



nano3GAP Operations Manual

N3G_OPM_300 1.0

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Approved by e-mail.

The information contained in this manual is commercially confidential and must not be disclosed to third parties without prior consent.

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1 Introduction

This document provides information on managing and troubleshooting the ip.access nano3GAP-4 AP, an indoor local area access point.

1.1 Overview

This manual is intended for use by individuals engaged in the day-to-day management of the nano3GAPs. It describes direct operation, administration and maintenance of the APs.

1.1.1 Configuration from a Provisioning PC

The nano3GAP includes a web server that can be accessed via a web browser running on the provisioning PC. The web server can be used during commissioning only because it is only available when the AP is in the factory reset state.

For instructions, see [INST_300].

1.1.2 Configuration and Administration from the OMC-R Client

A nano3GAP can be configured and managed from the OMC-R Client, a Java application that can run on Windows. It connects to the OMC-R Server, which in turn connects to one or more ACs. Hence, the OMC-R Client can provide a view of the whole network. This view may be restricted according to user permissions.

Following commissioning (see [INST_300]), nano3GAP objects are created automatically by the AC to which the AP first connected. Once a 3GAP object has connected to a nano3G AC, they are visible in the OMC-R, and they can be configured and managed remotely. When a nano3GAP has been added to the database, its configuration attributes can be changed in the OMC-R Client and additional features, such as Measurement Functions, can be used with the nano3GAP. Furthermore, the OMC-R Client has full alarm management capability. Alarm notifications from a nano3GAP or the controlling AC are grouped into lifecycles according to the unique ID of the object that raised an alarm. Hence, the alarm status of a particular object can be tracked as it changes, until the lifecycles ends when the alarm clears. Alarms can be acknowledged and optionally notes may be added to an alarm.

For more information, see [OPM_410].

1.2 Related Information

[GST_100]	nano3G System Overview Manual (N3G_GST_100)
[GST_300]	nano3GAP Product Description (N3G_GST_300)
[INST_300]	nano3GAP Installation Manual (N3G_INST_300)
[OPM_410]	nano3G OMC-R Client Operations Manual (N3G_OPM_410)
[OPM_430]	nano3G PM/DL Server Operations Manual (N3G_OPM_430)
[REF_105]	nano3G System Glossary (N3G_REF_105)

[REF_130]	nano3G Alarm Data Reference Manual (N3G_REF_130)
[21.905]	Vocabulary for 3GPP Specifications, 3rd Generation Partnership Project

1.3 Terminology

For standard nano3G System terminology, see [REF_105].

For additional standard GSM terminology, see [21.905].

2 Common Procedures

2.1 Restart a nano3GAP

To restart an AP:

- Power cycle it.
- Invoke a reinitialize action from the OMC-R, see section 2.3.2.

The AP will start up in the same administrative state in which it was before the restart.

2.2 Using the OMC-R Client

2.2.1 Start the OMC-R Client

The OMC-R Server provides a web page to start the OMC-R Client.

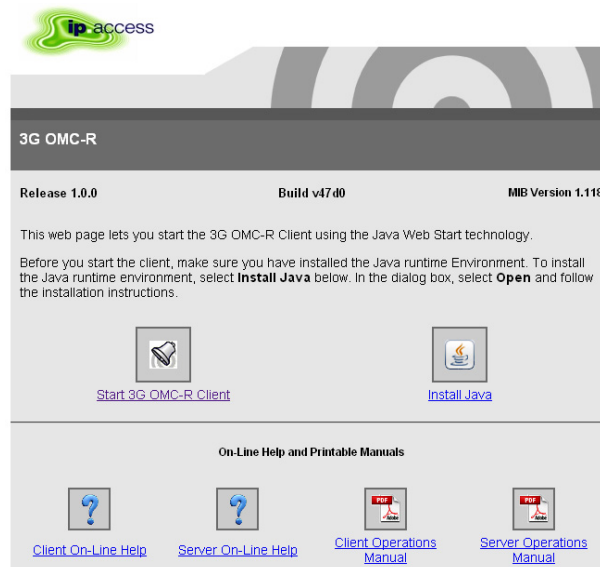
- 1) Start a web browser application.
- 2) Enter the URL for the OMC-R server's web page as:

`http://<server-hostname>/omcr`

Where <server-hostname> is the fully qualified hostname of the OMC-R server.

Note: This assumes that DNS is correctly configured on the management network: the OMC-R server can be found by using its host name from client computers on the same network.

- 3) Press the Enter key and the OMC-R web page will be displayed.



- 4) If it has not been installed on the client computer, click the link to download and install the Java runtime (JRE version 1.5) for Windows®. This will allow a Windows® client computer to run the OMC-R Client.

Note: When installed on Windows®, the JRE may automatically update to version 1.6. The OMC-R Client will operate correctly with JRE 1.6. However, do not install any version later than 1.6 (or allow JRE to be automatically updated; for example, decline the update if prompted). The Java Control Panel may be used to disable automatic updates and/or disable usage of JRE versions later than 1.6.

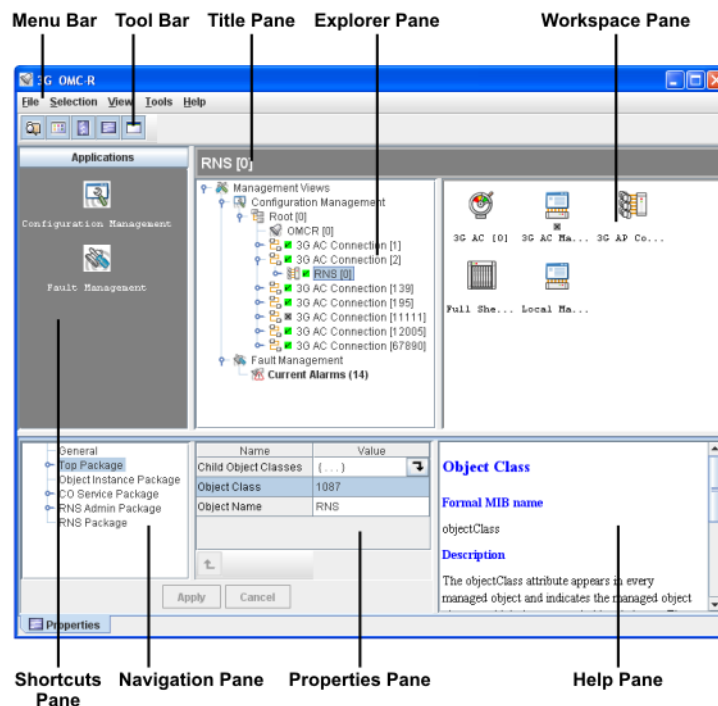
- 5) The OMC-R Client is automatically installed when it is started. Click the link or icon for Start 3G OMC-R Client.

If this is the first time the OMC-R Client has been started from this client computer, or if the client version on the OMC-R Server has been updated, the client application will download (which also installs the application).

If a security warning appears about verification of the digital signature for the application, click the Run button.

- 6) The OMC-R Client will initialize and connect to the OMC-R Server. A login prompt will appear. The first time the client is used from a particular computer, the User name will be set to the login ID used for the current session on the client computer.
- 7) Enter the username and password, then click OK. The user name will be remembered at the next login.
- 8) The OMC-R Client will initialize and connect to the OMC-R Server.

The following screen appears:

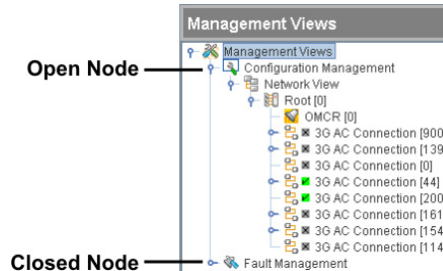


- 9) Double-click through the tree (Management Views > Configuration Management) to navigate to the AP to configure.

2.2.2 Find an AP in the OMC-R

Note: The serial number of the required AP must be known.

- 1) Click the handles to open the Management Views and Configuration Management nodes in the Explorer pane, then the Network View and Root nodes. The ACs connected to the OMC-R will be listed.



- 2) Open the node for the AC serving the required AP, then open its RNS node and then the ApController node. The ApConnections will be shown for all the APs connected to the AC.

2.2.3 Change the Administrative State of an AP

The nano3GAP has the following administrative states:

- Locked
- Shutdown
- Unlocked

Most attributes can be configured with the AP in the unlock state, but some attributes can only be configured when an AP is in the locked state and does not provide operational service. The attributes that require the AP to be in the locked state are shown in red in the Properties pane.

To change the Administrative State:

- 1) Find the required AP in the OMC-R (as above).
- 2) Right-click the AP object (below the ApConnection object). A context menu will appear. The menu includes three administrative state options (the current state is unavailable, or 'greyed out'):
 - Lock
Lock the AP immediately. This will take the AP out of service immediately. Any active calls will be dropped and UEs camped on are disconnected. A padlock is shown against the AP object and its administrative state is set to Locked.
 - Shutdown
Lock the AP as soon as all active calls have ceased. This will take the AP out of service and lock it as soon as all active calls are complete. No new calls can be established. UEs camped on are disconnected. An arrow pointing down is shown against the AP object, which changes to a padlock once it locks.

- Unlock
Return the AP into service so that it may allow UEs to camp on and make calls.
- 3) Click the menu option for the required Administrative State.

2.3 nano3GAP-4 Objects in the OMC-R

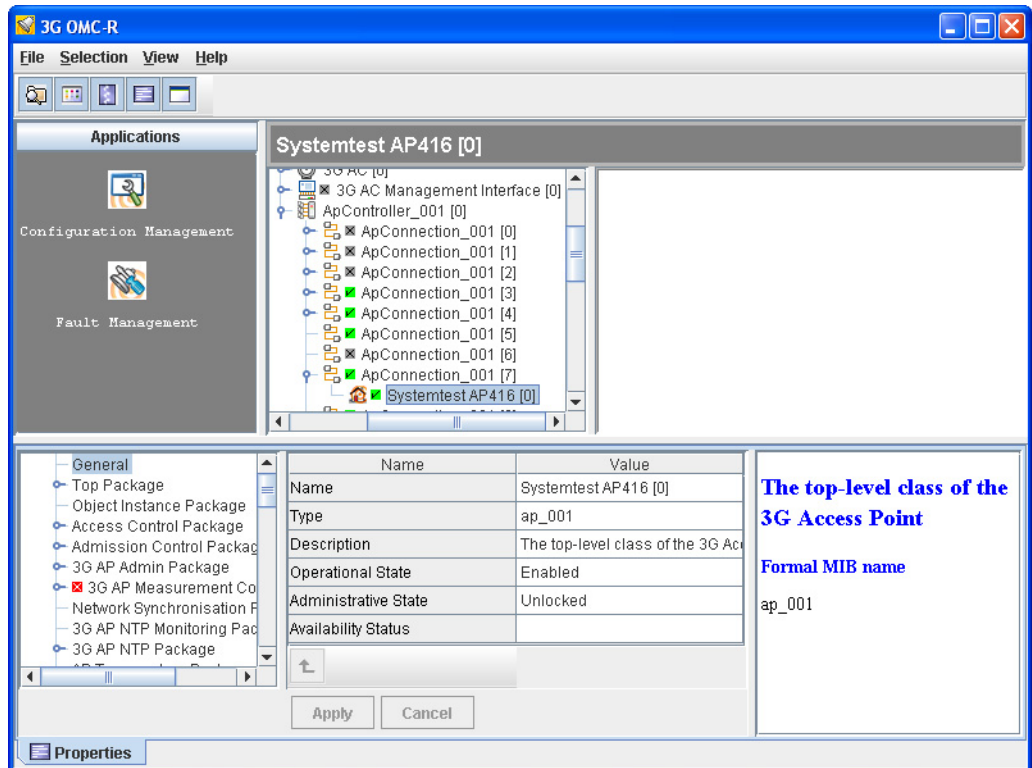
The AP object in the OMC-R can be used to:

- Provide information about the AP.
- Configure the AP.
- Perform other actions on an AP (such as changing administrative state).

2.3.1 Useful Information

2.3.1.1 General Information

When an AP object is selected in the Explorer or Workspace pane, the General package is initially selected in the Navigation pane, with its attributes shown in the Properties pane.



This shows the basic state of an AP in terms of Operational State, Administrative State and Availability Status. An AP should be providing service normally when these are indicated as Enabled, Unlocked and blank respectively (as in the example above). The Availability Status usually only has a value when the AP is not providing service. This information is also shown by a tooltip when the mouse pointer is paused over an AP object.

Select the AP Admin Package to see more information about the general status of an AP. In particular, this shows the MIB Version, which must match the MIB Version used by the OMC-R and the AC.

2.3.1.2 Bands Supported

To verify the UMTS bands supported by the AP hardware, go to the Network Listen Status Package and drill down to UMTS Bands Supported.

The GSM bands supported by NWL can also be inspected, to show the valid bands to use when configuring the Static GSM Neighbour List.

2.3.1.3 Hardware Information

To check the exact hardware version of an AP, select the Factory NV Package in the Navigation pane and inspect the Hardware Version attribute. This package also shows the serial number and other factory configured information.

2.3.2 Actions

The context menu for the AP object (available from right-click on the object) has an Actions sub-menu:

Action	Behaviour
Enable Service	Automatically initiated by the nano3G AC once the BSMIS Synchronisation procedure has completed and the AC is ready for the AP to start providing service.
Lock	Changes the administrative state to LOCKED. The AP immediately releases all RRC connections and turns off its radio.
Reinitialise	The AP will reboot.
Shutdown	Changes the administrative state to SHUTTING_DOWN. The AP will wait until all RRC connections are closed before turning off the radio and transitioning to the locked state.
Unlock	Changes the administrative state to UNLOCKED. The AP will turn on its radio.
Report Alarms	Generates an alarm report. If no parameters are provided, the configuration from the Alarm Report Control package is used. The value of the attribute alarmReportDetail specifies the content of the report and the value of the attribute alarmReportingUrl specifies its destination. The component behaviour on receiving this action is similar to the component behaviour for Periodic Alarm Reporting. The key difference is that the periodic timers are left unchanged while the time of the next scheduled report remains the same.

Report Diagnostics Now	The AP will report its current log files to the URL contained in the action.
Perform Software Download	The AP will download the new software image from a specified URL. The optional attribute swDownloadOps controls what operations the AP performs following the download; this can be used to change the default SW version of the AP and to reboot it. If this parameter is not present, then the AP performs the download and changes the default SW version, but does not reboot.
Swap Default Software	The AP will change its default software version, that is, the software that will be run the next time the AP reboots. The attribute defaultSwVersion in the AP Admin package, which reports the current default software version, will change when the Swap Default Software action is completed.
Report Measurements	The AP will send a measurement report, as set up in the Measurement Control package. The component behaviour on receiving this action is similar to the component behaviour for Periodic Measurement Reporting. The key difference is that the periodic timers are left unchanged while the time of the next scheduled report remains the same.
Abort Network Listen Test	Stops all Network Listen activities and resets the value of the attribute nwlTestStatus to "NWL_IDLE".
Apply Frequency Correction	Uses the results of the most recent BCCH Detect test to adjust the crystal oscillator of the AP. When the adjustment is done, the value of the attribute estimatedFreqOffset is set to zero. Frequency correction is not possible if either the value of the attribute estimatedFreqOffset is zero or the BCCH Detect results are older than one hour.
Factory Restore	Restores the AP settings to their factory defaults and triggers a reinitialization.
Start BCCH Detect Test	Invokes the BCCH Detect Test that performs an RSSI scan followed by an attempt to decode BCCH (GSM) and CPICH (UMTS) for each ARFCN or UARFCN that has an RSSI value above the associated decode threshold. Note: This test is recommended only as part of a diagnostic procedure.
Start RSSI Scan Test	Invokes the RSSI Scan Test that scans the enabled bands and ARFCNs. Note: This test is recommended only as part of a diagnostic procedure.
Start Sequential NWL Tests	Invokes a sequence of Network Listen tests: RSSI scan, BCCH Detect Test and Frequency Accuracy Test. The order of the tests is identical to that of a scheduled NWL test.

Delete CRLs	The AP will delete its CRLs. The currently open secure connections are not disconnected. The next time the AP attempts to open a secure connection, it has to connect to the CRL server to get an up-to-date CRL.
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2.3.3 AP Configuration

The essential configuration steps for commissioning an AP using the OMC-R are described in [INST_300]. This section provides additional information about configuration changes that may be of interest.

- Network Listen Control Package
- Cell Package
- NAS Package
- Location Package

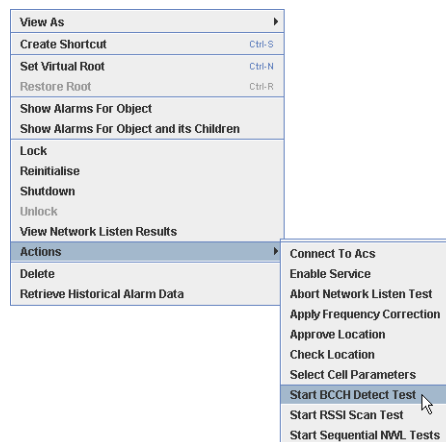
2.4 Using Network Listen

Network Listen (NWL) is used by a nano3GAP to scan the local RF environment and gather information from neighbouring cells. Network Listen can detect WCDMA cells, both macro and other nano3G and GSM cells. The AP can use the information gathered for the following:

- Check neighbour cells for handover and reselection
- Automatic clock frequency calibration

2.4.1 Run Network Listen Tests

- 1) Find the required AP by its serial number or object name (see section 2.2.2).
- 2) Right-click the AP object and a menu will appear.
- 3) Move the pointer down to Actions and a sub-menu will appear.

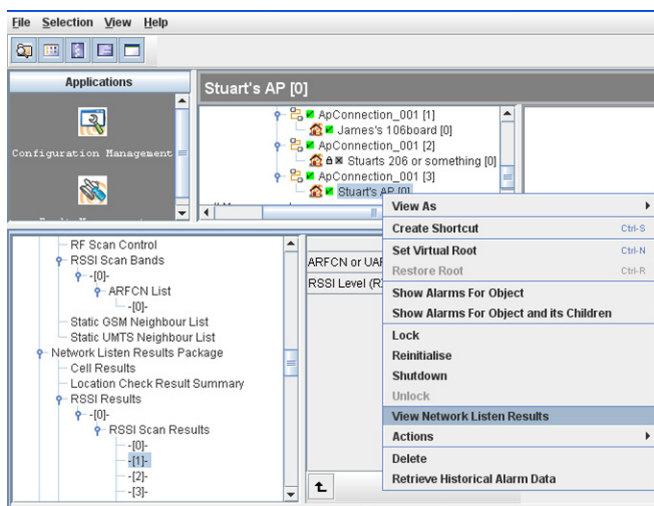


- 4) Click **Start BCCH Detect Test**, **Start RSSI Scan Test** or **Start Sequential NWL Tests**.
- 5) The AP will administratively shut down (wait for calls to complete) and lock, then the tests will run. The AP will then unlock once the tests are complete.

2.4.2 View Network Listen results

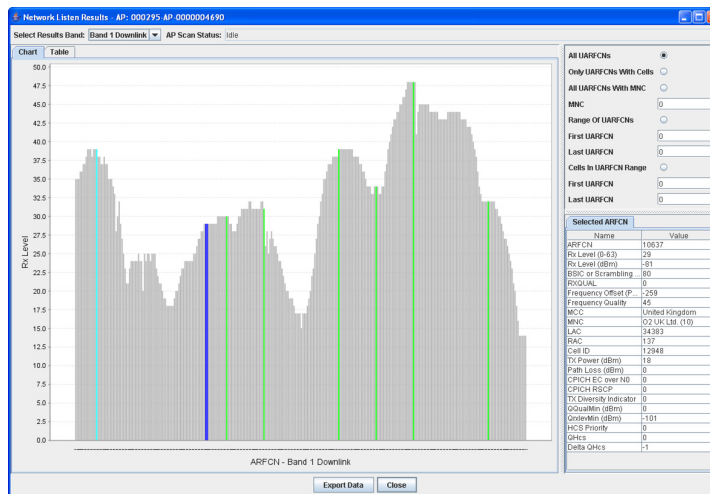
Once the nano3GAP has booted up and performed an RF scan, it is possible to see the results in the OMC-R Client.

- 1) Find the required AP by its serial number or object name (see section 2.2.2).
- 2) Right-click the AP object and select **View Network Listen Results** from the menu.



- 3) The Network Listen Results viewer will appear (see below).
- 4) Alternatively, select the **Network Listen Results Package** in the Navigation pane and select the following:
 - Cell Results
 - RSSI Results
 - UMTS UL Results

The view has a graphical representation of the Network Listen results on the Chart tab, and a list of detected cells on the Table tab.



Click a detected cell (in Chart view the line changes to blue) to show more details in the Selected ARFCN tab on the right.

Note: Optionally use the detected results to fill in the static neighbour lists.

2.4.3 Apply Frequency Correction

First check the possible frequency adjustment as follows:

- 1) Find the required AP by its serial number or object name (see section 2.2.2).
- 2) In the Navigation pane, select the Network Listen Status Package.
- 3) In the Properties pane, inspect the Estimated Frequency Offset (PPB) value.
- 4) If the offset magnitude is more than 50 (that is more than +50 or less than -50), it may be useful to apply frequency correction.

Note: If the offset is within +/- 50ppb, that offset will never be used. A correction will only be applied if the Network Listen results are more than 10 minutes old and a rescan results in a recalculated offset magnitude greater than 50ppb.

If it is necessary to apply a frequency correction, use the following procedure:

- 5) Right-click the AP object and a menu will appear.
- 6) Select **Shutdown** and wait for the AP to lock or **Lock** to lock the AP immediately.
- 7) When the AP is locked, with the padlock symbol, right-click the AP object again and the menu will appear.
- 8) Move the pointer down to Actions and a sub-menu will appear.
- 9) Click **Apply Frequency Correction**. The AP will do the following:
 - o The time of the last scan is checked. If the scan is older than 10 minutes, a new scan takes place and a replacement offset value is recalculated. If the offset is smaller than +/- 50ppb, there is no further action (that is, no offset is applied).

Note: When no offset is applied, the NWL Test Status in the Network Listen Status Package is set back to NWL Idle. This can happen very quickly and there may be no visible change to NWL Test Status. If the NWL Test Status appears to have stayed at NWL Idle for more than one minute, it can be assumed that nothing has happened and the AP may be unlocked.

- If the process continues, the frequency correction is applied.
- A new scan takes place to check that the new setting has improved the frequency offset. If the new offset is worse than the offset just applied, the frequency correction is reversed. Otherwise, the new value is retained.
- The Estimated Frequency Offset (PPB) value in the Network Listen Status Package is reset to 0 until the offset is recalculated by another Network Listen scan. The NWL Test Status in the Network Listen Status Package is set to NWL Idle.

10) Right-click the AP object again and select **Unlock**.

3 *Troubleshooting the nano3GAP*

3.1 Monitoring Alarms from the nano3GAP

For instructions see [OPM_410]. For information on the alarms, see [REF_130].

3.2 Modifying the AP Configuration

3.2.1 Create an Attribute Configuration File for an AP

The properties of the AP can be set from the OMC-R. Optionally, attributes can be imported from a text file.

For the description of the text file format and for instructions on how to use it, see [INST_300].

3.2.2 Download the Attribute Configuration File to the AP

For instructions, see [INST_300].

3.3 Modifying the AP-AC Connection

The configuration of a nano3GAP can be modified in a web interface from the provisioning PC. The AP-AC connection and the IP configuration of the AP can be managed this way.

The web interface is only enabled by default during commissioning when the AP is in factory reset state. To enable the web interface, the nano3GAP needs to be put into factory reset state (see section 3.5).

- 1) Start a web browser and go to the following address:

`http://192.168.0.1:8089/`

- 2) Enter the username and password.

3.3.1 Modify the Connection to the AP

For instructions, see [INST_300].

3.3.2 Edit the IP Configuration of the AP

For instructions, see [INST_300].

3.4 AP Diagnostics from the OMC-R

3.4.1 Automatic Crash Log Upload

It is possible to enable uploading a crash log file automatically from the OMC-R to a server that is capable of HTTPS PUT.

Note: By default Apache does not allow HTTP PUT.

The apdiaglog file is created by a bash script `/opt/ipaccess/bin/diagupload`. It collates all of the files needed to troubleshoot and analyse issues in the field. The diagupload script will create a tar.gz file stored temporarily in the `/tmp` folder, for example:

```
apdiaglogs_000295-000000007804_1246441198_demand.tar.gz
```

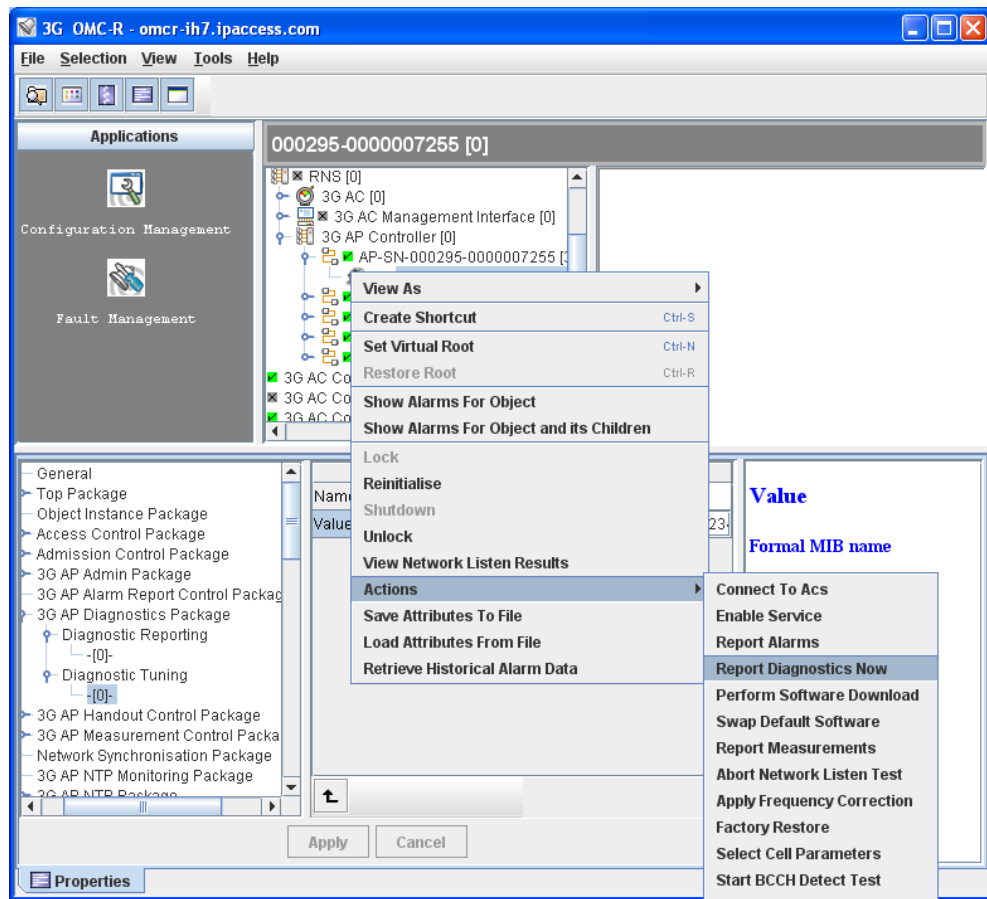
The tar file contains the following files:

File	Description
tcpdump.pcap0 and 1	Rolling tcpcapture.
procmon output	Contains the same information as the printout of the ps command, with additional details. Furthermore, it contains a log rotated version that is updated every 30 seconds, which helps when looking for memory leaks.
Log files	For example: dmesg, bootlogs, apdiag cli output, syslog, klog
Legacy configuration files	
Software version information	
Crash files	In case of a crash

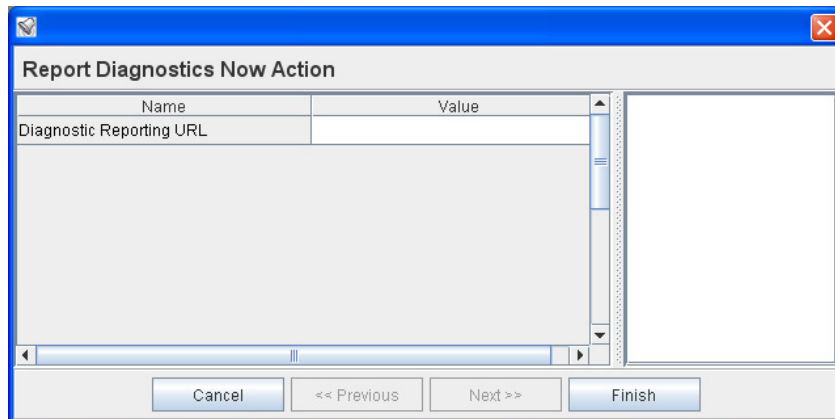
3.4.2 Report Diagnostics

To generate a status report of the AP:

- 1) Log in to the OMC-R.
- 2) Find the required AP by its serial number or object name (see section 2.2.2).
- 3) Right-click the AP object and select **Report Diagnostics Now** from the menu.



- 4) Enter the URL where the diagnostic report should be displayed.

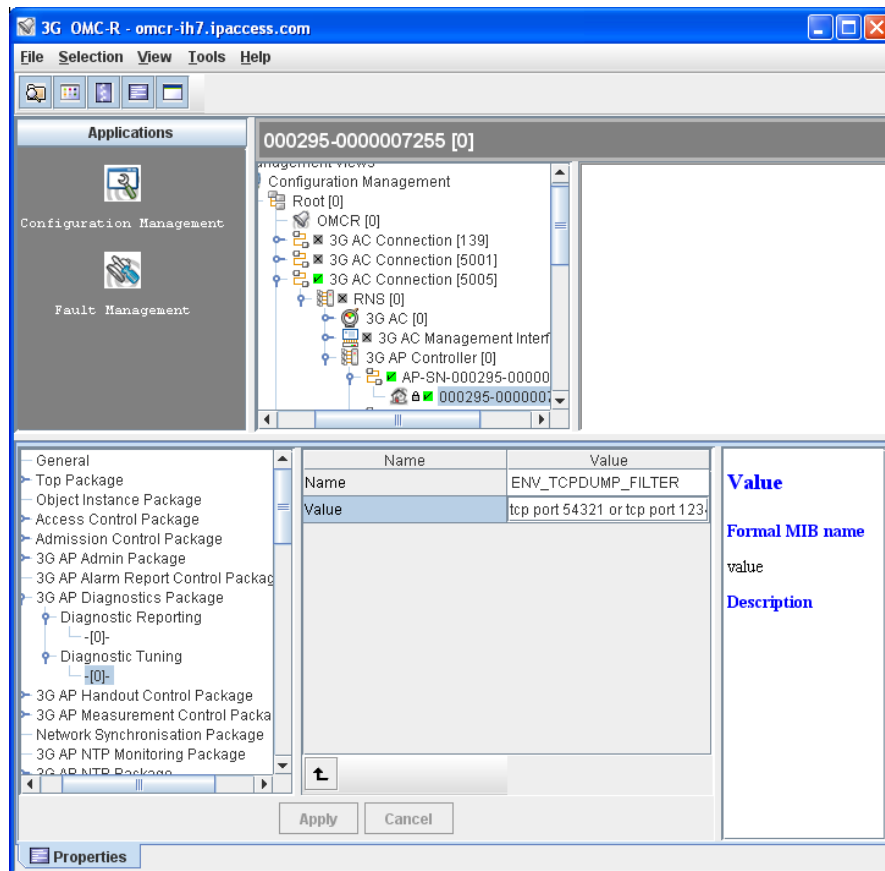


3.4.3 Diagnostics Tuning of the AP

It is possible to modify some AP settings remotely from the OMC-R.

- 1) Log in to the OMC-R.
- 2) Find the required AP by its serial number or object name (see section 2.2.2) and select it.
- 3) In the attribute frame, select the Diagnostics Tuning attribute.
- 4) Edit the following parameters as needed:

File	Description
Start-up CLI commands	CLI commands run automatically once MgrApp has started up. Allows CLI commands, such as “ ma::dbgtask 16 on ” to be run which turns on task 16’s CLI output.
Immediate CLI commands	CLI commands to be run immediately.
Nv_env.sh Bash environment variables	Used by the platform and bash based scripts to change the behaviour of the AP.



3.5 Factory Reset

Factory reset can be used when there are no ways to repair the AP-AC connection. The AP configuration needs to be redone manually after the factory reset, see [INST_300].

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

When the button is initially pressed, the 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 section 3.3.2.