C-Gate Server Software

C-Bus Integration Software for Control System Developers
The Clipsal C-Gate Server is a software suite that monitors and controls C-Bus. Clipsal's Building Automation System. It has been produced by Clipsal Integrated Systems to allow third party software developers and existing Building Management Systems to interface to C-Bus at a high level, allowing high-speed control and monitoring of C-Bus.

The C-Gate Server Software is either run on a separate server computer or in the background on a standalone PC and uses industry standard TCP/IP interfaces to support:

- Multiple C-Bus networks - connected to a TCP/IP backbone network using TCP/IP terminal servers
- Multiple connections - from one or more front-end or building management systems using TCP/IP sockets
- Simple connection - to web servers for Internet-based C-Bus control and monitoring.

Using the TCP/IP standard opens up the ability to control, connect to, monitor and Internet-enable C-Bus.

Internally, C-Gate builds an object model of the C-Bus devices that it is controlling and monitoring. It uses the smart monitoring features of C-Bus to fully simulate the operation of C-Bus input and output devices. C-Gate can rapidly give up-to-date information about the status of C-Bus without having to poll individual devices.

C-Gate can be used to control C-Bus loads, collect and use information from the C-Bus network(s), noting when buttons were pushed or providing monitoring and control interfaces for a 3rd party building management system that is managing lighting and other building subsystems.

Applications or building management systems connect to C-Gate's Command Interface and can issue commands (such as ON, OFF and RAMP) and query the status of any object (using the SET and GET commands) in C-Gate's model of each network.

C-Gate provides additional interfaces for 3rd party applications or building management systems. These interfaces allow a continuous real-time list of events that have occurred on C-Bus to be available. They also enable changes in the programming status of C-Bus units on the network.

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### Why use C-Gate?

C-Gate allows you to connect to C-Bus networks across a TCP/IP backbone network as well as through a local RS232 interface.

C-Gate allows you to connect one or more networks with C-Bus devices to other software or systems for control or monitoring.

C-Gate's high-level Command and Event Interfaces mean that you don't have to go into the details of the C-Bus protocol in order to interface to C-Bus.

A number of C-Bus networks can be managed in parallel at high speeds, meaning that control is rapid and monitoring is accurate - even where a number of networks are involved.

### How does C-Gate work with C-Bus?

The C-Gate Server Software opens a connection to each C-Bus network it is going to manage.

To connect to a C-Bus network, C-Gate opens a connection to a C-Bus PC Interface through a local serial port or a C-Bus CNI (model 5500CN) through a TCP/IP socket connection.

There is a configuration file that tells C-Gate how and where to connect to the C-Bus PC Interfaces for the networks that C-Gate is going to control.

Once connected, C-Gate scans each C-Bus network and builds an object model of the network and the network's C-Bus units. This model is the base that C-Gate uses for control and monitoring.

Once this initial model is established, C-Gate listens to each network, receiving monitoring events from the network that will update the model with the latest state of the network.

C-Gate receives an event every time a C-Bus switch, sensor or other C-Bus input device changes state, or every time a C-Bus Group Level changes.

To ensure the C-Gate model of the network is up to date, the network is periodically re-scanned.
When to use C-Gate

- When required to provide an Internet or TCP/IP interface to control and monitor C-Bus networks via third-party software.
- When required to control a C-Bus network from another building management or control system.
- When required to use a custom front-end or user interface to C-Bus, such as Clipsal Schedule Plus, Clipsal C-Lution, Citect or Wonderware SCADA software.

Overview of C-Gate & C-Bus Connections

C-Gate can control one or more C-Bus networks. To add flexibility to C-Gate, particularly when operating many C-Bus networks across a large building or factory, there are a number of ways to connect to C-Bus networks from C-Gate.

Every C-Bus network that is going to be managed needs to have a C-Bus PCI or C-Bus Network Interface connected to it.

There are several ways that C-Gate can connect to the C-Bus PCI for each network:

- Serial network connection
- Socket connection via a Terminal Server
- Socket connection via a C-Bus Network Interface

The three connection types can be used simultaneously from one C-Gate server, giving the flexibility to control local and remote networks with ease.

Serial Network Connection

Connect to the PCI directly via a serial port, such as COM1 or COM2 on your computer or server.

This type of connection requires one PC serial port for every C-Bus network to be managed. Multi-port serial cards can be added to the computer or server to allow many serial connections to many C-Bus networks.

Socket Connection

Connect the PC or server to the C-Bus networks PCI across a network using a terminal server.

In most cases the terminal server must be configured so that a connection on a TCP/IP port over the network will open a direct connection to the serial port.

In the diagram, for example, a connection to TCP/IP port or socket 2001 on the terminal server will open a direct connection to serial port 1, allowing management of C-Bus network 1.

The network connection to the terminal server can be:

- Across a local LAN network
- Across a backbone stretching across a building
- Across the world via a private network or the Internet
Connection via a C-Bus Network Interface (CNI) device

Another way of connecting C-Gate to a C-Bus network is via a C-Bus Network Interface device or CNI. The CNI provides an internet style IP address for the network it is attached to. The C-Gate server can connect to a network anywhere in the world provided the CNI on that network is connected to the Internet.

Alternatively, if the building has a dedicated Ethernet system for C-Bus services, the C-Gate server could connect to a network on any floor of a building using exactly the same technique. In this configuration file you associate a network number with the IP address of the CNI. When you use C-Gate you refer to the network number, just as in the other cases.

As an example, if a floor in a commercial building uses a C-Bus network with a CNI, and the CNI has some IP address you could assign a network number, say 42, to that CNI. When you use C-Gate you would issue commands like “on 42/56/XX” to turn on a lighting load on the floor.

C-Gate Server Modes

The C-Gate server can be run in two modes:

- Standalone mode. C-Gate can be run this way under Windows 95, Windows 98, Windows Millennium, Windows NT or Windows 2000, Windows XP or Linux. In this mode, C-Gate runs in a Console window showing a continuous list of events produced by C-Gate.

- Windows NT/2000/XP service mode. This is only available under Windows NT, Windows 2000 or Windows XP. Once installed as a service, C-Gate is started and stopped by the Service Manager, and the events produced by C-Gate are entered into the Event Log.

Connecting to the C-Gate Server

The C-Gate Server is used to easily interface between C-Bus networks and other systems or programs that are going to manage those networks. It is also possible to connect to C-Gate and interact with it and the C-Bus networks using a standard TCP/IP telnet client.

C-Gate provides four interfaces to allow other systems to have high-level control and monitoring of the C-Bus networks via the C-Gate Server:

- The Command Interface
- The Event Interface
- Lead Change Port
- Configuration Change Port

Addressing

C-Gate Commands and Events use an addressing system to refer to C-Bus networks, groups and devices.

This addressing system gives the name of a network, then either a C-Bus unit or a group number. Additionally, a terminal of an output unit can be addressed also. All the group, unit and terminal numbers are in decimal.

The Command Interface

The Command Interface allows a controlling system or program (or even a Perl script or Java applet) to control and get the status of C-Bus groups and units on the networks. The command interface is based on ASCII text commands and formatted responses delivered via a TCP/IP socket.

When C-Gate starts, it opens a TCP/IP server on the command-port (defined in the C-Gate configuration file). One or more clients then connect to this port and access the command interface. A computer program does this by using TCP/IP to open a socket connection, then sending and receiving commands over this socket connection. To type commands and get information from C-Gate, a Telnet client can be used to connect and interact with C-Gate.
Command Interface Example

To find out which networks are available on C-Gate, log into the computer running C-Gate using a telnet window and type the following:

get cbus networks

This will return a list of network names separated by commas. (They are listed in the same order as the network configuration file.)

For each network it is possible to find out the defined C-Bus groups or the units on the network by means of one of the following commands:

get 1 units

get 1 groups

The result in either case is a comma-separated list:

000:1: units=0,6,8,10,14,15,19,20,22,24,30,38

Further information about a given unit may be obtained by interrogating the unit information:

get p1/100 type

000 p1/100 type-DIMON8

The groups for this unit can also be obtained, just as for the complete network:

get p1/100 groups

000 p1/100: groups=32,33,34,35,36,37,38,39

Having identified the groups on a unit, the output level for that group can be accessed through the command:

get 1/56/32 level

The first digit is the network number, the second digit is the "application" which in this case is lighting (56) and the last digit is the group number. The parameter required is the "level." which is the output level. The response in this case is:

000 1/56/32: levels=127

which means that the load on group 32, on the lighting application of network 1, is half on (127 is half of full range, which is 255)

To set a group level, the on, off or ramp commands are used. If the next group in the list for the dimmer is turned on:

On 1/56/33

then the result is:

000 1/56/33 level=255

Off 1/56/33 would naturally turn the group off, to a level of 0. The ramp command allows a slow ramping of loads.

For example, the ramp command:

Ramp 1/56/34 127 8

would ramp up Group 34 to half on over 8 seconds. Similarly, if an actual user were typing into a command window (as opposed to a program) the "%" notation could be used:

Ramp 1/56/34 50% 8

with the same result.

Event Interface Example

All events are formatted in a standard way to allow easy processing by other systems. This format consists of:

- A date and time of the event
- The event code - a three digit code unique for this type of event
- The device or object associated with the event
- A detailed description or additional information.

The two examples below show the format of events. The date and time are given first, in the format yyyymmddhhmmss, in local time, then the three digit event code, then the object associated with the event, then the description or details.

20020702-080631 800 gate1 C-Gate started

20020702-080634 700 1 opened cbus network: 1

The first event is an "800" event, indicating that C-Gate has started. This code is only used for this purpose. The associated object is C-Gate itself, hence the C-Gate object name.

The second event is a "700" event, indicating a C-Bus network has been opened. This event is associated with a C-Bus network, in this case network 1.

The Event Interface

C-Gate is constantly monitoring the C-Bus networks to capture monitoring information. This information is available to external systems and for archiving as a list of events that are made available as the events occur.

Events can be distributed several ways - and more than one of these can be used at once:

1. To a text file
2. To a TCP/IP socket interface on a remote computer.
3. To a connection made to the C-Gate event-port number.

If you are using the standalone version of C-Gate in Console Mode, events are automatically distributed to a console window, in Server Mode C-Gate runs in the background.

When using the Windows NT/2000 service version of C-Gate events are automatically placed into the Event log. The events can be viewed by opening the Event Viewer.
Minimum System Requirements

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximately 50 Megabytes of disk space</td>
<td>Microsoft Windows 95 B, Microsoft Windows 98, Microsoft Windows Millennium Edition, Windows 2000 or Microsoft Windows NT 4.0 Service Pack 5 or later, Windows XP or Linux Operating System</td>
</tr>
<tr>
<td>At least 48 Megabytes of RAM</td>
<td></td>
</tr>
<tr>
<td>Intel Pentium™ 100MHz or better processor</td>
<td></td>
</tr>
<tr>
<td>CD-ROM drive for software installation from CD</td>
<td>Microsoft TCP/IP</td>
</tr>
<tr>
<td>One or more RS232 serial ports, or an Ethernet network adaptor</td>
<td></td>
</tr>
</tbody>
</table>

System RAM, CPU and network resource requirements are increased as more C-Bus networks are opened. The requirements quoted here are for small-scale C-Gate systems accessing 8 or less networks.

C-Gate Catalogue Numbers

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalogue No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Gate Software Package, single C-Bus network licence.</td>
<td>5000CG</td>
</tr>
<tr>
<td>C-Gate Software Package, 5 C-Bus network licence.</td>
<td>5000CG5</td>
</tr>
<tr>
<td>C-Gate Software Package, 10 C-Bus network licence.</td>
<td>5000CG10</td>
</tr>
<tr>
<td>C-Gate Software Package, 50 C-Bus network licence.</td>
<td>5000CG50</td>
</tr>
</tbody>
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C-Bus Developer’s Kit

Also available from Clipsal Integrated Systems is the C-Bus Developer’s Kit. This is intended to provide a convenient platform for easy development of third party software drivers and hardware to the Clipsal C-Bus system.

The kit consists of:
- A C-Bus Serial Interface SIM (Single Inline connection Module)
- A Prototyping board
- A Development Software Utility
- A User’s Manual
- The C-Gate driver software package - supporting single C-Bus network
- The C-Bus Serial Interface Protocol Specification document
- An Installation Manual
- AC/DC adaptor (12Vdc)
- 9-pin RS-232 cable

Obtaining a C-Bus Developer’s Kit

If you are a 3rd party systems developer and you are interested in obtaining further details, please contact your Clipsal Integrated Systems Representative.

The C-Bus Enabled Program

“C-Bus Enabled” is an approach used by Clipsal Integrated Systems Pty Ltd to specify, test and certify that devices attached to a C-Bus network:
- Comply with the network protocols;
- Avoid excessive bus traffic; and
- Have acceptable interoperability with other C-Bus devices.

The objectives are achieved by specifying the interface requirements for C-Bus devices, and by specifying, for each application, the message traffic that may be sent over C-Bus. Finally, guidance is provided for the use of the C-Bus Serial Interface.

If you are a 3rd party systems developer and you are interested in obtaining further details about the C-Bus Enabled Program, please contact your Clipsal Integrated Systems Representative.
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