General Specifications

VP6B1500, VP6B1501

Unified Gateway Station (UGS)
Standard Function
Dual-redundant Package (for UGS)

CENTUM VP

GS 33J20C10-01EN
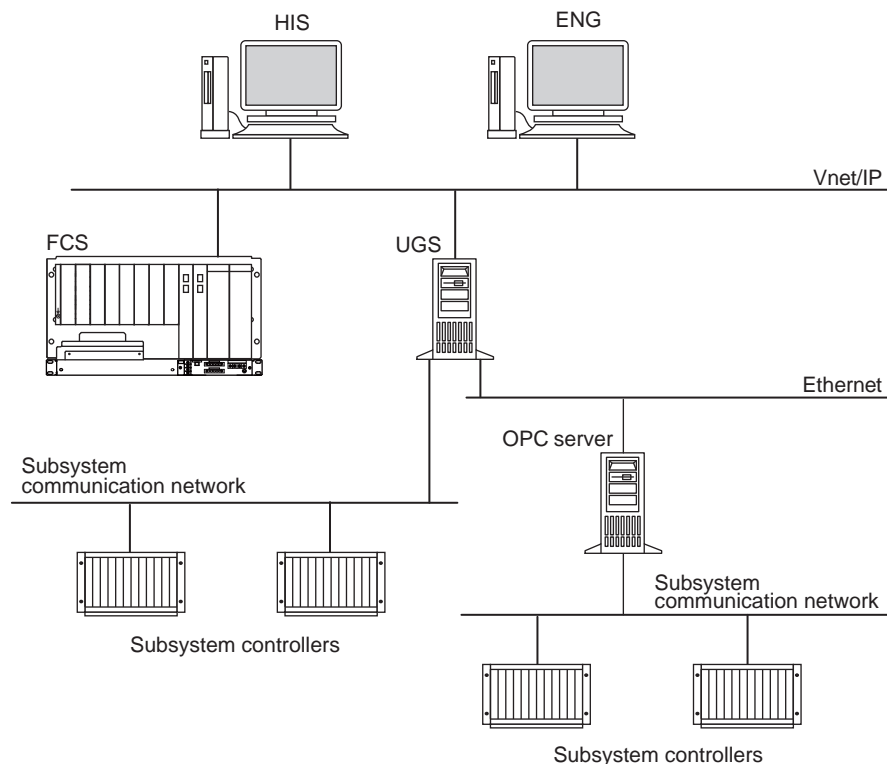
[Release 6]

■ OVERVIEW

Unified Gateway Station (UGS) is a Vnet/IP station that unifies subsystem controllers such as STARDOM controllers (FCN/FCJ) and third party PLCs to a CENTUM VP system.
With the existence of UGS, operation and monitoring of the subsystem controllers can be performed on HIS in the same way as a CENTUM VP field control station (FCS).
UGS can take a redundant configuration by using two dedicated Layer 2 switches. It is called "network switchover type UGS."

■ SYSTEM CONFIGURATION

UGS works as a gateway between CENTUM VP and subsystem controllers. UGS connects with CENTUM VP via a control network (Vnet/IP) in the same way as HIS and FCS, and it connects directly with subsystem controllers or via an OPC server.

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Figure System configuration example

![Yokogawa logo] **YOKOGAWA ◆**

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■ UNIFIED GATEWAY STATION (UGS) STANDARD FUNCTIONS

● Connection with subsystem controllers

UGS connects with STARDOM controllers (standard function). UGS also connects with other controllers compliant with the following protocols using UGS option packages. UGS complies with all types of communications such as single and dual-redundant communication networks for STARDOM, Modbus, EtherNet/IP and IEC 61850.

- Modbus (Modbus TCP and Modbus RTU)
- EtherNet/IP
- OPC DA/A&E (*1)
- IEC 61850

  *1: Because the OPC DA/A&E protocol does not have a mechanism to configure a dual-redundant configuration, use solutions provided by each OPC server vendor when configuring the OPC server in dual-redundant.

● Data access to subsystem controllers

Subsystem controller data is assigned to and accessed via the UGS function blocks. The following five function blocks are available.

- Data faceplate block: A function block for operating and monitoring a single data of subsystem controllers
- User-defined faceplate block: A function block for operating and monitoring multiple data of subsystem controllers. A single function block handles multiple data in the same way as FCS does. The available data types are 16-bit signed integer, 32-bit signed integer, 32-bit single-precision floating point data, 64-bit double-precision floating point data and 2 to 16 byte characters.
- Annunciator faceplate block: A function block for operating and monitoring single bit data of subsystem controllers.
- Bit array faceplate block: A function block for reading the bit information on the data of subsystem controllers, and assigns data item to each bit.
- FCN/FCJ faceplate block: A function block to used for NPAS POU for process control of STARDOM FCN/FCJ and complies with the following POU.

Regulatory control POU
NPAS_PVI, NPAS_PID, NPAS_PI_HLD, NPAS_ONOFF, NPAS_ONOFF_G, NPAS_MLD, NPAS_MLD_PB, NPAS_MLD_BT, NPAS_RATIO, NPAS_RATIO_RT, NPAS_PG_L30, NPAS_PG_L30_BP, NPAS_VELLIM, NPAS_VELLIM_PB, NPAS_AS_H/M/L, NPAS_FOUT, NPAS_FFSUM, NPAS_FFSUM_BL, NPAS_XLMT_S, NPAS_XLMT_D

Arithmetic calculation POU
NPAS_LDLAG, NPAS_DLAY, NPAS_AVE_M, NPAS_AVE_C, NPAS_FUNC_VAR, NPAS_TP_CFL, NPAS_T_CFL, NPAS_P_CFL, NPAS_ASTM1, NPAS_ASTM2, NPAS_SW13 (SW31), NPAS_SW19 (SW91), NPAS_BDBUF_R, NPAS_BDBUF_T

Sequence POU
NPAS_SIO, NPAS_TM, NPAS_CT

● Alarms

UGS can generate subsystem controller alarms as the CENTUM VP alarms. As for STARDOM FCN/FCJ, UGS generates alarms detected by FCN/FCJ as the CENTUM VP alarms. In case of other controllers than FCN/FCJ, UGS detects controller alarms and generates them as CENTUM VP alarms.

Process alarm
FCN/FCJ: UGS converts and generates process alarms generated by FCN/FCJ into CENTUM VP alarms.

Other than FCN/FCJ: UGS detects and generates alarms from the subsystem controller data. These alarms are detected by the alarm setpoint value (HH, HI, LO, and LL) which is specified on UGS function block.

Annunciator
UGS generates annunciator messages in accordance with the subsystem controllers bit status.

System alarm
UGS detects and generates its own errors and connection errors with subsystem controllers. UGS also converts and generates system alarms generated by FCN/FCJ into CENTUM VP system alarms.

● **HIS operation and monitoring functions available for subsystem controllers**
• Graphic View
• Trend View
• Trend Point View
• Tuning View
• Faceplate View
• Custom Faceplate View
• System Alarm View
• Process Alarm View
• CAMS for HIS Message Monitor View
• Process Report View
• Message Monitor Window
• Historical Message Report Window

● **Time synchronization function**
Used as a time master for subsystem controllers.

● **Application capacity**
Number of tags: Max. 100,000
Number of data items that can be defined:
                         Max. 2,000,000 data (for a single UGS configuration)
                         Max. 1,000,000 data (for a dual-redundant UGS configuration) (*1)
Number of data items for communication with controllers:
                         Max. 750,000 data (*1) (*2)
                         (The sum of the data items of the following controllers)
Number of subsystem controllers:
                         Max. 256 (The sum of the following controllers)
        FCN/FCJ: Max. 256
        OPC DA server: Max. 16
        OPC A&E server: Max. 16
        Modbus RTU: Max. 256
        Modbus TCP: Max. 256
        Ethernet/IP: Max. 256
        IEC 61850 IED: Max. 256
Data acquisition: Max. 6,400 data/sec (*1) (Number of data acquired from subsystem controllers)
Data setting: Max. 640 data/sec (*1) (Number of data set on UGS from HIS and FCS)
Data throughput: Max. 6,400 data/sec (*1) (Number of data collected from HIS and FCS)
Number of alarms: Max. 44 alarms/sec (*1) (Number of system and process alarms generated by UGS)
1 second Trend points: Max. 2048
    *1:   It depends on the application conditions.
    *2:   The UGS accesses the controllers' data by assigning each of the controller's data into the data items in the UGS's function
          block(s). Among all the data items that can be defined, those which do not communicate with controllers can be used as a
          data buffer for the data which are set by other sources such as FCS. See below formula for a quick glance.
          Number of data items that can be defined
             = Number of data items for communication with controllers + Number of data items used as a data buffer

● **Data update period**
Fast, medium and slow update periods can be set for each controller, within the ranges of 100 ms to 1 hour.

The update period speed can be selected from fast, medium or slow for each function block data item.

● **Optional software packages**
The following optional software packages are available to use with Unified Gateway Station standard function.
VP6B1501 Dual-redundant Package (for UGS)
VP6B1550 OPC Communication Package (for UGS)
VP6B1553 Modbus Communication Package (for UGS)
VP6B1570 IEC 61850 IED Communication Package (for UGS)
VP6B1591 EtherNet/IP Communication Package (for UGS)

■ DUAL-REDUNDANT PACKAGE (FOR UGS)

● Functional overview

With two units of UGS, the UGS can be configured in dual-redundant. One of the UGS is active in communicating with subsystem controllers. The other is on stand-by. For the redundant configuration, a dual-redundant control network connects the two of the UGS. The UGS' engineering data is downloaded to the active UGS and it is equalized to the stand-by UGS via the dual-redundant control network.

When the active UGS is failed, the active side is automatically switched to the stand-by UGS, which is called "fail over." The manual switch over is also available, which is called "switch over." During the fail over and switch over, UGS cannot detect alarms. UGS cannot send subsystem controller data to the HIS either.

The subsystem controller network can be configured in single or dual-redundant when the UGS is configured either in single or dual-redundant.
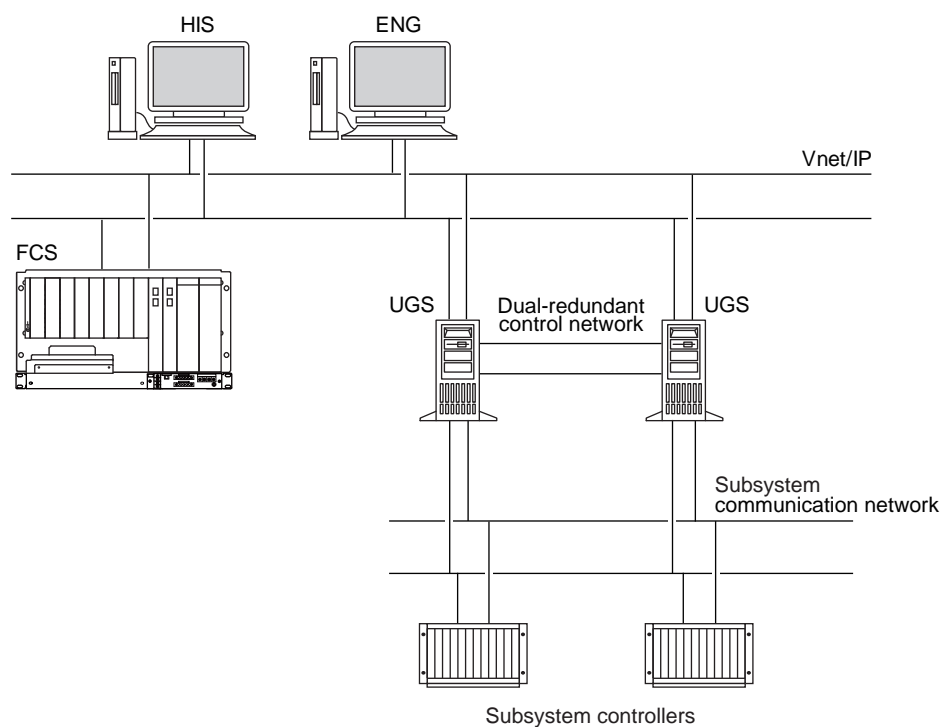
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Figure System configuration example of dual-redundant UGS configuration

● **Network configuration**

For dual-redundant configuration of network switchover type UGS, two units of layer 2 switches (abbreviated as L2SW) dedicated for the UGS dual-redundant configuration are required. Two units of the UGS are connected to the L2SW for Vnet/IP via the dedicated L2SW. The active UGS performs the Vnet/IP control communication via the dedicated L2SW.

Each of the dedicated L2SW is connected to the active UGS and the stand-by UGS respectively to configure the dual-redundant network. This dual-redundant control network is used for data communication between the UGS on the dual-redundant configuration.

In case the fail over or switch over happens, the UGS instructs the dedicated L2SW for dual-redundancy via the dual-redundant control network, and changes the communication route so that the newly activated UGS conducts the Vnet/IP control communication.

For the dedicated L2SW for UGS dual-redundant communication, Vnet/IP instruments, such as an HIS or an FCS, and subsystem controllers cannot be connected. Use the L2SW out from Yokogawa's recommended models only.

Ethernet communication

An Ethernet communication is used when performing online or offline download from an engineering station (ENG). As shown in the figure below, the Ethernet communication is performed via an Ethernet card connected to the UGS. Bus 2 open communication of the Vnet/IP can also be used for the Ethernet communication; however, in the dual-redundant UGS configuration, the Ethernet communication on the network connected to a UGS's Ethernet card is strongly recommended. For the operating environment and conditions for Bus 2 of the Vnet/IP to perform the Ethernet communication for both single and dual-redundant UGS configurations, refer to General Specifications for Integrated Production Control System CENTUM VP System Overview (GS 33J01A10-01EN) for details.
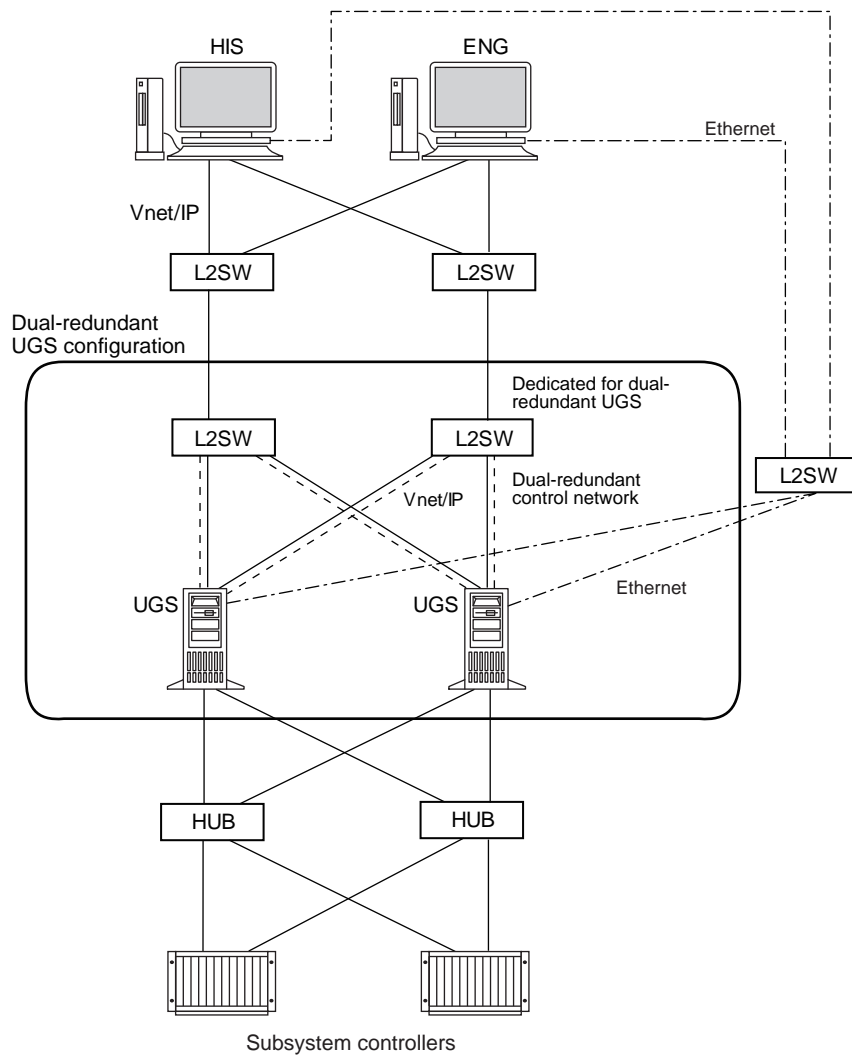
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Figure An example of dual-redundant UGS network

■ OPERATING ENVIRONMENT

Hardware Requirements

Machine	Recommended	Server computer for hardware reliability
CPU	Required	Minimum 2.0 GHz
	Recommended	Multi-core
Main memory	Required	Minimum 4 GB
	Recommended	Using ECC memory
Hard disk	Required	Free space of minimum 100 GB
Network	Required	Vnet/IP interface card

		Ethernet port :
		    2 ports for dual-redundant control network (in dual-redundant configuration of UGS)
		    1 port for Ethernet communication (recommended)

		Either or both of the following ports are required depending on the connecting controllers.
		    Ethernet port:
		        For connection with subsystem controllers
		        (FCN/FCJ, OPC server, Modbus TCP, EtherNet/IP, IEC 61850)
		    Serial port (RS-232C, RS-422, RS-485):
		        For connection with subsystem controllers (Modbus RTU)

Optical drive	Required	DVD-ROM

Peripheral (*1)	Required	Followings are required in dual-redundant configuration:
		A pair of Yokogawa-specified L2SW dedicated for the dual-redundant UGS
		    A pair of L2SW manages up to 2 sets (4 units) of dual-redundant configuration of the UGS.
		Auto-configuration Adapter
		    The Yokogawa-specified model of auto-configuration adapter is required for downloading the L2SW configuration from UGS into L2SW dedicated for the dual-redundant UGS.

	Recommended	Uninterruptible power supply (UPS)

    *1:   Contact Yokogawa for more details about peripherals.

Software Requirements
    Windows OS:
        Windows Server 2016 Standard (64-bit) (*1)
        Windows Server (IoT) 2019 Standard (64-bit) (*2)
        Windows Server (IoT) 2022 Standard (64-bit) (*3)

    *1:   Supported by R6.06.00 or later.
    *2:   Supported by R6.09.00 or later.
    *3:   Supported by R6.11.00 or later.

■ MODELS AND SUFFIX CODES

Unified Gateway Station (UGS) Standard Function

		Description
Model	VP6B1500	Unified Gateway Station (UGS) Standard Function
Suffix Codes	-V	Software license
	1	Always 1
	1	English version

    Note: When using UGS in a dual-redundant configuration, order two licenses of the Standard Function (VP6B1500).

Dual-redundant Package (for UGS)

		Description
Model	VP6B1501	Dual-redundant Package (for UGS)
Suffix Codes	-V	Software license
	1	Always 1
	1	English version

    Note: When using UGS in a dual-redundant configuration, the two UGS require "Standard Function (VP6B1500)" and "Dual-Redundant Package (VP6B1501)." Order two licenses of each model.

■ ORDERING INFORMATION

Specify model and suffix codes.

■ TRADEMARK ACKNOWLEDGMENT

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