address:
- 3G AP ID (decimal):
- CRL Server Base URL:
- NTP Server Address:

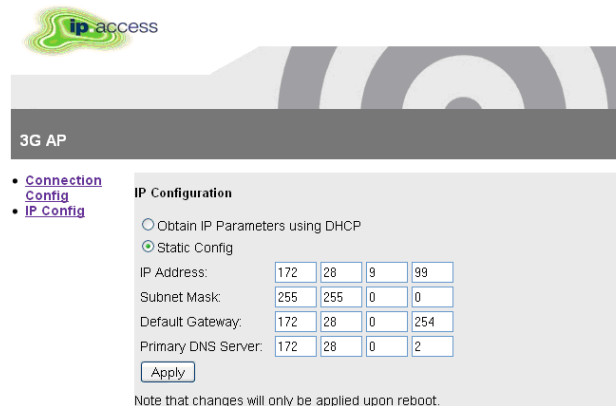
At the bottom of the configuration area, there are two buttons: 'Apply Changes' and 'Complete Commissioning'.



## 4.2.1 Static IP Configuration

Obtaining an IP address with DHCP is recommended for the nano3G AP, and this is selected by default. Only execute this section if static IP configuration is needed. This must be done before completing the Connection Config page.

- 16) If static IP is required, click the **IP Config** link on the left. The IP Configuration page appears.



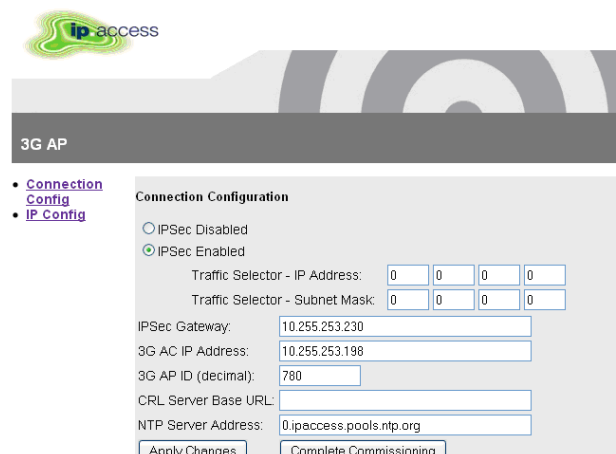
- 17) Edit the parameters as needed and then click **Apply**.

**Note:** At this point it may be useful to make a separate note of the parameter values entered in this screen. Alternatively, save a screenshot of the web page (information about how to take a screenshot is outside the scope of this manual).

- 18) Click the **Connection Config** link on the left.

## 4.2.2 Configure the AC Connection

- 19) If Secure Connection is required, select **IPSec Enabled**, and enter the IPSec Gateway and Traffic Selector addresses.
- 20) Enter the IP address of the AC and the NTP server (do not use the values shown - these are examples only).
- 21) Enter the ID of the AP. This must be the same as the Cell ID assigned to the AP.



- 22) To save the configuration, click **Apply Changes**.

**Note:** At this point it may be useful to make a separate note of the parameter values entered in this screen. Alternatively, save a screenshot of the web page (information about how to take a screenshot is outside the scope of this manual).

- 23) To start the AP in normal operation mode, click **Complete Commissioning**.
- 24) Acknowledge the warning about changes in the IP configuration and click **OK**.
- 25) When the initial configuration is complete, power off the AP and disconnect it from the laptop.

At this point, the commissioning web page is no longer accessible. If there are configuration errors that prevent the AP connecting to its serving AC, the commissioning procedure must be started again after resetting the AP with a factory reset. See section 7.2 for factory reset instructions.

- 26) Mount the AP at its intended location, as in section 3.2.4 or 3.3.6.
- 27) Connect the AP to the operator network.
- 28) Power up the AP. Either use the power supply provided with the AP, or connect the short power cable from the POE Splitter unit.

The AP performs its normal, deployed mode start-up and connects to its serving AC. During this procedure, the nano3G AP obtains network time and day information from the NTP server. If IPsec is in use, the AP establishes an IPsec tunnel to the Security Gateway.

From this point on, the AP must be managed from the OMC-R. It is now ready for initial configuration, typically by NOC engineers, as in section 6.

## 5 Configuration File Preparation

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A nano3G AP holds the master copy of its own configuration. Therefore, it cannot be pre-provisioned in the OMC-R. However, the attribute values for configuring a nano3G AP can be stored in a text file, and then loaded via the OMC-R Client to provision the AP.

This section describes how to prepare one or more text files of attributes for provisioning nano3G APs. This may be done at any time, but it is recommended to do as much as possible in advance of the site visit to install an AP.

The main reason for preparing a configuration file to provision an AP is to help bring the AP into service as quickly as possible. This can be done in combination with configuration adjustments from the OMC-R Client, according to whichever method is best suited for given configuration tasks.

### 5.1 Overview of Attribute Configuration Files

An attribute configuration file is a text file containing an object class followed by a list of attribute names and the value applied to each attribute. The file can also contain comment lines anywhere that start with the # character. Hence, the file is of the form:

```
# some comment about the object type
Object=class_nnn
# some other comment
attribute1=value
attribute2=value
...
attributeN=value
```

The file must contain the Object type. The OMC-R Client will not load a file that does not have an Object type defined. For N3G\_2.0, the Object for a nano3G AP must be apNano8\_001 or apNano\_002. So in each case the file must start like this:

- For a nano3G E8 AP

```
Object=apNano8_001
```
- For a nano3G S4 AP

```
Object=apNano_002
```

An attribute configuration file can be created from scratch. More conveniently, a file can be saved from within the OMC-R Client from an object of the same type and then customized for a different object of the same class. The resulting configuration file can then be imported against the target object, which in this case will be an AP.

An example file is provided in section 5.3.

Configuration files must be imported one at a time, but there is no restriction on the number of configuration files that can be imported to configure any given object. This means it is possible to create a generic template file, which contains attribute values common to all APs of the same type. Typically, this can be started by exporting the configuration from an AP that has already been fully configured, and then edited to remove non-generic attributes. Once the generic template has been created, optionally create a file for each individual AP with additional settings particular to each AP. However, if the majority of

required settings are in the generic template, it may be easier to simply load the template then use the OMC-R Client for fine tuning the configuration of an individual AP.

The ObjectInstance must be removed from a generic template if the original file was created by export from the OMC-R Client. If required, a configuration file for a specific AP can include the ObjectInstance value for that AP. This will ensure the file can only be loaded against the target AP. However, this must be reproduced exactly or the configuration file will not load against the target AP. A way around this is to save a configuration file for that AP, regardless of its configuration state, then copy and paste the ObjectInstance into the file that has the correct configuration.

**Note:** All of the attributes can be configured from the OMC-R Client. After initial provisioning from a configuration file the OMC-R Client can be used to set attributes or the configuration file can be edited to set more parameters, for example when importing configuration information from a radio planning system. To obtain a sample file with all the attributes that can be configured, export a configuration file as described in section 5.2 and inspect its content.

### 5.1.1 Attribute Types and Values

The attribute types and values conform to the attribute definitions in the MIB. See [REF\_110] for a full description of each object type, the attributes it may contain and the valid values that may be assigned to each attribute.

The following attribute types are available, which are also formally described in [REF\_110]:

- Base types:
  - Integer - a whole number numeric value, often must be within a range of valid values  
`tos=0`
  - Enumeration, or enum - a value name from a pre-defined set of names with specific values  
`t300=T300_4000_MSEC`
  - Boolean - a true or false value  
`soipHeartbeatEnabled=true`
  - String - a value enclosed in double-quotes (the double-quote character itself cannot be part of the value)  
`mnc="12"`
- Compound types that are made of multiple instances of any types:
  - Array - a comma delimited set of values of the same type within square brackets [ ]  
`ascPersistenceScalingFactors=[6,6,6,6,6,6]`
  - Structure - a comma delimited set of values within curly brackets { }, and each value can be of any type  
`cellBroadcastMessage={50,GSM_DEFAULT,"nano3G"}`
  - Set - similar to an array, this a comma delimited set of values of the same type within round brackets ( ), however, each value must be different  
`rfParamsCandidateList=({1062,437,1})`

- Note:** In the OMC-R Client, the compound types are the complex attributes that have multiple levels within the Navigation and Properties panes.
- Note:** In [REF\_110], there is a distinction between expert and non-expert attributes. As a general rule, it is recommended to leave expert attributes at their default values.

## 5.2 Create a nano3G AP Attribute Configuration File

A file can be created from scratch in a text editor, or can be started from the configuration of an existing AP.

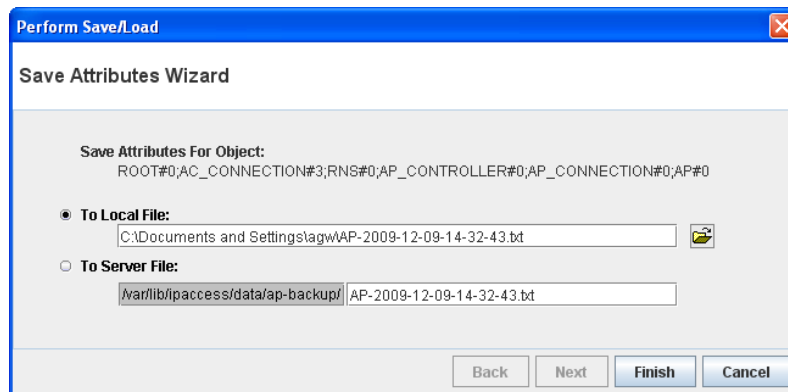
To create a configuration file from scratch, simply open a text editor and enter the required configuration details.

For information on the syntax of the configuration file, see section 5.1.

For example configuration files, see section 5.3.

To start a configuration file by saving the configuration of an existing AP:

- 1) Start an OMC-R Client session.
  - Note:** For full information on using the OMC-R Client, see [OPM\_410].
- 2) In the Explorer pane of the OMC-R Client, find and select a suitable 3G AP object to use as a template. That is, select an AP of the same type as the target AP.
- 3) Right-click on the AP object and select **Save Attributes to File**. The Save Attributes Wizard will appear.



- 4) Select the radio button for the required location. For the purposes of creating a template for another AP, saving **To Local File** is recommended.

When saving **To Local File**, the target directory and file name may be changed.

When saving **To Server File** (on the OMC-R Server), the directory and file name are set automatically and cannot be changed. The file is named as follows:

```
AP-<Serial_number>-<Object_name>-<Date_Time>.txt
```

Where the <Serial\_number> for the AP ensures the file name is unique, the <Object\_name> can make individual APs easier to identify and the <Date\_Time> is the date and time the file was created.

- 5) Click **Finish** to save the configuration file.

The file will contain all writable attributes. That is, all attributes that can be changed from within the OMC-R Client. Most of these will be at default values.

- 6) Edit the file in a suitable text editor, and adjust the configuration as needed for the new AP, or any number of new APs. If the file will be used as a general template that will be loaded on multiple APs, remove the ObjectInstance= line from the file.

**Note:** Use a text editor that can edit Unix text files. Windows® WordPad can be used, but Notepad is not suitable.

## 5.3 Example AP Configuration Files

### 5.3.1 Example Generic Template File for nano3G S4 AP

The following example file shows the attributes that are typically the same for all AP on the same AC. This is a manually created example, rather than being based on a file exported from an existing AP.

```
Object=apNano_002
#
# Cell Package
rncIdentity=139
#
# NAS Package
mcc="159"
mnc="12"
sac=1
saiLac=1
#
# Network Listen Control Package
rfParamsCandidateList=({1062,437,1})
rssiScanBands=({BAND_NAME_UMTS_BAND_04_NO_SPOT, ()})
neighbourListPopulation=STATIC_ONLY
# to scan all bands, use the empty value: rssiScanBands=()
#
# 3G AP Diagnostics Package
diagnosticReporting=({REPORT_ON_CRASH,"http://oam.server/upload/diagnostic"})
#
# 3G AP Measurement Control Package
reportingUrl=http://oam.server/upload/pm/ap
#
# 3G AP Time Package
localTimeZone=PST8PDT
#
# end of file
```

Parameter	Description
Object	Object type for APs, must be apNano_002 or apNano8_001
rncIdentity	RNC ID of the AC
mcc	Mobile Country Code
mnc	Mobile Network Code
sac	This is the SAI SAC (Service Access Code) which can be used by the billing system. If this is not used by the billing system, it is recommended to set this to 1.
saiLac	SAI Location Area Code which can be used by the billing system. This is a different value than the LAC set in the lacRacCandidateList for an individual AP. If this is not used by the billing system, it is recommended to set this to 1.

Parameter	Description
rssScanBands	Specify which bands to scan with Network Listen, when performing RSSI detect and BCCH decode tests. Leave this empty to scan all bands supported by the AP hardware.
neighbourListPopulation	This determines how the live neighbour list is populated. The recommended setting is STATIC_ONLY, which only uses neighbours entered in the static neighbour lists, as determined by network planning.
diagnosticReporting for S4 APs or diagnosticReporting_001 for E8 APs	Set the URL of the OAM File Server diagnostics service. Replace oam.server with the IP address or FQDN of the server.
reportingUrl	Set the URL of the OAM File Server measurement reporting service. Replace oam.server with the IP address or FQDN of the server.
localTimeZone	Set the timezone, in POSIX format, where the APs are located. This assumes that all APs on the same AC are in the same timezone, which is the most probable scenario. If APs are spread across several timezones, this can be an AP-specific setting.

### 5.3.2 Example AP-Specific Configuration File

The following example file shows the attributes that are unique for each AP. This is a manually created example, rather than being based on a file exported from an existing AP.

```
Object=apNano_002
#
# Network Listen Control Package
lacRacCandidateList={{15912,(99)}}
rfParamsCandidateList={{1062,437,1}}
rfScanControl={"0200",1440,240,true}
#
# Location Package
lcsLongitude=-2540
lcsLatitude=695
lcsUncertainty=15
#
# end of file
```

Parameter	Description
Object	Object type for APs, must be apNano_002 or apNano8_001
lacRacCandidateList	LAC and RAC for the AP.
rfParamsCandidateList	Set the UARFCN, Scrambling Code and Cell ID to be used by the AP.

Parameter	Description
rfScanControl	<p>This is composed of:</p> <ul style="list-style-type: none"> <li>The scan time, as HHMM, for the first scan, after which the scans take place every time the interval passes - if this is daily, set the time when usage is expected to be low so that the NWL scan does not disrupt the service</li> <li>The interval in minutes, the default value of 1440 is one day, or set to 0 to disable periodic scans</li> <li>The randomization period in minutes, which ensures multiple APs in close proximity do their scans at different times</li> <li>Use reduced scan, true or false: a reduced scan is faster but may not detect all changes to the RF environment</li> </ul> <p><b>Note:</b> Depending on deployment requirements, this could be in the general template instead.</p>
lcsLongitude	This is entered as a number for east (positive) or west (negative) of the Greenwich meridian. It may be easier to enter this directly in the OMC-R Client, as this allows entry in degrees, minutes and seconds.
lcsLatitude	This is entered as a number for north (positive) or south (negative) of the equator. It may be easier to enter this directly in the OMC-R Client, as this allows entry in degrees, minutes and seconds.
lcsUncertainty	Radius of uncertainty in metres.

### 5.3.3 Other Attributes

The following table shows some other attributes to consider for inclusion in AP configuration files. Apart from the static neighbour lists, which are usually configured individually, any of these can be in a general template for all APs or can be set individually.

Parameter	Description
<b>Admission Control Package</b>	
psHandoverEnabled	Whether or not PS RABs will handover between an AP and the macro network. This is disabled (false) by default.
<b>Network Listen Control Package</b>	
neighbourPlmns	If specified, this restricts the networks that neighbouring cells can belong to for populating the neighbour lists by specifying the MCC/MNC values.
plmnsToSyncWith	If specified, this restricts the networks that neighbouring cells can belong to for frequency synchronisation by specifying the MCC/MNC values.



Parameter	Description
staticGsmNeighbourList	<p>This is a complex attribute that specifies GSM (2G) neighbour candidates. It is recommended to enter these directly in the OMC-R Client. However, if a similar list has already been configured for a nearby AP, it may be advantageous to copy this attribute from a configuration file saved from the nearby AP, load this into the target AP and then make suitable adjustments from the OMC-R Client.</p> <p>See [OPM_300] for information on neighbour list configuration.</p>
staticUmtsNeighbourList	<p>This is a complex attribute that specifies UMTS (3G) neighbour candidates. It is recommended to enter these directly in the OMC-R Client. However, if a similar list has already been configured for a nearby AP, it may be advantageous to copy this attribute from a configuration file saved from the nearby AP, load this into the target AP and then make suitable adjustments from the OMC-R Client.</p> <p>See [OPM_300] for information on neighbour list configuration.</p>
<b>Oscillator Synchronisation Package</b>	
oscillatorSynchronisationTimeout	<p>The number of days an AP can go without resynchronisation before it raises the relevant alarm.</p>

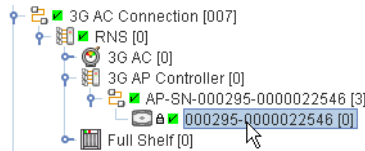
## 6 Configuring a nano3G AP from the OMC-R

The nano3G AP needs to be configured before it is brought into service. All the remaining configuration changes must be applied via the OMC-R Client, typically by a NOC engineer.

### 6.1 Check and Upgrade the nano3G AP Software Image

#### 6.1.1 Check the Current Software Image Version

- 1) Login to the OMC-R Client with a user name (and password) that has Full Access rights for changing the AP's configuration.
- 2) Find the AP according to its serial number and select the AP object.



**Note:** For full information on using the OMC-R Client, see [OPM\_410].

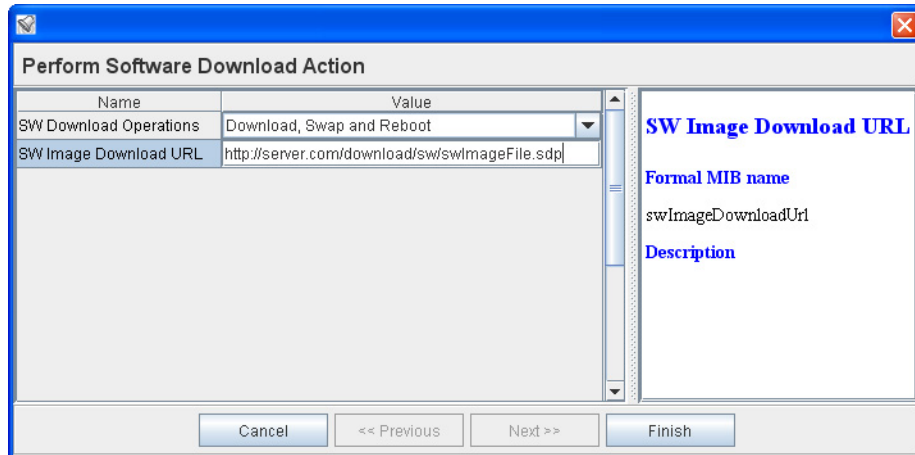
- 3) Verify that the **AP Connection** has a green tick, to show that the AP is connected to the AC. The AP object, below the AP Connection, is currently locked. The AP will remain locked until it is properly configured and ready to provide service.
- 4) In the Navigation pane, browse to the **AP Admin Package**.
- 5) Check the values of the **Active SW Version** and **Standby SW Version** attributes.
- 6) If the AP does not have the latest software image, download it to the AP from the OAM File Server according to the instructions below.

#### 6.1.2 Download the Latest Software Image from the OAM File Server to the AP

For instructions about how the software images (SDP files) are uploaded to the OAM File Server, see [OPM\_430].

- 1) Select the AP in the OMC-R Client.

- 2) Right-click the AP, select **Actions** and then **Perform Software Download**. The Perform Software Download Actions dialogue box will appear.



- 3) Change the **SW Download Operations** to Download, Swap and Reboot.
- 4) Click in the **SW Image Download URL** box and enter the URL of the required SDP file using the following URL pattern:  

```
http://<server>/download/sw/<filename>.sdp
```

Where <server> is the IP address or host name of the required OAM File Server, and <filename>.sdp is the required software download package file.
- 5) Press **<TAB>** or **<Enter>** to set the URL.
- 6) Click **Finish** and the download will take place. On the AP, download progress is indicated by the flashing network LED. When the download is complete, the AP will reboot under the new software, which should take less than 1 minute.
- 7) Wait for the AP to be shown as connected to the OMC-R.
- 8) Select the **3G AP Admin Package** for the AP object and verify that the Filesys version reported by the **Active Software Version** matches the SDP file that was downloaded.

## 6.2 Apply an Attribute Configuration to the AP

- 1) Ensure the attribute configuration file is available on the OMC-R Server or the computer running the OMC-R Client. For information on preparing an AP configuration file, see section 5.
- 2) Log in to the OMC-R Client with a user name that has Full Access to the AP.
- 3) To start the OMC-R Load Attributes Wizard, right-click on the AP object in the OMC-R Client and then select **Load Attributes From File**.
- 4) Browse to the edited configuration file and click **Apply** to load and apply the configuration settings.  

If any of the loaded values are inconsistent with the current state of the AP or if any of the values are illegal, the wizard displays a warning.
- 5) Repeat as needed, if there are multiple configuration files.

## 6.3 Finalize Configuration

- 1) Login to the OMC-R Client with a user name that has Full Access to the required AP.

### 6.3.1 Final Attribute Changes and Checks

- 2) Make any AP-specific configuration changes that have not already been applied by loading configuration files. In particular, ensure the static neighbour lists are correctly configured. See [OPM\_300] for information on neighbour list configuration.
- 3) Spot check any or all of the following packages to verify the attributes have been set correctly by the configuration file(s):
  - Cell Package
  - NAS Package
  - Location Package

### 6.3.2 Network Listen and Frequency Correction

- 4) To execute a Network Listen scan, right-click the AP object, select **Actions** and then select **Start Sequential NWL Scan**.
- 5) When the scan is complete, view the results and verify there is some radio activity detected, and ideally some neighbour cells. This will confirm the radio is working.
- 6) Only if a suitable macro neighbour has been detected, a correction can be applied to ensure that the oscillator frequency is correct. Select **Actions** and then select **Apply Frequency Correction**.

**Note:** Assuming there is a suitable macro neighbour, this should be repeated approximately 24 hours after the AP is brought into service. This will allow time for the oscillator crystal to stabilize, at which time the frequency correction should be re-applied.

### 6.3.3 Automatic Configuration Backup

The configuration of an AP is automatically backed up on the OMC-R server each time configuration changes are applied from the OMC-R Client. The configuration files are named according to the AP serial numbers. A file is overwritten automatically by subsequent configuration changes. The files are saved in:

```
/var/lib/ipaccess/data/auto-ap-backup
```

## 6.4 Bring the AP into Service

Once the AP has the latest software image and configuration is complete, it is ready for service.




- 1) To bring the AP into service, right-click the 3G AP object in the OMC-R Client and select **Unlock**. The padlock symbol next to the 3G AP icon will be removed.
- 2) If the installation engineer is still on site, the engineer should make CS and PS test calls to verify the AP is providing service.

## 7 Troubleshooting

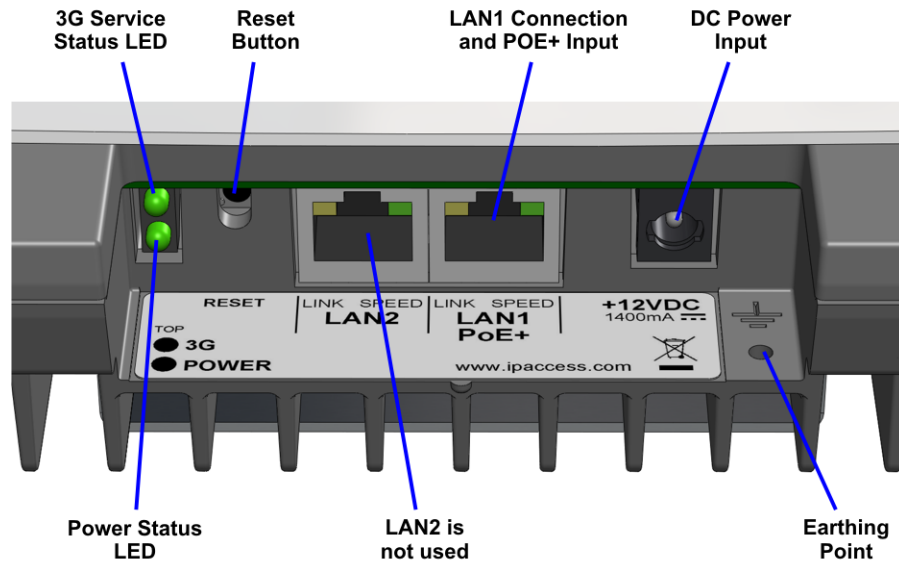
### 7.1 LED Status Indicators

#### 7.1.1 nano3G S4 AP LEDs

The following table shows the meaning of the status LEDs under normal and fault conditions.

 Power	Off	The nano3G AP is not switched on.
	Green	The nano3G AP is powered up normally.
	Flashing green	Self-test is running.
	Red	There is a fault with the nano3G AP.
 Network	Off	Unable to detect a network. This is usually because there is no network cable connected, or there is no network connection at the other end of the cable (for example, the router or broadband modem may have failed).
	Green	The 100Mbps connection is OK.
	Flashing green	Indicates activity on the network at 100Mbps speed (that is, the nano3G AP is sending and/or receiving data across the LAN).
	Amber	The 10Mbps connection is OK.
	Flashing amber	Indicates activity on the network at 10Mbps speed (that is, the nano3G AP is sending and/or receiving data across the LAN).
 Service	Off	The nano3G AP is not provisioned, it has no IP address. This may be a temporary condition when the AP is switched on for the first time, or after factory reset.
	Green	The nano3G AP is provisioned and unlocked, it is connected to the AP and is providing service.
	Flashing green (evenly, slowly)	The nano3G AP is provisioned but has lost connection to the AC, for example because the AC is not available or there is a DNS problem.
	Flashing green (evenly, fast)	The nano3G AP has been reinitialized (the reset button was pressed but for less than 5 seconds).
	Off, with a short green blink every 3 seconds	The nano3G AP is administratively Locked.
	Off, with short green blinks on	Factory reset is in progress in the nano3G AP (the reset button was pressed for more than 5 seconds).
	On, with short green blinks off	Software download is in progress to the nano3G AP.

## 7.1.2 nano3G E8 AP LEDs



The following table shows the meaning of the status indicators under normal and fault conditions.

3G	Off	The nano3G E8 AP is not provisioned, it has no IP address. This may be a temporary condition when the AP is switched on for the first time, or after factory reset.
	Green	The nano3G E8 AP is provisioned and unlocked, it is connected to the AC and is providing service.
	Flashing green (evenly, slowly)	The nano3G E8 AP is provisioned but has lost connection to the AC, for example because the AC is not available or there is a DNS problem. The nano3G E8 AP is has been locked.
	Flashing green (evenly, fast)	The nano3G E8 AP has been reinitialized (the reset button was pressed but for less than 5 seconds).
	Off, with short green blinks on	Factory reset is in progress in the nano3G E8 AP (the reset button was pressed for more than 5 seconds).
	On, with short green blinks off	Software download is in progress to the nano3G E8 AP.
Power	Off	The nano3G E8 AP is not switched on.
	Green	The nano3G E8 AP is powered up normally.
	Flashing green	Self-test is running.
	Red	There is a fault with the nano3G E8 AP.
Ethernet Link	Amber	This is on to show the link is active, or flashes when there is network activity.
Ethernet Speed	Green	Shows the network speed. On for 100Mbps or off for 10Mbps.

## 7.2 Backhaul Network Connection Problems

If static IP addressing is disabled and DHCP is in use, the nano3G AP expects to be automatically provided with an IP address by the broadband router every time it starts. Ensure that the DHCP service is enabled on the broadband router.

## 7.3 Factory Reset

A factory reset will delete all configuration settings that have been applied to an AP. This includes the initial configuration applied to commission the AP so that it will connect to its serving AC, and all configuration changes subsequently applied from the OMC-R. Therefore, executing a factory reset will mean that the AP will not provide service until it is recommissioned from the commissioning laptop and then reconfigured from the OMC-R.



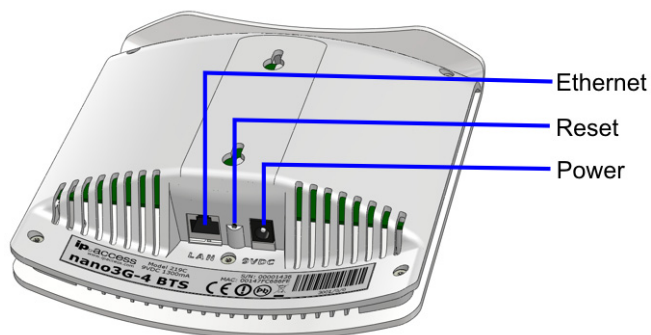
### WARNING

Only use the reset button to return the AP to factory reset state as a last resort, such as when the AP does not connect to the AC. After a factory reset, the AP will need to be commissioned again manually, as in section 4.2.

**Note:** If the reset button is pressed for less than 5 seconds, the AP will reboot. It will not return to the factory reset state.

### 7.3.1 nano3G S4 AP Factory Reset

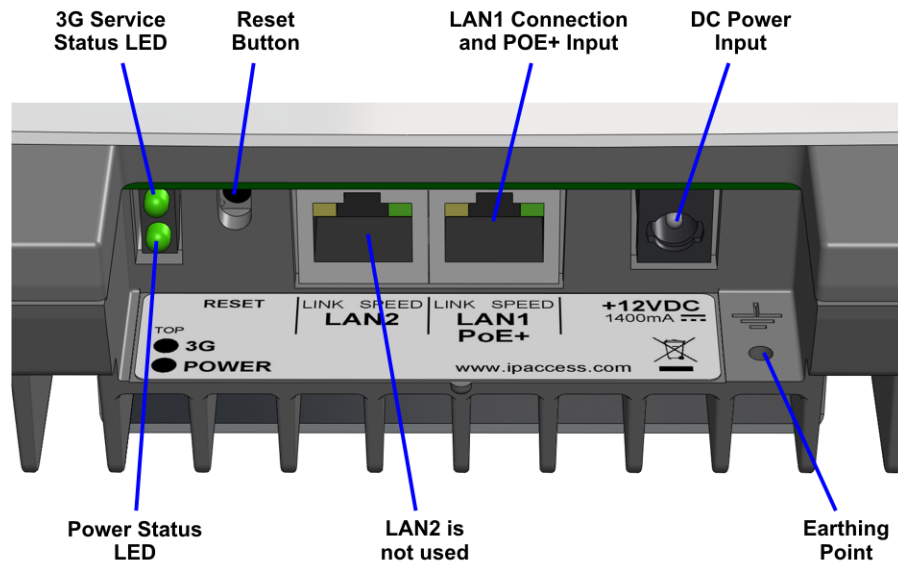
To perform a factory reset, use a thin rod to press and hold the reset button for more than 5 seconds.



The Service LED will blink fast (50ms on, 50ms off) until the factory reset commences, then it will start to blink slowly (200ms on, 200ms off). When the factory restore process is complete, the LED will extinguish and the AP will automatically reboot. The AP will have the fixed IP address used for initial commissioning and will enable the web interface for configuration. Commission the AP to connect to its serving AC, as in section 4, then configure the AP from the OMC-R, as in section 6.

### 7.3.2 nano3G E8 AP Factory Reset

To perform a factory reset, press and hold the reset button for more than 5 seconds.



The 3G LED will blink fast (50ms on, 50ms off) for 5 seconds, then it will start to blink slowly (200ms on, 200ms off). When the factory restore process has completed, the LED will extinguish and the AP will automatically reboot, take the fixed IP address and enable the web interface for configuration (see section 4).

### 7.4 nano3G E8 AP Does Not Start Up

- Check the power-over-Ethernet inserter: it must be a POE+ unit
- Verify the Ethernet cable from the POE+ inserter is plugged into the correct socket (LAN1)
- If using a DC power supply instead of POE+, verify the power supply is a 12V supply with the correct polarity














## 8 nano3G AP and PSU Regulatory Information




This chapter provides the customer with safety and regulatory warnings, cautions and information for the ip.access Ltd range of products.

### 8.1 Warnings and Cautions






#### Electrical Safety

	<p><b>CAUTION</b></p> <p>The nano3G AP is intended for dry indoor applications only. If evidence of condensation is present do not apply power to the nano3G AP.</p>
	<p><b>CAUTION</b></p> <p>The nano3G AP is designed to be operated as a fixed system device and must be located away from the user. It must be mounted in a manner to ensure that all users and bystanders are kept a minimum of 20cm away from the integral antennas at all times.</p>
	<p><b>WARNING</b></p> <p>Do not immerse any part of the nano3G AP or its power supply in water or any other liquid. Do not install or use the nano3G AP or its power supply near open water. Do not spill liquids of any type on the nano3G AP or its power supply.</p>
	<p><b>WARNING</b></p> <p>Do not use liquid, solvent or aerosol cleaning agents on or near the nano3G AP or its power supply.</p>
	<p><b>CAUTION</b></p> <p>To avoid the risk of fire and/or electrical shock, do not push objects through openings into the nano3G AP or its power supply (except when operating the Reset switch on the nano3G AP).</p>
	<p><b>CAUTION</b></p> <p>Do not disassemble the nano3G AP or its power supply.</p>
	<p><b>CAUTION</b></p> <p>The nano3G AP must only be powered using the ip.access power supply provided for use with the nano3G AP.</p>
	<p><b>CAUTION</b></p> <p>Before using the power supply, verify that the mains voltage is within the range specified by the voltage printed on the power supply.</p>
	<p><b>CAUTION</b></p> <p>The PSU supplied with the nano3G AP must not be used for powering any other equipment.</p>
	<p><b>CAUTION</b></p> <p>To avoid the risk of fire and/or electrical shock, do not overload power outlets or extension cables.</p>
	<p><b>CAUTION</b></p> <p>When disconnecting the power supply from the mains, pull the plug. Pulling the cable may result in damage to the cable.</p>

### Interference with Electronic Devices

	<b>CAUTION</b> If using a pacemaker, ensure you are using the device in accordance with its safety requirements with respect to RF devices. Consult your doctor if you have questions about RF signals and your pacemaker.
	<b>CAUTION</b> If using a hearing aid, RF devices may cause interference.
	<b>CAUTION</b> Unshielded electronic devices should not be used near the nano3G AP. Conversely, the nano3G AP should not be installed adjacent to unshielded electrical or electronic devices (such as unshielded speakers).

### Other Warnings and Cautions

	<b>WARNING</b> Do not install the nano3G AP in a position where the power supply cable or network cable may cause a tripping or choking hazard.
	<b>WARNING</b> Do not install the nano3G AP or the power supply on an unstable surface. All caution must be observed to prevent the device from falling and causing injury to a person and/or damage to the device.
	<b>WARNING</b> The nano3G AP should not be disposed of in household waste bins. Please follow local regulations for disposal of electronic devices.
	<b>CAUTION</b> Do not install the nano3G AP in a position where the power supply cable or network cable may be damaged by walking on the cables.
	<b>CAUTION</b> Do not attempt to fit an external antenna or antenna cabling to the nano3G S4 AP.

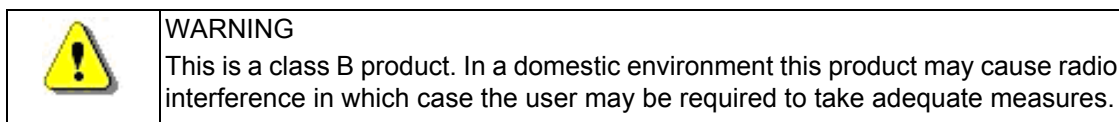
## 8.2 Regulatory Statements for nano3G S4 AP

### 8.2.1 Type Approval and EMC Standards

- FCC CFR47 Parts 15B, 27

**Note:** Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate this equipment.

Model nano3G 219C has FCC ID QGGIPA219C



**Note:** 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 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.

### 8.2.2 Safety Standards

- IEC 60950-1:2005 (2nd Edition) and EN 60950-1:2006

The power adapter, as well as the POE inserter and splitter supplied by ip.access comply with LPS requirements in accordance with IEC/EN 60950-1.

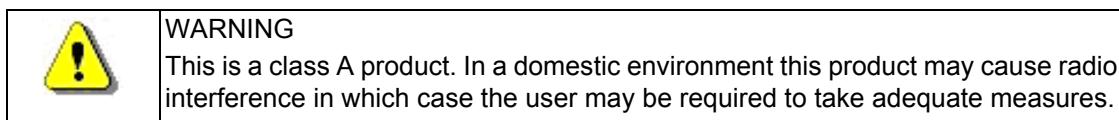
## 8.3 Regulatory Statements for nano3G E8 AP

### 8.3.1 Type Approval and EMC Standards

- FCC CFR47 Parts 15B, 27

**Note:** Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate this equipment.

Model nano3G 217C has FCC ID QGGIPA217C



**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.

### 8.3.2 Safety Standards

- IEC 60950-1:2005 (2nd Edition) and EN 60950-1:2006

The POE+ inserter supplied by ip.access complies with LPS requirements in accordance with IEC/EN 60950-1.