



# Development of the UPS Management System “SANUPS SOFTWARE”

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## 1. Introduction

Computers that are the basis of our information-intensive society are backed up by uninterruptible power supply systems (hereafter, UPS) in case of a power supply trouble. However, there are numerous constraints with UPS, such as computers that cannot be shut down using only the UPS even though they need to be shut down during a long power interruption.

To overcome such constraints and enable efficient operation of UPS systems, our company had developed the UPS management system “SAN GUARD” series. With the “SAN GUARD” series, users are able to flexibly shut down their computers and schedule shutdown of their servers.

However, recently, demands for a more efficient and reliable system have risen. Also, with the increasing presence of 64-bit operating systems, a UPS management system supporting these operating systems was required. In response to these demands, we developed the “SANUPS SOFTWARE”, a new UPS management system that inherits the features of the conventional system “SAN GUARD”.

This document introduces the features of this new software.

## 2. System Configuration

A UPS management system notifies and shut downs computers when a power failure is detected at the UPS.

There are several possible system configurations. In this document, we will describe a sample configuration in which a server is serially connected to the UPS. Fig. 1 shows this sample configuration.

In this configuration, the “SANUPS SOFTWARE” server that is serially connected to the UPS communicates with the UPS and sends information to the “SANUPS SOFTWARE” client via LAN.

A computer that does not have the “SANUPS SOFTWARE”

installed can also initiate a shut down in case of a power failure by using Telnet connection.

The “SANUPS SOFTWARE” connects to any UPS developed by our company. It can also operate in an environment where our conventional product “SANGUARD IV Lite” is running. The maximum number of devices that can be registered with this software is 50.

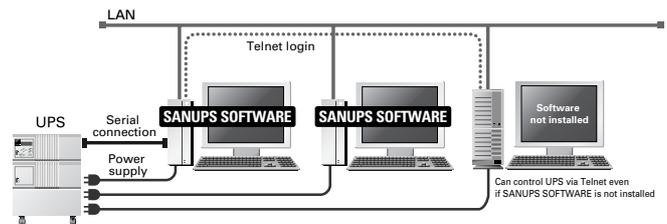


Fig. 1: Sample system configuration

## 3. Safety Improvements

### 3.1 Enhanced automatic battery check function

With our conventional product, the automatic battery check function was performed by the UPS unit itself. Therefore, when using a UPS without this function, the operator had to manually check the battery level on regular basis.

The “SANUPS SOFTWARE” introduces a software automatic battery check function that enables users to automatically check the battery of UPS units that are not equipped with this function.

The result of the battery check is proactively sent to users via popup messages, battery check information, alarm indication (refer to section 4.1), and e-mail messages.

### 3.2 Enhanced alarm notification function

With our conventional product, alarms indicating major faults, low batteries, and needs for battery replacement were notified to users with popup messages. Once these popup messages were closed, users could not view the alarms unless they took the trouble to check

for such alarms.

With the new cyclic alarm notification function introduced with the “SANUPS SOFTWARE”, the outstanding alarms are shown as popup messages every seven days. With this function, users are continuously reminded of the alarms and are able to safely operate the UPS system.

### 3.3 Shutdown on major faults and overloads

When a major fault or an overload occurs, the bypass power supply is used. If the power goes down during this condition, the load device will not be backed up. In order to avoid such problem, the “SANUPS SOFTWARE” includes functions to shut down computers even when a major fault or overload occurs.

Verification periods can be specified for these functions to prevent computers from being unnecessarily shut down during a temporary overload.

### 3.4 Flexible operation settings

The “SANUPS SOFTWARE” includes “Low battery transmission condition” and “UPS automatic startup after power recovery condition” settings, which were introduced with the hybrid UPS “SANUPS E E11A”.

The “Low battery transmission condition” setting shuts down the computers when the estimated remaining time of the battery approaches the specified time.

The “UPS automatic startup after power recovery condition” setting prevents UPS from automatically starting up after power recovery until the battery charging rate reaches the specified level. This function prevents the power from turning on before the battery is fully charged in case the power is lost again after the recovery, thus ensuring safe operation of the system.

## 4. Operational Improvements

### 4.1 Intuitive system status screen

With our conventional product, the UPS status was shown only as text on the status bar of the configuration tool. With “SANUPS SOFTWARE”, the status indication is dramatically improved by adopting a system status screen that shows the activity status of UPS graphically.

Fig. 2 shows sample system status screens.

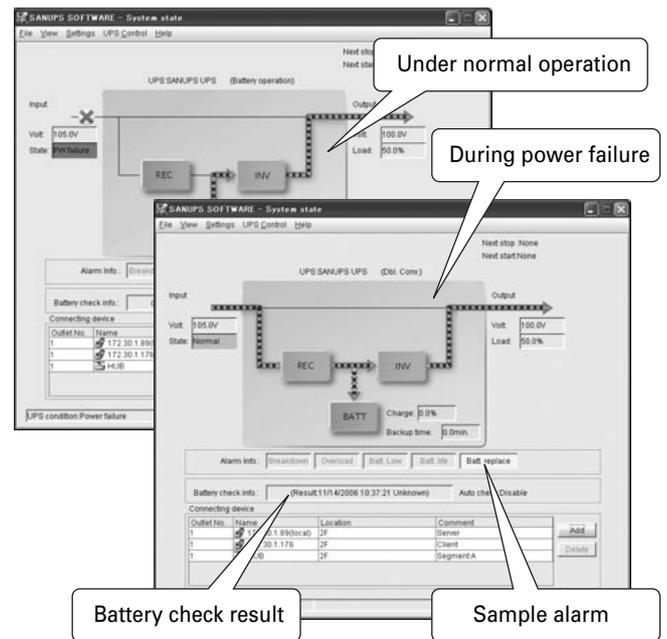


Fig. 2: Sample system status screens

This status screen shows the UPS status, various alarms, connected devices, and the next shutdown and startup schedule, which allows users to check the status of UPS at a glance.

### 4.2 Per-client shutdown delay

With our conventional product, shutdown delay could only be performed per outlet. However, there were demands to shut down each client at different timings.

The “SANUPS SOFTWARE” introduces a function to shut down each client with different delays in respond to market demand.

### 4.3 Retrieval of status and event log information via e-mail

With our conventional product, users could be notified of event occurrences via e-mail, but they could not receive current status and event logs.

With the “SANUPS SOFTWARE”, users can receive event log and status information as replies to reference requests they send via e-mail, thus allowing them to retrieve any UPS information.

Fig. 3 shows sample e-mail messages.



Fig. 3: Sample replies to requests

#### 4.4 Configuration via web browsers and Telnet

The “SANUPS SOFTWARE” allows configuration of the “SANUPS SOFTWARE” server using web browsers. Users can configure and check the status from a computer that does not have the software installed.

The “SANUPS SOFTWARE” also includes a Telnet function that permits configuration of the “SANUPS SOFTWARE” server via Telnet. Users can remotely control the server from an environment with only a CUI<sup>(\*)</sup>.

Using these functions, users can configure the “SANUPS SOFTWARE” and check the UPS status from various environments. Also, these functions share the same user interface as our LAN interface cards, making the navigation easy when used together. Fig. 4 shows sample web screens.

The web and Telnet functions can be disabled if they are not needed to enhance security.



Fig. 4: Sample web screens

(\*)CUI: Character-based User Interface

A user interface that displays information in text only and is navigated by command inputs. Often used for servers.

#### 4.5 Support of 64-bit operating systems

As the operating systems move to 64-bit, UPS management systems need to support such operating systems. Since 32-bit operating systems are still in high demand, the “SANUPS SOFTWARE” supports both 32-bit and 64-bit operating systems.

Supported operating systems are Windows, UNIX, and Linux.

#### 4.6 Application shutdown

The “SANUPS SOFTWARE” introduces an application shutdown function. This function automatically saves the files that were opened in Microsoft Office applications at the time of shutdown.

It allows secure saving of files that were being edited without operator intervention during shutdown.

Supported applications are Word, Excel, PowerPoint, Project, Publisher, Visio, and FrontPage.

Please note that only the Windows editions of these applications are supported.

### 5. List of Functions

Table 1 lists the major functions of the “SANUPS SOFTWARE” for serial and contact connections.

Table 1: List of functions

| Function                                    | Serial connection | Contact connection |
|---------------------------------------------|-------------------|--------------------|
| Automatic shutdown                          | ○                 | ○                  |
| UPS control                                 | ○                 | ×                  |
| User command execution                      | ○                 | ○                  |
| Event notification                          | ○                 | △                  |
| E-Mail transmission                         | ○                 | ○                  |
| Event log display                           | ○                 | △                  |
| UPS status and measurements display         | ○                 | ×                  |
| UPS status and measurements history display | ○                 | ×                  |
| Scheduling                                  | ○                 | ×                  |
| SNMP support                                | ○                 | ○                  |
| WakeOnLAN                                   | ○                 | ○                  |
| Web browser support                         | ○                 | ○                  |
| Telnet support                              | ○                 | ○                  |
| Automatic battery check                     | ○                 | ×                  |
| Cyclic notification                         | ○                 | ×                  |

Legend ○: Supported, △: Limited support, ×: Not supported

## 6. Conclusion

The “SANUPS SOFTWARE” has improved the functionality of our conventional products while keeping compatibility with them. Thus, it remains easy to use for existing users and at the same time, responds to wide range of needs.

It is difficult to achieve a good balance between improving the functions and maintaining the ease of use, since not every user needs all of the functions.

Also, it is not easy to create a user interface that is friendly to both existing and new users.

In our future developments, we will strive to keep a balance between these different needs and provide a more advanced UPS management system to all users.



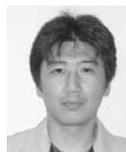
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### Reference

- (1) Hiroshi Sakaba, et al: “Development of the Hybrid UPS ‘SANUPS E11A’”  
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