Honeywell

Computer Gateway Specification and Technical Data

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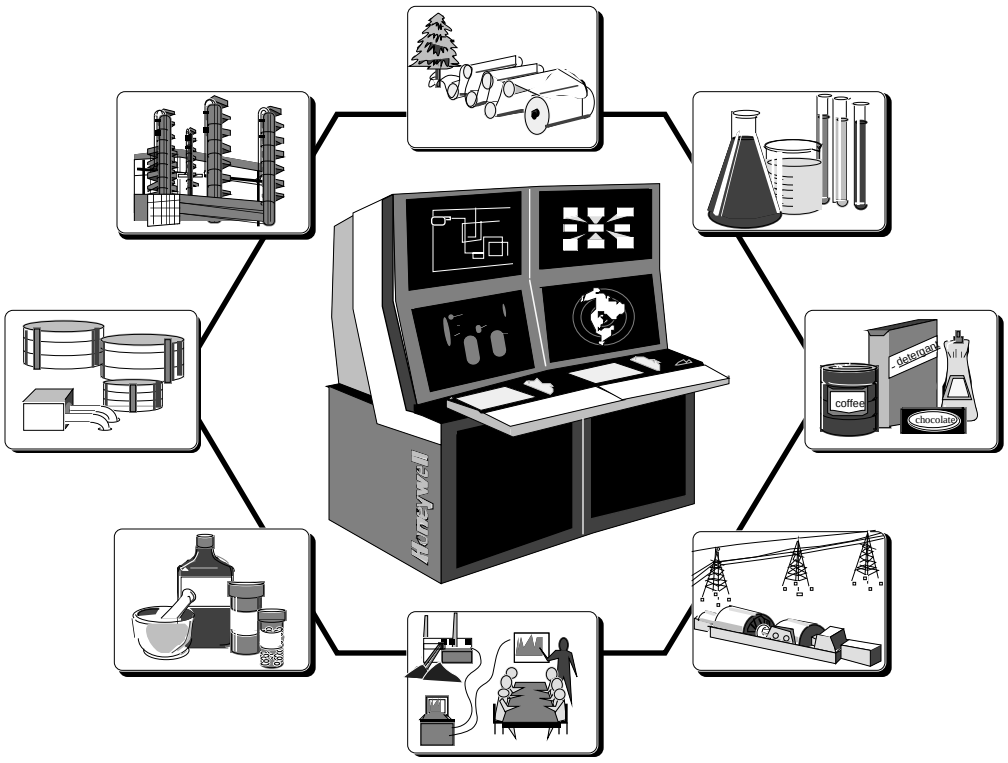

Total Plant

TDC 3000X Computer Gateway

Specification and Technical Data

Introduction

This publication defines the significant functions of the Computer Gateway (CG), a TDC 3000X 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 CG is a node on the LCN, 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 *System Technical Data* for more information on the CG's relationships with other modules and process-connected devices.

Implementation details are available in the *Computer Gateway User Manual.*

New Computer Gateway Features in R500 LCN Software

- History journal data retrieval added
- Improved file transfer speed
- Enhanced file transfer command to list files into a dataout file (*now identical to Command Processor*)

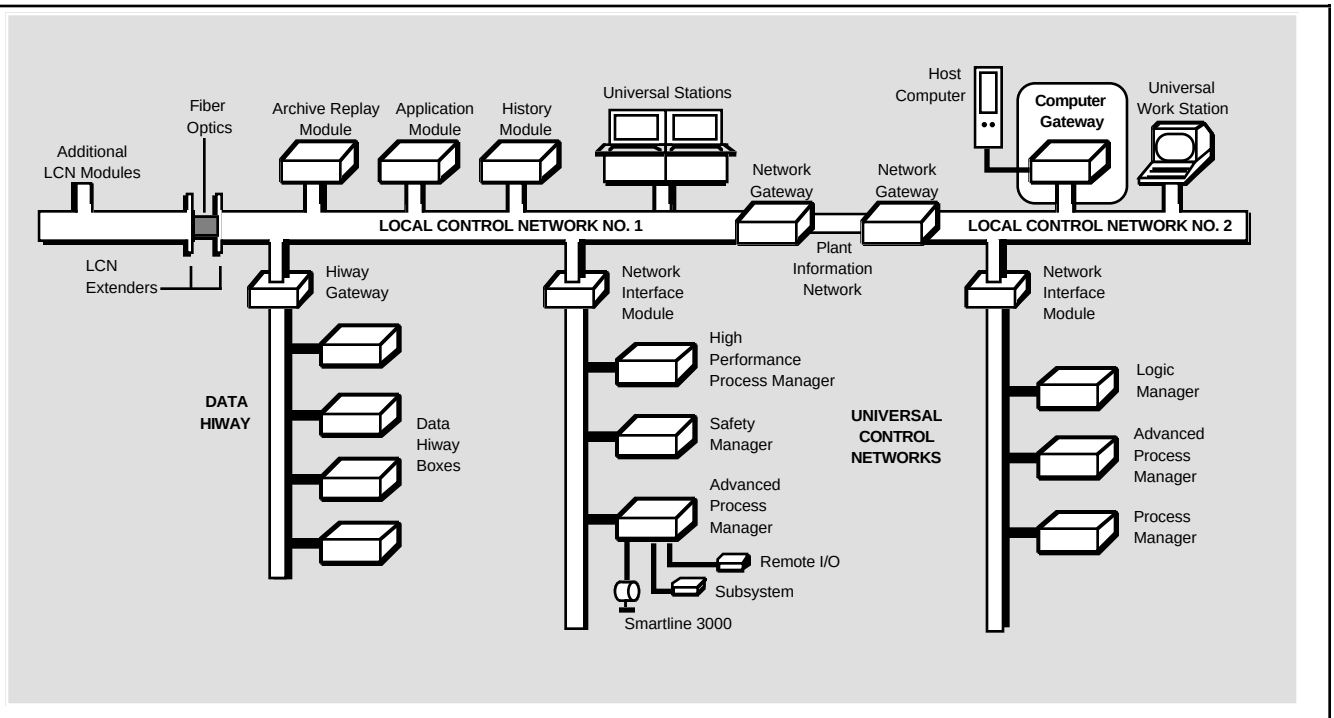

Figure 1 — TDC 3000X Architecture With Computer Gateway 15010

Functional Description

The relationships of the CG functions are shown in Figure 2.

The host computer is 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, CG control strategies are implemented in conjunction with Process Manager, Advanced Process Manager, and Application Module control strategies.

Host Computer to CG Link

Information is exchanged between the host computer and the CG over a serial communication link using either Bisynch, or HDLC protocol.* For a Bisynch system, either one or two links are supported. For an HDLC system, one full-duplex link is supported. The standard interface is an RS422, Type RS449 interface, with configurable speed up to 76.8 k baud for a Bisynch application and 57.6 k baud for HDLC.

(NOTE: An RS232 interface, with a configurable speed up to 19.2 K baud could also be used, instead of the RS422 interface. However, the CG is supplied only with the latter (i.e., RS422) interface as standard.

* 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.

HDLC–Link Access Procedure, Balanced (LAPB) per C.C.I.T.T. Document AP VIII-58-E, June, 1984 (Recommendation X.25), and compliance with FIPS 100 certification.

Computer Gateway Functions

- Provides a standard interface between the Local Control Network and the user-selected host computer
- Collects data from other LCN nodes and stores data to other nodes on request from the computer
- Collects continuous history data from the History Module
- Holds a database that represents computer programs, plus other computer-prepared data
- Provides for scheduling and/or operator/event demand of computer programs
- Transmits messages to Universal Station operators
- Receives messages from Advanced Process Manager, Process Manager, and Multifunction Controller sequences
- Performs file transfer and management functions
- Retrieves LCN History journals to the host computer

Messages between the computer and CG are managed by a communications handler program that queues messages for

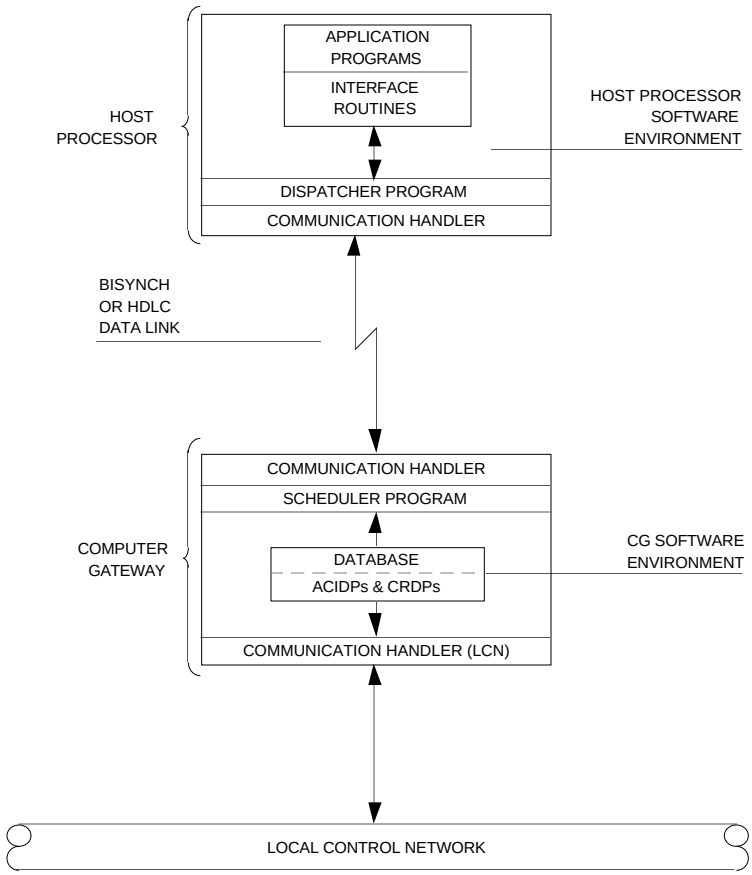

Figure 2 — Host Processor/Computer Gateway/Local Control Network Relationships

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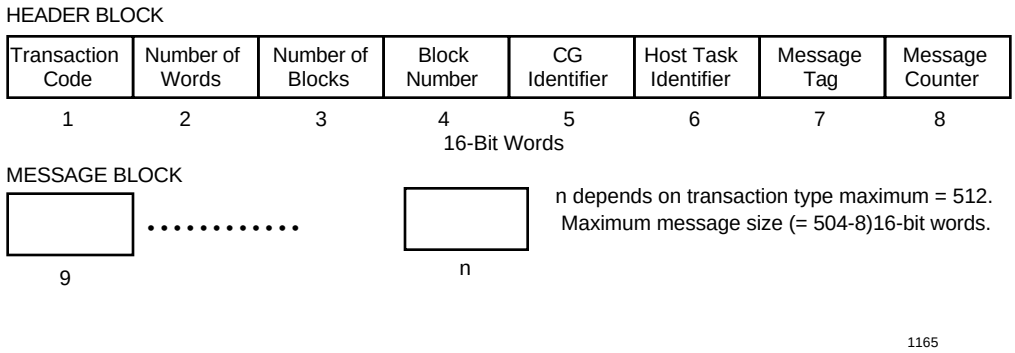

Figure 3 — Message Format

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 CG functions. No programming of the CG itself is required; it is configured in a manner similar to other LCN nodes through the Engineer Personality or Universal Personality of the Universal Station.

Data Collection and Storage

Computer programs can gain access to data throughout the TDC 3000^X system. This is accomplished through seven major types of CG functions:

- Link Handling/Restart
- Get/Store Point Data
- Get History
- Get/Send Message
- Transfer/Message Files
- Access Journals
- 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^X system. The CG 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.

* Some data types are restricted to under 300 parameters per transaction, due to specific limitations on the maximum message size on the LCN.

Once built, these tables are stored in the host computer. Copies can also reside in the CG for use with Get-Data calls. The CG 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 LCN 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. The CG allows host-programs to operate in all of the above nodes; implementation is up to the user.

History

Continuous history data from History Modules, including fast 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 CG. 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 CG and held, pending a transfer request by the application program.

File Transfer and Management

Application programs running in the host computer can read and write files on the LCN History Module. Utilities are provided for support functions such as file copy, file re-naming, creation and deletion of files and directories in user-created volumes, moving files from one directory to another, and listing volume and file attributes.

History Journal Access

An application program in the host computer may also retrieve the history journal events from an LCN.

History journals include system journals (i.e., System Status, System Maintenance, System Errors and Status Notification Journals) and process journals (i.e., Process Alarms, Operator Messages, Process Changes, and Sequence-of-Events journals).

Either complete journals can be retrieved or a specific time interval may be specified. Specific events can also be selectively extracted from the journals, using various filters.

Gateway Database

Visibility of computer operation at the Universal Station is provided by a CG 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. In addition, each ACIDP is associated with a computer program and represents that program's status to the LCN. Each ACIDP also contains security information about its associated program, which allows the program's access to TDC 3000^X data to be restricted; for example, to read only.

Up to 250 ACIDPs and up to 500 CRDPs can reside in a CG. 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 LCN. They can be configured to run on a cyclic, periodic, and/or demand basis. ACIDPs provide a convenient method of activating programs in the host computer. Modules on the LCN 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.

Configuration Options

A host computer can be connected to more than one CG. When more than one computer is to be interfaced to a TDC 3000^X system, at least one CG is required for each computer. A combination of CGs totaling up to 10 may be connected to a single LCN. More than one LCN may be connected to a computer, but there must be a serial-communications link and a CG for each connection.

Physical Description

The CG is currently supplied from the factory as a module (boardset) that installs in a dual node cardfile (electronics chassis). For additional information on the dual node cardfile (DNCF) see *System Technical Data.*

The CG boardset consists of a dual node power supply, a Communications Line Interface (CLI) board, a CLI I/O board, and a LCN processor board. A choice of two LCN processor boards are available: K4LCN (68040 microprocessor) and K2LCN (68020 microprocessor). The K4LCN version requires R500 (or higher) LCN system software, while the K2LCN version is compatible with R320 (or higher) LCN system software.

The CG connects to the Local Control Network through standard LCN coaxial connectors. The computer communications link uses multiconductor cables with an RS422, Type RS449 interface. Maximum cable length for the RS422 signal is 1000 feet.

Computer Gateway Specifications

Physical Characteristics

Approximate Dimensions (In Dual Node Cardfile)		Approximate Weight	
Height	18.8 cm (7")	Dual Node Cardfile with:	
Width	48.3 cm (19")	Single Node	14.6 kg (32 lb)
Depth	53.3 cm (21")	Two Nodes	18 kg (40 lb)

Power Supply

Universal AC Input

120-264 VAC (autoranging power supply)

47-63 Hz (frequency range)

All Computer 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)

Protocol	Bisynch or HDLC
Physical	RS449 (RS422 signal), up to 76.8 k baud (Bisynch), up to 57.6 k baud (HDLC) One or two Bisynch links (half-duplex*) One HDLC Link (full-duplex) *Although 'full-duplex' hardware is used, the link is effectively 'half-duplex', because of the Bisynch protocol.
Network	Point-to-point
Presentation	ASCII Character Strings (LSB, MSB); Floating Point (1-bit sign, 7-bit biased characteristic, 24-bit mantissa); Integer (16-bit)

Operating Characteristics

Point Capacity	250 Advanced Control Interface Data Points (ACIDPs) 500 Calculated Results Data Points (CRDPs) 40 Data Access Tables (CG-resident)

Configuration Capability

Maximum Number of CGs per LCN	10

Computer Gateway Specifications (continued)

CE Conformity (Europe)

This product is in conformity with the protection requirements of the following European Council Directives: 73/23/EEC, the Low Voltage Directive, and 89/336/EEC, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.

Deviation from the prescribed procedures and conditions specified in the installation manuals may invalidate this product's conformity with the Low Voltage and EMC Directives.

Product Classification	Class I: Permanently mounted, permanently connected Industrial Control Equipment with protective earthing (grounding). (EN 61010-1-1993)
Installation Category	Category II: Energy-consuming equipment supplied from the fixed installation. Local Level Appliances and Industrial Control Equipment. (EN 61010-1-1993)
Pollution Degree	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (IEC 664-1-1992)
EMC Classification	Group 1, Class A, Industrial, Scientific and Medical (ISM) Equipment. (EN55011-1991; Emissions)
Method of Assessment	EMC: Technical Construction File (TCF) LVD: Technical File (TF)

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TDC 3000 system

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