Teldat Bootserver

User's Guide

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Chapter 1 About This Guide

This is the User's Guide for the Teldat Atlas i6x Bootserver application.

1.1 Supported Devices

The information contained in this guide only applies to the Atlas i6x equipped with an internal storage device and the Bootserver application installed.

1.2 Who should read this manual?

This manual should be read by the user who needs to configure a Bootserver in an Atlas i6x.

1.3 When should I read this manual?

Read this guide as soon as you are ready to configure your Bootserver application. This manual shows several scenarios where the Bootserver application is useful and how to configure its different parameters.

1.4 What is in this manual?

This User's Guide contains the following information:

- Some explanations about Bootserver's purpose and operation.
- Configuration of the application by using the internal web of the Atlas i6x.
- The description of some common scenarios where the Bootserver could be used, showing all the configuration process.
- Troubleshooting.

1.5 What is not in this manual?

This user guide does not contain information relative to the Atlas i6x hardware nor is intended as a comprehensive reference to all management operations available in the Management Platform, the Atlas i6x Application Host software and configuration, or other applications other than the Bootserver. It does not contain information about how to setup the device to connect to the Internet. For information about configuring the device, please see the relevant manuals for the different protocols, which can be found in the following web site: *www.teldat.com* .

1.6 How is the information organized?

Chapter 1 explains how to use this guide and describe its contents. Chapter 2 is an introduction about what a Bootserver application is and a brief explanation on boot images and the boot process. Chapter 3 shows the different configuration methods for this application. Chapter 4 presents several scenarios where the Bootserver is used described step by step in order to make easy for the user to carry out some normal operations with the application.

In addition, there are some appendices to provide several additional explanations related to the Bootserver application, and a troubleshooting.

1.7 Technical Support

Note

The manufacturer reserves the right to make changes and improvements in the appropriate features in either software or hardware of this product, modifying the specifications of this manual without prior notice. The screen captures provided throughout the guide are provided as information guidelines only. Some small modifications may exist in the current software.

1.8 About OpenSource Software

Some software components of this product contains copyrighted software that is licensed under the GPL, GFDL, LG-PL and other open source licenses. You may obtain the complete corresponding source code from us for a period of three years after our last shipment of this product by downloading this free of charge from Teldat, S.A. . If you want to obtain the complete Corresponding Source code in the physical medium such as CD-ROM, the cost of physically performing source distribution may be charged. This offer is valid to anyone in receipt of this information.

For more information about the licenses of the installed software in the Application Host of an Atlas i6x, please enter in the *About section*found in the web configurator of the device.

Chapter 2 What is a boot server and why is it useful?

2.1 Teldat Bootserver application

A boot server is a machine that stores boot images and serves them through the network to connected client machines. These clients will use the images in their boot processes. The image serving process involves different services, such as DHCP, TFTP and NBD, to be able to make the images available on the client machine.

This application allows the use of an image without having it in a physical support for each client and provides an easy way for the network administrator to choose what image he wants to offer to the clients at any point.

Using the Atlas i6x with the Bootserver application to storage the images can be an easy solution to give the capability of using different VDI solutions and operating systems to the connected clients without making any changes in the local network configuration. The Bootserver application allows the management of the boot images, the clients, and the process of serving images to client machines.

By using the Atlas i6x Bootserver application, corporations would no longer need to invest in an external dedicated server for storing images. This is particularly true for networks with only a few machines were this kind of expenditure would not be justifiable.

Teldat Bootserver application has been designed for the Atlas i6x device. This user guide explains how to configure the application together with its capabilities and limitations.

2.1.1 Advantages

- *Reduce implementation costs and initial investment, reduce power and cooling requirements, reduce complexity and risk.* This is a major characteristic of using thin clients and a network booting solution. Having a Bootserver means you can have lower hardware requirements for the clients or even reuse old machines with the associated advantages. Cost reduction too is implicated when using the Bootserver application.
- *Accelerate deployments, upgrades, and server repurposing.* Bootserver makes these things as easy as uploading a new image and only requires minimal configuration in the application web.
- *Supports different VDI solutions.* Bootserver application is not VDI provider-specific. Images of different virtualization solutions can coexist and be served to different clients.
- *Easy administration of images and clients.* The web configuration is intuitive and user friendly allowssing the administrator to control clients and images; the internal services´configuration being transparent.
- *Implement enhanced Disaster Recovery solutions.* Complete bootable Operating Systems can be stored as images and be served to clients.

2.1.2 Bootserver network schema

A general scheme of a network and the services used by the Bootserver are shown in the image below. The network that involves Bootserver comprises of a certain number of clients in a LAN connected to a particular router interface, connected to the Internet. The schema also shows the different services used by the Bootserver. In first place the Bootserver provides a configuration web in the same way as other Atlas i6x applications or general configurations. Secondly, the images the Bootserver servers are stored in the Atlas i6x hard disk and is available via SMB. Finally there are three services running that are necessary for serving images to the clients. These are the DHCP service, TFTP service and an NBD service.

Fig. 2.1. Main configuration status
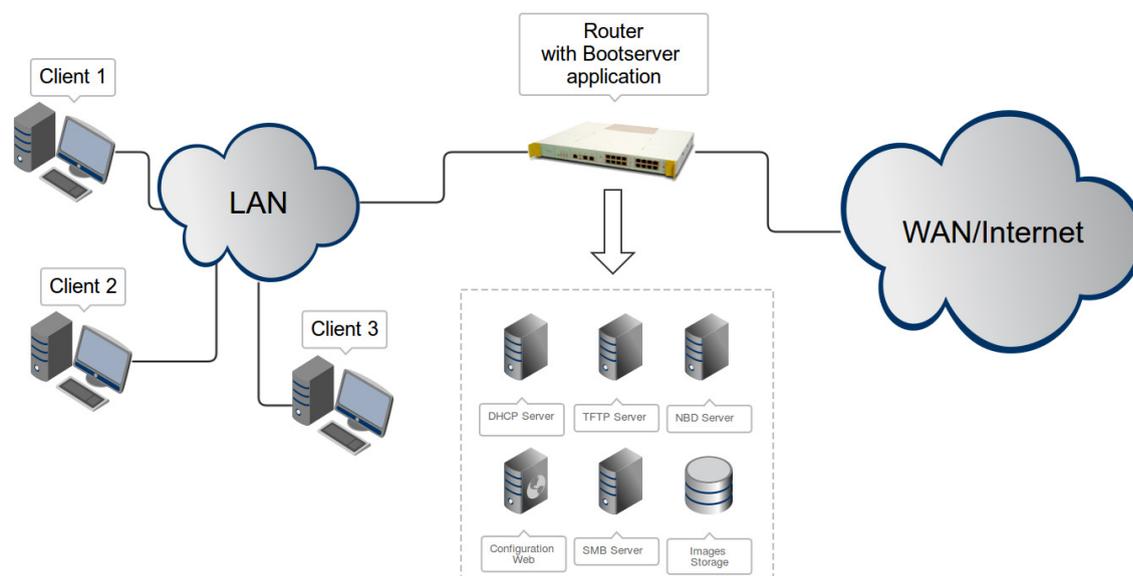
2.2 Boot images

A boot image is a type of disk image (a computer file containing the complete contents and structure of a computer storage media). When transferred onto a boot device it allows the associated hardware to boot. This usually includes the operating system, utilities and diagnostics, as well as boot and data recovery information. It can also include applications that the specific users of these images may need to use, e.g. office software or a remote desktop client connecting to a virtual desktop hosted in a remote server.

2.3 Bootserver operation

The Bootserver uses the PXE (pre-execution environment) protocol for booting an image on the client machine. The PXE allows computers to be booted using a network interface independently of the data storage devices or the installed operating systems. PXE can involve many protocols and options. The Bootserver uses the PXE based on the use of tree protocols: DHCP (Dynamic Host Configuration Protocol) for serving the client with an ip address and relevant parameters for the boot process, TFTP (Trivial File Transfer Protocol) for transferring boot files (pxelinux.0, pxelinux.cfg/default and others) and NBD (Network Block Device) which serves the image, if necessary, as a remote storage device accessible by the client. Other approaches, such as the use of NFS (Network File System) instead of NBD are not supported by Bootserver.

We are going to briefly describe, step by step, the process of serving the image and booting for a Bootserver client.

(a)   Client sends a broadcast DHCP discovery package (the client is configured to boot from network).

(b)   A Bootserver DHCP server responds with a DHCP offer package. It offers an ip address and a set parameters related to the boot process.

(c)   Client sends a unicast DHCP request package to the DHCP server.

(d)   DHCP server responds with a DHCP ACK package.

(e)   At this point, the client has an ip address and knows the path of pxelinux.0 file. It has to obtain this file from the Bootserver´s TFTP server.

(f)   The client obtain some files using TFTP, the pxelinux.cfg/default indicates if it has to access an image file using NBD.

(g)   The client requests the image file from the Bootserver´s NBD server.

Chapter 3 Configuring the Application

This application, like other applications installed on the Atlas i6x device, is configurable in two ways: by using the Atlas i6x internal web, and by using a text configuration or a configuration template inside the management platform to configure one or more devices simultaneously.

3.1   Configuring the Web

The application is represented in the main window as an icon over the "Bootserver" name. Click on the "Bootserver" tab to access the application configuration or click on the "Bootserver" icon or name.

When one of them is clicked, a new window is shown. Press on "Bootserver" in the left hand menu to enter the main configuration section.

> **Note**
>
> Summary of interface buttons:
>
> - [↑+] : Use this button to add a new entry in a table.
> - [+X] : Use this button to remove an entry from a table.
> - [Modify ⟨⟩] : Use this button to modify the value of the current section parameters. You must click on this button before clicking any other interface button such as a table button as the whole page will be refreshed and you lose all the modifications.
> - [Show status ⟨⟩] : This button shows the status parameters when there are any.

3.1.1 Main configuration section

The main configuration section presents a blank screen with the exception of a "show status" button. Press it to see the main configuration section status. This status screen, as shows in the figure, presents the status of the three main services associated with the Bootserver application: DHCP server, TFTP server and NBD server. Their status may be running or stopped. TFTP and NBD starts with the Bootserver application. DHCP starts when "DHCP enable" option is checked in the DHCP server configuration section (see *DHCP configuration section* on page 9). If they are stopped the Bootserver doesn´t serve the client with either the IP address or images.

The left hand side of the screen shows a menu with the different configuration sections. Click on one of them to enter that configuration section.

Fig. 3.1. Main configuration status

3.1.2 Clients configuration section

The clients configuration section includes all the configuration options related to the client machines: register new clients, delete clients, modify clients´ data and view their status.

This screen shows a table summarizing the registered clients' information: the MAC address, the client name, IP address and the image assigned to the client for the next reboot.

Fig. 3.2. Clients´ configuration

By clicking on the "show status" button found in the Client Configuration, a status table is shown. This table provides information on the last executed services. The table columns are as follows:

- *Mac:* client mac address.

- *Name:* client name.

- *Date:* date of the last service provided to the client.

- *Ip:* last served IP address.

- *Image:* identifier for the last image served.

- *Status:* client status. Running if it responds to the ping or stopped.

Fig. 3.3. Clients´ configuration status

The left hand menu shows a list containing the registered clients. To access a client's individual configuration, click on the client's name in the left hand menu. The individual client configuration screen is detailed in the section on: "Modify client data".

> **Note**
>
> Default parameters meaning:
>
> - auto: when used in the IP address fields this means the DHCP server dynamically assign an unused IP taken from the range of DHCP IP addresses to the client.
>
> - none: when used in the image fields this means there are no image assigned.

3.1.2.1 Registering a new client

To register a new client fill in the empty row cells in the table and click the button [↑+] . When a client is correctly created a new entry appears in the table. There are four fields that can be completed: MAC, name, address and image.

The MAC refers to the MAC address for the client machine to be registered. The name can be any alphanumeric characters or "_" without spaces and identify the client. This name appears in the left hand menu used to access the client´s individual configuration. The MAC and the name fields must be filled out. These parameters define the client and cannot be duplicated for other clients. Make sure you enter a well-formed MAC.

The address is the IP address served by the DHCP server to the client in its next reboot. If you enter "auto" or leave the field blank, the DHCP assigns an unused IP from the DHCP IP range, which can be specified in the DHCP configuration section as explained in the *DHCP configuration section* on page 9 of this document. This is dynamic ip assignation, the normal behavior for the Bootserver. It can be also specify a fixed address that must be one from out of the DHCP range. In this case the ip is assigned to the client in its next reboot. Addresses cannot be repeated and must be in the subnet defined in the DHCP configuration section. The belonging to the subnet is checked when the DHCP service is enabled to avoid entering of a non-valid address. If it isn't enabled and an invalid IP is registered, the DHCP service cannot be enabled until the non-valid address is changed.

The image field indicates the image served to the client in its next reboot. It shows the image identifier or "none" if no image has been assigned. The field is a combo where one or none of the registered images can be selected. Image registration is discussed in the *Managing images* on page 11 of this document.

3.1.2.2 Deleting a client

Each row in the clients table has a delete [X] icon . If you click on this button, the client is removed from the table and the Bootserver. When a client has alredy received an IP from the DHCP server it is not possible to remove it from the system for an hour. The Bootserver stores the services historical data and deletes it once a day. Every 60 seconds this data is checked and the client is automatically reregistered if the IP lease less than an hour ago.

3.1.2.3 Modify client data

The data on a specific client stored by the application can be modified in the individual client configuration screen, which can be accessed by clicking on the client name in the left hand menu. The parameters presented here, as can be seen in the figure, are described below.

Fig. 3.4. Configuring an individual client

3.1.2.3.1 Name

Client name. This can be any alphanumeric or "_" character, without spaces, and identifies the client. This cannot be left blank or duplicated for other clients.

3.1.2.3.2 MAC

This is the client machine MAC address and cannot be modified.

3.1.2.3.3 Address

This is the IP address served by the DHCP server to the client on its next reboot. If you enter "auto" or leave this field blank, the DHCP assigns an unused IP to the client from the DHCP IP range. This can be specified in the DHCP configuration section explained in the *DHCP configuration section* on page 9. This is dynamic IP assignment and normal Bootserver behavior. This can also specify a fixed address, which must be taken from the DHCP range. In this case, the IP is assigned to the client on its next reboot. Addresses cannot be duplicated and must be in the subnet defined in the DHCP configuration section. The IP is checked to see if it belongs to the subnet when the DHCP service is enabled to prevent invalid addresses being entered. If the DHCP isn't enabled and an invalid IP is registered, the DHCP service cannot be enabled until the invalid IP is changed.

3.1.2.3.4 Image Id.

The image id. field indicates the image that is served to the client in its next reboot. It shows the image identifier or a "none" if no image has been assigned. The field presents a list where one or none of the registered images can be selected. Image registration is discussed in the *Managing images* on page 11 of this document.
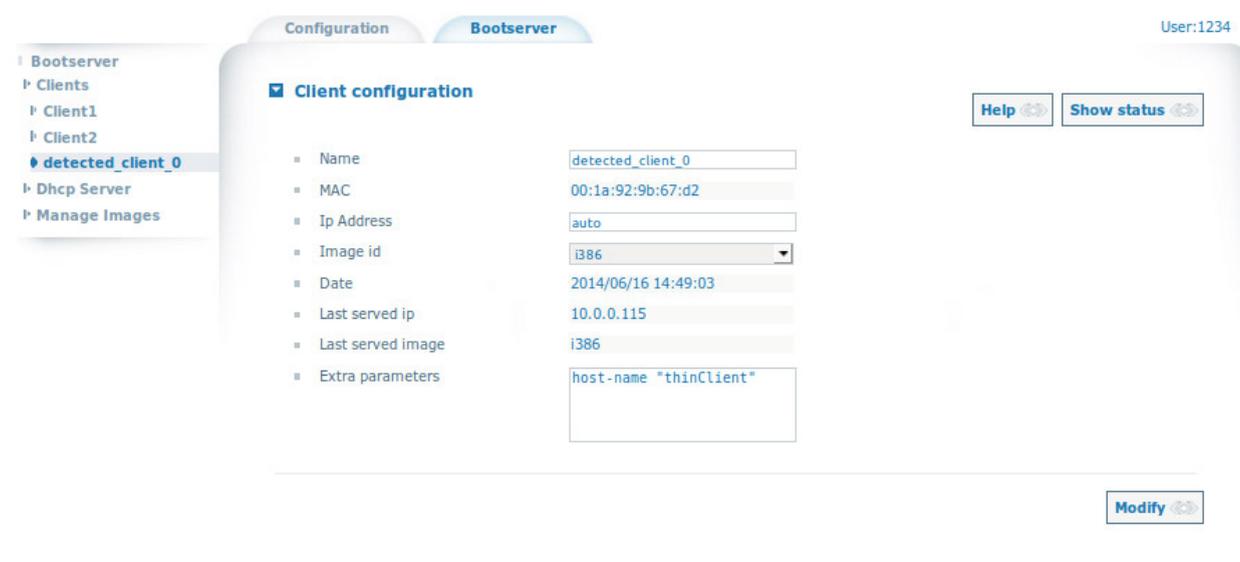
3.1.2.3.5 Date

This is the date for the last service for that client or the creation date if no service has been performed. Format is "yyyy/MM/dd HH:mm:ss" (y=year, M=month, d=day, H=hour, m=minute, s=second). This parameter cannot be modified.

3.1.2.3.6 Last served IP

The last IP address served by the Bootserver to that client. "None" means there haven't been any DHCP IP leases to that client as yet. This parameter cannot be modified.

3.1.2.3.7 Last served image

The last image served by the Bootserver to that client. "None" indicates that during the last client reboot only an IP address was served and not an image or that the client hasn't been served yet. This parameter cannot be modified.

3.1.2.3.8 Extra parameters

The extra parameters are parameters that can be sent by the DHCP server in its message with the rest of the information. They must be specified in the following form:

```
<param_name> <value>
```

More than one parameter can be entered. The different parameters must be separated by a carriage return (enter key). Double quotes ("") are allowed for string values. More information on extra parameters can be found in *Extra Parameters* on page 26.

> **Note**
>
> The extra parameters are checked. An error will be shown if they are not allowed by the DHCP server or they are badly formed parameters. This prevents the DHCP server from failing to reboot in order to apply configuration changes.

3.1.2.4 Client auto-detection

Clients can be auto-detected instead of registering them before connecting to the network and booting them. The Bootserver DHCP server provides IP addresses to any machine that asks for then with a DHCP discovery message. When a client does this, the Bootserver stores information on the client with its MAC address, the provided IP address, the image served, if any have been served, and the date. Every 60 seconds the Bootserver checks the information stored searching for new clients.

This information appears in the client and status tables in the clients configuration section. An individual client config-uration screen will be is available by clicking on the client´s name in the left hand menu .

The IP address assigned for the next reboot for a detected client is set to "auto". This means, it is dynamically taken from the DHCP IP addresses range. The next boot image for a detected client is the same image that it had received if it is still available or "none" if it is not or if no image has been served to the client.

3.1.2.5 Client auto-update

Following the same mechanism as described in the previous section *Client auto-detection* on page 8, when a client executes a reboot, the information on it is updated by the Bootserver. The last new served IP address and image ap-pears both in the client's status table and the client's individual configuration screen.

In the same way as the client's auto-detection, the IP address assigned for the next reboot for a detected client is set to "auto". This means it is dynamically taken from the DHCP IP address range. The next boot image for a detected client is the same image.......

The next boot image for a detected client will be the same image that it had received if it is still available or "none" if it is not or if no image has been served to the client.

3.1.3 DHCP configuration section

The DHCP configuration allows the main DHCP server parameters to be configured. These parameters are de-scribed in detail below. The changes made in the DHCP configuration are always stored by the Bootserver, however the DHCP configuration file is only changed if the "enable dhcp" checkbox is checked market. If the "enable dhcp" checkbox is checked any changes in the configuration forces a DHCP server restart in order to apply the changes.

Fig. 3.5. Configuration the DHCP server

> **Note**
>
> The "enable dhcp" checkbox has to be checked to have the DHCP server running and to apply the con-figuration changes.

If you click on the "show status" button, two parameters are shown. One of them is the DHCP server status, which can be stopped or running. The other parameter is the "Server IP". This is the Atlas i6x applications host address. This parameter is read from the CIT. In order to read it, the traffic control must be enabled in the Atlas i6x General Configuration (see the *General Configuration* on page 24). If access to the CIT is negated (not permitted) then the "ServerIP" parameter doesn't show the applications host address.

Fig. 3.6. DHCP server configuration status

3.1.3.1 Subnet

The subnet address where the DHCP server provides IP addresses.

3.1.3.2 Mask

The subnet mask where the DHCP server provides the IP addresses.

3.1.3.3 IP allocated start

The first IP address in the range the DHCP server dynamically offers to the clients. It must belong to the subnet.

3.1.3.4 IP allocated end

The last IP address in the range the DHCP server dynamically offers to the clients. It must belong to the subnet.

3.1.3.5 DHCP server IP

This IP address is used to specify the host address where the initial boot file is loaded from. Usually this is the server IP where the DHCP server we are configuring in this section is located, but another DHCP server can be assigned here.

3.1.3.6 Broadcast address

This option specifies the broadcast address being used on the client's subnet.

3.1.3.7 Router address

This parameter specifies a list of IP addresses for routers on the client's subnet. Routers should be listed in order of preference and separated by commas. Usually this parameter is the IP address for the Atlas i6x interface in the subnet where the clients are.

3.1.3.8 Domain name

This parameter specifies the domain name that client should use when resolving hostnames via the Domain Name System.

This parameter affects all clients. If you want a client or clients associated to a certain image be included in another domain it's possible to overwrite this parameter using the extra parameters field in the individual client or the individual image configuration sections (see *Extra Parameters* on page 26).

It's important to remember that the clients served with a Vmware client image or a Citrix receiver image need to be in the same domain where their virtualization desktop infrastructure is.

3.1.3.9 DNS 1

This parameter indicates a Domain Name System server available to the client or its IP address.

The clients served with a Vmware client image or a Citrix receiver image need their DNS to be their Active Directory Controller so they can authenticate and connect to their virtual desktops.

3.1.3.10 DNS 2

This parameter indicates a Domain Name System name server available to the client or its IP address. It is the second DNS option after DNS 1.

3.1.3.11 DHCP relay interfaces

This parameter indicates the Atlas i6x interfaces where the DHCP server works. More than one interface can be specified separated by commas.

If the CIT can be accessed for the applications (see how to enable it in *General Configuration* on page 24) an entry is entered in the CIT configuration for the indicated interfaces configuring the DHCP relay for the IP server. If the CIT cannot be accessed, this parameter, the Bootserver does not use it and you have to manually enter the DHCP relay entry in the CIT configuration. This is described in *General Configuration* on page 24.

3.1.3.12 Enable DHCP

Check this checkbox to start the DHCP server. When this is marked, the changes made in the configuration is immediately written to the DHCP configuration file and applied immediately restarting the DHCP server.

3.1.4 Managing images

The "Manage Images" section allows you to access two image configuration sections described below: the "Images directories" and the "Default Image" sections. The two are accessible by clicking their names in the left hand menu.

3.1.4.1 Directories

The boot images files are stored in the Atlas i6x in a directories structure accessible through SMB. In the images directories you can manage creation, modification, remove and accessing those directories.

The image directories have a screen divided into two parts. The upper part contains parameters related to the SMB: user, password and quota. The second part consists of a table summarizing the registered images. This information includes: image, identifier, directory creation and a description of the image. The date format is "yyyy/MM/dd HH:mm:ss" (y=year, M=month, d=day, H=hour, m=minute, s=second).

Fig. 3.7. Configuring images directories

If you click on the "show status" button, information on the status is displayed. Firstly, the SMB status indicates if the SMB service is running or no and the used quota, in Bytes, shows the value over the total quota and in a percentage. Secondly, there is a table showing the status for each image file. The message "Warning. Boot files not found" appears if the files haven't been uploaded yet. Contrariwise, the "OK. All files are available" message is shown . The files checked by the system to make the table are the "pxelinux.0" and the "pxelinux.cfg/default". These two files are needed for the boot. Other files are needed too but aren't common to all the images and it's the user's responsibility to check them.

The registered images appear in the left hand menu . By clicking on them you can access the individual image configuration section. More information on the individual image configuration can be found in *Modifying an image* on page 13.

Fig. 3.8. Images directories status

3.1.4.1.1 Creating an image directory

For creating a new image directory you have to enter the fields available for this purpose, the image name, the identifier and, optionally, a description. The date that appears on the date field is the image creation date, it's the system´s current date and cannot be modified. The images names and identifiers cannot be duplicated and must be filled out. When you click on the "add image" button on the right of the [icon] row, the new image is added to the table and its name appears in the left hand menu so permitting access to the individual image configuration.

Adding to this row the Bootserver creates the directories and links needed to upload the image files. The created image identifier is available in other sections of the Bootserver configuration web with other registered images. You are able to select it as the default image or as the next boot image for any client.

> **Note**
>
> When you create or modify an image identifier the NBD service restarts so activating the changes. This restart means a loss of the connections established between the clients and the NBD server. Clients not using an image provided by NBD will not be affected.

3.1.4.1.2 Deleting an image directory

Each row in the images table has a delete [icon] icon . If you click on this button, the image is removed from the table and the Bootserver. The deleted image is no longer available in the clients configuration image selection list nor in the default image. The individual configuration of that image is lost.

When an image directory is removed the image files the user has uploaded to the server aren't removed. They stay in their directories and continue to occupy assigned quota space. The SMB user can manually remove the image files, accessing in the same way used to upload the files (see *Remotely accessing image directories* on page 14).

The images directories are defined by their image identifier. If you create an image with a previously used and deleted image identifier, you can reuse the old directories containing this image identifier and the image files that are

still there can be served to the clients as usual.

When an image is deleted, all the clients that had this image assigned as their next reboot image now take the default or "none" image instead of the removed one.

3.1.4.1.3 Modifying an image

By clicking an image name in the left menu you are taken to the individual image configuration screen. This screen shows several image parameters that can be modified. A brief description of these parameters is presented below. You can modify the parameters changing their values by clicking the "modify" button.

Fig. 3.9. Configuring an image
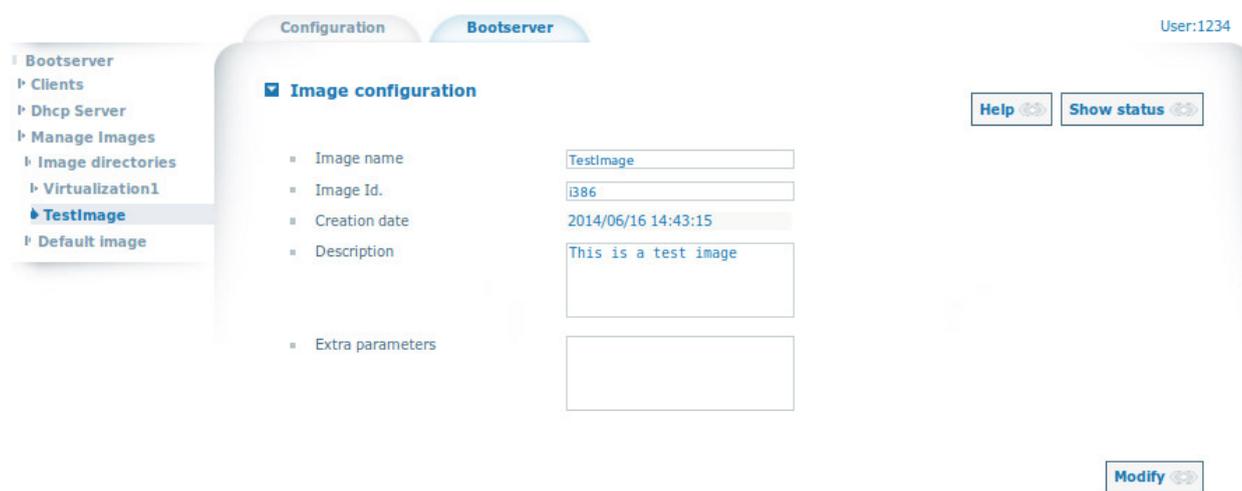
3.1.4.1.3.1 Image name

The image name. It can be formed by any alphanumeric character or "_" without spaces. This is shown in the left menu for accessing to the individual image configuration screen. It cannot be left blank. The name cannot be repeated in other clients.

3.1.4.1.3.2 Image identifier

Image identifier. This can be formed through any alphanumeric character or "_" without spaces and is used to identify the client. It is shown in the image selection options in the web and used in the images directory tree for allocating the image files. It cannot be left blank. The name cannot be duplicated for other clients. If you change an image identifier NBD service restarts to apply the changes. This restart means a loss of the connections established between the clients and the NBD server.

It is shown in the image selection options in the web and used in the images directory tree for the image files in it. It cannot be left blank. The name cannot be in other clients. If you change an image identifier the NBD service restarts to apply the changes. This restart means a loss of the connections established between the clients and the NBD server.

3.1.4.1.3.3 Date

It's the date the image directory is created. This is for information purpose only and cannot be modified. The format is "yyyy/MM/dd HH:mm:ss" (y=year, M=month, d=day, H=hour, m=minute, s=second).

3.1.4.1.3.4 Description

Here you can enter a description of the image.

3.1.4.1.3.5 Extra parameters

The extra parameters are parameters that can be sent by the DHCP server in its message with the rest of the information. They must be specified in the following format:

```
<param_name> <value>
```

More than one parameter can be entered. The different parameters must be separated by a carriage return (enter key). Double quotes ("") are allowed for string values. More information on extra parameters can be found in the *Extra Parameters* on page 26. The extra parameters specified here affect all clients that have reception of this image configured.

> **Note**
>
> The extra parameters are checked. An error is shown if the DHCP server does not permit them or they are badly formed parameters. This prevents the DHCP server from failing to reboot in order to apply the configuration changes.

3.1.4.1.4 Remotely accessing image directories

When you want to access the image directories to upload image files or carry out some modifications over the previously uploaded ones you have to use the SMB user and password entered in the *Changing the SMB user name* on page 15 and*Changing the default password* on page 15 sections.

To access the image directories you have to connect to the Bootserver files tree (you can find an image of it below) via SMB . You can do this with any SMB client application suitable for your operating system. Remember you have to access the application host IP address where the files are stored.

```
smb://<application-host-ip>/
```

Access the bootserver directory. Once in the bootserver directory, you can see two directories: "boot_files" and "client_images". Each one has a directory for each image registered in the "Image directories" table configuration. There are also directories for the deleted images. The directories are labeled with the image identifiers. Access the directory containing the image you want to upload and add the files from your machine or modify the existing ones. You can also delete these files. In the "boot_files" images directories, files served to the client by the TFTP must be added. Fundamentally these are the "pxelinux.0" and the "pxelinux.cfg/default" (located in a subdirectory). The presence of these files is checked by the application showing the image directories status. Files indicated in the "pxelinux.cfg/default" file are also required, however they are not checked.

The image file served by the NBD must be added in the "client_image" images directory. This said image file is optional as all the images can be added to the boot_files directory and be served by TFTP. This file is used when the images are too big. The name of the image file located here must be "<image-identifier>.img", as this is the image identifier defined for this image in the image configuration.

Fig. 3.10. Image files tree

```
/bootserver/
          |boot_files/
          |          |<img-id-1>/
          |          |<img-id-2>/
          |          |     .
          |          |     .
          |          |     .
          |          |<img-id-n>/
          |                    |(initrd.img)
          |                    |(vmlinuz)
          |                    |   ...
          |                    |pxelinux.0
          |                    |pxelinux.cfg/
          |                                 |default
          |
          |client_images/
                        |<img-id-1>/
                        |<img-id-2>/
                        |     .
                        |     .
                        |     .
                        |<img-id-n>/
                                   |<img-id-n>.img
```

3.1.4.1.5 Changing the SMB user name

The default username is "bootserver". This can be changed by entering a new username and clicking the "modify" button.

3.1.4.1.6 Changing the default password

The default password is "bootserver". This can be changed by entering a new password and clicking the "modify" button.

3.1.4.1.7 Changing the SMB quota

The quota is the storage space available in the Atlas i6x for the image files uploaded by the users. The quota is not associated to the SMB user but to the bootserver SMB users group. This means that a change in the user name doesn't make any difference to the quota or any other issues related to the uploading of the image files.

The default quota is 16777216 bytes. It is possible to change the quota introducing the new value and pressing the "modify" button.

3.1.4.2 Default image

The "Default image" configuration allows the *default image* configuration to be served to those *clients that haven't been registered* in the configuration web and some *extra parameters* that will affect *all the clients*.

3.1.4.2.1 Image

This is the default image identifier. The "non" option can also be selected. The "non" option permits the default extra parameters to be configured. If the default image is not enabled the unregistered clients only receive an IP address from the DHCP by default and no image. If the default image is enabled and "none" is selected, the unregistered clients receive an IP address by default and no image; however the extra parameters entered in the default image configuration extra parameters field is sent to all clients in the DHCP packets.

3.1.4.2.2 Enabling the default image

Default image is enabled when this checkbox is checked.

3.1.4.2.3 Extra parameters

The extra parameters are parameters the DHCP server can send in its message with the rest of the information. They must be specified as follows:

```
<param_name> <value>
```

More than one parameter can be entered. The different parameters must be separated by carriage return (enter key). Double quotes ("") are allowed for declaring string values. More information on extra parameters can be found in the *Extra Parameters* on page 26.

If the default image is enabled, the extra parameters specified here affect all clients. These parameters can be overwritten in the client or image extra parameter fields, in their individual configurations using a different value.

> **Note**
>
> The extra parameters are checked. An error is shown if the DHCP server does not permit them or they are badly formed parameters. This prevents the DHCP server from failing to reboot in order to apply the configuration changes.

3.2 Configuring text

All the configuration commands permitted in the application text configuration are described here.

> **Note**
>
> The configuration commands must be sent in a single text file through the Atlas i6x management portal to the device.

3.2.1 Boot Server configuration

```
bootserver
```

Top level configuration command

3.2.1.1 Clients configuration

```
clients
```

Clients configuration

3.2.1.1.1 Add Client

```
add client <value> client-name <value> ip <value> image <value>
```

Adds an entry in the clients table

- *client* : client MAC.
- *client-name* : Name of the client.
- *ip* : IP address assigned to the client for its next boot.
- *image* : Identifier of the image assigned to the client for its next boot.

3.2.1.1.2 Individual client configuration

```
client <value>
```

Individual client configuration

- *client* : Name of the client.

3.2.1.1.2.1 Client name

```
name <value>
```

Name of the client

3.2.1.1.2.2 Client MAC

```
mac <value>
```

Client MAC

3.2.1.1.2.3 Client IP

```
ip <value>
```

Client IP address

3.2.1.1.2.4 Last service date

```
date <value>
```

Date of the last service to the client

3.2.1.1.2.5 Last served IP

```
last-served-ip <value>
```

Last IP address served to the client

3.2.1.1.2.6 Last served image identifier

```
last-served-image-id <value>
```

Identifier for the last image served to the client

3.2.1.1.2.7 Extra parameters

```
  begin-multiline-command
             extra-parameters ^---><value><---^
  end-multiline-command
```

Client's DHCP extra parameters

> **Note**
>
> You cannot use double quotes ("") in extra parameters multiline commands. Instead enter its HTML number ".

3.2.1.2 DHCP server configuration

```
dhcp-server
```

DHCP server configuration

3.2.1.2.1 Subnet

```
subnet <value>
```

Subnet address where the DHCP server provides IP addresses

3.2.1.2.2 Mask

```
mask <value>
```

Subnet Mask

3.2.1.2.3 IP allocated start

```
ip-allocated-start <value>
```

Start of the DHCP IP addresses range

3.2.1.2.4 IP allocated end

```
ip-allocated-end <value>
```

End of the DHCP IP addresses range

3.2.1.2.5 DHCP server IP address

```
dhcp-server-ip <value>
```

DHCP server IP address

3.2.1.2.6 Broadcast address

```
broadcast-address <value>
```

Broadcast address used in the client subnet

3.2.1.2.7 Router address

```
router-address <value>
```

IP addresses for routers in the client subnet. Separated by commas.

3.2.1.2.8 Domain name

```
domain-name <value>
```

Domain name client should use when resolving hostnames via the Domain Name System

3.2.1.2.9 DHCP relay interfaces

```
dhcp-relay-ifaces
```

DHCP relay interfaces. Separated by commas.

3.2.1.2.10 Enable DHCP

```
enable-dhcp
```

Enables DHCP service

3.2.1.3 Manage images

```
manage-images
```

Manages image configuration

3.2.1.3.1 Images directories

```
upload-images
```

Images directories configuration

3.2.1.3.1.1 Add Image

```
add image <value> image-id <value> date <value> description <value>
```

Adds an entry to the images table

- *image* : Image name.
- *image-id* : Image identifier image.
- *date* : image directory creation date.
- *description* : image description.

3.2.1.3.1.2 Individual image configuration

```
image <value>
```

- *image* : Name of the image.

Individual image configuration

(a) *Name*

```
name <value>
```

Image name

(b) *Identifier*

```
id <value>
```

Image identifier

(c) *Date*

```
date <value>
```

Image creation date

(d) *Description*

```
begin-multiline-command
         description ^---><value><---^
end-multiline-command
```

Image description

(e) *Extra parameter*

```
begin-multiline-command
         extra-parameters ^---><value><---^
end-multiline-command
```

Image extra parameters

3.2.1.3.2 Default image

```
default-image
```

Default image configuration

3.2.1.3.2.1 Default image identifier

```
default-image-file <value>
```

Default image identifier

3.2.1.3.2.2 Enable default image

```
enable-default-image
```

Enables the use of the default image

3.2.1.3.2.3 Extra parameters

```
begin-multiline-command
            default-image-extra-parameters ^---><value><---^
end-multiline-command
```

Default image extra parameters

> **Note**
>
> You cannot use double quotes ("") in default image extra parameters multiline command. Instead enter its HTML number ".

Chapter 4 Use cases

In this section several user scenarios are presented with the purpose of showing the capabilities of the Bootserver application. This also acts as a practical guide to take you through the application web in order to have a correctly configured system ready to go.

4.1 VDI example (using VMware)

In this example scenario you want to use six old PCs to connect to Virtual Desktops using VMware VDI solution. The process is described step by step.

(a) *Get ready the virtualization infrastructure.* Firstly, get the virtualization infrastructure ready. You need at least one server with Esxi where the virtual desktops run. You also need a VMware Connection Server that works as a broker between the clients and the virtual desktops. The configuration of the virtualization infrastructure is not within the intended scope of this user guide.

(b) *Obtain an image with the VMware client.* You need to obtain or make an image with the Vmware client. The Vmware client application allows you to connect the client to the Vmware Connection server, which manages the access to the virtual desktops.

(c) *Set DHCP server configuration.*

    (a) Enter the Bootserver application configuration web and click on the "Dhcp server" tag in the left hand menu to enter the DHCP server configuration .

    (b) In this section a list of parameters are presented to be filled out. The meaning of each of them is described in the *DHCP configuration section* on page 9 of this guide. Take a look and fill out the fields with the appropriate data. For this example let´s define a private subnet "10.0.0.0" with mask "255.0.0.0". Firstly set a range of IPs wide enough for all our clients amount: starting with "10.0.0.105" and ending with "10.0.0.125". The DHCP server IP is the same as the web shown as Server IP in the status, the one where the Bootserver is running with its DHCP server (this is the most common configuration). The broadcast address is "10.255.255.255". The router IP is "10.0.0.1", the Atlas i6x address on the interface where our clients LAN are connected. The domain name could be "bootserverdemo.net". In that case, due to the VMware requirements, it must be the same as the domain the clients and VMware connection server are in. In this example the DNS1 must take the Active Directory Controller IP address for the "bootserverdemo.net" domain as the VMware needs this for client authentication and the DNS2 could be anything, such as google's DNS "8.8.8.8". Enter the Atlas i6x interface name in the DHCP relay interfaces field where the IP address for the DHCP server is provided. In our example this is ethernet0/2".

    (c) When all the data has been entered, check the "enable dhcp" checkbox. This permits the DHCP configuration file to be modified and boots the DHCP server. This step can be carried out at the end of the configuration process if you prefer.

    (d) Press the "modify" button to save and apply all the changes in this configuration screen. If the "enable dhcp" has been checked, the changes are written in the DHCP configuration file and DHCP server starts immediately. If the "enable dhcp" check-box is checked and "modify" button previously clicked (DHCP server is alredy running), the DHCP server restart to apply the configuration changes.

(d) *Create an image directory for VMware image.*

    (a) Click on the "Manage Image" tag in the left hand menu.

    (b) In the left hand menu, click on "Directories" to enter in the Image Directories configuration section.

    (c) This section shows you an image table. At the bottom of the table there are some empty fields that you have to fill out to create a new image. Name, for example, "Virtualization1"; id., for example: "vmware"; the date is provided by the system and a description, in this case: "Image with vmware client". Click the add button located on the right of the row . A message "added properly" confirms the success of the operation. A new row subsequently appears in the table with the image data.

(e) *Set default image.*

    (a) Now, click on "default image" on the left hand menu. This takes you to the default image configuration section.

    (b) You want all your clients to receive the same image and you don't want to register your client machines one by one entering their MAC address and other data. In the default image section you can select an image

from the available images field. This image is served by default to all new clients asking the Bootserver application for an IP address and an image. In this case the selected image is "vmware", the previously registered image identifier.

(c) Check the "default image enable" check-box to enable the default image.

(d) You can also enter some extra parameters in the appropriate field, however please Make sure these are allowed parameters.

(e) Once this has been completed, click on the "modify" button and the changes are saved.

(f) *Start the client machines.*

(a) Start the client machines and wait for the machines to boot. The VMware client image should download to them.

(b) Click on "Clients" in the left hand menu. A client's table appears where each new client is displayed in a row with its MAC, a generic name: "detected_client_1", and an IP address set to "auto". This means that the client dynamically takes an IP from the DHCP on next reboot and the image cell is set to "vmware". This image is also received on the next reboot. To check the client's current status, click on the "show status" button. A new table appears showing the client rows where you can see the MAC, name, date of last service to the client, IP address provided, the image served and the status (running or stopped depending on the client response to a ping to the registered IP address).

4.2 Replacing a broken machine

To replace a broken machine, please carry out the following:

(a) If the image and other configuration parameters of the old machine are the same as the default image settings and the default image is enabled, simply connect the new machine and start it. It receives an IP address plus the default image and the Bootserver application automatically registers it.

(b) In other cases, you have to create a new machine in the Bootserver application.

(a) Click on "clients" on the left hand menu and access to the clients configuration section.

(b) At the foot of the clients table, there are some fields that need to be filled out to create a new machine; the new machine MAC e.g. "00:1a:92:9b:67:d2", machine name "Replacement", set the IP address to 'auto' or leave this field empty if you want the DHCP server to dynamically assign an address from the range defined in the 'DHCP Server' configuration for the new machine (you can define an out of range fixed address for this machine, but it cannot be the same as the old one until you've removed the old machine entry from the table) and finally select the same image the old machine had

(c) If the old machine had some extra parameters defined, enter in the individual client configuration section by clicking on the client name in the left hand menu. Copy the extra parameters in the appropriate field in the individual client configuration screen and click on the "modify" button so the changes take effect.

(d) Click on the "add" button on the right of the row to add the new machine. The table shows a new row with the information.

(c) Connect and start the new machine.

(d) Remove the old machine from the clients table by clicking on the "delete" buttonto the right of its row. This must be done more than an hour after the last old machine´s reboot. Prior to that time the Bootserver auto-registers the old machine again.

4.3 Changing image for some of your clients

Image the scenario described in the VDI example (using VMware) on page 22. We want three of our clients to stop using VMware and start using a Citrix VDI solution instead with the rest still using VMware.

(a) *Create an image directory for the Citrix image.*

(a) Click on the "Manage Image" tag in the left hand menu.

(b) In the left hand menu, click on "Directories" and enter the "Image Directories" configuration.

(c) This section shows you an image table. At the foot of the clients table, there are some fields that need to be filled out to create a new image: name e.g. "Virtualization2"; id. e.g. "citrix"; the date provided by the system and a description (in this case: "Image with citrix receiver"). Click the add button located on the right of the

row . A message appears "added properly", confirming success. A new row now appears in the table with the image data.

(b) *Assign the new image to the clients.*

    (a) Click on "Clients" on the left hand menu. The client names will deploy on the menu.

    (b) Click on the name of one of the clients that you want to assign the new image to. This opens the individual client configuration.

    (c) Change the image field and set it to the "citrix" image.

    (d) Click on the "modify" button to apply the change.

    (e) Repeat this process with the other machines where you want to change their image.

(c) *Reboot clients* Now you have the correct image assigned to the selected clients. Reboot the client machines whose image has changed.

4.4 Uploading a new version of an image

Suppose you have a new version of an image and you want to both upload and serve it to the same clients as you have been doing till now and under the same conditions (same configuration).

(a) Access the image directory for the image you want to update using the SMB user and password as described in the *Remotely accessing image directories* on page 14.

(b) Remove the image files of the image from the "bootserver/boot_files/<image_id>" and the "bootserver/client_images/<image_id>" directories.

(c) Upload your new file images to the same directories. Remember that the image file that is served by NBD must have the image identifier name, i.e. "bootserver/client_images/<image_id>/<image_id>.img".
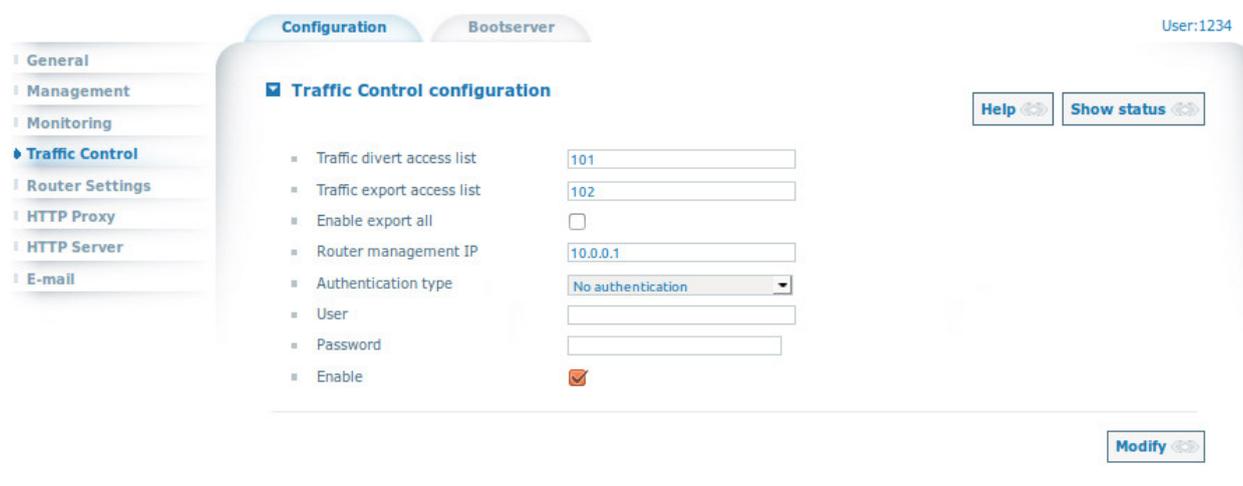
(d) Reboot the client machines.

Appendix A General Configuration

The Bootserver needs to have some particular configuration on the CIT for doing its functions. This configuration can be done in two ways: using the configuration web of the Atlas i6x or configuring the CIT manually. With the web option you are going to enable the access to the CIT for the Atlas i6x applications. The Bootserver will do automatically the configuring process. In the case of doing it manually you have to access to the CIT to enter a DHCP relay server entry. With the manual configuration the "Server IP" parameter of the DHCP server configuration status section will show a warning instead of show the application host IP address.

A.1 Enabling CIT access for the applications in the configuration web.

(a)   Enter in the Atlas i6x "Configuration" section in the web the "Configuration" icon (a gear) or the "Configuration" tab at the top. The left hand menu will show you several options.

(b)   By clicking on the "Traffic Control" option you access the "Traffic Control" configuration screen.

(c)   Here you can see a checkbox labeled "enable". Check this and click on the "modify" button to enable traffic control and to allow applications such as the Bootserver to access the CIT configuration.

Fig. A.1. Configuring Traffic Control

A.2 Configuring CIT manually to enable DHCP relay

(a) Execute telnet to the CIT IP address.

```
telnet <CIT-address>
```

(b) Enter the dynamic configuration mode.

```
p 5
```

(c) Enter the interface(s) menu where DHCP server is running.

```
network <interface-name>
```

(d) Enable the DHCP relay agent in the required interfaces specifying the DHCP server IP address (this is usually the application's host address as this is where the DHCP server configured by the Bootserver is running).

```
ip dhcp-relay server <dhcp-server-ip>
```

(e) Exit the interface menu.

```
exit
```

(f) Exit the dynamic configuration.

```
ctrl + p
```

(g) Exit telnet.

```
logout
```

Appendix B Extra Parameters

The Bootserver application allows you to enter extra parameters in three situations.

(a)   In the *individual client* configuration: the extra parameters only affects a certain client.

(b)   In the *individual image* configuration: the extra parameters affect all the clients using a certain image.

(c)   In the *default image* configuration: if default image is enabled the *extra parameters affect all the clients* regard-
        less of the image they have been assigned.

The extra parameters are options that can be sent in the DHCP packages to configure the client. They are sent as a
response to a client request.

B.1 Allowed extra parameters

Each extra parameter is associated to a code number, which identifies it in the DHCP package. The parameters and
codes are standardized an you have to use the standard names for them together with the appropriate value type.
For example, you cannot enter the parameter host-name using data different to a string (*host-name "thinclient"* is
correct but *host-name 15* isn't).

The Bootserver application doesn't admit your own defined parameters.

A list of options is available here:

https://www.iana.org/assignments/bootp-dhcp-parameters/bootp-dhcp-parameters.xhtml

See also the RFCs 2939, 2132, 2131 and 951.

B.2 Overwriting parameters

It is possible to overwrite parameters. That means you can declare the same parameters in the three levels: default
image (general), image and client. The parameters hierarchy is as follows: client parameters have priority over image
parameters and image parameters have priority over default image (general) parameters.

This can be useful if you want declare a parameter to apply to all clients that use a certain image except one. In this
case you can declare in the image extra parameters, a parameter with one value and in the individual client configur-
ation the specific client you want to provide with a different configuration configured in set the same parameter with
other value. The client value takes priority over the image value.

Appendix C Troubleshooting

Here you can find several situations and their possible solutions described. These can help you search for solutions when Atlas i6x Bootserver application is not running properly.

We assume that your Bootserver application is installed in the Atlas i6x Application Host and the device is accessible over the network.

C.1 Problem: DHCP server config section doesn't show the "Server Ip"

This is possible when the Bootserver application cannot access the CIT. Make sure that "Traffic control" is enabled in the Atlas i6x web General Configuration.

- Follow the steps described in the section *Enabling CIT access for the applications in the configuration web.* on page 24 to enable "Traffic control".

C.2 Problem: Client is not receiving IP address via DHCP

This situation could be produced by the following causes.

- DHCP service is not running. Make sure that the "DHCP enable" checkbox is checked in the DHCP configuration section. If it is, uncheck it and click on modify to save the configuration. Recheck this field and click on modify once more thus restarting the DHCP server. If the DHCP enable field is not checked, then check it.
- Loss of connectivity. Check that the device is connected to the network.

C.3 Problem: Client only receives IP address via DHCP but not the assigned image

This situation could be produced by the following causes.

- TFTP is not running.
- Check this in the web section main configuration status page. The TFTP service should start when the Bootserver application starts. If it isn't running, make any necessary changes in the configuration; this should enable the TFTP service again.
- Loss of connectivity. It's possible that the connection has been lost during the boot process. Make sure you have connectivity between client an Bootserver and restart the client machine to reinitiate booting.

C.4 Problem: Client receives IP via DHCP and boot files via TFTP but doesn't start.

If client starts but falls in any kind of initrd command terminal, that means that the image hasn't been served right via NBD. This could be caused by different reasons:

- There isn't an image file in the "client_images/<image-id>/" directory. Be sure that you upload the image there. Remember that the image files status information only refers to the boot files, not to the optional image served by NBD.
- NBD service is not running. In that case, any change in the configuration (disable and enable the DHCP in DHCP server configuration, for example) will check if NBD service is running and start it if not.
- Loss of connectivity. It's possible that the connection has been lost during the boot process. Make sure you have connectivity between client an Bootserver and restart the client machine for initiate again the boot process.

C.5 Problem: Clients status shows a client machine stopped but it is

running

- Loss of connectivity. The client status window shows if the client responds to a ping from the server. If the client machine is not running, this is interpreted as a connectivity problem.
- This could also mean that the client IP address saved and shown by the Bootserver is wrong. Maybe because the client has changed its IP address.

C.6 Problem: DHCP server doesn't seem to be using the configuration determined by you on the web.

- DHCP service hasn't restarted. The DHCP server needs to restart to apply the changes made in the configuration. This restart happen immediately after a configuration change but can take several seconds. If you have waited for some time and the restart hasn't taken place, try and force the DHCP to restart: uncheck the "dhcp enable" checkbox and click on the "modify" button to stop DHCP server. Then check the checkbox again and click on the "modify" button. This should start the DHCP immediately.

C.7 Problem: Bootserver doesn't allow you to enable DHCP showing an error message but the DHCP configuration appears to be correctly configured.

Remember that you can only enable DHCP and start the DHCP server if the DHCP has been correctly configured. When DHCP is not enabled the Bootserver application allows you to fill out the configuration fields however you may fill out some of the fields incorrectly such as leaving empty parameters in the DHCP server configuration or setting IP addresses for the clients NOT included in the subnet defined in the DHCP server configuration. The aim of this is to make the configuration process easier for the user (you don't have to follow any order in the process). When you enable the DHCP an error message is shown if any parameters are incorrectly configured. With the DHCP enabled any change you make is checked. Please check the following issues to find the error source.

- Make sure that all the DHCP server section parameters are filled out. Do not leave any blank.
- In the DHCP server section check the start and end of the IP range as well as the other IP addresses except for the DNS addresses are in the defined subnet.
- In the Clients configuration section check that none of the clients have a fixed IP address configured which is IP outside the subnet defined in the DHCP server configuration or an IP that falls into the DHCP dynamic IP range, defined in the same section.
- Check that the DHCP relay interfaces entered in the DHCP server configuration field are actually Atlas i6x available interfaces.