Development of IPv6 Compatible "SANUPS SOFTWARE" and "LAN Interface Card"

Hironori Ogihara   Yutaka Kato   Yuuki Hara

1. Introduction

We have added a variety of function to the UPS management products, "SANUPS SOFTWARE" and "LAN Interface Card" in order to meet the diversifying needs of the market.

This is because, in order to connect to a server, PC, etc. using a network, it is necessary to use the same protocol as the party you are communicating with.

The "SANUPS SOFTWARE" and the "LAN Interface Card" use IPv4 protocol (Internet Protocol version 4) which is mainstream with current networks, however now IPv6 (Internet Protocol version 6) is becoming popular as the next-generation protocol, and these products were developed to support this.

This document gives a basic introduction of the IPv6 compatible "SANUPS SOFTWARE" and "LAN Interface Card".

2. What is IPv6?

Currently, IPv4 is the main protocol used on the Internet, and IPv4 addresses are used to identify between devices. If these overlap, normal communication is no longer possible. The IPv4 addresses used on the Internet are managed by IANA (Internet Assigned Numbers Authority – an association that manages numbers relating to the Internet.)

There are approximately 4.3 billion IPv4 addresses from 0.0.0.0 to 255.255.255.255 (2 to the power of 32). However due to the rapid spread of information terminals, all of the non-allocated addresses managed by IANA were exhausted as of 2011. Currently, the respective associations use the addresses they have already been allocated which are not in use. However it is only a matter of time these addresses will be exhausted.

Due to this, the IPv6 popularization becomes popular as a fundamental solution to this problem. IPv6 will use approximately 340 undecillion addresses from 0:0:0:0:0:0:0:0 to ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff (2 to the power of 128).

LANs do not directly connect with the Internet, therefore are free from restriction on IPv4 addresses. Furthermore, there were not many compatible devices with IPv6, therefore the migration to IPv6 had not progressed.

However, recently, there are a higher number of compatible devices and software with IPv6, and suitable environment for the migration has been prepared. In line with this, compatibility with IPv6 is now being progressed for LANs as well.

3. System Configuration

Fig. 1 shows an example of system configuration using these products.
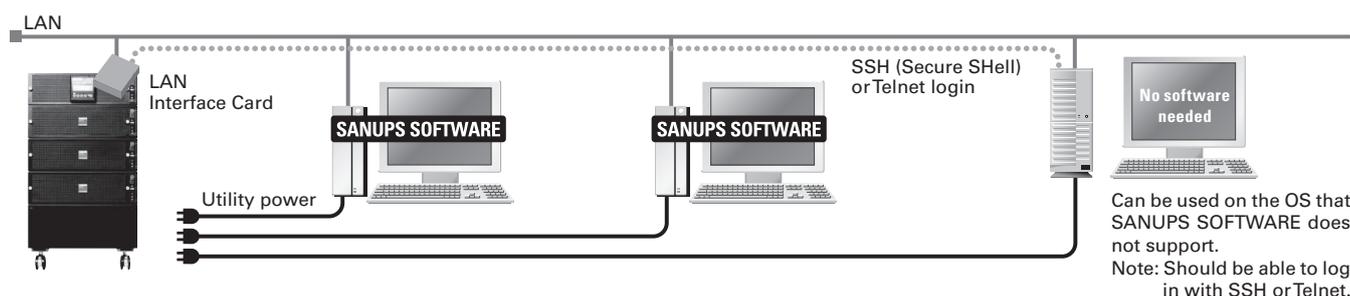

Fig. 1: Example of system configuration

The "LAN Interface Card" which is mounted on the UPS and registering the devices connected via the network makes possible to shut down such devices during power failure, etc.

Devices can be connected either by using the "SANUPS SOFTWARE" or the universally used SSH (Secure Shell – enables secure communication via an encrypted route.)

Furthermore, connecting a device which has the "SANUPS SOFTWARE" installed to a UPS via a serial cable is an alternative to use the "LAN Interface Card".

4. Features

4.1 IPv6-support

Control of connected devices, monitoring of UPS and so on is possible to use the "SANUPS SOFTWARE" and the "LAN Interface Card", therefore various things are supported regarding the IPv4 high-level protocol also. So that IPv6 could be used with all functions on the products developed this time, we made them compatible with IPv6 for all protocols.

IPv6 and IPv4 are not compatible, however these new developments can operate both protocols simultaneously, therefore can be used during the migration period from IPv4 to IPv6.

Also, in regards to user interface, the screen has been made horizontally long in order to make the input and confirmation of IPv6 addresses easier. Fig. 2 shows the screen of the conventional model, while Fig. 3 shows the screen of the new models.

4.2 Environmental availability

The "SANUPS SOFTWARE" is compatible with Windows, Linux and UNIX OS, and can be used with approximately 30 types of OS, even just counting the major versions alone.

However, the IPv6 is a new technology and there are some OS which are not supported, therefore IPv6 may not be available in certain environments. In such cases, the "SANUPS SOFTWARE" operates as an IPv4 application, therefore it can be used in any environment.
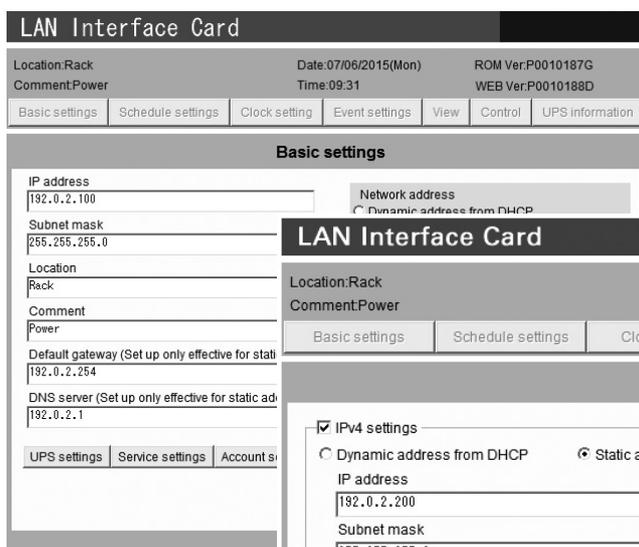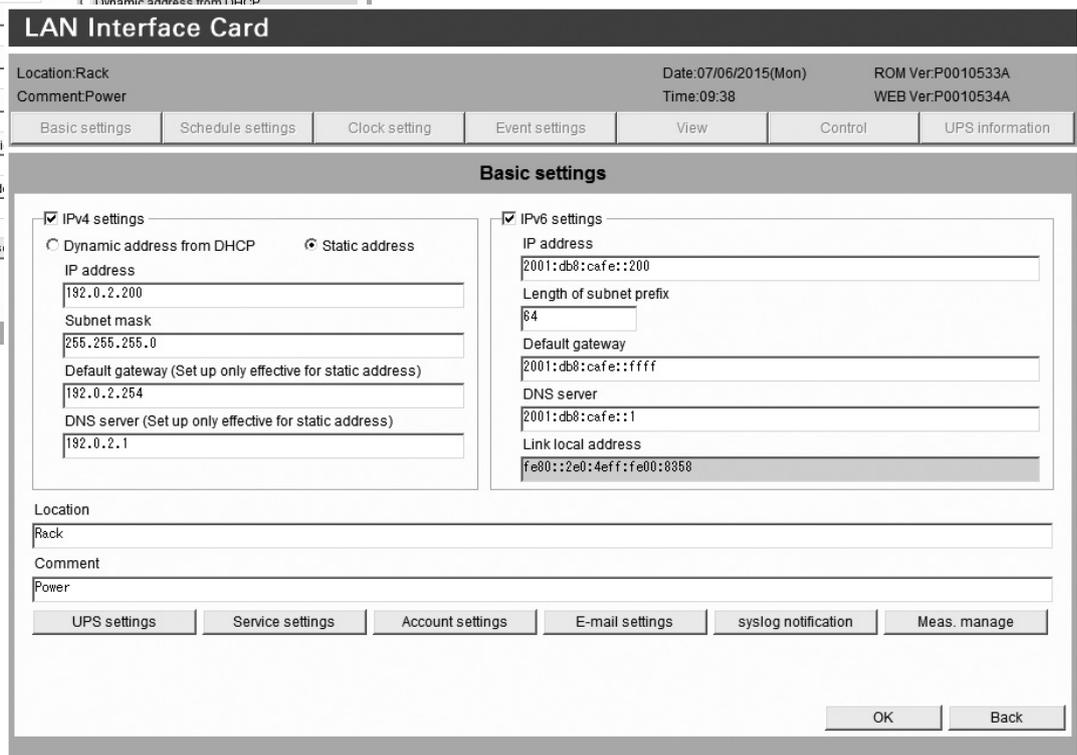

Fig. 2: Setting screen of the conventional model

Fig. 3: Setting screen of the new model

4.3 Expanding the number of SSH-registered devices

The "LAN Interface Card" is equipped with a feature to control a computer using SSH (Secure Shell). By using this, encryptions are used for user authentication, sending/receiving data and so on, therefore it keeps a high security level communication.

However, each of the devices communicating must repeat the process of encryption and decoding, therefore a vast quantity of calculations is required. Authentication uses a particularly vast quantity of calculations, therefore for the initial "LAN Interface Card" equipped with an SSH function, out of a total of 50 connected devices, only eight could be SSH-connected.

However, after this, the conventional "LAN Interface Card" became possible to perform high-speed processing due to hardware modifications, therefore this limitation was no longer an issue. This time, we have made it possible for all 50 connected devices to become SSH-connected.

4.4 Device-association function of the Environment monitoring sensor

The "LAN Interface Card" can be connected to up to 16 temperature/humidity sensors, and if the temperature/humidity threshold is exceeded, it is possible to send notifications via email, etc. and shut down connected devices.

If the shutdown function is used, all of the connected devices can be shut down by detecting a fault in one of the connected sensors. However, we received a request to also be able to shut down only a part of the connected devices in cases where sensors are installed for each server rack, etc.

As such, in this development, we have made it possible to select which devices will be shut down for each sensor. With this function, it is possible to only shut down specific connected devices if a fault occurs on a specific sensor. Moreover, flexible settings are possible as multiple sensors and connected devices can be selected.

In regards to user interface, sometimes operations become complicated if flexible settings are made possible, however this must be avoided.

We have devised a simple method where one first selects the device to be shut down, then the details are displayed below and the target can be finalized by moving left or right. Fig. 4 shows the setting screen.
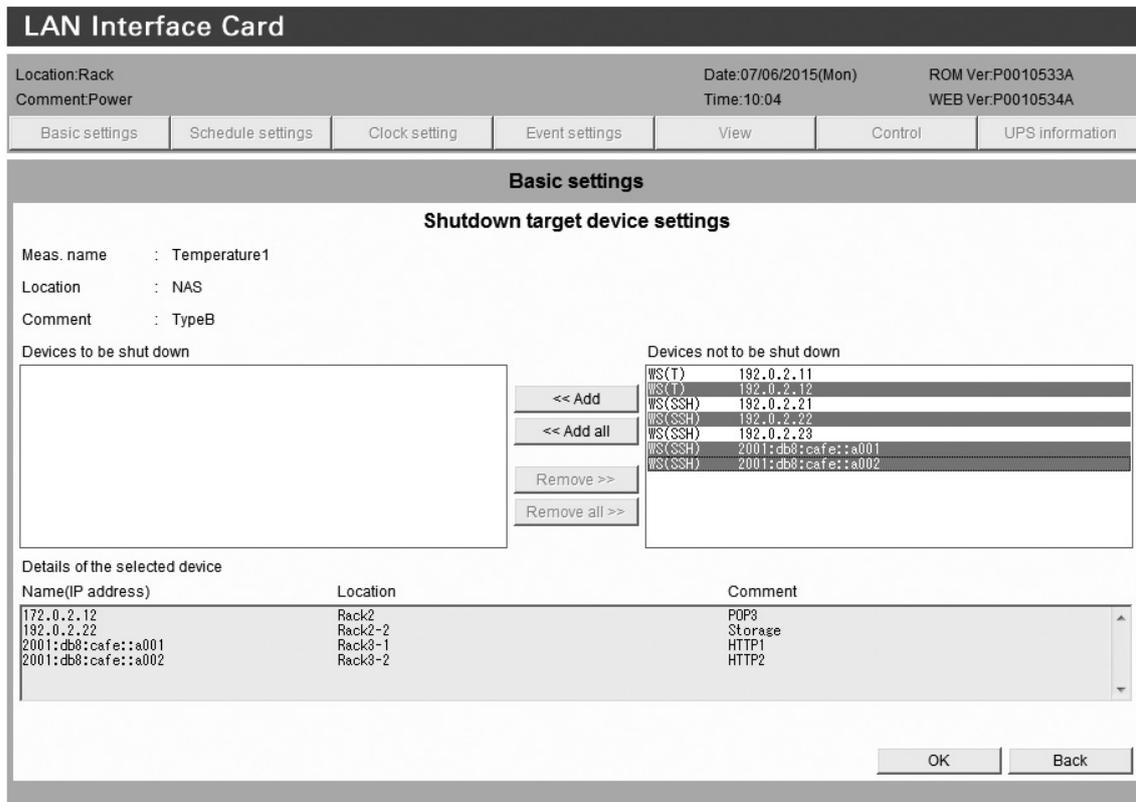

Fig. 4: Screen for selecting devices targeted by sensors

4.5 Email server setting check function

UPS are often connected to mission-critical devices such as servers, therefore subtle setting oversights could potentially trigger major problems. The administrator changes settings with extreme caution but there is always the possibility of human error.

The "LAN Interface Card" has a number of functions which use email such as email notification upon trouble occurrence, and it is necessary to perform settings on the email server if these are used.

In the past, there were problems where the administrator performed settings and then actually sent an email to ensure information was correct. These consisted of discovering the email function could not be used if incorrect settings were made until the correct settings were reestablished and not knowing the original setting value to return to when trying to rectify incorrect settings.

In order to solve those issues, we have equipped the "LAN Interface Card" with a function to check if the currently input information is correct, rather than change the information which has been set. By inputting the information to be set and pressing the check button, it is possible to perform an operational check without reflecting the set information. Therefore it makes possible to eliminate the mistake of updating with the incorrect setting information. Fig. 5 shows the applicable screen.

Fig. 5: Screen for confirming email server settings

5. Specifications

Table 1 shows the specifications of the "SANUPS SOFTWARE" while Table 2 shows the specifications of the "LAN Interface Card".

Table 1: Specifications of the "SANUPS SOFTWARE"

Item	Specifications
Functions	• Automatic computer shutdown (supports multi-platform) • Shutdown of power redundancy computers • Automatic computer startup at power restoration • Scheduled operation • UPS status display (supports Web browser, SSH or Telnet) • Sending/receiving emails • Test function (script execution, sending emails, shutdown) • Setting tool (GUI, CUI, Web, Telnet)

Table 2: Specifications of the "LAN Interface Card"

Item	Specifications
External dimensions (width x depth x height)	105 x 125.5 x 23.5 mm
Mass	160 g
Operating environment	-25 to +60°C
Power consumption	1.7 W (When 16 humidity sensors are attached to the LAN Interface Card)
Functions	• Automatic computer shutdown (supports multi-platform) • Shutdown of power redundancy computers • Automatic computer startup at power restoration • Scheduled operation • UPS status display (supports Web browser, SSH or Telnet) • SNMP agent (RFC1628, JEMA-MIB, Sanyo Denki private MIB) • Sending/receiving emails • Supports NTP (Network Time Protocol) • Test function (script execution, sending emails, sending SNMP traps, shutdown) • Email server check function • Notification of events to the syslog server • Temperature/humidity measurement (up to 16 points) • Measurement deviation monitor function (UPS internal information, external temperature/humidity) • Statistical graph display function (UPS internal information, external temperature/humidity) • Setting tool (Web, SSH, Telnet, FTP)

6. Conclusion

This document gives a general introduction of the "SANUPS SOFTWARE" and the "LAN Interface Card".

Information technology is advancing at an eye-widening rate and new specifications and functions will continue to be added on a constant basis. We are determined to continue proactively incorporating leading technology and develop even more attractive products.
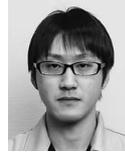
Hironori Ogihara
Joined Sanyo Denki in 2005.
Power Systems Division, 2nd Design Dept.
Worked on the development and design of power devices and monitoring devices.

Yutaka Kato
Joined Sanyo Denki in 1991.
Power Systems Division, 2nd Design Dept.
Worked on the development and design of power devices and monitoring devices.

Yuuki Hara
Joined Sanyo Denki in 2013.
Power Systems Division, 2nd Design Dept.
Worked on the development and design of power devices and monitoring devices.