

Introduction of Product

Internet File Server "WebDEPOT"

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Komatsu TriLink Ltd. has merchandized various networking devices, such as print server. Recently it succeeded in developing Internet file server as a new series product. This report introduces its functions and advantages.

Key Words: *Ubiquitous Computing, Internet File Server "WebDEPOT", WebDAV, Storage, Print Server*

1. Introduction

For the purpose of establishing a new core of our network equipment business that follows print server, project server and information appliance, we started a project in April 2004 and developed a new Internet file server (hereinafter called "IFS"). This report provides the overview of our developed IFS.

1.1 Background of product development

As computer spreads, diverse information has come to be created by personal computer. And data size is increasing as the complexity of information increases and multimedia spreads more widely. On the other hand, to enhance their competitiveness, companies come to actively cooperate with each other, and the necessity of sharing information not only in company but also beyond company is increasing. Today, various methods are available for transmitting information via Internet, and each of them has its own merits and demerits in sending and receiving large size files between companies. So, there is no decisive solution at the present time. Aiming at the needs in this field, we made

various surveys and studies and started the development of IFS.

1.2 Placement of product

Komatsu TriLink Ltd. has developed products based on the interface technology for transmitting information till now. From now on, we will adopt the technologies and know-how for storing information and develop appliance type products to establish the basis for storage applied products in the future.

1.3 Product concept

- Internet file server
 - File server that enables simply and easily sending, receiving and sharing large volume files via Internet
- Simple operation
 - Products that can be operated simply and safely even in an environment where there is no dedicated network administrator, aiming mainly at medium- to small-scale enterprises

2. Product Overview

IFS is a file server that allows to read, write and share files via Internet (**Photo 1**).



Photo 1 Appearance of IFS Main Unit

The product was named "WebDEPOT", meaning "Depot on Web".

Unlike conventional file servers, IFS permits freely sharing information not only in company but also beyond company. Though this function can be used in any type of industry, we think there will be much merit when used in the following types of industry where there are many opportunities of sending and receiving data.

Manufacturing industry: CAD data, software, specification

Printing industry: Manuscript, artwork

Creator: Web contents, CG data

Education: Materials, report

Medical: Image data

Construction industry: Drawing, photo

It can also be used to read the data existing in company from the place of business trip or your house.

Following are the outline of its functions.

2.1 Internet file server function

Not only does IFS work as an ordinary file server to enable sharing files within a local network, but it also permits external access via Internet (**Fig. 1**).

It has taken measures to improve security for sharing information beyond company.

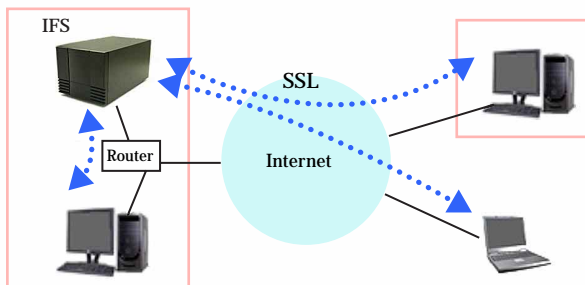


Fig. 1 An Image of Use

2.1.1 Principle of operation

A standard technology called "WebDAV" is employed for sending and receiving files.

"WebDAV" (Web-based Distributed Authoring and Versioning) is the communication protocol the specifications of which were established by IETF (Internet Engineering Task Force). It is an extension of HTTP protocol that is generally used by Web servers basically to modify the contents of Web server from remote. We applied this technology to IFS to enable reading and writing of files via Internet.

FTP (File Transfer Protocol) is often used to share information with external computer. Compared with FTP, WebDAV has the following advantages:

- While FTP uses multiple ports to send and receive data, WebDAV uses only a single port, so that higher security can be assured. (As the number of externally opened communication ports increases, the risk of external attack increases.)
- WebDAV permits file operation by drag-and-drop with Windows' standard tools.
- WebDAV has a high affinity with encryption technology "SSL" (described later).

2.1.2 How to use

Using the Web Folder function that is incorporated in Windows2000/XP as standard, user can access a remote IFS to open the user area allocated in the built-in hard disk of IFS as if it were a folder on the local PC. And, by drag-and-drop of a file, he can freely read or write a file. It is possible to send or receive a folder at a time as well as a file. Also with Macintosh that is often used for designing, it is possible to access an IFS in the same manner as operating a local folder by installing a freeware.

2.1.3 Security measures

The access to IFS is limited by user name and password, so that other users do not know even the existence of your folder. In addition, it is possible for individual user to set permit/prohibit of external access via Internet. When prohibited, access is possible only within the local network. Further, the communication between server and client is automatically encrypted by "SSL" technology, so that there is no possibility that a third party steals a glance at the content.

"SSL" (Secure Socket Layer) is the encryption technology developed by Netscape Communications, U.S.A. It is highly reliable and widely used, for example, to improve the security of Web site for online shopping. The affinity of "WebDAV" with "SSL" is essentially high, which is one of the reasons why we employed "WebDAV" in our IFS.

2.1.4 User and group

By inputting your user name and password, you can access the folder allocated in IFS and freely read and write files. Basically other user's folder cannot be accessed, but when a group is set, it is possible to share a folder with the users who belong to the same group. It is possible that one user belongs to multiple groups. Thus, arbitrary mode of information sharing can be realized.

For users other than ordinary user (general user), IFS has the "temporary user" function, having the following advantages:

- Can add users without the authority of administrator
- Automatically issue user name (generated at random)
- Automatically deleted after the expiration of term

When it is known in advance that information is shared only in a short time, the temporary user function is convenient, saving the workload for maintenance.

2.2 Tools

When IFS is accessed with the Web browser, a dedicated window is displayed (**Photo 2**).

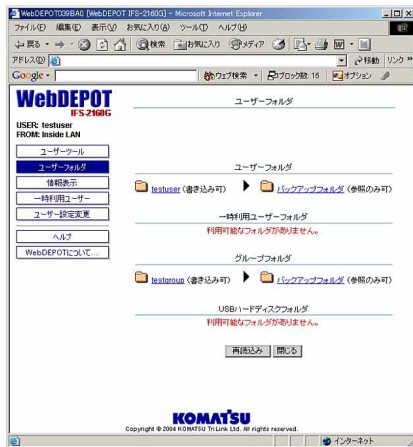


Photo 2 Tools

From this window, user can browse or download files that are stored in his or his group's folder.

The following functions can be used at the same time.

- Memo Pad
- Schedule (Calendar)

They can simply add, modify or browse information and be accessed via Internet. So, with these tools, you can use IFS not only as a file server but also as your dedicated information management tool.

2.3 File server / print server function

IFS is equipped with two USB ports as standard (**Photo 3**). Connecting hard disk and printer to these ports, you can share them within the local network.



Photo 3 Rear of IFS

It is possible to write data from IFS built-in hard disk into an external hard disk connected to the USB port. We are planning to make it possible to connect other USB devices, such as camera in the future.

2.4 Automatic backup function

To improve reliability, two units of hard disk are built in the IFS main unit (**Photo 4**). One is used for information sharing and the other for backup. The loss of data is mostly attributable to human error, such as misoperation. This risk is higher with IFS because multiple users access a same folder from different places. To assure safe operation, the backup function is incorporated as standard.

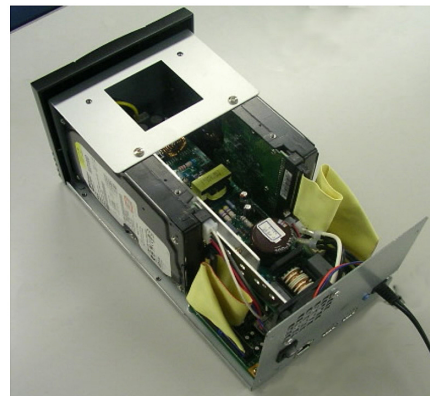


Photo 4 IFS inside

At specified time, IFS automatically copies data from shared area to backup area.

Even when a file is destroyed or deleted by mistake, it can be easily restored from the backup area. The user who has the right to access the backup source folder can freely restore file at any time even when he is not an administrator.

Because user folder and backup folder are stored in different hard disks, even when one hard disk becomes inaccessible due to physical error, the data can be restored if the other hard disk is operating normally. Reliability is im-

proved further by storing system software not in hard disk but in flash memory.

With ordinary file servers, system software is stored in a hard disk. In this case, if the hard disk failed, the system does not work, making it impossible to read the data stored in the hard disk. On the other hand, with IFS that uses a flash memory, the system works even in case of hard disk error. Therefore, it is possible to read data from either hard disk that is operating normally. For storing system software, NAND Flash ROM with high cost performance is used.

2.5 Simple setting

To realize our basic concept "Usable Product without Administrator", we developed the user interface that can be set easily with the Web browser.

IFS uses embedded Linux as operating system (OS), on which multiple applications run, to implement various functions as explained before. This, however, requires very complicated setting. To solve this problem, we developed many CGI programs to bridge between the Web browser as user interface and the operating system (OS) and succeeded in automating most of the setting. Therefore, the setting can be made without profound knowledge of OS. Because IFS employs expanded functions of Web server, it can be installed and run by the same method as ordinary Web server, requiring no complicated system.

For initial installation, it is necessary to change the setting of the router to which IFS is to be connected. By incorporating UPnP technology, we made it possible for IFS to automatically change the setting of router.

In addition, both hardware and software are integrated in the product so that user can save the labor of initial installation.

2.6 Miniaturization

We aimed at the product that is small in size and can be installed in any place but has the same "reliability" as large-scale file server.

Because IFS has many components that heat up, such as hard disk and power supply, taking their heat radiation property into consideration, we devised the shape and arrangement of boards, and succeeded in realizing a compact size, or 13 cm x 13 cm x 26 cm. In order to cut operation noise, we first intended to eliminate cooling fan, however, because it was difficult to achieve the elimination of cooling fan and miniaturization at the same time, and because the service life of hard disk is greatly influenced by ambient temperature, we chose reliability and finally decided to install a cooling fan.

3. Main Specifications

Table 1 Main Specifications

OS	Embedded Linux
Communication protocol	WebDAV, SMB/CIFS
CPU	TX4938
Network I/F	1000BASE-T/100BASE-TX/10BASE-T
Built-in hard disk (selectable)	80GB×2, 160GB×2, 250GB×2
External I/F	USB2×2
Outside dimensions	130×130×260mm
Weight	2.8kg
Power supply	AC100V
EMI	VCCI-A

4. Future Prospect

As computer and network technologies develop and spread wider, the digitization of information progresses further. And the systems for storing and transmitting data will be more and more important in the future.

The completeness of IFS seems high as the first-generation product, but many new problems were encountered in the course of the development. We will solve them to develop more useful product. At the same time, we will serialize the product and develop peripheral devices to meet user needs.

Introduction of the writers

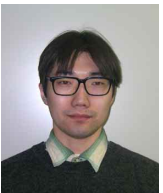
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[A few words from the writers]

“Make it possible to safely, simply and surely access necessary information at any time” was our idea in planning the product.

IFS is our first step toward the realization. We would like to bring up this product as a new core of our business by listening to customers’ opinion and making efforts for further improvements.