

Hitachi NAS Platform F1000 Series Cluster Getting Started Guide for Virtual NAS

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Preface

This manual explains how to create and operate virtual servers by using a Hitachi NAS Platform F (HNAS F) system.

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This preface includes the following information:

- [Intended audience](#)
- [Product version](#)
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Intended audience

This manual is intended for system administrators who operate and manage virtual servers in an HNAS F system.

In addition, the user must have:

- A basic knowledge of storage systems
- A basic knowledge of networks
- A basic knowledge of the file sharing service
- A basic knowledge of SANs
- A basic knowledge of CIFS
- A basic knowledge of NFS
- A basic knowledge of UNIX
- A basic knowledge of Windows
- A basic knowledge of Web browsers

Product version

This document revision applies to Hitachi NAS Platform F version 5.1.1 or later.

Release notes

Release notes can be found on the documentation CD. Release notes contain requirements and more recent product information that may not be fully described in this manual. Be sure to review the release notes before installation.

Organization of HNAS F manuals

HNAS F manuals are organized as shown below.

Note that whether HNAS F nodes can be set up in a redundant configuration depends on the HNAS F model. A configuration where nodes are made redundant is called a cluster configuration, and a configuration where a node is not made redundant with another node is called a single-node configuration. Which manuals you need to read depends on which configuration you are going to use.

Manual name	Description
<i>Hitachi NAS Platform F1000 Series Installation and Configuration Guide, MK-92NAS061</i>	You must read this manual first to use an HNAS F system. This manual contains the information that you must be aware of before starting HNAS F system operation, as well as the environment settings for an external server.

Manual name	Description
<i>Hitachi NAS Platform F1000 Series Cluster Getting Started Guide, MK-92NAS076</i>	This manual explains how to set up an HNAS F system in a cluster configuration. To operate HNAS F on a virtual server, see the <i>Cluster Getting Started Guide for Virtual NAS</i> .
<i>Hitachi NAS Platform F1000 Series Cluster Getting Started Guide for Virtual NAS (This manual)</i>	This manual explains how to set up virtual servers for HNAS F systems in a cluster configuration.
<i>Hitachi NAS Platform F1000 Series Cluster Administrator's Guide, MK-92NAS084</i>	This manual provides procedures for using HNAS F systems in a cluster configuration, as well as provides GUI references.
<i>Hitachi NAS Platform F1000 Series Cluster Troubleshooting Guide, MK-92NAS066</i>	This manual provides troubleshooting information for HNAS F systems in a cluster configuration.
<i>Hitachi NAS Platform F1000 Series Single Node Getting Started Guide, MK-92NAS079</i>	This manual explains how to set up an HNAS F system in a single-node configuration.
<i>Hitachi NAS Platform F1000 Series Single Node Administrator's Guide, MK-92NAS089</i>	This manual explains the procedures for using HNAS F systems in a single-node configuration, as well as provides GUI references.
<i>Hitachi NAS Platform F1000 Series Single Node Troubleshooting Guide, MK-92NAS078</i>	This manual provides troubleshooting information for HNAS F systems in a single-node configuration.
<i>Hitachi NAS Platform F1000 Series CLI Administrator's Guide, MK-92NAS085</i>	This manual describes the syntax of the commands that can be used for HNAS F systems in a cluster configuration or a single-node configuration.
<i>Hitachi NAS Platform F1000 Series API References, MK-92NAS064</i>	This manual explains how to use the API for HNAS F systems in a cluster configuration or a single-node configuration.
<i>Hitachi NAS Platform F1000 Series Error Codes, MK-92NAS065</i>	This manual contains messages for HNAS F systems in a cluster configuration or a single-node configuration.
<i>Hitachi NAS Platform F1000 Series File System Protocols (CIFS/NFS) Administrator's Guide, MK-92NAS086</i>	This manual contains the things to keep in mind before using the CIFS or NFS service of an HNAS F system in a cluster configuration or a single-node configuration from a CIFS or NFS client.

Referenced documents

Hitachi Content Platform

- *Hitachi Content Platform Administering HCP*
- *Hitachi Content Platform Managing a Tenant and Its Namespaces*
- *Hitachi Content Platform Managing the Default Tenant and Namespace*
- *Hitachi Content Platform Replicating Tenants and Namespaces*
- *Hitachi Content Platform HCP Management API Reference*
- *Hitachi Content Platform Using a Namespace*
- *Hitachi Content Platform Using the Default Namespace*
- *Hitachi Content Platform HCP Metadata Query API Reference*
- *Hitachi Content Platform Searching Namespaces*
- *Hitachi Content Platform Using HCP Data Migrator*
- *Hitachi Content Platform Installing an HCP System*
- *Hitachi Content Platform Third-Party Licenses and Copyrights*
- *Hitachi Content Platform HCP-DM Third-Party Licenses and Copyrights*
- *Hitachi Content Platform Installing an HCP SAIN System - Final On-site Setup*
- *Hitachi Content Platform Installing an HCP RAIN System - Final On-site Setup*

Abbreviation conventions

This manual uses the following abbreviations for product names:

Abbreviation	Full name or meaning
HCP	Hitachi Content Platform
HNAS F	Hitachi NAS Platform F
Windows	Microsoft(R) Windows(R) Operating System


Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: <code>copy source-file target-file</code>

Convention	Description
	<i>Note:</i> Angled brackets (< >) are also used to indicate variables.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important and/or additional information.

Convention for storage capacity values

Storage capacity values (e.g., drive capacity) are calculated based on the following values:

Capacity Unit	Physical Value	Logical Value
1 KB	1,000 bytes	1,024 (2 ¹⁰) bytes
1 MB	1,000 KB or 1,000 ² bytes	1,024 KB or 1,024 ² bytes
1 GB	1,000 MB or 1,000 ³ bytes	1,024 MB or 1,024 ³ bytes
1 TB	1,000 GB or 1,000 ⁴ bytes	1,024 GB or 1,024 ⁴ bytes
1 PB	1,000 TB or 1,000 ⁵ bytes	1,024 TB or 1,024 ⁵ bytes
1 EB	1,000 PB or 1,000 ⁶ bytes	1,024 PB or 1,024 ⁶ bytes
1 block	-	512 bytes

Getting help

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Comments

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Before Starting Setup

A Hitachi NAS Platform F (HNAS F) system provides a file sharing service for network clients.

If a file system is managed by an HNAS F resource group, access to files can be distributed among both nodes by mounting a separate file system onto the resource groups running on each node, and services can be provided. However, because the nodes are managed as one system in a cluster, network and user authentication environments cannot be divided up for each node or resource group. Building multiple virtual servers in the HNAS F system enables you to provide multiple independent systems with a file sharing service and to manage those systems.

- [Network configuration](#)
- [Before using virtual servers](#)
- [Prerequisites](#)
- [Items to be confirmed](#)
- [Work flow](#)

Network configuration

The following figure shows an example of an HNAS F network configuration for operating virtual servers.

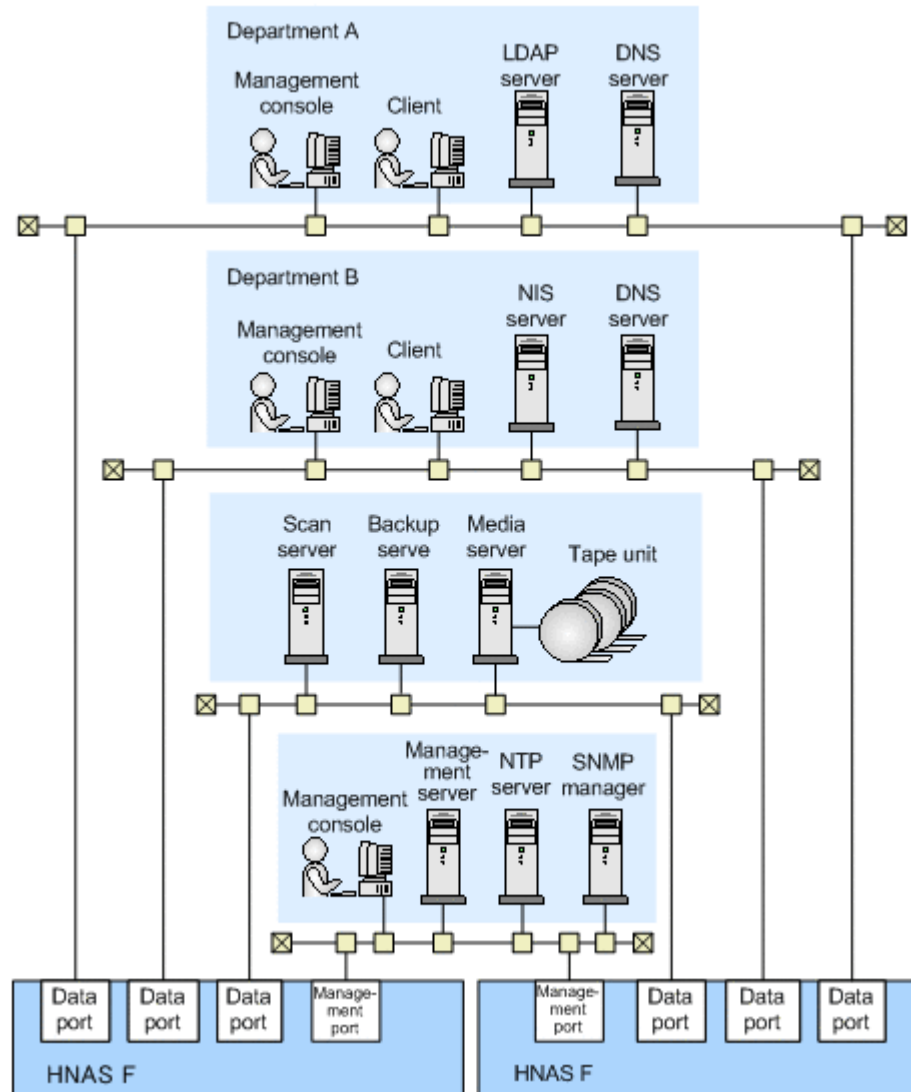


Figure 1-1 Network configuration for operating virtual servers

If multiple virtual servers are used, access load can be distributed by allocating the servers to different nodes and ports. In addition, the scan server, backup server, and other external servers that can be shared by virtual servers can be connected to a separate network from the network that clients use for file access. This configuration allows the external servers to be centrally managed without degrading file access performance. For the network considerations applicable to virtual server operation, see [Appendix A, Considerations Related to the Configuration of Networks on page A-1](#).

Before using virtual servers

You can create multiple virtual servers in a cluster. The maximum number of virtual servers that can be created depends on the memory capacity for the node. A combined total of 24 user LUs (not including the virtual server OS LU) and interfaces (including management interfaces) can be assigned to a virtual server. If you increased the file system capacity or set up the file snapshot functionality, you need to add user LUs. The limit on the total number of file systems and mounted differential-data snapshots is 1,024 per virtual server, and 6,144 for the whole system. Before configuring a system, carefully consider the number of virtual servers to be created, the type of service operation, and the future scale of the file systems. For details about the memory capacity allocated to virtual servers and the upper limits applicable to virtual servers, see [Appendix B, Memory Capacity Allocated to Virtual Servers on page B-1](#) or [Appendix C, Upper Limits for Virtual Servers on page C-1](#).

The file sharing service provided by resource groups cannot be used with virtual servers. Instead, use the file sharing service provided by virtual servers for clients.

In an HNAS F system, the external servers that will be shared by virtual servers are set up on nodes (physical nodes). Depending on the operating requirements, a different server might be set up for each virtual server.

For details about external servers necessary for the HNAS F system, see the *Installation and Configuration Guide*.

Prerequisites

The following describes the HNAS F configuration prerequisites for the setup procedures described in this manual:

- Segments of the front-end LAN and the management LAN are separated.
- A machine to be used as a management server and management console is prepared.
- The system administrator uses the GUI or commands for HNAS F with the management console placed in the management LAN.
- NTP servers are prepared.
- Nodes are in a cluster configuration.
- The following LUs are created in the storage system: an LU to be used as a shared LU (approximately 70 GB), a user LU to be assigned to a virtual server OS LU (approximately 50 GB), and an LU to be used as a user LU.
- LUs in the storage system are set to be used in an HNAS F system.

In addition, when an HNAS F system is linked with Hitachi Content Platform (HCP), make sure that DNS servers are prepared and the HCP system is configured with tenants and namespaces created in advance.

Items to be confirmed

To efficiently perform the setup procedure, the system administrator needs to confirm in advance information to be specified in the setup. The following shows the information that needs to be confirmed in advance:

Table 1-1 Information that needs to be confirmed in advance

Items to be confirmed	Detail	Result
HNAS F	Management IP addresses of both nodes	
	Virtual IP addresses for management ports of both nodes	
	Virtual IP addresses for data ports of both nodes	
	License key files or license keys (whether to encrypt user LUs when using an encryption license)	
	Management IP addresses or virtual IP addresses for virtual servers	
NTP server	IP address	
Others	Time zone	

If an HNAS F system is linked with an HCP system, confirm the following information:

Table 1-2 Information that needs to be confirmed in advance when an HNAS F system is linked with an HCP system

Items to be confirmed	Detail	Result
HCP	HCP system name (Fully Qualified Domain Name)	
	Tenant name	
	User name and a password of a user account for the tenant administrator	
	Namespace name	
	Host name or IP address that has been made external and is used to connect to the HCP system (if any relay device such as a load balancer is used when connecting the linked HCP system)	
A router placed between a management LAN	IP address of the default gateway	

Items to be confirmed	Detail	Result
and a front-end LAN		
DNS server	Domain name	
	IP address	

This manual describes the setup procedure for creating one CIFS share on the virtual server and starting test operation. Unless otherwise indicated, use default values. To efficiently perform the procedure, determine in advance the information and default values that need to be confirmed before proceeding with the procedure and values of items to be specified by the user. The following shows the items that need to be specified by the user in the setup procedure.

Table 1-3 Items that need to be specified by the user in the setup procedure

Items to be confirmed	Result
Cluster name of HNAS F	
Virtual server name	
CIFS users for HNAS F operational testing (local authentication) <ul style="list-style-type: none"> • Group name (Setup example: testgroup) • GID (Setup example: 1000) • User name (Setup example: testuser) • UID (Setup example: 1000) • Password (Setup example: password789) 	
Shared name for HNAS F operational testing (Setup example: MyShare)	

Work flow

The following are the tasks the system administrator must perform after all system components have been connected.

1. Determine the information required for initial setup.
For details about the information that needs to be confirmed in advance according to the setup prerequisites, see [Items to be confirmed on page 1-4](#).
2. Install Hitachi File Services Manager.
For details about how to install Hitachi File Services Manager on the management server for use as the HNAS F GUI, see [Installing Hitachi File Services Manager on page 2-2](#).
3. Set up the system.

For details about how to specify the basic system settings that are common to virtual servers, see [Setting up the system on page 2-2](#).

4. Create virtual servers.

For details about how to create a virtual server, see [Creating a virtual server and setting up the system on page 2-5](#).

5. To migrate data on virtual servers to the HCP system, use commands to set the HCP information for each virtual server.

For details about how to set the HCP information, see [Setting the migration-destination HCP information on page 2-6](#).

6. On the virtual servers you have created, specify the system and service settings.

For details about how to specify the system and service settings on a created virtual server, see [Specifying the service settings on a virtual server on page 2-6](#).

Setup

This chapter explains the procedure for setting up an HNAS F system that will be used to operate virtual servers.

- [Installing Hitachi File Services Manager](#)
- [Setting up the system](#)
- [Creating a virtual server and setting up the system](#)
- [Setting the migration-destination HCP information](#)
- [Specifying the service settings on a virtual server](#)

Installing Hitachi File Services Manager

To use the GUI in an HNAS F system, you must install Hitachi File Services Manager on the management server. For details about the hardware requirements for the management server, the necessary tasks before installation, and the browser settings for using Hitachi File Services Manager, see the *Installation and Configuration Guide*.

To install Hitachi File Services Manager:

1. On the management server, execute `HFSMinst.exe` from the installation media.
2. Start the installation as instructed by the displayed dialog boxes.
In the dialog boxes, specify the program installation folder, the location of database files, and other information.
When installation is completed successfully, the Installation Complete dialog box appears.
3. Click the **Finish** button.



Note: After you complete installation, you need to change the initial password (`changeit`) for the SSL certificate imported to the key store file (`jssecacerts`). Execute the following command on the management server:

```
Hitachi-Command-Suite-Common-Component-installation-folder\bin  
\hcmdskeytool -storepasswd -keystore Hitachi-Command-Suite-Common-  
Component-installation-folder\jdk\jre\lib\security\jssecacerts -  
storepass current-password (changeit) -new new-password
```

Setting up the system

The procedure for specifying the basic system settings common to virtual servers is described below. To check the necessary information and environment settings before starting setup, see the *Cluster Administrator's Guide*.

1. In a Web browser, specify the following URL:
`http://IP-address-or-host-name-of-management-server:23015/
FileServicesManager/`
2. On the page that is displayed, specify the user name and password, and log on to Hitachi File Services Manager.
As the user name and password, specify the following:
 - o User name: `System`
 - o Password: `manager`



Note: To prevent unauthorized access, you must change the password after setup. For details about how to change the password or add an account other than `System`, see the *Cluster Administrator's Guide*.

For the first-time setup, the Configuration Wizard starts automatically. To manually start the wizard, from **Go** in the global task bar area, select **Configuration Wizard**.

3. In the **1. Introduction** page, click **Next >**.
4. In the **2. Node settings** page, enter the following information, and then click **Next >**.
 - o Management IP address first node (IP address of node 0 in the cluster)
 - o Management IP address second node (IP address of node 1 in the cluster)
 - o Management server's authentication password (The initial password is `manager`.)
5. In the confirmation screen, click **Next >**.
6. In the **3. License Settings** page, click **Activate License**.
7. In the **Activate License** dialog box, specify the settings for the license and click **OK**.
 - o If you are using a license key file, specify the license key file path into the text box. If you want to browse and specify the file name, click the **Browse** button.
 - o If you want to enter a license key directly, enter the license key into the text box.
8. In the confirmation screen, select the check box and click the **Confirm** button.
9. In the **3. License settings** page, click **Next >**.
10. In the **4. Cluster settings** page, enter the following information, and then click **Next >**.
 - o Cluster name
 - o The LU to be used as the cluster management LU (Note that the LU size must be about 70 GB.)
 - o Whether to encrypt user LUs. (You can use this if an encryption license is set.)
11. In the **5. Network settings** page, specify the virtual IP address of the management port, and then click **Next >**.
12. In the **6. Optional settings** page, click **Default settings**, and then click **Next >**.
13. In the **7. Confirmation** page, confirm the information, and click **Confirm**.
The **8. System settings** page appears, and setup starts.
14. In the **9. Completion** page, select **Custom setting** and then, with no check boxes selected, click **Network & System Configuration**.
15. In the **System Setup Menu** page (**Setting Type:** `network`) of the Network & System Configuration dialog box, click the **Interface Management** button.
16. In the **List of Interfaces** page of the Network & System Configuration dialog box, click the **Add** button.

17. In the **Add Interface** page of the Network & System Configuration dialog box, create the interfaces for the data ports that will be used.
18. In the **System Setup Menu** page (**Setting Type:** *network*) of the Network & System Configuration dialog box, click the **Routing Setup** button.
19. In the Network & System Configuration, on the **List of Routings** page, set the routing information for the interface of the data port.
20. In the **9. Completion** page, click **Close**.
21. In the *processing-node* subwindow, click **Reconfigure Processing Node**.
22. In the **1. Introduction** page, click **Next >**.
23. In the **2. Node settings** page, enter the management server's authentication password, and then click **Next >**.
24. In the **3. License settings** page, click **Next >**.
25. In the **4. Cluster settings** page, click **Next >**.
26. In the **5. Network settings** page, click **Next >**.
27. In the **6. Optional settings** page, select **Custom setting**, make sure that **HCP settings** is selected, and then click **Next >**:
To link with the HCP system, you need to select the following check boxes.
 - **DNS settings**
 - **HCP settings**
28. If you specified the **DNS settings** in step 27, in the **DNS settings** of the **6-1. DNS settings** page, enter the following information, and then click **Next >**.
 - IP address of the DNS server
 - Name of the domain to which the node belongs
29. In the **6-2. Time settings** page, enter the following information, and then click **Next >**.
 - Region and time zone
 - IP address of the NTP server
30. If you specified the **HCP settings** in step 27, in the **6-3. HCP settings** page, enter the following information, and then click **Next >**.
 - HCP system name for a fully qualified domain name
 - Tenant name
 - User name and a password of a user account for the tenant administrator

If you are using the HCP replication functionality, select the **Use** check box for **Replica**, and specify the HCP replica system name for a fully qualified domain name.

In the **8. System settings** page, check the connection for communicating with the HCP system.

31. In the **7. Confirmation** page, confirm the information, and click **Confirm**.
The **8. System settings** page appears, and setup starts.
32. In the **9. Completion** page, click **Close**.

Creating a virtual server and setting up the system

To create a virtual server, and then set up the system on the created virtual server:

1. In the **Advanced** subtab of the **Settings** tab in the *physical-node* subwindow, click the **Cluster Management**.
2. In the **Browse Cluster Status** page (for **Cluster / Node status**) of the Cluster Management dialog box, verify the cluster and node status.
Confirm that `ACTIVE` is displayed for the cluster status, and `UP` is displayed for the node status for both nodes.
3. In the object tree, select the processing node for which you want to create a virtual server, and then from the **Virtual Servers** tab of the *processing-node* subwindow, click the **Create** button.
4. In the Create Virtual Server dialog box, and on the **Storage** and **Front-end LAN** tabs of this dialog box, specify the information necessary for creating a virtual server.
5. Click the **OK** button. In the confirmation dialog box that is displayed, click the **Confirm** button.
When the processing finishes, the created virtual server starts. In the *processing-node* subwindow, on the **Virtual Servers** tab, confirm that `Online` is displayed in **Service** for **Status** of the created virtual server.
6. In the **Advanced** subtab of the **Settings** tab in the *physical-node* subwindow, click **Backup Configuration**.
7. In the **Save System Settings Menu** page of the Backup Configuration dialog box, click the **Save All System Settings** button.
8. In the **Save All System Settings** page of the Backup Configuration dialog box, click the **Save and Download** button to download the system configuration information to storage media outside the system.
9. In the object tree, select a virtual server, and then, in the **Advanced** subtab of the **Settings** tab in the *virtual-server* subwindow, click the **Network & System Configuration**.
10. If you are going to migrate data used in virtual servers to the HCP system, then in the **System Setup Menu** page (**Setting Type:** `network`) of the Network & System Configuration dialog box, click the **DNS, NIS, LDAP Setup** button.
11. If you are going to migrate data used in virtual servers to the HCP system, then in the **DNS, NIS, LDAP Setup** page of the Network & System Configuration dialog box, set the information about the DNS server.

12. In the **System Setup Menu** page (**Setting Type:** *network*) of the Network & System Configuration dialog box, click the **Routing Setup** button.
13. In the **List of Routings** page of the Network & System Configuration dialog box, set routing information for the interfaces.
14. In the *processing-node* subwindow, on the **Virtual Servers** tab, restart the virtual server.

Setting the migration-destination HCP information

To migrate data used in virtual servers to the HCP system, first use commands to set the HCP information for each virtual server. For details about how to use commands, see the *CLI Administrator's Guide*.

To use the commands in an HNAS F system, you must configure the SSH environment. For details about settings for using the commands, see the *Cluster Administrator's Guide*.

To set the HCP information:

1. Use the `archcpset` command to set the migration-destination HCP information.

```
$ sudo archcpset
HCP host name : HCP-host-name
Replica HCP host name (If replica HCP is not used, simply press the
[Enter] key.) : replica-HCP-host-name
HCP tenant name : HCP-tenant-name
HCP account user : user-name-of-data-access-account-to-be-used-to-access-
all-namespaces-in-the-tenant
HCP account password : password-of-data-access-account-to-be-used-to-
access-all-namespaces-in-the-tenant
confirm password : password-of-data-access-account-to-be-used-to-access-
all-namespaces-in-the-tenant
External HCP host name (To communicate with HCP directly, press the
[Enter] key.) : host-name-that-has-been-made-external-and-is-used-to-
connect-to-the-HCP
External replica HCP host name (To communicate with the replica HCP
directly, press the [Enter] key.) : host-name-that-has-been-made-external-
and-is-used-to-connect-to-the-replica-HCP
```

Note:

The character strings you enter for HCP account password and confirm password are not displayed.

2. Verify that the migration-destination HCP information was properly updated.

Specifying the service settings on a virtual server

To specify the service settings on a virtual server that you created:

1. In the object tree, select a virtual server, and then, in the **Basic** subtab of the **Settings** tab in the *virtual-server* subwindow, click **Local Users**.

2. In the **List of Users / Groups** page (for *List of users*) of the Local Users dialog box, select **List of groups** from the drop-down list, and then click **Display**.
3. In the **List of Users / Groups** page (for *List of groups*), click **Add New Group**.
4. In the **Add Group** page, add groups that access shared directories on the virtual server, and then click **OK**.
5. In the **List of Users / Groups** page (for *List of groups*), select **List of users** from the drop-down list, and then click **Display**.
6. In the **List of Users / Groups** page (for *List of users*), click **Add New User**.
7. In the **Add User** page, add users that access shared directories on the virtual server, and then click **OK**.
8. In the *virtual-server* subwindow, on the **Shares** tab, click the **Create and Share File System** button. In the Create and Share File System dialog box that appears, create a test file share.
To migrate data to the HCP system and not share HCP data migrated from other HNAS F systems, create a file share with settings that do not use namespaces, and then configure migration by using the Migration Wizard.
9. In the **Advanced** subtab of the **Settings** tab in the *virtual-server* subwindow, click **Backup Configuration**.
10. In the **Settings Backup Management** page of the Backup Configuration dialog box, click the **Back Up Settings** button.
11. In the **Browse Settings Backup Status** page of the Backup Configuration dialog box, click the **Backup** button to download the virtual server configuration information to storage media outside the system.
To periodically save virtual server configuration information on the HCP system, select **Transfer to HCP** and set up a schedule in the **Schedule Settings Backup** page that appears when you click the **Modify Schedule** button in the **Browse Settings Backup Status** page of the Backup Configuration dialog box.

Considerations Related to the Configuration of Networks

A combined total of 24 user LUs (not including the virtual server OS LU) and interfaces (including management interfaces) can be assigned to a virtual server. The management port must be assigned to the interface used for management. In addition, the interface used for management can be used to provide services to users. A network that uses a tagged VLAN or trunking can also be configured. For the basic network configuration in an HNAS F system, see the *Installation and Configuration Guide*.

This appendix focuses on network configurations necessary for the operation of virtual servers.

- [Configuration in which an interface is set for each virtual server](#)
- [Configuration in which multiple virtual servers share an interface](#)
- [Configuration in which an independent private network is operated for each virtual server](#)

Configuration in which an interface is set for each virtual server

The following figure shows an example of a configuration in which an interface is set for each virtual server.

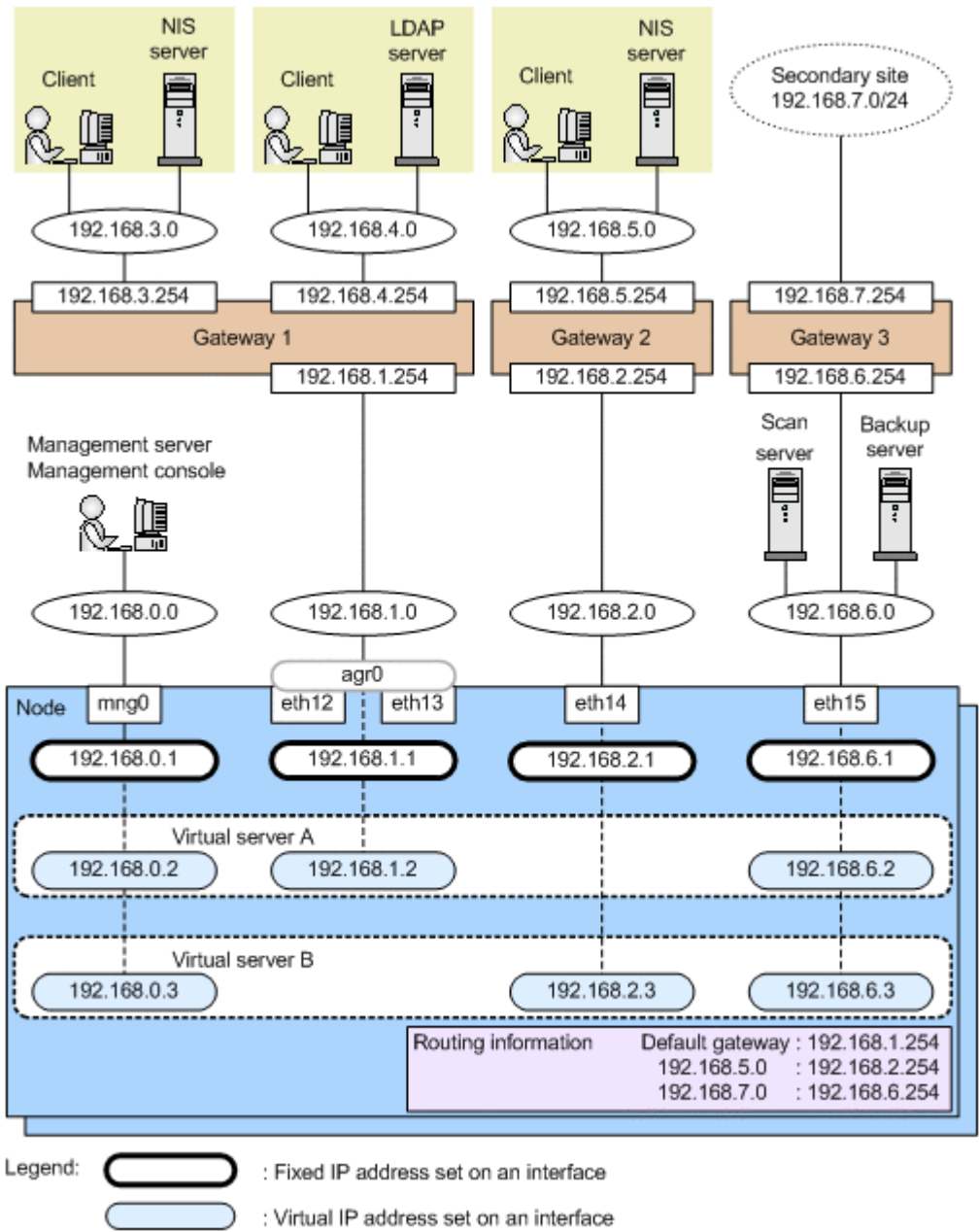


Figure A-1 Example of a configuration in which an interface is set for each virtual server

In this configuration example, the clients belonging to the networks at 192.168.3.0 and 192.168.4.0 are able to access virtual server A via interface `agr0`, and the client belonging to the network at 192.168.5.0 is able to access virtual server B via interface `eth14`.

In addition, an interface for the external servers has been created so that one scan server and one backup server can be used from all the virtual servers. In the routing information, the route to the secondary site has been added so that differential-data snapshots can be backed up remotely to the secondary site.

This configuration has the following advantages:

- A separate interface for each virtual server can prevent the access performance of a virtual server from being adversely affected by the operation of other virtual servers.
- An interface that uses multiple ports for link aggregation can increase the bandwidth available for communication.
- Because the information of more than one virtual server does not exist in the front-end LAN, security is stronger.

Configuration in which multiple virtual servers share an interface

The following figure shows an example of a configuration in which multiple virtual servers share an interface.

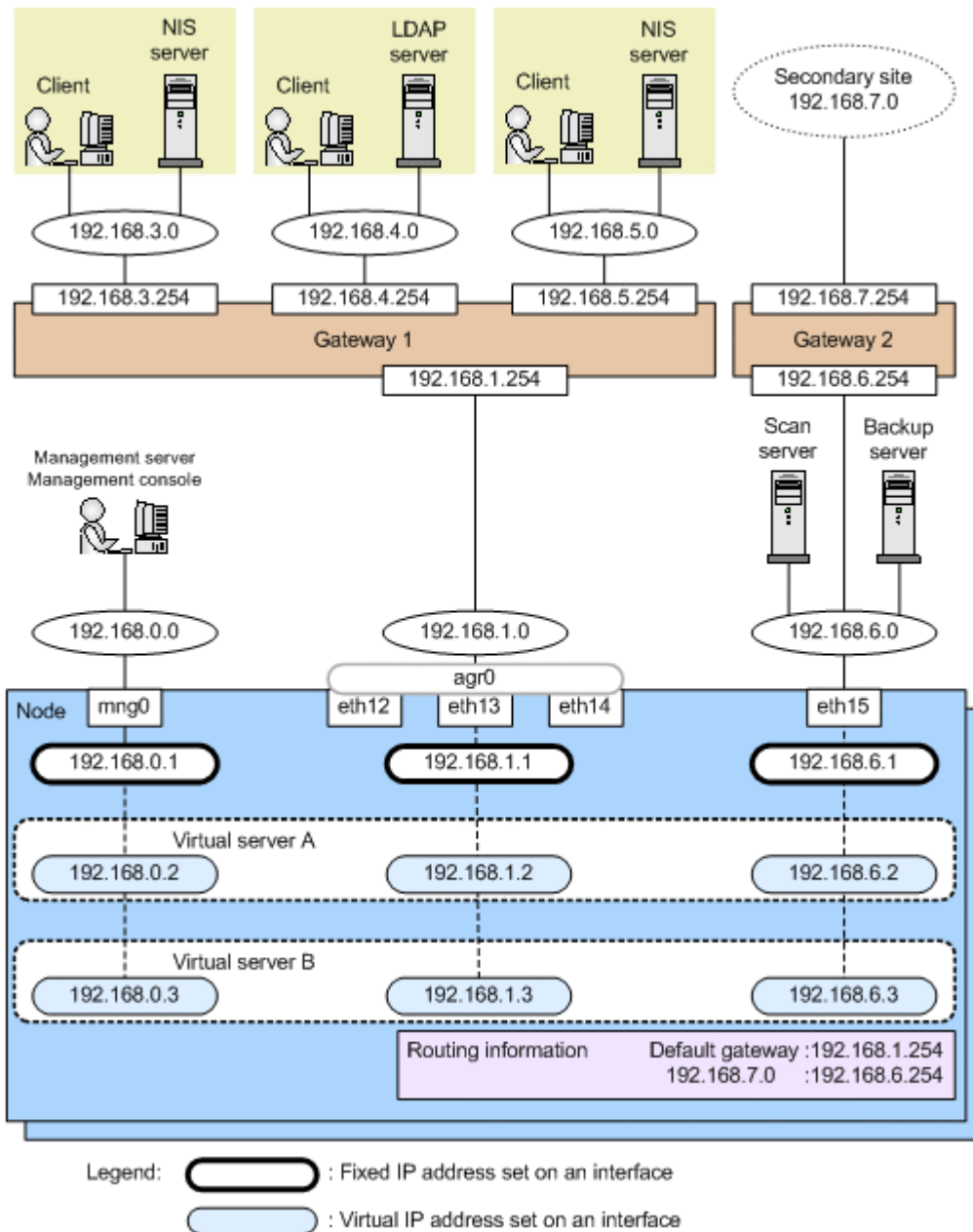


Figure A-2 Example of a configuration in which multiple virtual servers share an interface

In this configuration example, the clients belonging to the networks at 192.168.3.0, 192.168.4.0, and 192.168.5.0 are able to access virtual server A or virtual server B via interface `agr0`. Which virtual server (A or B) a network client can access depends on the settings on the authentication server used by the virtual servers.

This configuration has the following advantages:

- An interface that uses multiple ports for link aggregation can increase the bandwidth available for communication.

- Only one gateway can be directly connected to an interface that is shared by multiple virtual servers. This simplifies management because it is only necessary to add the default gateway in the routing information.

In this configuration example, note the following:

- Because access centers on the interface shared by multiple virtual servers, implement link aggregation with multiple ports to increase the bandwidth available for communication.
- Because information about multiple virtual servers exists in the front-end LAN, appropriate security measures must be taken.

Configuration in which an independent private network is operated for each virtual server

When an independent private network is operated for each virtual server, the same virtual IP address can be specified for virtual servers.

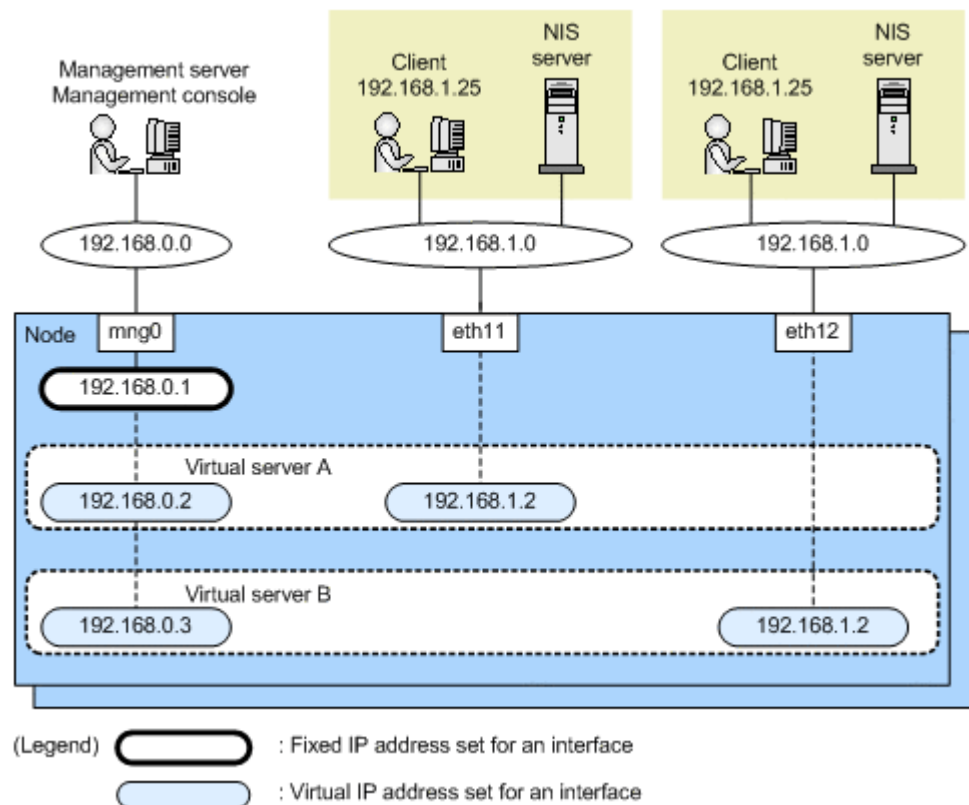


Figure A-3 Basic configuration for operating an independent private network for each virtual server

Connecting to a private network from each virtual server by omitting the fixed IP address setting for a data port enables aggregation of the system network settings operated by different servers without changing those settings.

Note that interfaces cannot be shared among virtual servers for which network segments are duplicated.

Memory Capacity Allocated to Virtual Servers

This appendix explains how to determine the memory capacity to be allocated to virtual servers.

- [How to determine the memory capacity allocated to virtual servers](#)

How to determine the memory capacity allocated to virtual servers

The system administrator can use the `vnasctl` command to change the memory capacity allocated to virtual servers. Use the value obtained from the following estimation as a guideline to set the memory capacity allocated to a virtual server if necessary.

Formula for estimating the memory capacity allocated to a virtual server

$$\text{Memory capacity allocated to a virtual server (GB)} = 1.2 + (A \times 0.2) + B + C + (D \times 1.1) + (E \times 0.15) + (F \times 0.006)$$

A: Number of file systems created on the virtual server

B: Recommended memory capacity obtained from the number of CIFS client connections (see [Table B-1 Number of CIFS client connections and the recommended memory capacity to be allocated on page B-2](#))

C: 0.1 if the file system data is migrated to the HCP system. 0 if the data is not migrated.

D: Number of file systems on the virtual server that will be backed up online by using the NDMP function

E: Number of differential-data storage devices if you use the file snapshot functionality

F: Number of differential-data snapshots if you use the file snapshot functionality

Table B-1 Number of CIFS client connections and the recommended memory capacity to be allocated

Automatic reloading	Number of CIFS client connections	Recommended memory capacity to be allocated (GB)
Enabled	1,000	1.4
	2,000	15
	3,000	21
	4,000	27
	5,000	33
	6,000	39
	7,000	46
	8,000	53
	9,000	59
	9,600	63
Disabled	1,000	1.1
	2,000	2.9
	3,000	4.7

Automatic reloading	Number of CIFS client connections	Recommended memory capacity to be allocated (GB)
	4,000	9
	5,000	12
	6,000	15
	7,000	18
	8,000	21
	9,000	23
	10,000	26
	11,000	29
	12,000	31
	13,000	34
	14,000	37
	15,000	39
	16,000	42
	17,000	45
	18,000	47
	19,000	50
	20,000	53
	21,000	55
	22,000	58
	23,000	61
	24,000	63

Upper Limits for Virtual Servers

This appendix explains the upper limits applicable to virtual servers.

- [Upper limits](#)

Upper limits

The following table shows the maximum number of virtual servers that can be created in a cluster and the maximum memory capacity that can be allocated.

A memory capacity of 3 GB is allocated to a created virtual server. You can use the `vnasctl` command to change the allocated memory capacity. For details about how to change the memory capacity, see the *CLI Administrator's Guide*.

Table C-1 Maximum number of virtual servers that can be created in a cluster and the maximum memory capacity that can be allocated

Model	Node memory	Maximum number of virtual servers that can be created
HNAS F1140	16 GB	4

Note:

If the total memory capacity does not satisfy the following estimate formula, actions such as creating virtual servers and changing the memory capacity to be allocated cannot be performed, even if the number of created virtual servers has not reached the maximum:

Total allocated memory capacity of all virtual servers in the cluster^{#1} + (1.2 + 0.25 x Number of virtual servers in the cluster) <= Memory capacity recognized by the system (Truncated after the decimal point)^{#2} (GB)

(<=: Less than or equal to)

#1

3 GB of memory is allocated when a virtual server is created. You can change the allocated memory capacity by using the `vnasctl` command.

#2

This is different from the memory capacity that is mounted on the node. Use the `hwstatus` command to check the memory capacity.

The following table shows the number of CIFS clients that can connect to the CIFS service (the maximum number of connections) per virtual server and the maximum number of CIFS shares.

Table C-2 Maximum number of CIFS clients that can connect to the CIFS service per virtual server and maximum number of CIFS shares

Model	Node memory	Memory allocated to each virtual server (in GB)	Automatic reloading	Maximum number of CIFS clients	Maximum number of CIFS shares
HNAS F1140 (Cluster configuration)	16 GB	From 2 to less than 3	N	2,000	7,500
			Y	1,000	256
		From 3 to 12	N	$285 \times \text{memory-capacity-allocated-to-each-virtual-server}^{\#} + 1,430$	7,500
			Y	$71 \times \text{memory-capacity-allocated-to-each-virtual-server}^{\#} + 858$	256

Legend:

Y: Automatic reloading is enabled.

N: Automatic reloading is disabled.

#

Always a GB-integer value without a decimal.

When multiple virtual servers are configured in a cluster, the total number of CPUs that are assigned to all virtual servers must be within the number of CPUs that can be assigned to a single virtual server. Note that if too many CPUs are assigned to virtual servers, processing performance might decrease. Therefore, if the number of virtual servers exceeds a certain amount, we recommend that you change the number of CPUs assigned to each virtual server in the cluster to 1.

The following table shows the number of CPUs that can be assigned to a virtual server, and the number of virtual servers at which the number of CPUs assigned to each virtual server should be changed to 1.

You can use the `vnasctl` command to change the number of CPUs assigned to a virtual server. For details about how to change the number of CPUs, see the *CLI Administrator's Guide*.

Table C-3 Number of assignable CPUs

Model	Assignable numbers	Number of virtual servers at which the number of CPUs assigned to each virtual server should be changed to 1
HNAS F1140	From 1 to 4	2

The following table describes other maximum values.

Table C-4 Virtual server maximum values

Item	Maximum value
Number of interfaces	From 1 to 23
Number of user LUs	24 - <i>maximum-number-of-interfaces</i>
File system capacity	1 PB
Number of NFS shares	Per virtual server: 1,024 For all virtual servers: 7,680

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