Computer Gateway Specification and Technical Data

CG03-400
9/92
**Introduction**

This publication defines the significant functions of the Computer Gateway (CG), a TDC 3000 gateway that provides an interface from the Local Control Network (LCN) to a user-selected host computer. To connect to a Digital Equipment Corporation (DEC) computer, refer to the PLNM Specification and Technical Data.

The Computer Gateway is a node on the Local Control Network, as shown in Figure 1. It allows a user-selected host computer to communicate with:

- all modules on a Local Control Network,
- modules on remote Local Control Networks through Network Gateways,
- UCN devices, and
- Data Hiway devices.

See the System Technical Data for more information on the Computer Gateway's relationships with other modules and process-connected devices. Implementation details are available in the Computer Gateway User Manual.

**Functional Description**

The relationships of the Computer Gateway functions are shown in Figure 2.

The Computer Gateway interfaces a user-selected host computer to the TDC 3000 System. The computer is expected to be used for data collection needed for management information system or plant management requirements (including both current values and historical data), and a higher level and wider scope of control than is possible with any other device. Typically, Computer Gateway control...
strategies are implemented in conjunction with Process Manager, Advanced Process Manager, and Application Module control strategies.

**Computer to Computer-Gateway Link**

Information is exchanged between the computer and the Computer Gateway over a serial communication link using either Bisynch, or HDLC protocol.* For a Bisynch system, either one or two half-duplex links are supported. For an HDLC system, one full-duplex link is supported. The interface may be either RS232C with configurable speed up to 19.2 k baud, or RS422 with configurable speed up to 76.8 k baud for a Bisynch application and 56 k baud for HDLC.

Messages between the computer and Computer Gateway are managed by a communications handler program that queues messages for forwarding to the computer, and distributes messages received from the host to the appropriate LCN destination. Figure 3 shows the message format. The user is expected to provide a communications handler in the computer, along with computer routines to support Computer Gateway functions. No programming of the Computer Gateway itself is required; it is configured in a similar manner to other LCN nodes through the Engineering Personality of the Universal Station.

**Data Collection and Storage**

Computer programs can gain access to data throughout the TDC 3000 System. This is

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* Bisynch—Binary Synchronous Communications Protocol Procedure for Point-to-Point Operation with Contention, as described in IBM publication GA27-3004-2, using transparent Bisynch with EBCDIC control characters. Maximum block size is 1024 bytes, and both single and multiple block transactions (maximum of 13 blocks) are supported.

accomplished through seven major types of calls:

- Link Handling/Restart
- Get Data
- Store Data
- Get History
- Get/Send Message
- Transfer Files
- Obtain CG Status

Data Link

The user program must support either the Bisynch or HDLC link protocol and link restart procedures. The remaining functions below are optional, depending on the intended applications.

Data

For Get and Store-Data calls, the values are requested either by single point parameter names or in data definition tables that are defined and built by the user in the host computer. Sixteen-character point names are supported. The tables contain ASCII data point and parameter names that will be fetched from and stored to the TDC 3000 System. The Computer Gateway converts the contents of these tables to internal identifiers that are used in actual data transfers. Real values are returned in engineering unit format. Status of data collected, as well as status of the call, is also returned. Up to 300 parameters can be collected or stored using a single table. Once built, these tables are stored in the host computer. Copies can also reside in the Computer Gateway for use with Get-Data calls. The Computer Gateway also supports the accessing of Custom Data Segment arrays using a single call.

Storing data is handled in a similar manner to collecting data—either single point, whole arrays, or data definition tables can be used. There are several levels of security provided to assure proper access control for writing data to the Local Control Network and its associated UCNs or Data Hiways. Writes can be prevented at the process device, UCN/hiway, and program level.

Program security is host-program dependent. Users may also want to provide several modes for host programs to operate, such as test, restricted, and normal processing.

History

Continuous history data from History Modules, including the recently available fast-rate history data, can also be obtained by the computer. This includes not only PV values, but other real parameters selected for historization by the History Module. Both snapshots and averages can be accessed. Historical data for up to 24 parameters can be obtained in a single call. History can be accessed in relative or absolute time. Min/max data is also available.

Messages

Computer programs can send messages to the Universal Station operator by way of the Computer Gateway. Such messages optionally may require confirmation by the operator. This allows the computer programs to request an action and to be suspended until a confirmation is received from the operator that the requested action has been completed.

Other devices on the LCN can send character-string messages to individual application programs in the computer. These messages are received by the Computer Gateway and held, pending a transfer request by the application program.

Gateway Database

Visibility of computer operation at the Universal Station is provided
by a Computer Gateway database, which can also be accessed by using the data-collection and storage facilities described above. This database consists of the following types of information:

- Advanced Control Interface Data Points (ACIDPs)
- Calculated Results Data Points (CRDPs)

Both of these can have optional custom data segments that hold data that is associated with computer programs. For example, the results calculated by an optimization program can be stored in a data point’s custom data segment. The results are then available to the operator at a Universal Station, for historization in the History Module, for calculations by the Application Module, etc. Each ACIDP also contains security information about its associated program, which allows the program’s access to TDC 3000 data to be restricted; for example, to fetch only.

Up to 250 ACIDPs and up to 500 CRDPs can reside in a Computer Gateway. Each point can accommodate up to 10 custom data segments, each segment can contain 250 parameters, and each parameter can consist of a 1000-element array (assuming adequate memory is available).

### Scheduling Computer Programs

Computer programs can be scheduled to run from the Local Control Network. They can be configured to run on a cyclic, periodic, and/or demand basis. Modules on the Local Control Network can request computer programs represented by ACIDPs to run. These requests can be initiated by an operator at a Universal Station, or by an event recognized in a Network Interface Module, a Hiway Gateway or an Application Module.

### Options

The Computer Gateway can be mounted in a dual node or in a 5-card electronics chassis. For additional information about the two types of enclosure, see the System Technical Data.

A computer can be connected to more than one Computer Gateway. When more than one computer is to be interfaced to a TDC 3000 System, at least one Computer Gateway is required for each computer. A combination of Computer Gateways totaling up to 10 may be connected to a single Local Control Network. More than one Local Control Network may be connected to a computer, but there must be a serial-communications link and a Computer Gateway for each such connection.

### Physical Description

The Computer Gateway connects to the Local Control Network through coaxial connectors. The computer communications link uses multiconductor cables with either an RS232C interface, or an RS422, Type RS449 interface. Maximum cable length for the RS232C without modem is 50 feet, while the RS422 signal will operate at up to 1000 feet.

The Computer Gateway consists of a high-density K2LCN microprocessor/memory/LCN Interface board, a Communications Line Interface board, CLI I/O board, power supply, and fan assembly. Each of these is an Optimum Replaceable Unit for maintenance. These assemblies can be mounted in either a dual node or 5-card electronic chassis. The chassis can be mounted in a standard 19” (48 cm) RETMA rack and is typically mounted in a standard TDC 3000 System cabinet.

* Optimum Replaceable Units (ORUs) are replaceable assemblies that provide the best trade-off between the cost of the ORU and the cost of attempting to isolate troubles to a smaller part of that ORU. Examples of ORUs include printed-circuit boards, power supplies, printers, and Winchester disk drives.
Computer Gateway Specifications

Physical Characteristics

<table>
<thead>
<tr>
<th>Approximate Dimensions</th>
<th>Approximate Weight</th>
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<tbody>
<tr>
<td>(5 Card and Dual Node)</td>
<td></td>
</tr>
<tr>
<td>Height 18.8 cm (7&quot;)</td>
<td>5 Card File 21 kg (46 lb)</td>
</tr>
<tr>
<td>Width 48.3 cm (19&quot;)</td>
<td>Dual Node File with</td>
</tr>
<tr>
<td>Depth 53.3 cm (21&quot;)</td>
<td>Single Node 14.6 kg (32 lb)</td>
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<tr>
<td></td>
<td>Two Node 18 kg (40 lb)</td>
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</tbody>
</table>

Power Options

Strap-Selected Ac-Voltage Options
120, 220, 240 Vac +10%, -15%

Frequency Options
50 Hz or 60 Hz, +3%, -6%

All gateways operate without disruption through an interruption in the input ac voltage of up to 40 ms duration.

Data Link Specifications (Computer Gateway to Host Computer)

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Bisynch</th>
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<tbody>
<tr>
<td>HDLC</td>
<td></td>
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<table>
<thead>
<tr>
<th>Physical</th>
<th>RS232C, up to 19.2 k baud</th>
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<tbody>
<tr>
<td></td>
<td>RS449 (RS422 signal), up to 76.8 k baud (Bisynch), up to 56 k baud (HDLC)</td>
</tr>
<tr>
<td></td>
<td>One or two half-duplex links (Bisynch)</td>
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<tr>
<td></td>
<td>Full-duplex link (HDLC)</td>
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<tr>
<th>Network</th>
<th>Point-to-point</th>
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<thead>
<tr>
<th>Presentation</th>
<th>ASCII Character Strings (LSB, MSB); Floating Point (1-bit sign, 7-bit biased characteristic, 24-bit mantissa); Integer (16-bit)</th>
</tr>
</thead>
</table>

Operating Characteristics

<table>
<thead>
<tr>
<th>Point Capacity</th>
<th>250 Advanced Control Interface Data Points</th>
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<tbody>
<tr>
<td></td>
<td>500 Calculated Results Data Points</td>
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<tr>
<td></td>
<td>40 Data Access Tables</td>
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</tbody>
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Configuration Capability

<table>
<thead>
<tr>
<th>Maximum Number of Computer Gateways per LCN</th>
<th>10</th>
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