



TimeIPS Server

IPS256T
Virtual Machine
on an open source host

Installation Guide

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WARNING: The TimeIPS IPSVM virtual machine license allows you to run a single instance of TimeIPS on your own hardware. If you would like to operate multiple instances of TimeIPS for testing or redundancy, please contact the TimeIPS Technical Support department first. Allowing unauthorized copies of your TimeIPS virtual machine image to operate may trigger a non-refundable cancellation of your license and may cause all such copies to become inoperable.

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Prepare and Plan

TimeIPS installations consist of one “master” server system and, optionally, one or more network clock “client” stations. For a TimeIPS virtual machine configuration, a host operating system, virtualization software and a TimeIPS VM image operate together to make a “master” server system.

Configuration and administration of TimeIPS is primarily done over the network with a web browser. An administration console allows for initial configuration of the VM image's network settings.

Network clocks can be connected on a LAN (Local Area Network) or at remote locations connected on a WAN (Wide Area Network) via secure VPN (Virtual Private Network). These clocks can be located at any door or entrance to your facility, or at any location which is convenient for your employees to clock in and out.

We recommend a TimeIPS network clock at each employee entrance to your facility and/or in your central break-room. Each clock will require an AC power outlet and a connection to your local area network.

Please examine the diagram on the next page to assist in planning your TimeIPS installation. Additional network clocks can be added at any time to entrances or any location within your organization.

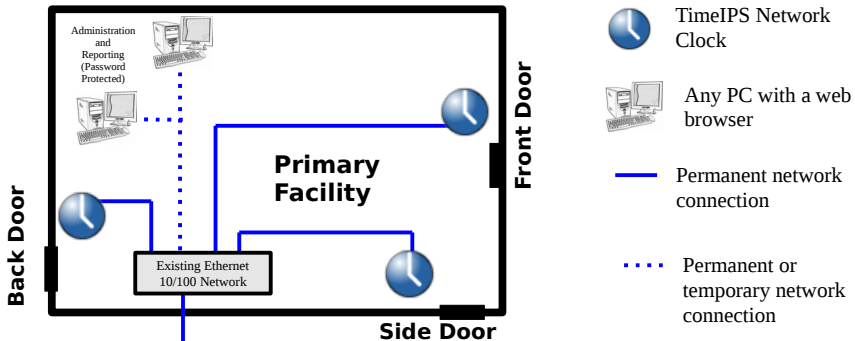
Layout and Installation Considerations

Overall Installation Notes:

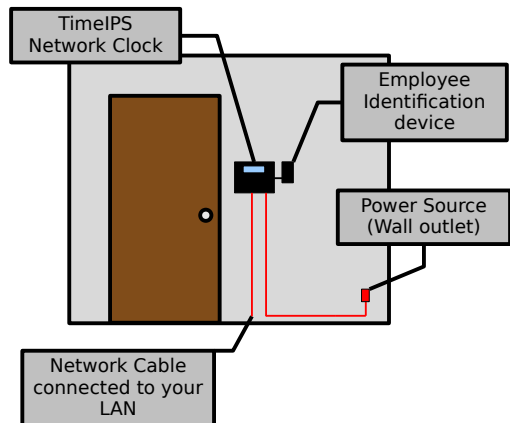
Installation of the TimeIPS system normally takes less than an hour. If you have multiple locations, a complex network or are not familiar with networking, installation may take longer. Our Technical Support department is available to assist if you have installation questions.

All TimeIPS systems and network clocks should be installed in an indoor location, out of direct sunlight, meeting the temperature requirements listed on the back cover of their Installation Guides.

Possible Primary and Remote Facility Installation



Typical Door Area Installation with Network Clock



TimeIPS VM Server Overview and Requirements

The TimeIPS VM (Virtual Machine) operates on a host server. Efficient virtual machine operation requires a server with a CPU providing hardware virtual machine support. You must also provide an operating system with a suitable virtualization package.

The required hardware for a host server:

- Intel processor with “Intel VT-x” support or AMD processor with “AMD-V” support, 2GHz or faster recommended.
- Storage Device: 80GB or larger. (Free disk space of at least 50 GB after OS installation recommended.)
- System RAM: 8GB or more.

Suggested virtual machine parameters:

- 1 or 2 CPU/core(s)
- 2GB – 8GB RAM

Recommended and supported virtualization:

- Fedora or openSUSE and “KVM” (kernel virtual machine). An example set of instructions using openSUSE are included on page 7.
- KVM on other Linux distributions

Recommended additional considerations:

For protection of your data, we recommend:

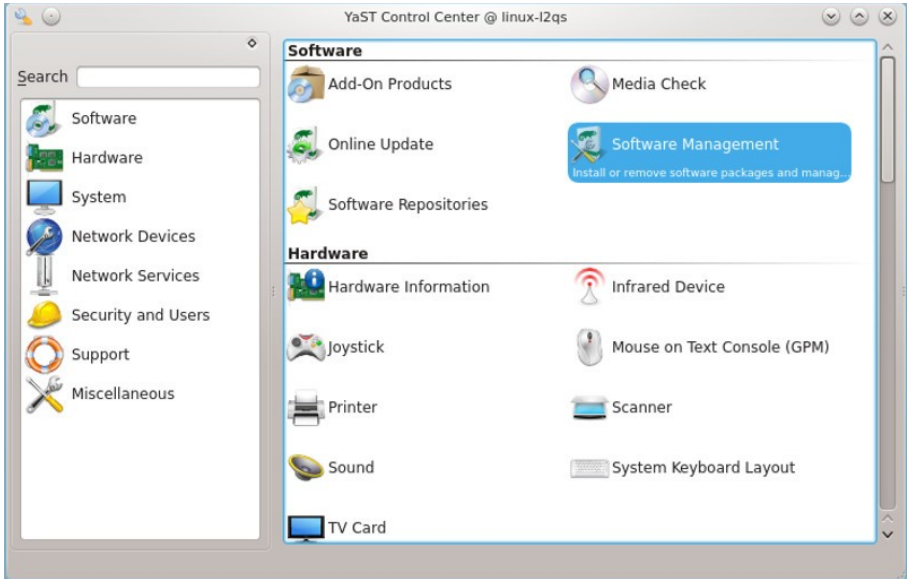
- 1) Configuring your host server with RAID. We recommend two drives configured as RAID 1 (mirror). This can be configured during the install of the operating system and does not require any special hardware or RAID controllers.
- 2) Using a suitable server-grade UPS for power backup. Configure the operating system to shut down gracefully in the event of an extended power outage.
- 3) Use of fast SSDs (solid state drives) for the data area storing the VM image. Using a fast SSD can dramatically improve the TimeIPS VM performance and responsiveness.
- 4) Backing up your data regularly. Backup files can be created manually through the web interface or automatically by using our off-site backup service. You may also want to periodically shut down your VM and make a backup copy of the actual image file.

Preparing the Host Operating System (openSUSE)

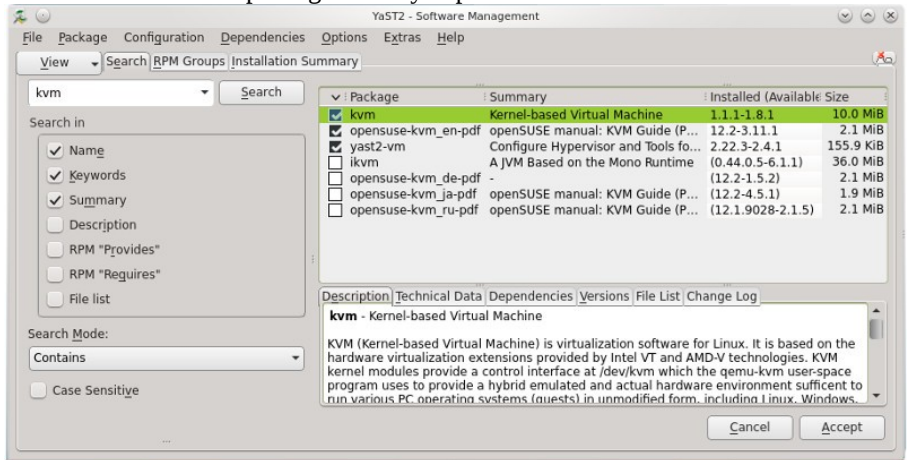
The following example is based on openSUSE 12.2. Newer versions may differ. Begin with a standard installation. Download an ISO for the distribution of your choice (i.e. www.opensuse.org) and burn it to a blank DVD.

Boot your server to the installation DVD and follow the on-screen prompts.

After installation, open Administrator Settings (YaST) → Software Management



Then install the KVM package and any dependencies



Additional configuration steps in YaST:

Under Security and Users:

- Click “Firewall” and click “Stop Firewall Now” and “Disable Firewall Automatic Starting.” After you have the TimeIPS VM up and running, return here and configure to suit your needs.

Under Network Services:

- Click “NTP Configuration” and select “Now and On Boot” and add an NTP server of your choice. If you're not sure, you can use `ntp.timeips.com`.

Under Network Devices:

- Click “Network Settings” and edit your network adapter to have a static IP address on your network.

Obtaining Your VM Image

Your VM image will be available for download as a .zip file. You must unzip the file before the image can be used in your virtualization environment.

Open your web browser and visit www.timeips.com/downloads. Enter the access code you received via e-mail and click on Submit. Right-click on the link provided and select “Save Link As . . .” Download the file to `/home/<username>/Downloads`. The download process may take a few minutes.

Launch the TimeIPS VM (openSUSE)

From a terminal:

```
sudo su
<enter your root password>
```

Make a directory for your VM

```
mkdir /root/timeips
```

Unzip the VM image

```
unzip /home/<username>/Downloads/<serial number>.zip -d /root/timeips
unzip /root/timeips/Linux_scripts.zip -d /root/timeips
```

Set your image to be writable and scripts to be executable:

```
chmod 640 /root/timeips/TimeIPS_<serial number>.vmdk
chmod 740 /root/timeips/timeips.cron
chmod 740 /root/timeips/startvm.sh
chmod 740 /root/timeips/stopvm.sh
```

Add a start/restart line to automatically launch your TimeIPS VM

cat /root/timeips/timeips.cron >> /etc/crontab

Start the TimeIPS VM

/root/timeips/startvm.sh

Shutdown the TimeIPS VM

/root/timeips/stopvm.sh (allow 1 minute to complete, run command again to verify the TimeIPS VM has stopped.)

*cron will restart every 15 minutes. Comment the cron line to prevent restart or mv TimeIPS_<serial number>.vmdk TimeIPS_<serial number>_disabled.vmdk

If you receive an error similar to “No Accelerator Found” when attempting to start the TimeIPS VM, it means hardware virtualization is not enabled on your system. To fix this, reboot your system and enter the BIOS. Look for the hardware virtualization settings. You may need to refer to the documentation for your motherboard in order to find the correct setting.

You should see an option for SVM or VMX depending on whether you have an AMD or Intel processor. If you are unable to find such a setting, double check whether or not you are using an Intel processor with “Intel VT-x” support or an AMD processor with “AMD-V” support. If you do not have a processor with hardware virtualization support, see page 10.

Using the Menu to Set or View the IP Address

The TimeIPS VM image will boot to a menu providing a number of basic functions, including viewing and setting the IP address, switching from DHCP to Static addressing, restarting and shutting down the image, etc.

```
TimeIPS Configuration (SN# A13000526500000, MAC 90:2b:34:d4:71:ff)

Network Configuration
01. Reread Network Settings
02. Revert to DHCP
03. Set IP Address
04. Set Default Gateway
05. Set Netmask
06. Set DNS
07. Apply Pending Network Settings
08. Backup Network Settings
09. Show / Restore Network Settings
10. View Public IP
Hardware Status
11. Check RAID status
12. Display drive 1 status
13. Display drive 2 status
Miscellaneous
14. Help
15. Set Boot Default
16. Restart Server
17. Shutdown Server
18. Check/Run Updates
19. Enable Remote Service

Current Settings          Pending Settings
-----
Network Type: DHCP      -- No change --
IP Address:   192.168.1.115  -- No change --
Gateway:     192.168.1.1    -- No change --
Netmask:    255.255.255.0   -- No change --
DNS 1:      192.168.1.1    -- No change --
DNS 2:      -- No change --
```

If using qemu-kvm:

The startvm.sh script will launch the VM in the background and the menu will not be displayed. To launch with the menu, you must log in as root. After logging in as root, run:

```
qemu-kvm -hda TimeIPS_<serial number>.vmdk -m 1024 -net nic,vlan=0,model=rtl8139 -net user,vlan=0
```

If you use sudo su from a terminal, you will likely see an error regarding SDL. This means the system can not connect to your display.

When finished configuring the network, select Shutdown Server and then relaunch using the startvm.sh script provided.

Running on a System Without Hardware Virtualization

For production installations, the TimeIPS VM image should run on a system with hardware virtualization support. This requires an Intel processor with “Intel VT-x” support or an AMD processor with “AMD-V” support. Most processors made in the last few years support one of these technologies and will work well for a virtual machine host.

Older systems without hardware virtualization support can be used with reduced performance. For openSUSE installations, this can be done by changing the `startvm.sh` script's reference to “`qemu-kvm`” to just “`qemu`” to disable hardware KVM support.

Initial Login Using IP Address

The virtual machine will port forward TimeIPS to the address of your host system on port 80 by default. If this port is already used on your server, you can change the startup script to use an alternate port.

Go to a PC on your network with a web browser.

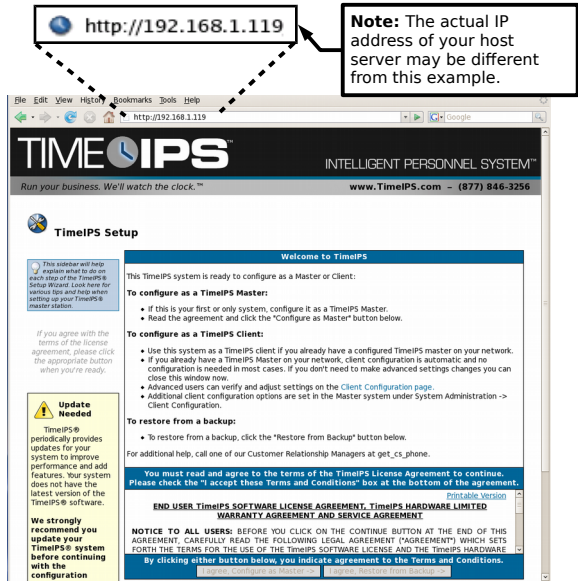
In your web browser, enter the IP address of your host server.

Beginning with the screen shown here, follow the instructions on each screen.

The setup process will include creating the first employee, who will have access to all areas of TimeIPS and who will be able to designate other employees as administrators and/or managers.

Once you complete the configuration, you can add and edit all settings and employees as needed.

For assistance with further configuration and use of TimeIPS, please visit our support web site at <http://support.timeips.com>. If you do not find the information you need there, call our Technical Support department at 316.264.1600.



Configuration Screen

Note: When you have successfully connected to TimeIPS from your PC, the screen on your PC monitor should look like the screen above. After reading the information at the bottom of this page, you will be ready to proceed with the guided setup process.

Network Troubleshooting

In the event you are unable to reach the web interface for your TimeIPS VM, you may be having network related problems.

Make sure you can reach the IP address of your host system.

Make sure your VM is running by using the following command:

```
ps aux |grep qemu
```

You should see a qemu-kvm process running your VM.

Open a web browser on the server and browse to <http://localhost>. If this works, you may need to check your firewall and/or port forwarding.

Network Requirements

Ports Used By TimeIPS

The following ports are used by TimeIPS on the Internet (if available) for the reasons described below:

80 (HTTP) Required for update downloads

25 (SMTP) Recommended for e-mail reports and messages

53 (DNS) Required for name resolution

123 (NTP) Recommended for time synchronization

443 (TimeIPS) Required for update and backup authorization

Best practice: Make sure your TimeIPS VM host has access to the Internet for all the ports listed above.

Ports Used by Network Clocks

Network clocks normally communicate with the server on port 80. An alternate port can be configured under System Settings in the Network Section. For network clocks on remote networks, we recommend a VPN for security. If a VPN is not available, it is possible to port-forward either port 80 or the alternate port and configure remote network clocks to find their master at the port-forwarded address.

Please visit <http://support.timeips.com> for additional network and port information.

Networking: Host and VM

There are two ways to allow the TimeIPS virtual machine image to access your network.

- The default (and recommended) method is “usermode networking.” In this mode, the TimeIPS VM image gets a DHCP network address (normally 10.0.2.15) from the VM host's internal DHCP server. The host provides NAT to route traffic to the VM. To access services on the VM, port forwards are configured on the host system. The KVM scripts included with your VM image are configured to do this. If you are using a different VM host environment, see “Ports Used By TimeIPS” on the previous page.
- The alternate is “bridged networking.” In this mode, the TimeIPS VM is assigned an IP address on your network and is “bridged” to your network by the VM host. No port forwards are required. To use this mode, configure your VM host for bridge mode, then watch your DHCP server logs while booting the TimeIPS VM. You should see the IP address assigned. Then, configure your DHCP server to always assign this address (or a different address of your choice) to the VM.

Depending on the VM host environment, bridged networking can require a significant amount of configuration which is beyond the scope of this manual. If you need to use this method, search the Internet for documentation related to TUN/TAP networking.

Note: To simplify networking, the default configuration in the VM is to automatically obtain an IP address using DHCP. If you want to set a static IP address without DHCP in the image, boot to the administration console and use the menu to configure a static IP address.

Special Considerations

Telephone clocking:

Telephone clocking can be used with a TimeIPS VM. Configuration assistance from the TimeIPS Technical Support department may be needed.

We recommend placing your TimeIPS telephone clocking device(s) on a LAN in the same subnet as your VM host for best results. (See note below on remote network considerations.)

For openSUSE installations using qemu-kvm, activate telephone clocking support (VOIP mode) by changing the VOIP option in startvm.sh from 0 to 1.

The default configuration uses the following ports:

UDP: 5060

UDP: 16384 to 16482

These ports must be open on the VM host.

When configuring a telephone clocking device, you must specify the external IP address the device will use. This will be the IP address of the VM host. You may also need to configure the subnet mask and default route for the device to match your external network.

Note: VOIP devices on remote networks, including over the Internet, are possible but may require additional considerations as follows:

1. The ports listed above to be port forwarded on the host side.
2. Your host site must have a static Internet IP address and the address must be configured in TimeIPS.
3. Your TimeIPS telephone clocking device(s) must have a direct Internet address (either static or DHCP). For example, they CANNOT be behind a gateway with NAT.

Network Clocks NTP sync:

Network clocks need a time synchronization source.

- 1) Option 1: Configure your VM host to run NTPD and allow external access.
- 2) Option 2: Point all network clocks to ntp.timeips.com.
- 3) Option 3: Use the TimeIPS VM as the time source for network clocks.

Advanced Topics

File system checks

In rare cases, the file system inside the TimeIPS virtual machine image may need a “file system check.” This is usually caused by unclean shutdowns. To fix it, you will need to use the TimeIPS recovery partition. Please contact our Technical Support department for assistance in loading and using the recovery partition.

Configure SMART for hard drives and mdadm alerts for RAID

SMART can monitor your hard drives and alert you if one of them detects an internal problem. Configure `/etc/smartd.conf` to monitor your drives and send you e-mail alerts.

In addition, mdadm can monitor your RAID array and alert you if one of the drives is malfunctioning.

For example, add to `/etc/mdadm.conf`:

```
MAILADDR <youraddress@yourcompany.com>
```

And run:

```
chkconfig --level 345 mdadm on
```

TimeIPS VM clean shutdown

The following command (put it all on one line) will send a special signal to the TimeIPS VM image requesting an immediate clean shutdown. The shutdown should be complete within 60 seconds unless the VM host is extremely busy.

```
wget --timeout=5 -q -O /dev/null  
"http://localhost:80/quickset_ip.php?stopMachineVM=1"
```

Note: If your VM is using bridged networking, replace “localhost” with the IP address of your VM.

Note: When running the TimeIPS VM on a virtualization platform other than KVM, you'll need to write your own script to shutdown the TimeIPS VM cleanly.

Technical Support

Technical Support Resources:

1. Our support web site at <http://support.timeips.com> offers extensive resources including documentation and our knowledge-base. Please check our support web site first, as it provides complete answers and instructions on almost everything. In the "Knowledge Base Search:" box, enter a few words describing your question. For example, if you have a question on payroll, enter "payroll" and browse the articles listed.
2. If you have a question not answered on our support site, you can call or e-mail us. A period of limited e-mail/phone support is included with your system. A serial number or registration number is required for this service. Additional support can be purchased by calling TimeIPS, or by visiting our web site at <http://secure.timeips.com>.
3. If you have a simple question, or need direction on how to use our support resources, feel free to e-mail us at support@timeips.com. If your question is quick, we'll be happy to help. If it's not, we'll let you know you need to purchase additional support.

Support website

<http://support.timeips.com>

Support e-mail

support@timeips.com

Support phone number

316.264.1600

System Specifications:

Requires host system with suitable virtualization software.

System Administration Requirements:

PC with modern OS.
(Linux™, MacOS™ or Windows™)
A network port and an up-to-date version of
Firefox™ or Chrome™ web browser.

Network Requirements:

Internet connection required for e-mail notifications, time synchronization, updates and off-site backups

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Thank you for reading this manual carefully. If you noticed errors, have any suggestions or found typographical problems, we want to know! Please send an e-mail with the version code below and your feedback to documentation@timeips.com. We appreciate your time.

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