

Proxedo Network Security Suite 2 Installation Guide

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Preface

1. Target audience and prerequisites

This guide is intended for use by system administrators and consultants responsible for network security and whose task is the configuration and maintenance of PNS firewalls. PNS gives them a powerful and versatile tool to create full control over their network traffic and enables them to protect their clients against Internet-delinquency.

This guide is also useful for IT decision makers evaluating different firewall products because apart from the practical side of everyday PNS administration, it introduces the philosophy behind PNS without the marketing side of the issue.

The following skills and knowledge are necessary for a successful PNS administrator.

Skill	Level/Description
Linux	At least a power user's knowledge is required.
Experience in system administration	Experience in system administration is certainly an advantage, but not absolutely necessary.
Programming language knowledge	It is not an explicit requirement to know any programming languages though being familiar with the basics of Python may be an advantage, especially in evaluating advanced firewall configurations or in troubleshooting misconfigured firewalls.
General knowledge on firewalls	A general understanding of firewalls, their roles in the enterprise IT infrastructure and the main concepts and tasks associated with firewall administration is essential. To fulfill this requirement a significant part of <i>Chapter 3, Architectural overview</i> in the <i>PNS Administrator's Guide</i> is devoted to the introduction to general firewall concepts.
Knowledge on Netfilter concepts and IPTables	In-depth knowledge is strongly recommended; while it is not strictly required definitely helps understanding the underlying operations and also helps in shortening the learning curve.
Knowledge on TCP/IP protocol	High level knowledge of the TCP/IP protocol suite is a must, no successful firewall administration is possible without this knowledge.

Table 1. Prerequisites

2. Products covered in this guide

The PNS Distribution DVD-ROM contains the following software packages:



- Current version of PNS 2 packages.
- Current version of Management Server (MS) 2.
- Current version of Management Console (MC) 2 (GUI) for both Linux and Windows operating systems, and all the necessary software packages.
- Current version of Authentication Server (AS) 2.
- Current version of the Authentication Agent (AA) 2, the AS client for both Linux and Windows operating systems.

For a detailed description of hardware requirements of PNS, see *Chapter 1, System requirements (p. 1)*.

For additional information on PNS and its components visit the [PNS website](#) containing white papers, tutorials, and online documentations on the above products.

3. Contact and support information

This product is developed and maintained by BalaSys IT Ltd..

Contact:

BalaSys IT Ltd.
4 Alíz Street
H-1117 Budapest, Hungary
Tel: +36 1 646 4740
E-mail: <info@balasys.hu>
Web: <http://balasys.hu/>

3.1. Sales contact

You can directly contact us with sales related topics at the e-mail address <sales@balasys.hu>, or *leave us your contact information and we call you back.*

3.2. Support contact

To access the BalaSys Support System, sign up for an account at *the BalaSys Support System page.* Online support is available 24 hours a day.

BalaSys Support System is available only for registered users with a valid support package.

Support e-mail address: <support@balasys.hu>.

3.3. Training

BalaSys IT Ltd. holds courses on using its products for new and experienced users. For dates, details, and application forms, visit the <https://www.balasys.hu/en/services#training> webpage.



4. About this document

This guide is a work-in-progress document with new versions appearing periodically.

The latest version of this document can be downloaded from the [*Documentation Page*](#).

4.1. Feedback

Any feedback is greatly appreciated, especially on what else this document should cover, including protocols and network setups. General comments, errors found in the text, and any suggestions about how to improve the documentation is welcome at <support@balasys.hu>.

Chapter 1. System requirements

This section outlines hardware and software requirements for running PNS on your firewall.

1.1. Hardware requirements for a PNS firewall host

Processor: PNS requires a 64-bit capable x86 processor (for example, Intel Core i series, Intel Xeon, AMD Ryzen, AMD EPYC, and so on).

Memory: At least 4 GiB RAM is recommended, though 2 GiB is acceptable on systems with low load.

Hard disk: Though PNS itself requires minimum of 16 GiB of disk space, 256 GiB or larger disk space is recommended to have enough space for log files, for example.

Hardware compatibility: PNS runs on Ubuntu, currently using version 5.15 of the Linux kernel. Most hardware supported by Linux is also supported by PNS.

**Note**

Make sure to install PNS on hardware that is Ubuntu Server certified. For a list of Ubuntu Server certified hardware, see [Ubuntu Server certified hardware](#).

**Tip**

Use disks designed for servers: other disks are not planned for 24/7 usage, and to participate in RAID sets. Use 2 or more redundant disks in a RAID array to prevent data loss and downtime (the PNS automatic installer supports software RAID mirroring).

For details on sizing a PNS host, see *Section 1.1.1, Sizing PNS hosts (p. 1)*.

**Tip**

A modern 1- or 2-unit-high server with remote management port is usually an optimal solution. Its size depends on the number of required LAN ports. Use reliable or brand hardware for your firewall with dual power supply and UPS.

1.1.1. Sizing PNS hosts

Correctly sizing the hardware is a difficult task. Actual hardware requirements of a running system depend on several factors, and taking everything into account is rarely possible. The three most demanding aspects of transmitted traffic are: number of new/parallel sessions, bandwidth, and log subsystem settings.

Number of new/parallel sessions:

The number of parallel sessions directly affects memory and CPU usage. In addition to standard operating system memory requirements, PNS uses memory for each established session. Usually, the following factors have to be taken into account:

- OS: 64-128 MiB is sufficient for the OS to operate.



- *Per PNS instance:* For each and every running PNS instance about 10-20 MiB is required depending on the complexity of the configuration (zones, proxies, services, and so on).
- *Per session:* For each additional session about 200 kiB is needed (kernel socket buffers, thread-specific data, dynamic proxy state information, and so on).

On an average firewall handling 500 sessions in 10 instances approximately 256-768 MiB memory is required. The required memory really depends on the complexity of the policy (content filtering can really increase the needs due to the various data buffers).

The question now is how many sessions a given number of clients generate. It can be assumed that peak load is caused by HTTP traffic, which is the most demanding application on the Internet today. Each object on the World Wide Web is fetched by a separate session of HTTP if keep-alive connections are not allowed, and a single web page consists of many objects as each picture is an object on its own. If keep-alive is allowed then only a few sessions are used by a client, and a good estimate is that a single browser opens four sessions simultaneously to fetch a page and additional graphics. Therefore, if you had 100-120 clients browsing constantly, your firewall would have to handle 400-480 sessions at a time as a peak.

Bandwidth:

Bandwidth adds another aspect to hardware requirements. You might need a single session only, but that single session could require 155 Mbit/sec fully saturated. This defines CPU requirements, but this is much more difficult to estimate. The CPU power is required mainly by session startup and by complex policies (for example, lot of customizations). Of course the bandwidth is important too. An average 2-3 GHz CPU with enough memory can handle about 50-100-150 new sessions per second depending on the type of traffic.

For performance tests, contact your PNS Support Partner.

Log subsystem settings:

Default log settings of PNS generate about 3-400 bytes of log messages for a single session. On a firewall serving 100000 sessions a day, this means 30-40 MiB of log messages. Increasing the verbosity level adds to this amount. You should carefully fine-tune the logging subsystem by selecting the messages you are really interested in, thus decreasing both storage and runtime demands.

1.2. Hardware requirements for Management Server (MS) and Authentication Server (AS) hosts

MS and AS do not require many resources — a virtual machine can be adequate.

Minimal hardware configuration:

- *Processor:* A 64-bit capable x86 processor.
- *Memory:* 1 GiB RAM.
- *Hard disk:* A minimum of 2 GiB, but significant amount of additional disk space can be required for logging.



1.3. Hardware requirements for a Content Filtering (CF) host

Content vectoring can consume significantly more resources than a simple PNS host. The exact requirements depend heavily on the actual traffic and the type and extent of the content analysis. In general, use the hardware requirements of *PNS hosts*.

1.4. Hardware requirements for a Management Console (MC)

Minimal hardware configuration:

- *OS:* MC runs on GNU/Linux platforms, and on Microsoft Windows.
- *Processor:* A 64-bit capable x86 processor.
- *Memory:* 512 MiB RAM.
- *Hard disk:* A minimum of 100 MiB disk space is required.

Chapter 2. Account requirements

This section describes the details on the account types that will be required at certain points of the installation or upgrade process.

2.1. Personal account

You will need a personal account to access the following sites:

- download.balasy.eu
- upload.balasy.hu
- support.balasy.hu

The personal account is also used to download files manually.

To register a personal account, send an email to <sales@balasy.hu> with the following personal data:

- full name
- phone number
- company name
- job title



Note

During a product evaluation period, the Sales Department grants time-limited access rights for the personal account.

After closing a sales process, access is granted for the required number of employees of the organization and a technical account is created. For details on a technical account, see *Section 2.2, Technical account (p. 4)*

2.2. Technical account

You will need a *BalaSys Support System* technical account to access the following sites:

- apt.balasy.eu

The technical account is not used for manual access, but for machine access. For example, it is used to upgrade PNS hosts using APT.



Note

During a product evaluation period, creating a technical account is not possible.

After closing a sales process, a technical account is created automatically.

Chapter 3. Installing PNS on an existing Ubuntu server

This chapter describes how to turn an existing Ubuntu server into a PNS host.

Before starting the installation, advance planning is necessary for a successful firewall implementation. All the critical network parameters, such as firewall IP addresses, routing topology, DNS hierarchy, and so on must be known in advance.

The following IP addresses are particularly important:

- IP address of the PNS host.
- IP address of the MS host.
- IP address of MC.

In addition, you must prepare the following:

1. Define firewall administration roles with a corresponding password policy.
2. Define a number of passwords that protect various elements of the system.
3. Record these passwords (according to the security policy of your organization) and keep them safe for later use.



Note
PNS must be installed on Ubuntu 22.04 LTS.

3.1. Procedure – Installing Ubuntu Server

Purpose:

To install Ubuntu Server, complete the following steps.

Prerequisites:

- Make sure to install Ubuntu Server on a supported hardware. For hardware requirements, see *Section 1.1, Hardware requirements for a PNS firewall host (p. 1)*.

Steps:

- Step 1. Download Ubuntu 22.04 LTS from the [Ubuntu Server downloads](#) page.
- Step 2. Write the installer to an installer media. This is typically an USB drive.
- Step 3. Boot the system from the installer media and select the following options:
 - Ubuntu Server (default install).
 - Use an entire disk (Set up this disk as an LVM group).
 - Install OpenSSH server.



3.2. Procedure – Installing PNS on a Ubuntu server

Purpose:

If you want to install PNS on an existing Ubuntu server, complete the following steps.

Prerequisites:

- An already installed Ubuntu 22.04 LTS server. Install only services and applications that you absolutely need. For details on installing Ubuntu Server, see *Procedure 3.1, Installing Ubuntu Server (p. 5)*.
- Ensure that you have a working *BalaSys Support System* registration and that you have downloaded the required PNS license files.

Steps:

Step 1. Login to the host as root from a local console or using SSH.

Step 2. Update your system and upgrade the PNS-related packages. This is important, because there might be newer packages available. To update your system, enter the following commands:

```
sudo apt update
sudo apt dist-upgrade
```

Note that during this step, some packages may be downgraded. This is normal.

Step 3. Create the following mount point for the PNS install medium:

```
sudo mkdir -p /media/cdrom
```

Step 4. Mount the PNS install medium to the previous mount point.

```
sudo mount /dev/cdrom /media/cdrom -o ro
```

Step 5. Add PNS installer package repositories to APT's list of available sources.

```
sudo /media/cdrom/add-pns-installer-apt-repository
```

Step 6. Install the PNS components that you want to use on the host. Issue the following command: `sudo apt install <PNS-components-to-install>`, where replace the `<PNS-components-to-install>` part of the command with the package names of the PNS components that you want to use on the host. The following packages are available:

- **PNS Application-level Gateway:** The package required for a firewall host. (Package name: *pns-product-alg*)
- **Management Server:** MS — depending on its product license — can be installed on the PNS firewall host or on a separate machine. (Package name: *pns-product-ms*)
- **Authentication Server:** AS enables the authentication of network traffic on the user level at the firewall using password, CryptoCard, S/key, or X.509 methods. Integrating with existing Microsoft Active Directory, LDAP, PAM, and Radius databases is also supported.

The module can be installed either together with the PNS and MS modules or separately at a later date. (Package name: *pns-product-as*)

- **PNS URL Filtering:** The package is required for the URL filtering functionality on a firewall host. (Package name: *pns-product-urlfilter*)
- **Content Filtering:** CF is a framework and a uniform interface to manage various built-in and third party content filtering modules (that is, virus and spam filtering engines). The content filtering modules to be installed (in addition to the CF framework) can be selected from the following list. (Package name: *pns-product-cf*)



Warning

The CF framework and the content filtering modules must be installed on the same host.

- **ESET's NOD32 antivirus engine:** This module contains the libraries and virus signature databases needed for using the ESET's NOD32 antivirus engine. (Package name: *pns-product-eset*)
- **ClamAV Antivirus Scanner:** This module contains the libraries and virus signature databases needed for using the ClamAV antivirus engine. (Package name: *pns-product-clamav*)
- **SpamAssassin spam filter:** This module contains the libraries and databases needed for using the SpamAssassin spam filtering engine. (Package name: *pns-product-spamassassin*)
- **ModSecurity:** This module contains the libraries needed for using ModSecurity Web Application Firewall (WAF) engine. (Package name: *pns-product-waf*)

For further information on the different modules, see the [Chapter 14, Virus and content filtering using CF](#) in *Proxedo Network Security Suite 2 Administrator Guide*.

Below are some guidelines about which modules should be installed on the different types of machines.

- When installing a single firewall (or a node of a cluster) that will be managed from a separate MS host, select only the **PNS Application-level Gateway (ALG)** component.
- The third-party modules that can be used by CF must be licensed separately from PNS. Select them only if you have a valid license for them, and only when you are installing the host that will run CF.
- When installing a MS host that will manage one or more PNS firewalls, but the machine itself will not be used as a firewall, select the **Management Server (MS)** component.
- If you will use a single host as the firewall and MS, select the **Management Server** and the **PNS Application-level Gateway** components. Also select **Content Filtering** and its required modules, and the **Authentication Server** component if you have purchased licenses for them.
- **Authentication Server (AS)** is an optional, central authentication service that can be installed on a PNS machine. If you have license for AS select it together with the **PNS Application-level Gateway** component. This service must be licensed separately.

**Note**

The **Management Console** and the **Authentication Agent** applications are client-side components that cannot be installed on PNS hosts. Their installation is discussed in *Chapter 5, Installing the Management Console (MC)* (p. 24) and *Chapter 6, Installing the Authentication Agent (AA)* (p. 26), respectively.

After choosing the modules to install, select **Continue**.

**Note**

When you continue the installation, some steps may not appear for you, depending on the components you have selected to install.

Step 7. Remove PNS installer package repositories from APT's list of available sources.

```
sudo /media/cdrom/remove-pns-installer-apt-repository
```

Step 8. Umount the PNS install medium from the file system.

```
sudo umount /dev/cdrom
```

Step 9. Configure network interface bootstrap by MS.

Step 10. Reboot the system:

```
sudo reboot
```

Step 11. Repeat this procedure to install other hosts if needed for your environment.

Step 12. If you have installed a Management Server (MS), install the Management Console (MC) application on the desktop of your PNS administrators. For details, see *Chapter 5, Installing the Management Console (MC)* (p. 24).

3.3. Overview of the installation process

The installation process can be divided into three main parts:

- *Configuring native services and the PNS modules*: This phase installs and configures the components of PNS (for example MS, AS, and so on). Numerous other services (like the mail transfer agent (Postfix), Secure Shell and IPsec access, and so on) are also configured in this phase. See *Section 4.1, Configuring PNS modules* (p. 10) for details.
- *Installing MC*: In order to access the Management Server (MS) remotely using the Management Console (MC), MC has to be installed on the machine from which PNS hosts will be administered. The IP address of this machine has to be known in advance, as during the installation MS has to be configured to accept connections from this machine. See *Chapter 5, Installing the Management Console (MC)* (p. 24) for details.

PNS has an easy-to-use text-based installer through debconf, requiring only a keyboard (mouse is not needed nor supported by the installer). Navigation between the different options of a screen is possible using the cursor buttons. Selected actions (for example **Go back** or **Continue**) is highlighted in red. When multiple selection is possible use space to select/deselect a given item (for example when selecting the PNS modules to be installed).



3.4. Reconfiguring already installed packages

If certain packages have been configured or installed incorrectly, use the `dpkg-reconfigure <package-name>` command (for example, `dpkg-reconfigure strongswan`).

Chapter 4. Configuring PNS components

4.1. Configuring PNS modules

4.1.1. Procedure – Configuring Postfix

Purpose:

PNS uses Postfix as a native service for handling emails. A mail transferring agent (MTA) must be installed on the machine at least for delivering the locally generated messages.

Steps:

Step 1. Select the mail server configuration that best meets your needs. The following options are available:

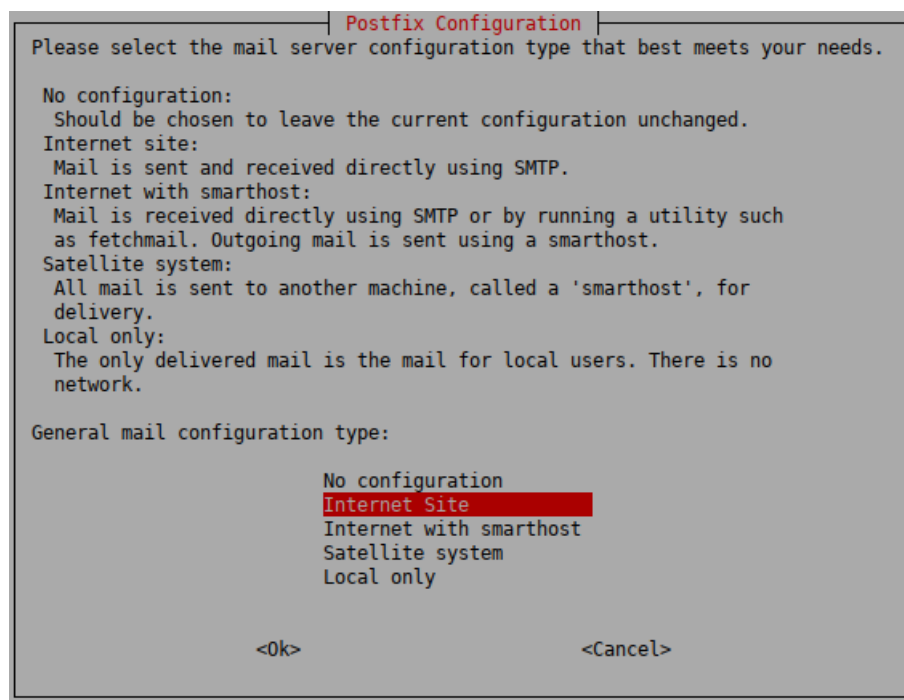


Figure 4.1. Postfix Configuration - General

- **No configuration:** No configuration changes will be done. Use this option if a working Postfix configuration is already available on the host, or if you wish to configure Postfix manually from MC.
- **Internet Site:** Sending and receiving mails is possible by using SMTP directly. This option is suitable in the most common scenarios.
- **Internet with smarthost:** Mails are received either by using SMTP directly or by running a utility such as `fetchmail`. Outgoing messages are sent through another machine (a smarthost).

- **Satellite system:** No mail is received locally. Root and postmaster mails are handled according to `/etc/aliases`. All messages are sent to another machine (a smarthost) for delivery.
- **Local only:** Mails are only delivered locally on the machine for local users. There is no network.

Step 2. Enter the name that should appear in the domain part of the outgoing mail (that is, after the `@` character). This name will also be used by other programs. It should be the fully qualified domain name (FQDN).

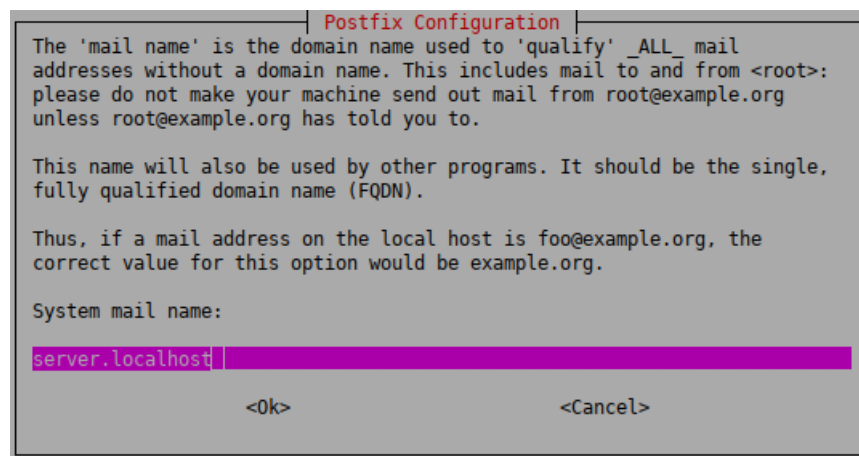


Figure 4.2. *Postfix Configuration - mail name*

4.1.2. Procedure – Configuring the pns-common package

Purpose:

If you are installing CF, then configure the `vavupdate` tool that updates the databases of the virus filtering engines:

Steps:

Step 1. **HTTP proxy:** The `vavupdate` application can download database updates through HTTP. Type the URL of the HTTP proxy to be used (or leave blank if the updates can be downloaded directly without using a proxy server).

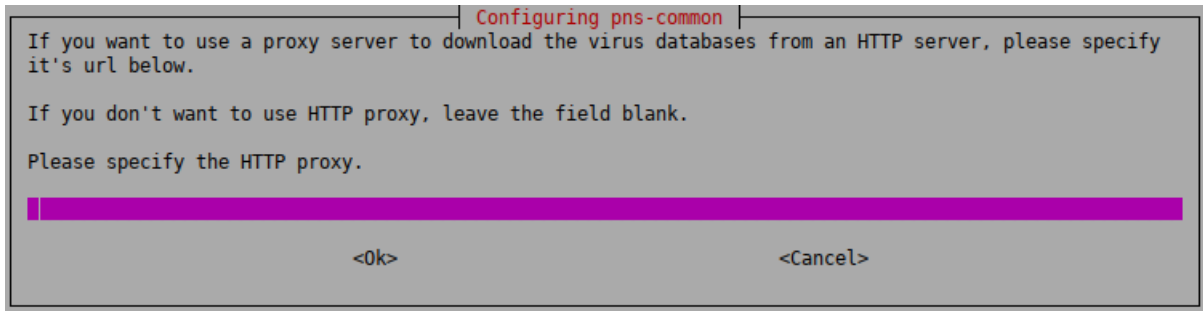


Figure 4.3. **Configuring pns-common** - Configuring the HTTP proxy for database updates

- Step 2. **Send update logs in email:** `vavupdate` can send the logs of the periodic antivirus (AV) update to the administrator through email. Type the address of the administrator and the subject to be used in these emails. If you do not want email notifications, leave it blank.

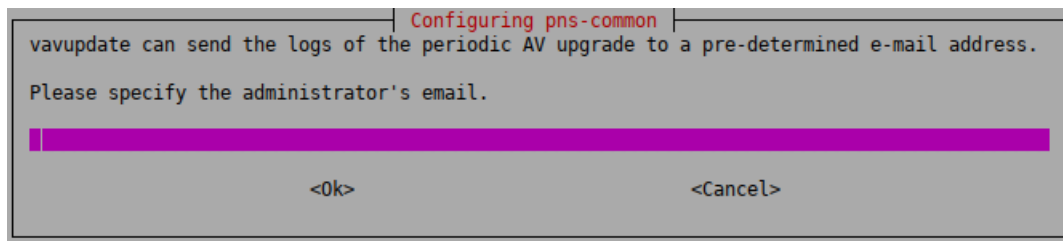


Figure 4.4. **Configuring pns-common** - Specifying the administrator's email address



Note

It is not advised to use a personal email address. Instead, use an address of a shared folder that can be accessible to whom it belongs. It can also be the address of a mailing list. In this way, more than one administrator can be notified at the same time, and the archive of the messages can be accessed by more than one administrator.

- Step 3. **Specifying email prefix:** `vavupdate` can add a prefix to the subject of the emails it sends to make sorting the messages easier for the administrator. Type a prefix (for example the name of the host in square brackets), or leave these fields blank. You can use command substitution using backticks (`) to include the output of any Linux shell command in the subject. This command will be run before sending the email and the output of the command will be the prefix of the email.



Note

This setting can only be changed manually later. Therefore, make sure that you enter a value that you will not want to change.

As a best practice, use a command rather than a fixed name. A command will dynamically follow the changes to your infrastructure, however, a fixed name will not. For example, if you use the name of the host `myhost1` and later you rename your host `myhost2`, you will still be receiving emails with the `myhost1` prefix and that can be confusing.

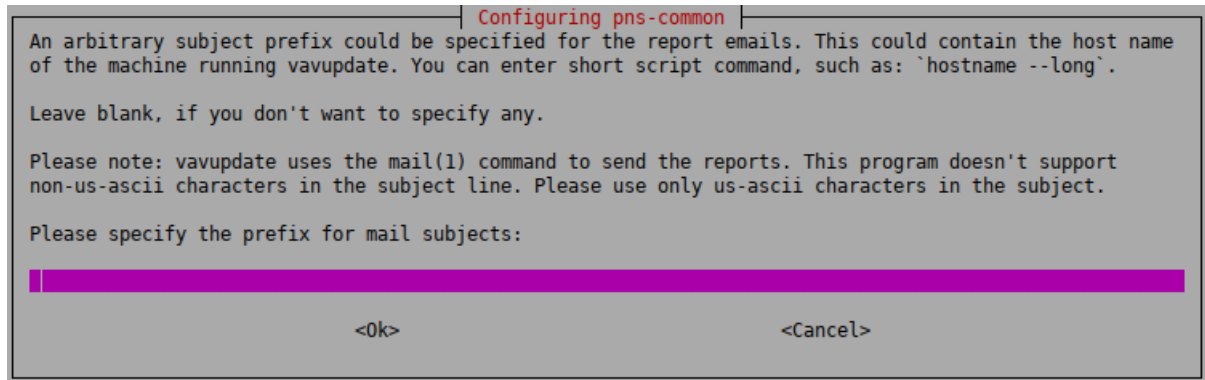


Figure 4.5. **Configuring pns-common** - Specifying a prefix for the administrator's email messages

In practice, it can be used in your mail client (or on the mail server) to move these mails (with the given prefix) automatically to a subfolder in the inbox. Also, it can be used to differentiate between emails originating from several firewalls. This can be especially useful if, for example, you have several firewalls and you want to easily identify the firewall that had an unsuccessful update.



Example 4.1.

For example, if you use `hostname --long` as prefix, you can later determine the exact origin of the message from the prefix, because it will display the Fully Qualified Domain Name (FQDN) of the host.



Note

If you want to change this setting later, you can reconfigure `pns-common` with the following terminal command:

```
dpkg-reconfigure pns-common
```

Step 4. **Verbosity level of vavupdate:** Select the level of verbosity of `vavupdate`. First the `vavupdate` options are displayed:

```
Configuring pns-common
You can choose the verbosity of vavupdate's logs. If you want to change this later, you can always
run 'dpkg-reconfigure --priority=medium pns-common'.

The meaning of each option:
none - logging disabled.
errors - log only error messages.
normal - log only errors and successful updates.
verbose - log detailed information.
all - log everything, even the updater programs' output.

Please select vavupdate's log level.

none
errors
normal
verbose
all

<Ok> <Cancel>
```

Figure 4.6. **Configuring pns-common** - Configuring the verbosity of vavupdate log level

Each level includes the logs of the levels above, for example, **verbose** will include all errors and successful update messages too.

- **none:** Logging is disabled.
- **errors:** Only error messages are logged,
- **normal:** Error messages and successful updates are logged,
- **verbose:** Detailed logging,
- **all:** Everything is logged, including the output of the update programs of ClamAV and/or NOD32.

Step 5. Specify the firewall's *BalaSys Support System* technical account username and password to enable the firewall to access the PNS repository and to download the updates.

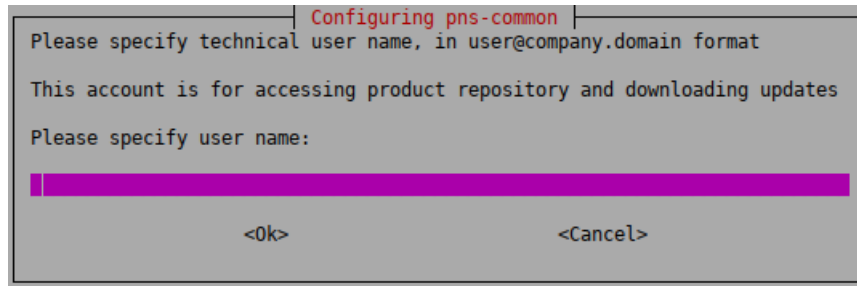


Figure 4.7. **Configuring pns-common** - Specifying the user name for the technical user to access PNS repository

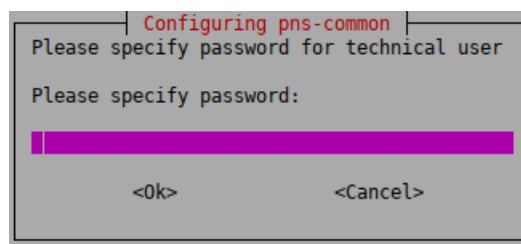


Figure 4.8. **Configuring pns-common** - Specifying the technical user's password to access PNS repository

- Step 6. **Configuring vavupdate:** Specify the actual minutes when the vavupdate process shall start in every hour. In case the necessary licenses are also purchased for the URL filter database, the upgrade for the URL database will also be performed as part of the vavupdate process. The upgrade for the URL filter database though will be performed only in the hours being specified in the next step.

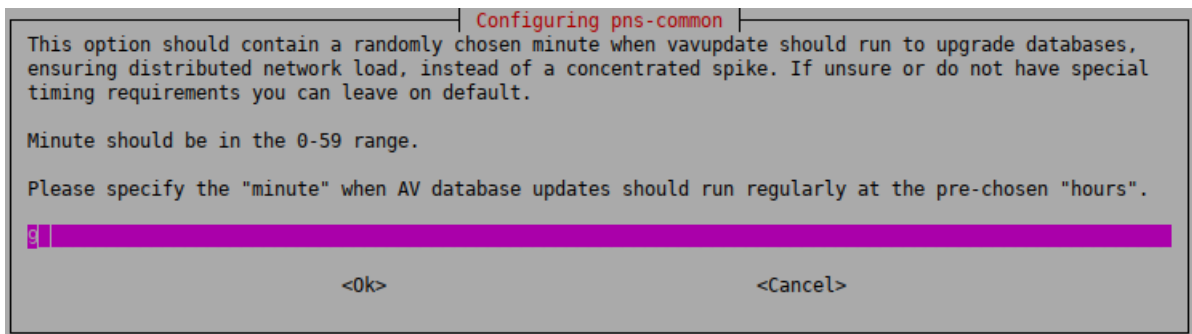


Figure 4.9. **Configuring vavupdate** - Specifying the actual minutes for the vavupdate process to start

- Step 7. **Specify the timing for the URL filter database:** The actual hours when the upgrade of the URL filter database shall take place. Provide the actual hours for the time of the upgrade.

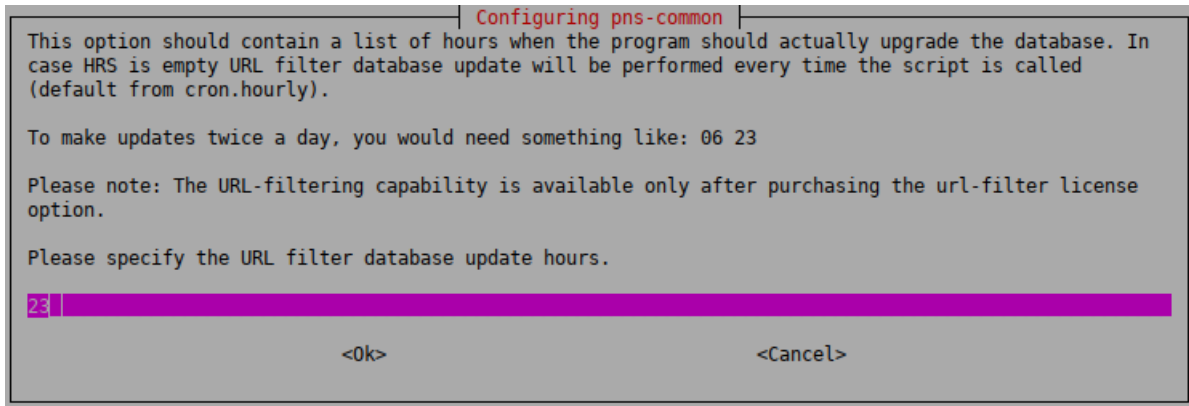


Figure 4.10. Specifying the exact time for the upgrade

Step 8. Fill in this field only if it is required. (optional step)

In specific cases, based on an agreement between Balasys and the customer, the customer has a mirror URL filtering database. The location of this mirror database can be specified here.

In any other cases, please leave this field empty.

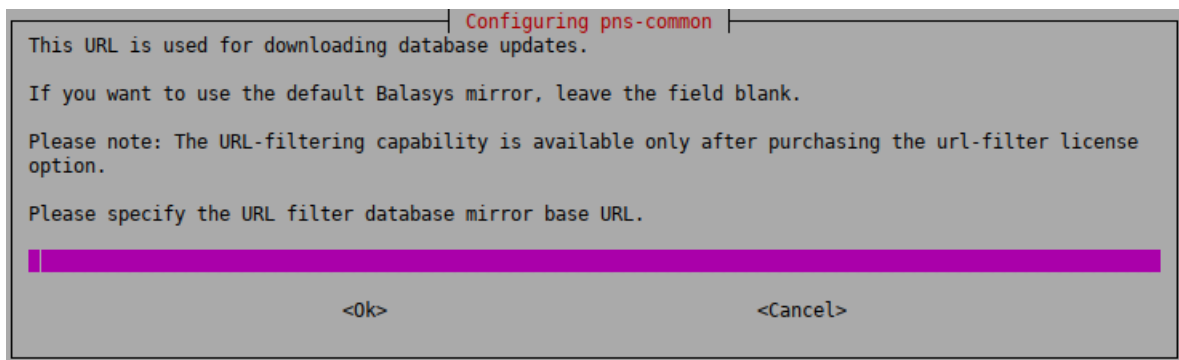


Figure 4.11. Configuring pns-common - Updating URL filtering database

Step 9. Choose the size of the URL filter database.

At this stage, the administrator can choose the size of the URL filtering database. The database can be a smaller-sized, optimized database (the recommended version) for usual scenarios, which requires 1 GiB storage space and 300 MiB daily update traffic, or a normal database for more extensive scenarios, which requires 6 GiB storage space and 2 GiB daily update traffic. If there are no specific needs, we recommend to choose the optimized database.

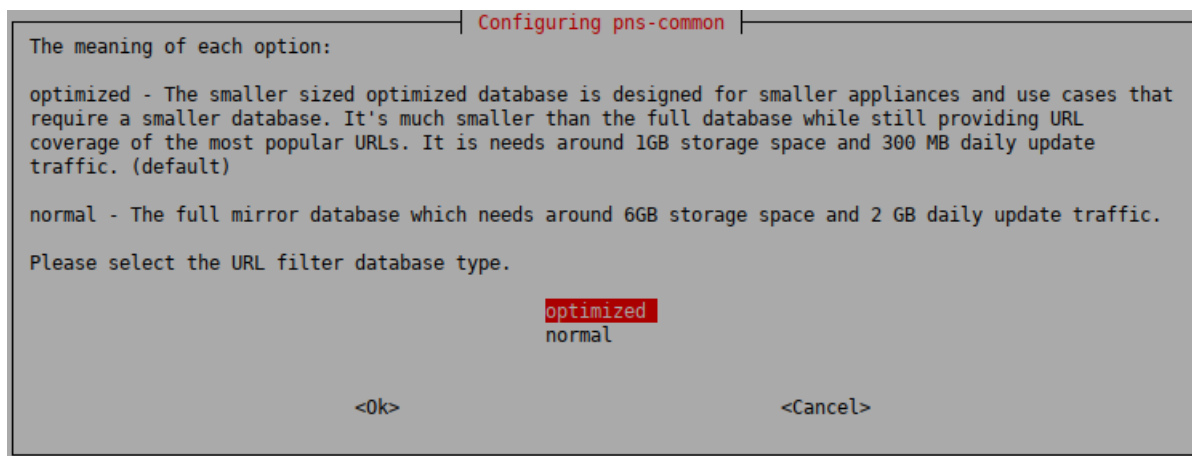


Figure 4.12. *Configuring pns-common* - Selecting the size of the URL filtering database

4.1.3. Procedure – Configuring the ESET (NOD32) virus filtering modules

Purpose:

If you are installing CF with the NOD32 module, complete the following steps:

Steps:

Step 1. To delete the virus database if you remove the NOD32 package, select **Yes**.

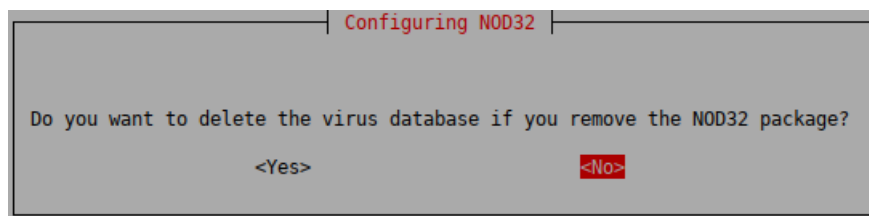


Figure 4.13. *Deleting the virus database*

Step 2. To be able to use the NOD32 Scanner effectively, you have to update the NOD32 virus database. The databases of the NOD32 module can be instantly updated from the official ESET webserver if the machine you are installing PNS on has network access.

To update the NOD32 virus database, select **Yes**.

Otherwise, you can start an update using the `vavupdate` command later.

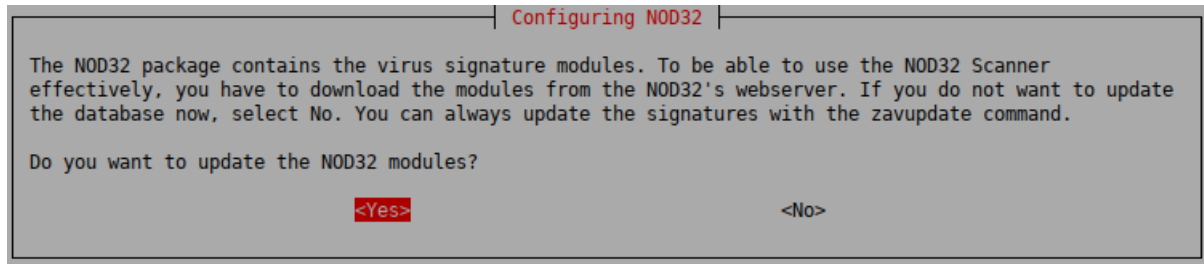


Figure 4.14. Updating the virus database

4.1.4. Procedure – Configuring One Time Password for initial connection to MSs

Purpose:

If the host you are installing will be managed from MS, you have to configure a One Time Password (OTP) for connecting to MS the first time. To configure the initial OTP, complete the following steps.

Steps:

Step 1. Type a One Time Password that will be used to connect to MS for the first time. Subsequent connections will be mutually authenticated using X.509 certificates.

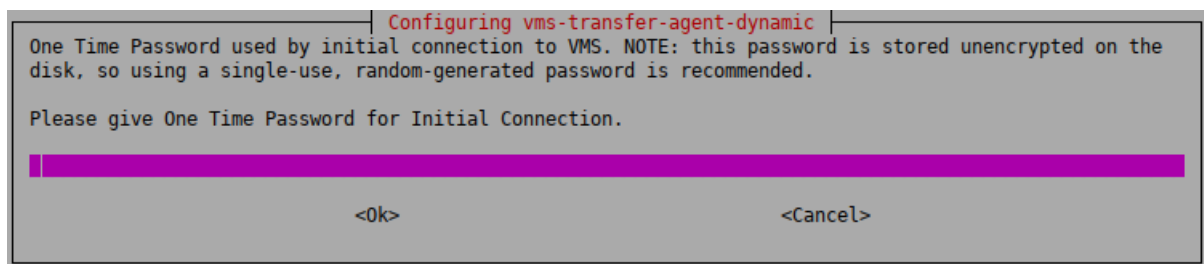


Figure 4.15. Configuring One Time Password

Step 2. To receive email alerts from MS before a certificate or license used in PNS expires, type the email address of the administrator who will receive these alerts.

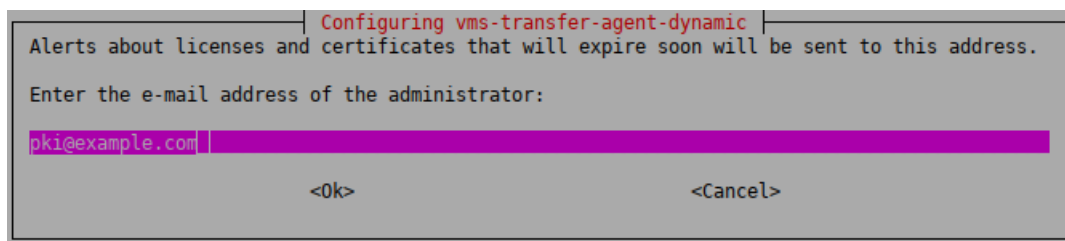


Figure 4.16. Configuring email address for PKI

4.1.5. Procedure – Configuring Management Server (MS)

Purpose:

To configure Management Server, complete the following steps.

Steps:

Step 1. Configure the site name.

The hosts managed by MS are organized into sites. Use a descriptive name for the site, for example, the name of the company. This will help the administrator distinguish MSs from each other. Enter the site name.

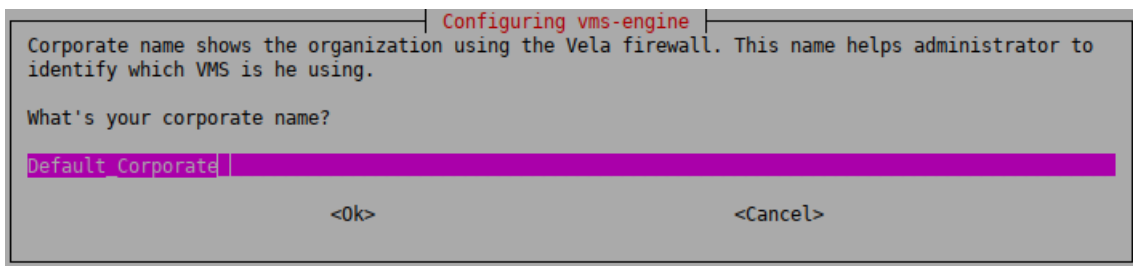


Figure 4.17. Configuring the site name

Step 2. Configure the hostname of the MS Engine.

It is recommended to enter the normal hostname, but do not use FQDN. The default value is VMS-Host.



Warning

Make sure to enter the correct hostname, because it is stored in the MS database and is complicated to modify later.

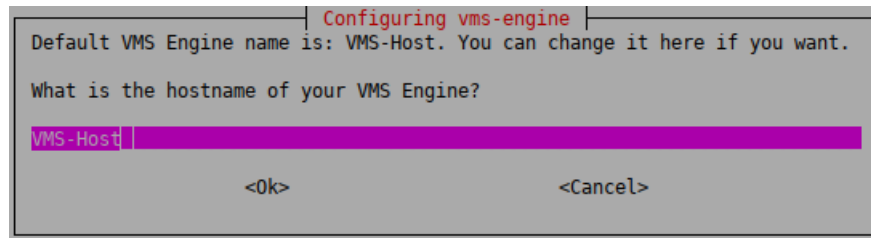


Figure 4.18. Configuring the hostname of the MS Engine supervising the PNS firewall host

Step 3. Configure the initial password of the administrator user on MS.

Enter the MS administrator password. This password is used to login to MS from the Management Console as an administrator, and configure the PNS firewalls. The username of the administrator by default is admin, which can be modified later. The password can be changed later at any time.



Note

Make sure to create a password that conforms to the secure password generation standards of your organization.

Store the password in a secure way.

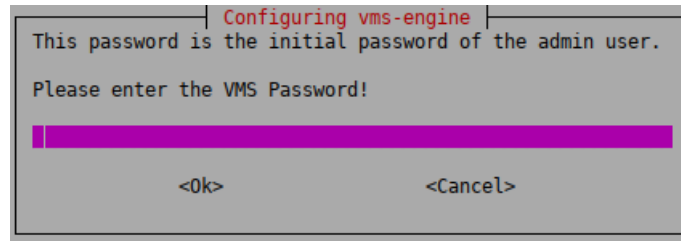


Figure 4.19. Configuring the initial password of the administrator user on MS

Step 4. Configure the Certificate Authority of MS.

Enter a secure password for the Certificate Authority (CA) of MS. This password will be used as the passphrase of the initial CA certificate.



Note

Make sure to create a password that conforms to the secure password generation standards of your organization. Store the password in a secure way.



Warning

Make sure to enter the correct CA password. It is difficult to change the CA password later and requires regenerating the whole CA chain.

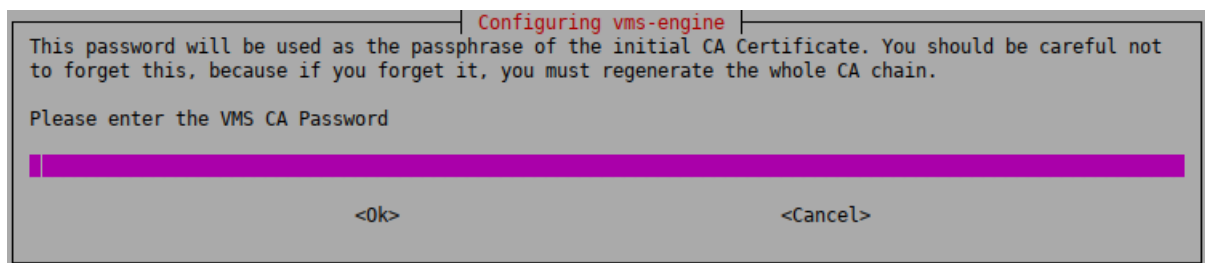


Figure 4.20. Specifying the CA password of MS

Step 5. Create the root Certificate Authority.

MS includes public key infrastructure (PKI) management to ensure that each element of the firewall system (MS module, VPNs, users) can be authenticated with X.509 certificates. During this stage of the installation the root CA is created and configured. Provide the following parameters.

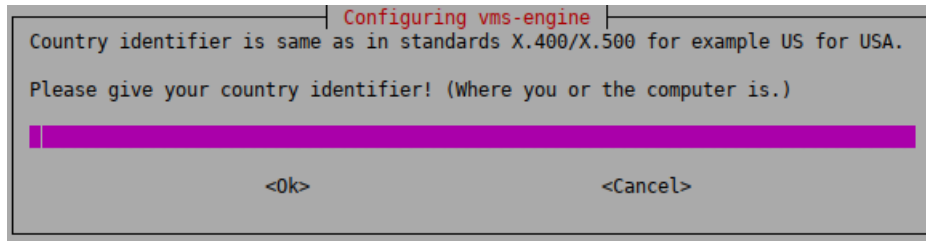


Figure 4.21. Creating the root Certificate Authority



Warning

Do not use accented characters. They are not supported in the X400/X500 standard.

- **Country ID:** two characters only. For example, US, DE, HU.
- **State:** *Optional.* United States (US) only. For example, Nevada.
- **City:** *Optional.* For example, Las Vegas.
- **Company name:** *Optional.* For example, Example Ltd..
- **Department name:** *Optional.* For example, IT department.

4.1.6. Procedure – Selecting the role of the host

Purpose:

By default, the iptables utility denies any traffic going through or to the machine. The installer configures the iptables utility according to the role of the host. This selection affects only the first installation of the host, it will not modify an existing iptables configuration.

Steps:

Step 1. Select the role of this machine in your firewall configuration. The following roles are available:

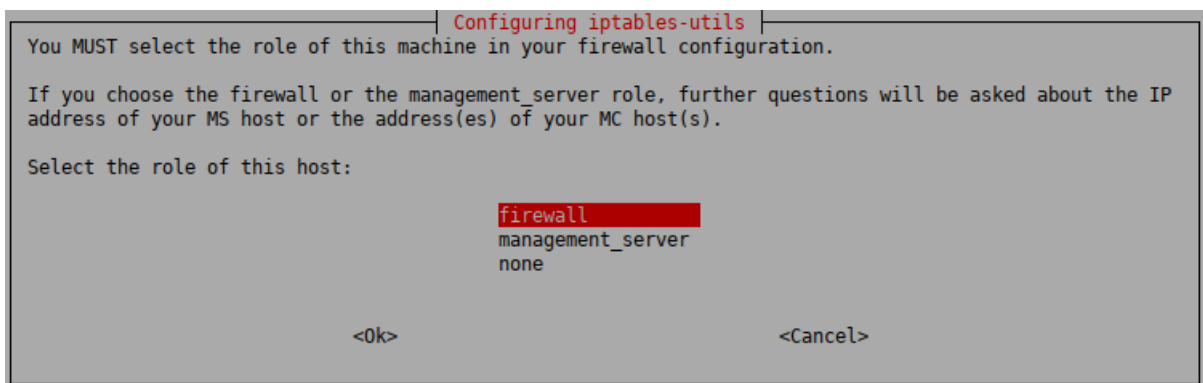


Figure 4.22. Selecting the role of the host

- **firewall:** Only connections from the MS host are allowed. Select this role when you are installing a firewall host, or any other standalone host that will be managed from MS.

MS agent and remote shell (SSH) communication will be enabled. This technically means ports TCP/1311 and TCP/22.

- **management_server**: Only connections from MCs are allowed. Select this role if you are installing the PNS firewall and the Management Server on the same host.

MC to engine communication and remote shell communication will be allowed on ports TCP/1314 and TCP/22, respectively.

- **none**: The host is unreachable from the network. All IP traffic will be dropped by default, therefore all remote administration attempts will fail. All allowed traffic has to be enabled manually from a local terminal.

Step 2. If you have selected the **firewall** or the **management_server** role, enter its IP addresses:

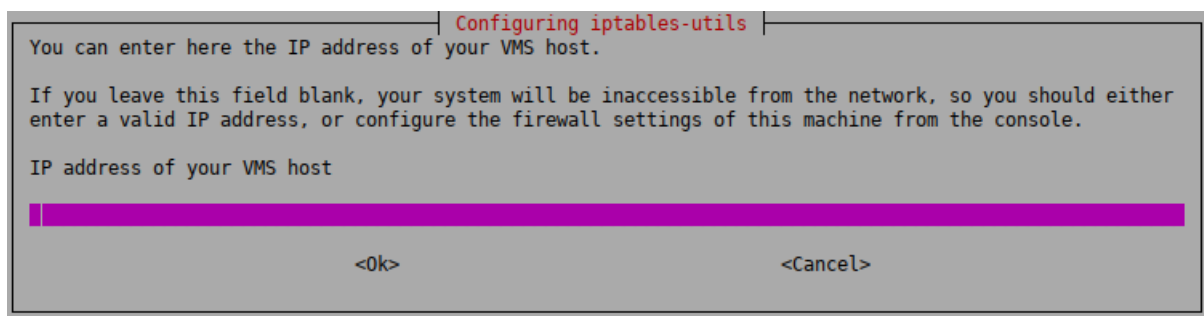


Figure 4.23. Specifying the IP addresses of the machines running MC

- **firewall**: The IP address of the MS host used to manage the firewall.
- **management_server**: The IP address of the MC used to manage the MS host (that is, the machines from where the firewall administrators will connect to MS). If managing MS is allowed from multiple hosts, separate the IP addresses of these hosts with spaces.



Warning

Make sure that you type the IP addresses of the MS/MC hosts correctly.

Otherwise, the machine will not be accessible from MS/MC. In this case, you must manually correct the configuration of iptables. For details, see `man iptables-utils`.

4.1.7. Installing the electronic license keys

Besides the license file(s), no online activation or similar activity is required.



Warning

PNS and its components will not operate without the new license files.

If you fail to install the new licenses during the upgrade, you must copy the license files to the host manually to the following locations:



- PNS Application-level Gateway (ALG): /etc/vela/license.txt
- Management Server (MS): /etc/vms/license.txt
- Content Filtering (CF): /etc/vcf/license.txt
- Authentication Server (AS): /etc/vas/license.txt

**Note**

When accessing the licenses, the directory structure is important: for each PNS component licensed, there is a separate subdirectory named after the component (for example, PNS, MS, AS) containing a license file named `license.txt`. Make sure that all file and directory names are in lowercase. When downloading the licenses from an internal Webserver, the same directory structure must be reproduced on the server. These directories do not need to be placed in the root folder of the Webserver, a virtual directory is also suitable.

The license files of 3rd-party engines are not necessary called `license.txt`.

4.2. Procedure – Upgrading PNS hosts using apt

Purpose:

All the components of PNS can be upgraded using the standard apt tools. When used on Debian GNU/Linux systems, the Management Console (MC) and Authentication Agent (AA) client-side applications can be upgraded using apt as well. On Microsoft Windows and other Linux platforms, upgrades to these applications must be downloaded manually from [BalaSys downloads](#). To perform an upgrade, complete the following steps.

Prerequisites:

You will need a *BalaSys Support System* technical account to perform the upgrade. You can register a technical account by sending an email to <sales@balasys.hu> with the following personal data:

- full name
- phone number
- company name
- job title

Make sure to remember your technical account credentials, because you will be asked to enter them during the installation of any PNS component. Later, the APT configuration file `/etc/apt/auth.conf` is generated automatically using these credentials.

After registering an account, send an email with the subject `REQUESTING ACCESS TO PNS UPGRADES` to <sales@balasys.hu> so that you receive the user rights required for downloading software updates.

Steps:

Step 1. Login to the host locally, or remotely using SSH.

Step 2. Issue the following commands: `apt update`; `apt -u dist-upgrade`. The host will download and install the new and updated packages.

**Note**

If for any reason you do not want to install new packages, use the `apt update`; `apt -u upgrade` command. That way packages are only upgraded, new packages are not installed. Dependencies that are not installed are listed in the output of the command as *kept back* packages. (Such packages can be installed by issuing the `apt -u dist-update` command).

Chapter 5. Installing the Management Console (MC)

After successfully installing the server-side components, you have to install the management console on the client. The Management Console (MC) is available for Microsoft Windows and GNU/Linux platforms. The Microsoft Windows version is a single .msi install file and the GNU/Linux version is a generic AppImage (a .AppImage package). Both versions are available on the PNS Installation DVD. Downloads and updates for MC can be downloaded from [Balasys downloads](#).

The Microsoft Windows and GNU/Linux versions are identical in look-and-feel, they are both built with the GTK Toolkit. Therefore, choosing a platform is only a matter of preference.

There are no license restrictions on the number of MCs you can install or run. Therefore, multiple management locations are possible.



Note

It is important to remember that the MC machine must always connect to the MS host and not the PNS firewall itself. The MS host must be reachable. The MS host, in turn, must be able to communicate with the management agents installed on the PNS firewall host.

The following platforms are supported:

- Windows 10 LTSC (Long-Term Servicing Branch)
- Windows Server 2016, 2019
- Ubuntu 22.04 LTS

MC is distributed as a portable AppImage package on GNU/Linux platforms without needing superuser permissions to install the application.



Note

To run AppImages, your system may need to install FUSE (Filesystem in Userspace) library version 2 (package *libfuse2* in Ubuntu 22.04 LTS). This can be accomplished by issuing the `sudo apt install libfuse2` command from terminal. Do not install entire *fuse* package (FUSE version 2), as it would break systems with FUSE version 3 installed!

For further information about Appimage and FUSE, visit <https://docs.appimage.org/user-guide/troubleshooting/fuse.html>

5.1. Procedure – Using MC on GNU/Linux platforms

Purpose:

To run MC on a GNU/Linux system, complete the following steps.

Steps:

Step 1. Make the AppImage file executable:



- In the terminal, enter the following command: `chmod a+x management-console-2.0.0-x86_64.AppImage.`

Step 2. Run the AppImage file:

- In the terminal, enter the following command: `./management-console-2.0.0-x86_64.AppImage.`



Chapter 6. Installing the Authentication Agent (AA)

This section describes the installation and configuration of the Authentication Agent on Microsoft Windows and GNU/Linux platforms. The Authentication Agent has to be installed on every computer having access to authenticated services.

The agent has two components:

1. *Authentication Agent Multiplexer*: It is a daemon running in the background, accepting the connections coming from PNS and verifying the TLS certificates of PNS (if the communication is encrypted). In a multi-user environment the Multiplexer displays the dialog of the *Authentication Agent* on the desktop of the user initiating a connection requiring authentication.
2. *Authentication Agent*: This application collects the information required for the authentication, for example, the username, authentication method, password, and so on.

The following platforms are supported:

- Windows 10 LTSC (Long-Term Servicing Branch)
- Windows Server 2016, 2019
- Ubuntu 22.04 LTS

AA is distributed as a portable AppImage package on GNU/Linux platforms without needing superuser permissions to install the application.

6.1. Installing the Authentication Agent on Microsoft Windows platforms

6.1.1. Procedure – Installing the Authentication Agent on Microsoft Windows

Purpose:

The Authentication Agent (AA) installer is located in the `\platforms\windows\` folder of the PNS CD-ROM, its latest version is also available from the [Balasys website](#).

The installer is available as Windows Installer Package (.msi)

Steps:

- Step 1. Place the PNS CD-ROM into the CD drive and start the `authentication-agent-<version>.msi` file located in the `\platforms\windows\` folder.



Warning
Administrator privileges are required to install the application.

Step 2. Check **I accept the terms in the License Agreement** to accept the End-User License Agreement, which is displayed after the installer starts. Click **Next** to continue installation process. To cancel the installation at any time during the process, click **Cancel**.

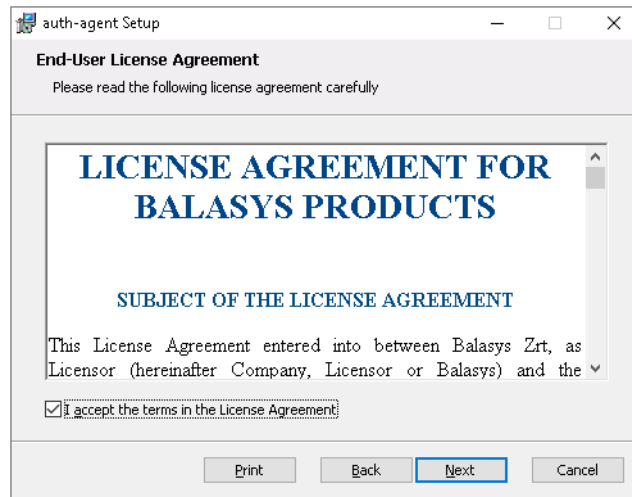


Figure 6.1. Accepting the EULA

Step 3. Select the destination folder for the application and click **Next** to continue. The default folder is C:\Program Files\auth-agent.

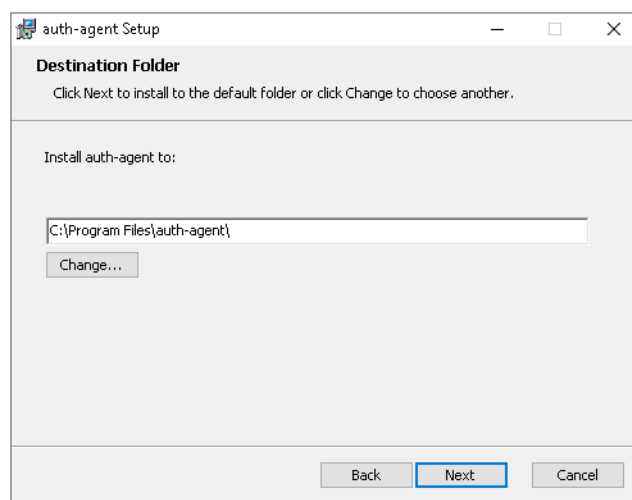


Figure 6.2. Selecting the destination folder

Step 4. *Optional step*: Click ... button, select the CA certificate to import, then click **Open** to import the CA certificate.



Note

For authentication purposes, when PNS communicates with AA, AA expects TLS-encrypted communication. For details, see section [Section 4.1.1, Registry entries on Microsoft Windows platforms](#) in *Authentication Agent Manual* and section [Section 4.1, Configuring Authentication Agent on Microsoft Windows platforms](#) in *Authentication Agent Manual*.

If the Authentication Agent and PNS communicate through a TLS-encrypted channel (recommended), the certificate of the Certificate Authority (CA) signing the certificates of the PNS firewalls can be imported to the Authentication Agent Multiplexer's certificate store.

**Note**

The CA certificate has to be in DER or PEM format. (with typical file extensions of *.der, *.pem, *.crt, *.cert) It is not necessary to import the certificate during the installation, it can also be done later. For details about encrypting the agent-PNS authentication, see [Section 4.1.3, Configuring TLS connections on Microsoft Windows platforms](#) in *Authentication Agent Manual*.

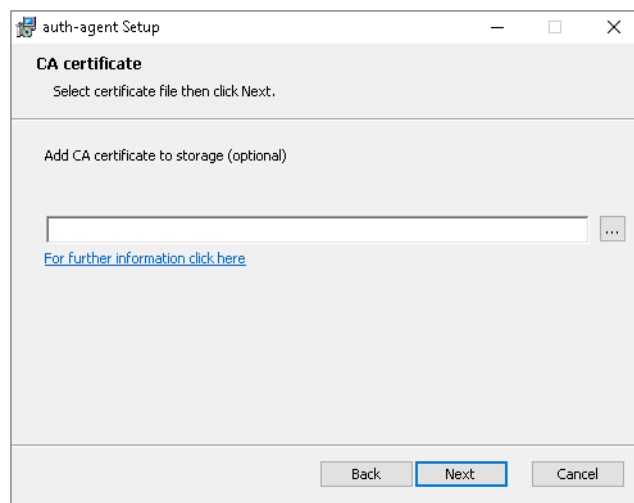


Figure 6.3. Importing the CA certificate

Step 5. Click **Install** to start the installation process. The installer copies the required files and registers the service called **Authentication Agent Multiplexer**, which is started after the registration.

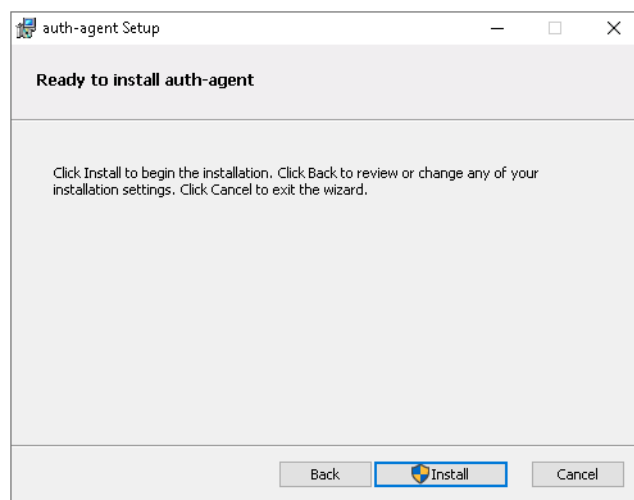


Figure 6.4. Ready to start installation

Step 6. After the installer has completed the above steps, click **Finish**.



Step 7. The Authentication Agent (AA) logo is displayed on the system tray, indicating that the application is running. It is also started automatically after each Windows startup.

6.1.2. Procedure – Installing Authentication Agent with Group Policy Object (GPO) deployment

Prerequisites:

- Create the necessary certificates as instructed in section *Procedure 11.3.8.2, Creating certificates* in *Proxedo Network Security Suite 2 Administrator Guide*.
- Set the parameters for the AS certificate.
- Export the CA certificate signed by AS in DER format for the Windows client.

Steps:

- Step 1. Download the .msi installer. The browser application or the Windows Defender Cloud might send a notification or a warning due to the new and unknown installer program, this can be disregarded.
- Step 2. Install the Windows Client and import the CA certificate during the installation. Reboot the system, if it is necessary.
- Step 3. Define the preferences with the help of the GUI or via the registry.
- Step 4. Test the expected behaviour by initiating traffic.
- Step 5. Export the following registries:

- Export the *HKEY_CURRENT_USER\Software\Balasys\AuthAgent* registry to the *hlcuaa.reg* file, which contains the user settings for AA. The result shall be as follows:

```
Windows Registry Editor Version 5.00

[HKEY_CURRENT_USER\Software\Balasys]

[HKEY_CURRENT_USER\Software\Balasys\AuthAgent]
"HasPreferences"=dword:00000000
"TLS"=dword:00000001
"Automatic"=dword:00000001
"Details"=dword:00000000
"CanRemember"=dword:00000001
"ForgetPassword"=dword:00000000
"ForgetPasswordInterval"=dword:00000001
```

- Export the *HKEY_LOCAL_MACHINE\SOFTWARE\Balasys\AuthAgent*, which contains the AA Multiplexer settings, into the *hklmaa.reg* file. The result shall be as follows:

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\Balasys]

[HKEY_LOCAL_MACHINE\SOFTWARE\Balasys\AuthAgent]
"InstallLang"="1033"
```



The *service private certificate store*, used by the AA Multiplexer, can also be deployed as a registry key.

- Export the `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd` registry to the `hklmaacert.reg` file. The result shall be as follows:

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd]

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd\SystemCertificates]

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd\SystemCertificates\My]

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd\SystemCertificates\My\Certificates]

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cryptography\Services\auth-agent-mpxd\SystemCertificates\MY\Certificates\6421DCB8501C2E1F15DB8BD3A94F435C01DB7CD3]
"Blob"=hex:03,00,00,00,01,00,00,00,14,00,00,00,64,21,dc,b8,50,1c,2e,1f,15,db,\
...
...
...
...
...
64,0a,87,e9,45,99,04,9e,28,cb,c0,6c,2a,e5,c7,cb,ce,29,d8,b1,e1
```

**Note**

Note that there can be several empty paths created by the system automatically, which can be included safely.

For further details on registries, see [Section 4.1.1, Registry entries on Microsoft Windows platforms](#) in *Authentication Agent Manual*.

As a result, there will be four registries exported.

Step 6. Switch to the GPO administrator system and download the AA *msi flavor* installer and place it in the Windows share where the other remotely installed applications are stored.

Step 7. Continue with the procedures detailed in section [Procedure 4.1.5, Configuring Group Policy Object \(GPO\) deployment](#) in *Authentication Agent Manual*

6.2. Procedure – Using AA on GNU/Linux platforms

Purpose:

To run AA on a GNU/Linux system, complete the following steps.



Steps:

Step 1. Make the AppImage file executable:

- In the terminal, enter the following command: `chmod a+x authentication-agent-2.0.0-x86_64.AppImage.`

Step 2. Run the AppImage file:

- In the terminal, enter the following command: `./authentication-agent-2.0.0-x86_64.AppImage.`

Appendix A. Further readings

The following is a list of recommended readings concerning various parts of PNS administration.

**Note**

Note that URLs can change over time. The URLs of the online references were valid at the time of writing.

A.1. PNS-related material

- Guides, manuals, and tutorials for PNS are available at the [Documentation Page](#)

A.2. General, Linux-related materials

- [The Linux Documentation Project](#)
- [Linux Advanced Routing and Traffic Control](#)

A.3. Postfix documentation

- Author's name. Title. Place of publication: publisher, year. [The Postfix Home Page](#)
- Blum, Richard. Postfix. SAMS Publishing, 2001. ISBN: 0672321149
- Dent, Kyle D. Postfix: The Definitive Guide. O'Reilly Associates, 2004. ISBN: 0596002122

A.4. BIND Documentation

- [BIND Manual Pages, BIND 9 User Guide](#)
- Albitz, Paul, and Liu, Cricket. DNS and BIND. O'Reilly Associates, 2001. ISBN: 0596001584

A.5. NTP references

- [NTP Documentation](#)
- [NTP Documentation](#)RFC 1305, Network Time Protocol Specification, Implementation and Analysis

A.6. SSH resources

- [Official site of the OpenSSH project](#)
- Barrett, Daniel J. Ph.D., and Silverman, Richard E. SSH: The Secure Shell The Definitive Guide. O'Reilly Associates, 2001. ISBN: 0596000111

A.7. TCP/IP Networking

- Stevens, W., and Wright, Gary. TCP/IP Illustrated: Volumes 1-3. Addison-Wesley, 2001. ISBN: 0201776316



- Mann, Scott. Linux TCP/IP Network Administration. Prentice Hall, 2002. ISBN: 0130322202

A.8. Netfilter/IPTables

- *[Official site of the Netfilter project](#)*

A.9. General security-related resources

- Garfinkel, Simson, et al. Practical UNIX and Internet Security, 3/E. O'Reilly Associates, 2003. ISBN: 0596003234

A.10. syslog-ng references

- The syslog-ng Administrator Guide
<https://www.syslog-ng.com/technical-documents>

A.11. Python references

- *[Official Python documentation page](#)*

A.12. Public key infrastructure (PKI)

- *[RFC 5280, Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List \(CRL\) Profile](#)*
- *[RFC 6960, X.509 Internet Public Key Infrastructure Online Certificate Status Protocol - OCSP](#)*

A.13. Virtual Private Networks (VPN)

- Wouters, Paul, and Bantoft, Ken. Openswan: Building and Integrating Virtual Private Networks. Packt Publishing, 2006. ISBN 1904811256.
- Feilner, Markus. OpenVPN: Building and Integrating Virtual Private Networks, 2006. Packt Publishing. ISBN 190481185X.



Appendix B. Proxedo Network Security Suite End-User License Agreement

(c) BalaSys IT Ltd.

B.1. 1. SUBJECT OF THE LICENSE CONTRACT

1.1 This License Contract is entered into by and between BalaSys and Licensee and sets out the terms and conditions under which Licensee and/or Licensee's Authorized Subsidiaries may use the Proxedo Network Security Suite under this License Contract.

B.2. 2. DEFINITIONS

In this License Contract, the following words shall have the following meanings:

2.1 BalaSys

Company name: BalaSys IT Ltd.

Registered office: H-1117 Budapest, Alíz Str. 4.

Company registration number: 01-09-687127

Tax number: HU11996468-2-43

2.2. Words and expressions

Annexed Software

Any third party software that is not a BalaSys Product contained in the install media of the BalaSys Product.

Authorized Subsidiary

Any subsidiary organization: (i) in which Licensee possesses more than fifty percent (50%) of the voting power and (ii) which is located within the Territory.

BalaSys Product

Any software, hardware or service licensed, sold, or provided by BalaSys including any installation, education, support and warranty services, with the exception of the Annexed Software.

License Contract

The present Proxedo Network Security Suite License Contract.

Product Documentation



Any documentation referring to the Proxedo Network Security Suite or any module thereof, with special regard to the reference guide, the administration guide, the product description, the installation guide, user guides and manuals.

Protected Hosts

Host computers located in the zones protected by Proxedo Network Security Suite, that means any computer bounded to network and capable to establish IP connections through the firewall.

Protected Objects

The entire Proxedo Network Security Suite including all of its modules, all the related Product Documentation; the source code, the structure of the databases, all registered information reflecting the structure of the Proxedo Network Security Suite and all the adaptation and copies of the Protected Objects that presently exist or that are to be developed in the future, or any product falling under the copyright of BalaSys.

Proxedo Network Security Suite

Application software BalaSys Product designed for securing computer networks as defined by the Product Description.

Warranty Period

The period of twelve (12) months from the date of delivery of the Proxedo Network Security Suite to Licensee.

Territory

The countries or areas specified above in respect of which Licensee shall be entitled to install and/or use Proxedo Network Security Suite.

Take Over Protocol

The document signed by the parties which contains

- a) identification data of Licensee;
- b) ordered options of Proxedo Network Security Suite, number of Protected Hosts and designation of licensed modules thereof;
- c) designation of the Territory;
- d) declaration of the parties on accepting the terms and conditions of this License Contract; and
- e) declaration of Licensee that is in receipt of the install media.

B.3. 3. LICENSE GRANTS AND RESTRICTIONS

3.1. For the Proxedo Network Security Suite licensed under this License Contract, BalaSys grants to Licensee a non-exclusive,

non-transferable, perpetual license to use such BalaSys Product under the terms and conditions of this License Contract and the applicable Take Over Protocol.



3.2. Licensee shall use the Proxedo Network Security Suite in the in the configuration and in the quantities specified in the Take Over Protocol within the Territory.

3.3. On the install media all modules of the Proxedo Network Security Suite will be presented, however, Licensee shall not be entitled to use any module which was not licensed to it. Access rights to modules and IP connections are controlled by an "electronic key" accompanying the Proxedo Network Security Suite.

3.4. Licensee shall be entitled to make one back-up copy of the install media containing the Proxedo Network Security Suite.

3.5. Licensee shall make available the Protected Objects at its disposal solely to its own employees and those of the Authorized Subsidiaries.

3.6. Licensee shall take all reasonable steps to protect BalaSys's rights with respect to the Protected Objects with special regard and care to protecting it from any unauthorized access.

3.7. Licensee shall, in 5 working days, properly answer the queries of BalaSys referring to the actual usage conditions of the

Proxedo Network Security Suite, that may differ or allegedly differs from the license conditions.

3.8. Licensee shall not modify the Proxedo Network Security Suite in any way, with special regard to the functions inspecting the usage of the software. Licensee shall install the code permitting the usage of the Proxedo Network Security Suite according to the provisions defined for it by BalaSys. Licensee may not modify or cancel such codes. Configuration settings of the Proxedo Network Security Suite in accordance with the possibilities offered by the system shall not be construed as modification of the software.

3.9. Licensee shall only be entitled to analyze the structure of the BalaSys Products (decompilation or reverse-engineering) if concurrent operation with a software developed by a third party is necessary, and upon request to supply the information required for concurrent operation BalaSys does not provide such information within 60 days from the receipt of such a request. These user actions are limited to parts of the BalaSys Product which are necessary for concurrent operation.

3.10. Any information obtained as a result of applying the previous Section

(i) cannot be used for purposes other than concurrent operation with the BalaSys Product;

(ii) cannot be disclosed to third parties unless it is necessary for concurrent operation with the BalaSys Product;

(iii) cannot be used for the development, production or distribution of a different software which is similar to the BalaSys Product

in its form of expression, or for any other act violating copyright.

3.11. For any Annexed Software contained by the same install media as the BalaSys Product, the terms and conditions defined by its copyright owner shall be properly applied. BalaSys does not grant any license rights to any Annexed Software.

3.12. Any usage of the Proxedo Network Security Suite exceeding the limits and restrictions defined in this License Contract shall qualify as material breach of the License Contract.

3.13. The Number of Protected Hosts shall not exceed the amount defined in the Take Over Protocol.



3.14. Licensee shall have the right to obtain and use content updates only if Licensee concludes a maintenance contract that includes such content updates, or if Licensee has otherwise separately acquired the right to obtain and use such content updates. This License Contract does not otherwise permit Licensee to obtain and use content updates.

B.4. 4. SUBSIDIARIES

4.1 Authorized Subsidiaries may also utilize the services of the Proxedo Network Security Suite under the terms and conditions of this License Contract. Any Authorized Subsidiary utilizing any service of the Proxedo Network Security Suite will be deemed to have accepted the terms and conditions of this License Contract.

B.5. 5. INTELLECTUAL PROPERTY RIGHTS

5.1. Licensee agrees that BalaSys owns all rights, titles, and interests related to the Proxedo Network Security Suite and all of BalaSys's patents, trademarks, trade names, inventions, copyrights, know-how, and trade secrets relating to the design, manufacture, operation or service of the BalaSys Products.

5.2. The use by Licensee of any of these intellectual property rights is authorized only for the purposes set forth herein, and upon termination of this License Contract for any reason, such authorization shall cease.

5.3. The BalaSys Products are licensed only for internal business purposes in every case, under the condition that such license does not convey any license, expressly or by implication, to manufacture, duplicate or otherwise copy or reproduce any of the BalaSys Products.

No other rights than expressly stated herein are granted to Licensee.

5.4. Licensee will take appropriate steps with its Authorized Subsidiaries, as BalaSys may request, to inform them of and assure compliance with the restrictions contained in the License Contract.

B.6. 6. TRADE MARKS

6.1. BalaSys hereby grants to Licensee the non-exclusive right to use the trade marks of the BalaSys Products in the Territory in accordance with the terms and for the duration of this License Contract.

6.2. BalaSys makes no representation or warranty as to the validity or enforceability of the trade marks, nor as to whether these infringe any intellectual property rights of third parties in the Territory.

B.7. 7. NEGLIGENCE INFRINGEMENT

7.1. In case of negligent infringement of BalaSys's rights with respect to the Proxedo Network Security Suite, committed by violating the restrictions and limitations defined by this License Contract, Licensee shall pay liquidated damages to BalaSys. The amount of the liquidated damages shall be twice as much as the price of the BalaSys Product concerned, on BalaSys's current Price List.

B.8. 8. INTELLECTUAL PROPERTY INDEMNIFICATION

8.1. BalaSys shall pay all damages, costs and reasonable attorney's fees awarded against Licensee in connection with any claim brought against Licensee to the extent that such claim is based on a claim that Licensee's authorized use of the BalaSys Product infringes a patent, copyright, trademark or trade secret. Licensee shall



notify BalaSys in writing of any such claim as soon as Licensee learns of it and shall cooperate fully with BalaSys in connection with the defense of that claim. BalaSys shall have sole control of that defense (including without limitation the right to settle the claim).

8.2. If Licensee is prohibited from using any BalaSys Product due to an infringement claim, or if BalaSys believes that any BalaSys Product is likely to become the subject of an infringement claim, BalaSys shall at its sole option, either: (i) obtain the right for Licensee to continue to use such BalaSys Product, (ii) replace or modify the BalaSys Product so as to make such BalaSys Product non-infringing and substantially comparable in functionality or (iii) refund to Licensee the amount paid for such infringing BalaSys Product and provide a pro-rated refund of any unused, prepaid maintenance fees paid by Licensee, in exchange for Licensee's return of such BalaSys Product to BalaSys.

8.3. Notwithstanding the above, BalaSys will have no liability for any infringement claim to the extent that it is based upon:

- (i) modification of the BalaSys Product other than by BalaSys,
- (ii) use of the BalaSys Product in combination with any product not specifically authorized by BalaSys to be combined with the BalaSys Product or
- (iii) use of the BalaSys Product in an unauthorized manner for which it was not designed.

B.9. 9. LICENSE FEE

9.1. The number of the Protected Hosts (including the server as one host), the configuration and the modules licensed shall serve as the calculation base of the license fee.

9.2. Licensee acknowledges that payment of the license fees is a condition of lawful usage.

9.3. License fees do not contain any installation or post charges.

B.10. 10. WARRANTIES

10.1. BalaSys warrants that during the Warranty Period, the optical media upon which the BalaSys Product is recorded will not be defective under normal use. BalaSys will replace any defective media returned to it, accompanied by a dated proof of purchase, within the Warranty Period at no charge to Licensee. Upon receipt of the allegedly defective BalaSys Product, BalaSys will at its option, deliver a replacement BalaSys Product or BalaSys's current equivalent to Licensee at no additional cost. BalaSys will bear the delivery charges to Licensee for the replacement Product.

10.2. In case of installation by BalaSys, BalaSys warrants that during the Warranty Period, the Proxedo Network Security Suite, under normal use in the operating environment defined by BalaSys, and without unauthorized modification, will perform in substantial compliance with the Product Documentation accompanying the BalaSys Product, when used on that hardware for which it was installed, in compliance with the provisions of the user manuals and the recommendations of BalaSys. The date of the notification sent to BalaSys shall qualify as the date of the failure. Licensee shall do its best to mitigate the consequences of that failure. If, during the Warranty Period, the BalaSys Product fails to comply with this warranty, and such failure is reported by Licensee to BalaSys within the Warranty Period, BalaSys's sole obligation and liability for breach of this warranty is, at BalaSys's sole option, either:



- (i) to correct such failure,
- (ii) to replace the defective BalaSys Product or
- (iii) to refund the license fees paid by Licensee for the applicable BalaSys Product.

B.11. 11. DISCLAIMER OF WARRANTIES

11.1. EXCEPT AS SET OUT IN THIS LICENSE CONTRACT, BALASYS MAKES NO WARRANTIES OF ANY KIND WITH RESPECT TO THE Proxedo Network Security Suite. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, BALASYS EXCLUDES ANY OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF SATISFACTORY QUALITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

B.12. 12. LIMITATION OF LIABILITY

12.1. SOME STATES AND COUNTRIES, INCLUDING MEMBER COUNTRIES OF THE EUROPEAN UNION, DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES AND, THEREFORE, THE FOLLOWING LIMITATION OR EXCLUSION MAY NOT APPLY TO THIS LICENSE CONTRACT IN THOSE STATES AND COUNTRIES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND REGARDLESS OF WHETHER ANY REMEDY SET OUT IN THIS LICENSE CONTRACT FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT SHALL BALASYS BE LIABLE TO LICENSEE FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT OR SIMILAR DAMAGES OR LOST PROFITS OR LOST DATA ARISING OUT OF THE USE OR INABILITY TO USE THE Proxedo Network Security Suite EVEN IF BALASYS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

12.2. IN NO CASE SHALL BALASYS'S TOTAL LIABILITY UNDER THIS LICENSE CONTRACT EXCEED THE FEES PAID BY LICENSEE FOR THE Proxedo Network Security Suite LICENSED UNDER THIS LICENSE CONTRACT.

B.13. 13. DURATION AND TERMINATION

13.1. This License Contract shall come into effect on the date of signature of the Take Over Protocol by the duly authorized

representatives of the parties.

13.2. Licensee may terminate the License Contract at any time by written notice sent to BalaSys and by simultaneously destroying all copies of the Proxedo Network Security Suite licensed under this License Contract.

13.3. BalaSys may terminate this License Contract with immediate effect by written notice to Licensee, if Licensee is in material or persistent breach of the License Contract and either that breach is incapable of remedy or Licensee shall have failed to remedy that breach within 30 days after receiving written notice requiring it to remedy that breach.

**B.14. 14. AMENDMENTS**

14.1. Save as expressly provided in this License Contract, no amendment or variation of this License Contract shall be effective unless in writing and signed by a duly authorised representative of the parties to it.

B.15. 15. WAIVER

15.1. The failure of a party to exercise or enforce any right under this License Contract shall not be deemed to be a waiver of that right nor operate to bar the exercise or enforcement of it at any time or times thereafter.

B.16. 16. SEVERABILITY

16.1. If any part of this License Contract becomes invalid, illegal or unenforceable, the parties shall in such an event negotiate in good faith in order to agree on the terms of a mutually satisfactory provision to be substituted for the invalid, illegal or unenforceable

provision which as nearly as possible validly gives effect to their intentions as expressed in this License Contract.

B.17. 17. NOTICES

17.1. Any notice required to be given pursuant to this License Contract shall be in writing and shall be given by delivering the notice by hand, or by sending the same by prepaid first class post (airmail if to an address outside the country of posting) to the address of the relevant party set out in this License Contract or such other address as either party notifies to the other from time to time. Any notice given according to the above procedure shall be deemed to have been given at the time of delivery (if delivered by hand) and when received (if sent by post).

B.18. 18. MISCELLANEOUS

18.1. Headings are for convenience only and shall be ignored in interpreting this License Contract.

18.2. This License Contract and the rights granted in this License Contract may not be assigned, sublicensed or otherwise transferred in whole or in part by Licensee without BalaSys's prior written consent. This consent shall not be unreasonably withheld or delayed.

18.3. An independent third party auditor, reasonably acceptable to BalaSys and Licensee, may upon reasonable notice to Licensee and during normal business hours, but not more often than once each year, inspect Licensee's relevant records in order to confirm that usage of the Proxedo Network Security Suite complies with the terms and conditions of this License Contract. BalaSys shall bear the costs of such audit. All audits shall be subject to the reasonable safety and security policies and procedures of Licensee.

18.4. This License Contract constitutes the entire agreement between the parties with regard to the subject matter hereof. Any modification of this License Contract must be in writing and signed by both parties.

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