

# Development of the “LAN Interface Card”

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## 1. Introduction

In the modern network society, network security is vital to maintain security against information leaks and malicious attacks through the network, and so security is being reinforced year after year.

With this background, for the LAN interface card that is mounted on our UPS to take prompt countermeasures through the network at the time of power failure, we developed in 2007 a LAN interface card that supports SSH\*1 protocol and shuts down the computer by encrypting the information running on the network.

However, encryption has become more and more complex, which makes it difficult for the current LAN interface card to handle it properly. To reinforce the security functions with the LAN interface card, there were following problems.

- (1) The encryption process takes time due to insufficient CPU performance.
- (2) Function cannot be expanded due to lack of memory.

To solve these problems, we made a new development aimed at higher performance and lower cost for the hardware.

This document introduces an overview of the “LAN interface card” with reinforced security.

\*1: Abbreviation for Secure Shell.  
Refer to SANYODENKI Technical Report No.25 “Development of SSH Compliant UPS Management Products” .

## 2. System Configuration

Fig. 1 shows the system configuration using this product.

This product is mounted on a UPS to perform serial communication with the UPS via RS-232 communication and obtain data such as the UPS status and measurement information.

When a power outage occurs, it executes a shutdown command to the registered computer via network.

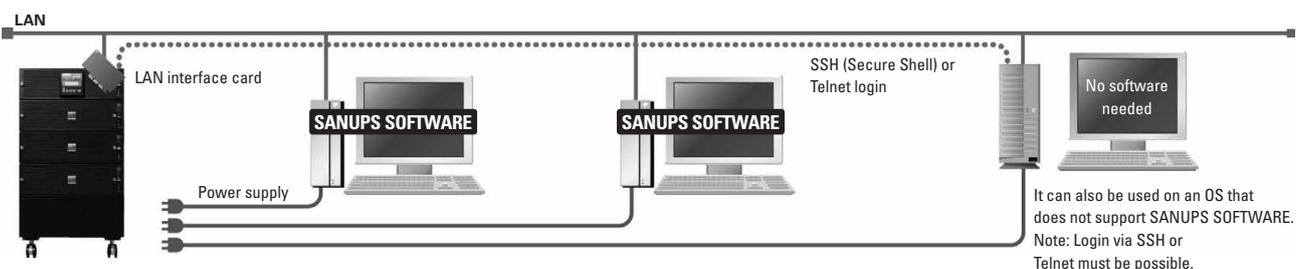


Fig. 1: Example of system structure

## 3. Features

### 3.1 Improvement of hardware performance

#### (1) CPU

By replacing the CPU with one that is higher in performance compared to the conventional model, the processing speed has greatly improved.

The processing time for the SSH login has become 1/18 shorter at 40 seconds for the new model compared to 720 seconds for the conventional model.

#### (2) Memory

With the ROM increased from 4 Mbytes to 16 Mbytes, and the RAM from 4 Mbytes to 32 Mbytes, the function can be flexibly expanded.

#### (3) Operating ambient temperature

The operating ambient temperature has increased from 0 to 40°C to -25 to 60°C, resulting in a wider temperature range. This makes it possible for the card to be mounted not only on a UPS, but also on the power conditioner for photovoltaic power generation SANUPS P for outdoor installation.

### 3.2 Security reinforcement

#### 3.2.1 Encrypting the electronic text on the network

##### (1) E-mail monitoring function

An increasing number of providers are leveraging OP25B<sup>\*2</sup> against spam mail, which often makes it difficult to send emails to Internet or mobile mail accounts.

This equipment supports encryption methods such as SMTP over SSL/TLS<sup>\*3</sup> or STARTTLS<sup>\*4</sup>, so it can send emails to tightly secured Internet and mobile mail accounts.

Also, encryption methods such as POP3 over SSL/TLS<sup>\*5</sup> or STLS<sup>\*6</sup> are also supported when receiving inquiry emails.

\* 2: OP25B stands for Outbound Port 25 Blocking. This blocks the communication to TCP port No. 25, which is used for sending mail, so that mail transmission to external mail servers is disabled. In this case, mail transmission is carried out using another port called a submission port where security is reinforced with user authentication and encryption of information.

\* 3, 4: SSL stands for Secure Socket Layer. TLS stands for TransportLayer Security. SMTP over SSL/TLS is a method that encrypts outgoing emails from the beginning using SSL or TLS, while STARTTLS is a method that encrypts them part of the way through using SSL or TLS.

\* 5, 6: POP3 over SSL/TLS is a method that encrypts incoming emails from the beginning using SSL or TLS, while STLS is a method that encrypts them part of the way through using SSL or TLS.

##### (2) Data download/upload function

This encrypts information such as setting information or event logs through the FTPS server function and enables the information to be downloaded to equipment on the network. Also, it can encrypt setting information and upload it.

##### (3) Web monitoring function

This provides access to this product through encrypted electronic text and allows it to be managed from the Web browser of equipment on the network through the HTTPS server function.

#### 3.2.2 SNMP monitoring function

Version 3 of SNMP is supported, so security is tighter than Version 1 or 2, which makes it possible to monitor this product more securely with SNMP.

### 3.3 Common interface establishment

As an MIB (Management Information Base: database for managing a device on a network) using SNMP, this can be managed with the Sanyo Denki private MIB (EXUPSMIB), in addition to the conventional standard UPS-MIB (RFC1628).

With the addition of this Sanyo Denki private MIB, this private MIB can be expanded and SANUPS products can be centrally managed using a common interface using SNMP.

### 3.4 Other functions

#### (1) Visualization of electric power

Statistical values of the UPS measurement information can be retained in the LAN interface card.

Table. 1 shows the list of measurement values that retain statistical values.

Table 1: Measured value list

Measured value		Statistical value
Input voltage (r-s)	V	Maximum, minimum, average
Input voltage (s-t)	V	Maximum, minimum, average
Input voltage (t-r)	V	Maximum, minimum, average
Input frequency	Hz	Maximum, minimum, average
Output voltage (r-s)	V	Maximum, minimum, average
Output voltage (s-t)	V	Maximum, minimum, average
Output voltage (t-r)	V	Maximum, minimum, average
Output current (r)	A	Maximum, minimum, average
Output current (s)	A	Maximum, minimum, average
Output current (t)	A	Maximum, minimum, average
Output power	kW	Maximum, minimum, average
Output electric energy	kWh	Hour/day/month total
Output frequency	Hz	Maximum, minimum, average
Load factor	%	Maximum, minimum, average
Ambient temperature	°C	Maximum, minimum, average
Battery temperature	°C	Maximum, minimum, average

The periods for storing statistical values are as follows.

Hourly summary data: 3 months + current month

Daily summary data: 2 years + current year

Monthly summary data: 10 years + current year

The above information can be shown as a statistical graph on the Web browser.

Fig. 2 shows an example of the ambient temperature statistical graph display.

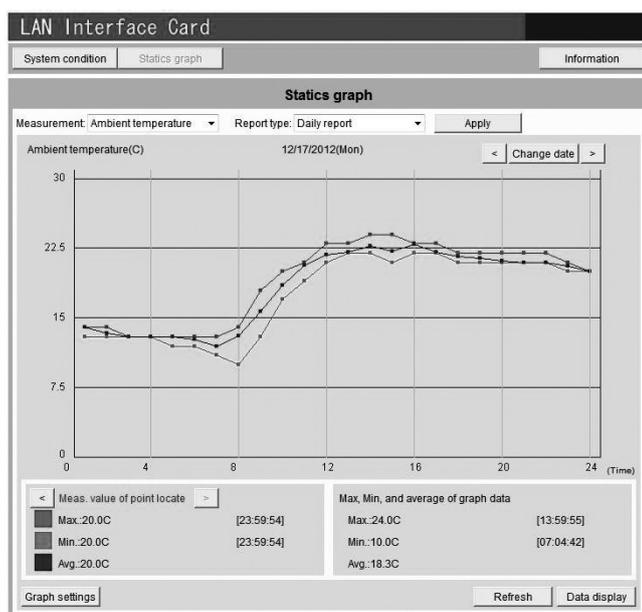


Fig 2: Example of ambient temperature statistical graph display

(2) Measurement value threshold monitoring function

By setting the threshold conditions for the load factor, ambient temperature, and input voltage of the UPS, deviations from the measurement value threshold can be monitored.

This can also shut down the computer when the measurement value is abnormal.

(3) Shutdown function for server of power sources in a redundant configuration.

Up to 5 UPS units can be configured redundantly and the server of power sources in a redundant configuration can be shutdown.

The method of shutdown for server of power sources in a redundant configuration is patent pending.

#### 4. Specifications of the “LAN Interface Card”

Table 2 shows the specifications of the “LAN interface card” .

Table 2: Specifications of the “LAN Interface Card”

Item	New model	Conventional model
Dimensions (W x D x H)	105 × 205 × 23.5 mm	Same
Mass	114 g	189 g
Operating ambient temperature	-25 to 60°C	0 to 40°C
Power consumption	1.4 W	5 W
Memory capacity	ROM / 16 Mbytes RAM / 32 Mbytes	ROM / 4 Mbytes RAM / 4 Mbytes
CPU	SH7619 / 125 MHz	SH7615 / 62.5 MHz
Function	SNMP version	v1, v2c, v3
	MIB	RFC1628, JEMA, Sanyo private
	Security	<ul style="list-style-type: none"> <li>• SSH (key size 1024, 2048)</li> <li>• SMTP encryption (SMTP over SSL/TLS, STARTTLS)</li> <li>• SMTP authentication (POP before SMTP, PLAIN, LOGIN, CRAM-MD5)</li> <li>• POP3 encryption (POP over SSL/TLS, STLS)</li> <li>• POP3 authentication (APOP)</li> <li>• FTPS</li> <li>• HTTPS</li> <li>• Terminal function login authentication</li> </ul>
		<ul style="list-style-type: none"> <li>• SSH (key size 1024)</li> </ul>

## 5. Conclusion

This document introduced the overview of the “LAN interface card”.

With the development of this product, we can now provide products with reinforced security measures greater than the conventional model with the SSH protocol.

Having greatly improved hardware performance and developed software that can centrally manage all SANUPS products, we have built a foundation upon which other SANUPS products can be developed even further.

We will strive to foresee the direction of the market and continue evolving the LAN interface card so that we can contribute to the growth of SANUPS products into more attractive products.



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