



C-Gate Server Application

User's Guide

5000 CG Series



Table of Contents

Section.....	Page
1.0 Product Range	3
2.0 Version	3
3.0 What is C-Gate?	3
4.0 Why use C-Gate?	4
5.0 How does C-Gate work with C-Bus?	4
6.0 When to use C-Gate	5
7.0 When not to use C-Gate	5
8.0 C-Gate limitations & operating environment	5
9.0 C-Gate Installation	8
10.0 Configuring C-Gate & C-Bus	17
11.0 C-Gate Operation	38
12.0 Scene module	47

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1.0 Product Range

The C-Gate server product is available in five basic variants distinguished by the number of licensed networks which can be operated concurrently.

5000CG	C-Gate licensed to operate one network
5000CG5	C-Gate licensed to operate five networks
5000CG10	C-Gate licensed to operate 10 networks
5000CG50	C-Gate licensed to operate 50 networks
5000CGUNL	C-Gate licensed to operate an unlimited number of networks

2.0 Version

This manual is for C-Gate version 1.5 and later. There are significant changes since C-Gate 1.0.

3.0 What is C-Gate?

The C-Gate server is a software package that monitors and controls the components of the Clipsal C-Bus wiring system in one or more networks.

The C-Gate server software is either run on a separate server or in the background on a PC to allow other C-Bus front end software or building management systems to have high-speed, high level control and monitoring of C-Bus. For example, Clipsal C-Lution can be used with C-Gate to control one or more C-Bus networks.

C-Gate 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.

Great flexibility is obtained by using the TCP/IP standard, providing 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.

The smart monitoring features of C-Bus are used to fully simulate the operation of C-Bus input and output devices.

C-Gate presents up-to-date information regarding the status of C-Bus without having to poll individual devices when the information is requested.

4.0 Why use C-Gate?

C-Gate is used to connect one or more networks containing C-Bus devices. The C-Gate server itself may then be connected to other software or systems for control or monitoring.

The high level Command and Event Interfaces allow control of a C-Bus network without detailed knowledge of the C-Bus protocol.

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

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

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

The C-Gate server software opens and maintains a connection to each C-Bus network managed.

C-Gate opens a connection to a C-Bus network through either a C-Bus PC Interface (model 5100PC) or C-Bus Network Interface (model 5500CN) via a local serial port or TCP/IP socket connection.

Configuration files provide information to C-Gate as to how and where to connect to the C-Bus PC Interfaces for the networks that C-Gate controls.

Once connected, C-Gate scans each C-Bus network and builds an object model of that network and the associated C-Bus units. This model contains information about the current status of the networks and is the basis that C-Gate uses for control and monitoring.

Once this initial model is established, C-Gate monitors each network, receiving events from the network. This information is used to update the model with the latest state of the network.

An event is received by C-Gate every time a C-Bus Group Level changes as a result of a button push or activity from a sensor or other C-Bus device.

To ensure the C-Gate model of the network is up to date, the network is periodically re-scanned. The combination of initial scan, event monitoring and periodic rescans ensures a very complete picture of the C-Bus network status.

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

C-Gate also provides several event interfaces to allow applications or building management systems to receive a continuous real-time list of events that have occurred on the C-Bus networks that C-Gate is managing. These applications in turn may use this event information to display a user friendly representation of the data or use it to record operating statistics and accounting information in an energy management system.

6.0 When to use C-Gate

Use C-Gate when:

- There is a need to accurately monitor and control the operating characteristics of one or more C-Bus networks.
- High performance control of one or more C-Bus networks is required.
- The C-Bus network must be controlled from another Building management or control system.
- A custom front-end or user interface to C-Bus, such as C-Lution or Citect is to be used.
- An Internet or TCP/IP interface to control and monitor C-Bus networks is required.
- Control based on a C-Bus network connected by bridges is too slow.
- The status of the C-Bus devices on a C-Bus network must be monitored.

When not to use C-Gate

C-Gate is not necessary when implementing a small, stand alone C-Bus network that has **no need** for any external control or monitoring

8.0 C-Gate limitations & operating environment

C-Gate server has the following limitations that should be considered:

- There is no absolute maximum number of networks that C-Gate can interface to. A reasonable operating maximum is 64 C-Bus networks. The hardware license key or software license file will limit the number of networks that C-Gate will work with.
- Above 64 networks, server configuration has to be carefully arranged to ensure C-Gate will perform reasonably. Contact Clipsal Integrated Systems Pty. Ltd. for this configuration information
- Support for control and monitoring of networks up to five bridges away from the PC interface with C-Bus Bridge version 1, and for seven levels of bridges with C-Bus Bridge version 2.
- C-Gate does not provide programming capabilities. The C-Bus Installation software is used to perform programming.
- Do not use large system fonts with C-Gate as this produces undesirable results with the C-Gate interface and other tray utilities.

C-Gate supports the following C-Bus devices. Other devices may function correctly but have not been explicitly tested.

Series	Description	Type	Notes
5000CT	Low Cost Touchscreen	PC_CTA	
5000DK	C-Bus PCI development kit	INT_CIS	If a third party uses the DK to create a new device, the name will be INT_ <i>manufacturer</i> in which case, contact CIS for an update.
5031N 5031NL	1 Key Input Unit	KEY1	Where an input unit is suffixed by "L" it is a learn enabled device.
5031NIR 5031NIRL	4 Key Infrared Input Unit	KEYIR1	
5031PE	C-Bus Light Level Sensor	PECELL SENLL	Additional support for reading light level, setting target and margin
5031TS	C-Bus Temperature Sensor	SENTEMP	Additional support for reading temperature and setting target, margin, offset, heating and cooling modes
5031x2TC7	C-Bus Two Channel Digital Clock	CLK2	
5032N 5032NL	2 Key Input Unit	KEY2	
5034AUX	C-Bus Four Channel Auxiliary Switch Input	KEYAUX	
5034N 5034NL	4 Key Input Unit	KEY4	
5034NIR, 5034NIRL	4 Key Infrared Input Unit	KEYIR4	
5034NS	4 Key Scene Controller	KEYSCEN4	
5052NL	Single Rocker Neo Input Unit	KEYM2	Provides supports for scenes and remote triggering
5054NL	Two Rocker Neo Input Unit	KEYM4	Provides supports for scenes and remote triggering
5058NL	Four Rocker Neo Input Unit	KEYM8	Provides supports for scenes and remote triggering
5100B	C-Bus Network Bridge	BRIDGE1N BRIDGE1F	Monitoring and control supported for five levels of bridges only.
5500NB	C-Bus Network Bridge	BRIDGE2F BRIDGE2N	Monitoring and control supported through correctly configured bridges.
5100PC	PC Interface	PC_LOCAL PC_INT PC_INT1 PC_INT_1	Firmware must support smart monitoring mode. V3 PCI offers improved performance.
5100PS	Power Supply		Power supplies do not have a C-Bus type.
5101R	C-Bus Single Channel Relay	RELAY1	

Series	Description	Type	Notes
L5102D10	Professional 2 Channel Dimmer 10 A per channel	RELAY2	Where an output unit is prefaced by "L" it is a learn enabled device.
5102RVF	C-Bus Two Channel Relay	RELAY2	
5104AM	C-Bus Analogue Output 0-10V	AN_OUT4	
5104AUX	Auxiliary module	KEY4	
5104BCL	C-Bus 4 Channel Bus Coupler	KEYBC4	
5104D5	C-Bus Professional Series 4 Channel Dimmer	DIMPR4	
L5104D5	Professional 4 channel dimmer, 5 A per channel	RELAY4	
5104D750	C-Bus Four Channel Dimmer	DIMMER4	
5104R	4 channel relay, 20A total	RELAY4	
5104RVF	4 channel voltage free relay, 10 A per channel	RELAY4	
5104RVF/20L	C-Bus Four Channel Relay	RELAY4	
5500CN	C-Bus Network Interface	PC_LOCAL PC_INT	
L5504D2A	DIN Rail 4 channel dimmer, 2A per channel, w power supply	DIMDN4	
L5504D2AP	DIN Rail 4 channel dimmer, 2A per channel	DIMDN4	
5504RDP	C-Bus Low Cost Relay Drive	RELAY4	
5504RV20P	C-Bus Low Cost 20A Relay	RELAY4	
L5504RVFP	Din Rail 4 channel relay, 10A per channel	RELDN4	
5508D1A 5508D1AP	C-Bus DIN Rail 8 Channel Dimmer	DIMDN8	
5508DSI	C-Bus DSI Dimmer	DIMDN8	
5512RVF	C-Bus DIN Rail 12 Channel Relay	RELDN12	
L5512RVFB	DIN Rail 12 channel voltage free relay, 1A per channel Fluoro, w power supply	RELDN12	
L5512RVFBP	DIN Rail 12 channel voltage free relay, 1A per channel Fluoro	RELDN12	
L5512RVFP	DIN Rail 12 channel voltage free relay, 10A per channel	RELDN12	
5750WP 5750WPL 5751 5751L	C-Bus PIR Occupancy Sensor	SENPIRSS	
5753L	C-Bus PIR Occupancy Sensor 360° – Indoor Learn Enabled	SENPIRSS	

9.0 C-Gate Installation

This section deals with installation and events which occur during an installation for both the Windows and Linux operating systems.

9.1 Overview

This section describes how to install the C-Gate server.

Most of the installation is automated by the installation software, but this section presents an overview of what happens as a result of the installation process as an aid to problem diagnosis.

Once installation is complete the C-Gate server is configured for the networks involved. See the next section for configuration details.

9.2 Minimum System Requirements

To install and operate C-Gate, the following minimum system requirements should be observed:

9.2.1 Hardware

The hardware requirements are as follows:

- Approximately 50 Megabytes of disk space
- At least 48 Megabytes of RAM
- Intel Pentium™ 100MHz or better processor
- CD-ROM drive (for software installation from CD only)
- One or more RS232 serial ports, or an Ethernet network adapter

9.2.2 Software

The supporting software to run C-Gate is as follows:

- An approved operating system such as Red Hat Linux version 6.2 or newer, Microsoft Windows™ 95 B, Microsoft Windows™ 98, or Microsoft Windows™ NT 4.0 Service Pack 5 or later, Microsoft Windows™ 2000 or Microsoft Windows™ XP.
- TCP/IP for the operating system chosen, Microsoft TCP/IP. (Normally provided with the operating system, but may have to be installed from the original product CD if the TCP/IP option was not selected during original installation.)
- Adobe Acrobat Reader v4.0 (or higher), xpdf or gv required for viewing and printing the Online Documentation. A copy of the Adobe product for Windows is distributed on the CD-ROM.
- Windows NT Media Player v6.4 (or higher) required for viewing the Video Presentation included with the Online Documentation (v7.0 or higher for Windows 95/98/00). The Linux packages may use xanim or the GXAnim GTK front end for xanim.

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.

9.3 **Basic Configuration**

C-Gate may be installed on Windows 95B, Windows 98, Windows NT 4.0 or later, Windows ME, Windows 2000 and Windows XP as well as the Linux operating system (see the Linux section which follows). Special note should be taken of the following:

- **For Windows 95** - Windows 95 B must be used.
- **For Windows NT 4.0** - Windows NT Service Pack 5 or later must be used. Service Pack 5 fixes year 2000 issues in Windows NT. Service Pack 5 may be downloaded from <http://www.microsoft.com/downloads>.
- For a trouble free installation of C-Gate, at least 50 Megabytes of free disk space are required. A CD ROM drive must be used for the standard installation from CD.

9.4 **How to install the software**

The installation has two steps:

- Installing the Java Runtime Environment (JRE)
- Installing the C-Gate Server

In the Windows installation, one installer handles both of these. Once these two components are installed, the configuration of C-Gate must be carried out. If a previous version of C-Gate resides on the computer, the configuration files such as networks.txt, c-gateconfig.txt and access.txt are overwritten. These files should be archived to prevent loss of configuration information.

9.4.1 **Installing the JRE and C-Gate in Windows**

The Java Runtime Environment (JRE) is required for the operation of C-Gate. Sun Microsystems™ provides the JRE as a self-installing executable file for Windows installations.

To install the C-Gate server and the JRE, the following steps are required:

- C-Gate CD-ROM inserted into the computer CD-ROM drive.
- Under normal circumstances a menu as shown below will appear. "Install C-Gate" commences the installation. Alternatively, if the autorun does not work, it is necessary to navigate to the CD-ROM drive and double click autorun.exe. A menu screen will open and "Install C-Gate" is chosen.



- Follow the instructions as the installation proceeds.

The path offered in the Sun JRE installation should be accepted. Our experience with this software is that it runs reliably in the default installation directory.

At the completion of the installation a prompt to reboot appears. This suggestion should be accepted and then the C-Gate server should be configured.

9.4.2 Installing the JRE and C-Gate in Linux

The reference distribution of Linux is RedHat 7.0, although closely allied distributions such as Mandrake 7.2 also perform in the same way. In the following each step is described in functional terms first and then explicit instructions to bring about the desired outcome are described. The basic steps in installing the JRE for Linux are:

The binary file *j2re-1_3_1-linux-i386-rpm.bin* is copied from the Linux directory on the CDROM to a temporary directory and run. The bin file is a wrapper that displays a license agreement and unpacks the actual RPM file for extraction. The bin file must be made executable as follows:

```
chmod u+x j2re -1_3_1-linux-i386-rpm.bin
```

Now the binary is run:

```
./j2re -1_3_1-linux-i386-rpm.bin
```

The license terms should be accepted by entering the appropriate response.

The new path is added to *.bashrc* or other shell *.rc* file (for example, *.cshrc* if the c-shell is in use)

The default installation is in */usr/java/jdk1.3.1* so we add this line to the *.bashrc* file for the user who will be running C-Gate:

```
JAVAPATH = /usr/java/jre1.3.1/bin
```

Then, in the PATH line already present the \$JAVAPATH variable is prefixed:

```
PATH = $JAVAPATH: ...paths already present... :$PATH
```

To run the RPM script, root permissions are required and thus the root user is logged in at this point.

The RPM command is run to perform the installation which was unpacked in step 1

```
rpm -iv jre-1.3.1.i386.rpm
```

The root user may now exit.

1.1 Test the installation

A new console window is created under the name of the user who will be running C-Gate and the following entered:

```
java -version
```

The expected response for version 1.3.1 follows:

```
java version "1.3.1"  
Java (TM) 2 Runtime Environment, Standard Edition (build 1.3.1-b24)  
Java HotSpot (TM) Client VM (build 1.3.1-b24 mixed mode)
```

This response demonstrates successful installation.

The Linux installation of C-Gate itself consists of copying the relevant files to working directories. One point of difference with the Linux version of C-Gate is that local com ports are not supported so a CNI must be used for communications. While logged in as the user who will be running C-Gate the following steps are performed:

A directory is created to hold the C-Gate executable.

The current directory is set to the home directory by typing:

```
cd ~
```

A directory to hold C-Gate is created,

```
mkdir cgate
```

The cgate.jar is copied to the directory

From the CDROM Linux directory

```
cp cgate.jar ~/cgate/.
```

The config directory and associated files are now copied

```
cp -r config ~/cgate/
```

The cgate config directory will contain these files:

- **C-GateConfig.txt** - the default configuration file for C-Gate.
- **Networks.txt** - the default networks configuration for C-Gate.
- **Access.txt** - the access control file for the C-Gate server.

The *macros* directory is now created

From within the cgate directory this command is entered:

```
mkdir macros
```

The *documents* directory must also be created.

From within the cgate directory the new directory is created

```
mkdir documents
```

Then from the CDROM the entire directory tree is copied

```
cp -r documents ~/cgate
```

The documentation system utilizes a system of proprietary forward and back buttons used by Adobe Acrobat which are not supported by xpdf or gv, however the various documents may be read by explicitly opening the desired document.

Alternatively, the Adobe Acrobat reader 4 for Linux is bundled with the distribution. The Linux folder of the cd contains an Acrobat directory. In this directory is a tarball called ar-405.tar.gz. This file should be copied to a user-writable directory and the following commands run:

```
gunzip ar-405.tar.gz  
tar ar-405.tar.gz
```

The resulting directory contains a shell script which is invoked from within the directory thus:

```
./INSTALL
```

Once installed, Acrobat reader can be invoked with the command

```
acroread
```

from within a console window.

This will produce a directory tree for the various documents.

Finally, if scenes are to be used, the scene directory is created from within the cgate directory.

```
mkdir scene
```

1.2 Customize X-Windows to run C-Gate in a convenient fashion

In the case of the GNOME environment a Gnome launcher is created for C-Gate in a file drawer. The C-Gate.ico file from the Linux directory on the CDROM is copied to the cgate directory. A new file drawer is created with the C-Gate.ico file just copied as the icon and a new launcher is created in this drawer with the following parameters:

Parameter	Value
Name	C-Gate
Comment	This starts C-Gate
Command	cd ~/cgate; java -jar cgate.jar
Icon	C-Gate.ico
Run in Terminal	NO

The command interface is accessed through another launcher added to the same drawer with these parameters:

Parameter	Value
Name	C-Gate Command Interface
Comment	Run Command Interface
Command	telnet <i>hostname</i> 20023
Icon	Your choice
Run in Terminal	YES

Where *hostname* is the name of the host or local IP address if static addressing is used with the CNI.

C-Gate is invoked by selecting the file drawer and clicking the C-Gate icon. Once the C-Gate server begins acquiring information about the network the Ethernet LED will flash green/orange and the C-Bus LED will flash orange/green. (See the CNI Installation instructions for a complete description of CNI codes)

9.5 *What happens during installation?*

The installation has two parts, the first is the Java Runtime environment (JRE) and the C-Gate server software.

9.5.1 **Java Runtime Environment**

The Java Runtime Environment (JRE) is the basic platform that allows Java 2 applications to run. The installer also installs the Java 2 plugin to your web browser to enable Java 2 applets to be displayed.

Classes and other required files are placed in C:\Java\JRE\1.3\bin for a Windows environment or /usr/java/jdk1.3.1/bin for Linux environment.

9.5.2 **C-Gate on Windows**

The C-Gate Installer performs the following functions:

The Installer creates a base directory for the C-Gate installation. The default name for this directory is C:\Clipsal\C-Gate. Another path can be specified during the installation process.

The Installer installs the following files in the base directory:

cgate.jar - The C-Gate server program.

Files to allow later removal of C-Gate are also placed here.

The Installer creates the directory containing C-Gate configuration information. This is a directory called config off the base directory. By default, this directory will be called C:\Clipsal\C-Gate\config.

The Installer installs the following files into the config directory:

- **C-GateConfig.txt** - the default configuration file for C-Gate.
- **Networks.txt** - the default networks configuration for C-Gate.
- **Access.txt** - the access control file for the C-Gate server.

The Installer creates the directory containing C-Gate macro files. This is a directory called macros off the base directory. By default, this directory will be called C:\Clipsal\C-Gate\macros. There are no files installed in this directory.

The Installer creates the directory containing C-Gate network startup files. This a directory called net off the base directory. By default, this directory will be called C:\Clipsal\C-Gate\net. There are no files installed in this directory.

The Installer installs the following file to the directory given in the LibsDirectory value discovered in the last step:

javax.comm.properties - a configuration file required when using local serial ports with C-Gate.

The Installer adds items to the registry to facilitate removal of the C-Gate software.

The installer calls the installation program for the hardware key drivers. This installer will complete and then the C-Gate installation will finish.

9.5.3 C-Gate on Linux

The Linux installation of C-Gate itself is a manual process however, the installation of the JRE is automated, and places the runtime environment in `/usr/java/jre1.3.1/` and associated directories.

The directory tree for C-Gate may reside anywhere on the system at the Linux system administrator's discretion. The system administrator must set permissions for the C-Gate jar file so the C-Gate user can execute it and must add a path to the `java.exe` to the `$PATH` environment variable in the user's `.bashrc` file (or `.cshrc` file for the c shell) as described above.

One useful feature of Linux is the ability to run separate virtual consoles in a full screen session. Each virtual console is obtained by pressing the left hand ALT key and F1 through F8. Each session can have a different user logged in. The X-Windows terminal session is normally invoked from one of these virtual consoles and is thus that particular session becomes unavailable. (In fact each of the eight virtual consoles can run an X-Windows session) It is possible to run the C-Gate program directly from the command line by logging in as the C-Gate user and entering:

```
cd ~/cgate
```

```
java -jar cgate.jar
```

The C-Gate event interface information appears on the screen and once the server is started it may be accessed by any user on the system or indeed by any user on any system networked to the C-Gate server computer.

9.5.4 Installation Environment for C-Gate - Java VM

The C-Gate server requires Sun's Java Runtime Environment 1.3.1 for operation. This is installed during the installation process.

9.5.5 C-Gate Online Documentation

The C-Gate Online Documentation Installer performs the following functions:

A distributable version is included on the C-Gate CD.

The Installer creates a base directory for the C-Gate Online Documentation. The default name for this directory is `C:\Clipsal\C-Gate\Online Documentation`.

The Installer copies the C-Gate Manuals onto the user's hard disk. The file format is PDF (Portable Document File), which requires Adobe Acrobat Reader 4.0 (or higher) to view or print. The Linux operating system supports two tools called `xpdf` and `gv` either of which can display pdf files. A version of Acrobat reader for Linux is now available but has not been tested at this point.

The video (CBUS.avi) is not installed on the hard drive and it is run from the CD. This can be run by the Windows media player under Windows or by xanim or GXAnim on Linux. These are available from http://xanim.va.pubnix.com/xa_obtain.html on the web.

This completes the installation process.

9.6 **Removing C-Gate Software**

To remove C-Gate from your computer under Windows:

- Double-click the **Add/Remove Programs** icon in the Windows Control Panel folder.
- Select the **C-Gate** option in the box presented.
- Click the **Add/Remove** button.
- Follow the instructions to remove C-Gate.
- To remove the software under Linux the system administrator or C-Gate user must delete the cgate directory tree.

9.7 **Testing C-Gate Installation**

To test the C-Gate server, the configuration steps in the Configuring C-Gate & C-Bus section of this document must be performed first. Then C-Gate is started as described in the C-Gate Operation section.

9.8 **C-Gate Licencing**

The installation may include a hardware licence key or license file that is checked by C-Gate on startup and at 15 minute intervals. The hardware licence key or license file allows use of C-Gate with a limited number of networks. However, C-Gate will always operate with one C-Bus network without a hardware key or license file for an unlimited length of time.

At C-Gate startup, the startup event screen will indicate if the hardware key or license file is found, and the number of networks that are licenced.

If the licence key is not found, C-Gate will operate for 15 minutes with an unlimited number of C-Bus networks. Every 15 minutes, C-Gate will check the hardware licence key and if more than the licenced networks are open, C-Gate will shut down immediately.

To purchase a licence for more networks, please contact your Clipsal Integrated Systems representative to arrange a licence for the number of networks that are required.

Note that C-Gate can operate with either a C-Gate licence key, a C-Lution licence key or a C-Gate license file.

9.8.1 **Installing the Hardware Key**

The hardware key should be installed on a parallel port on the computer that is to run C-Gate. The hardware key may be installed on a port which is also used for printing, as the hardware key will pass through commands to the printer.

9.8.2 Installing the license file

The license file is provided separately to the rest of the installation materials. The license file is a description of the license details signed with a digital signature that C-Gate can verify.

No attempt should be made to edit the license file or it may be rendered inoperative.

For installation, the license file called cgate.lic is placed in the directory where the cgate.jar executable is located. This will most likely be in \Clipsal\C-Gate on a Microsoft Windows™ platform.

10.0 Configuring C-Gate & C-Bus

The C-Gate server software must be configured before it can control and monitor C-Bus networks.

For example, C-Gate must have information as to how to connect to the C-Bus networks it will be managing. This section explains how to configure C-Gate to manage C-Bus networks.

Refer to the C-Bus Technical Manual and C-Bus Design Guide for details of designing and implementing C-Bus networks using C-Bus devices.

10.1 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 PC Interface (often referred to as a PCI, Clipsal Catalog Number 5100PC) or C-Bus Network Interface (referred to as a CNI, Clipsal Catalog Number 5500CN) connected to it. Refer to the documentation that comes with these devices to correctly install these devices.

Where reference is made to a PCI in this guide, this can also be a CNI device.

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

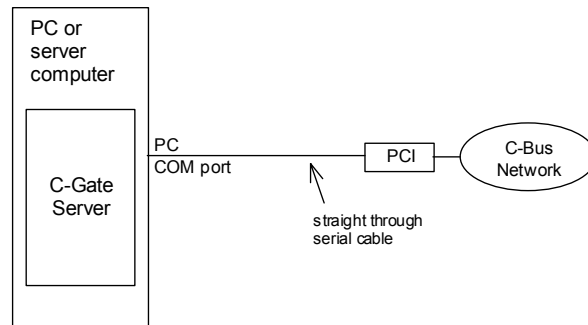
- Serial network connection
- Socket or CNI connection
- Etherlite interface.

All three connection types may be used simultaneously from one C-Gate server, giving the flexibility to control local and remote networks with ease. The network configuration files used by C-Gate establish the configuration of these interfaces.

10.2 Serial Network Connection

The C-Gate server may connect to the PCI directly via a serial port such as COM1 or COM2 on a computer or server.

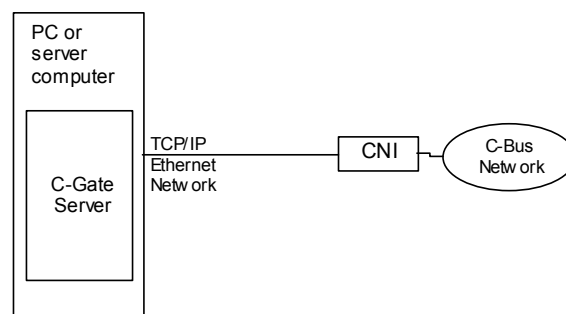
This connection requires one PC serial port for every C-Bus network to be managed. Multi-port serial cards can be added to the computer or server to allow serial connections to multiple C-Bus networks.



10.3 C-Bus Network Interface (CNI) Connection

The PC or server may be connected to the C-Bus network using a C-Bus Network Interface (CNI).

The C-Bus Network Interface provides a single C-Bus connection for C-Gate which is connected via a TCP/IP socket.



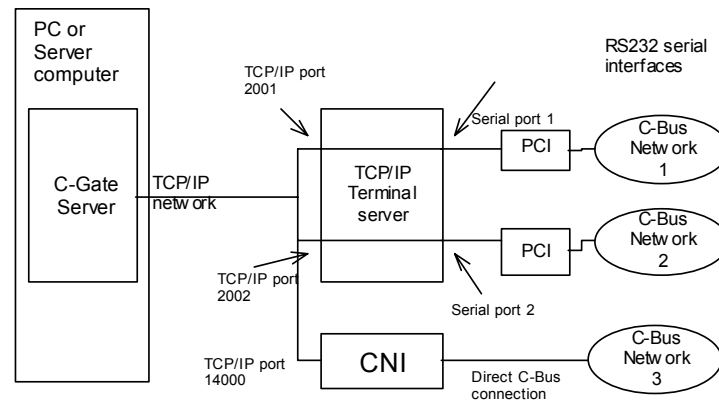
One side of the CNI is directly connected to a C-Bus network. The other side is connected to an Ethernet LAN that is shared by the C-Gate server computer. One CNI is used for every C-Bus network. The network connection to the CNI can be:

- Across a local LAN network
- Across a backbone stretching across a building, or potentially
- Across the world via a private network or the Internet.

10.4 Socket Connection

The PC or server may be connected to the C-Bus network's PCI across a network using a terminal server with one or more PCIs.

A terminal server is a network device (it has an Ethernet or other network connection) that provides remote access across the network to one or more serial ports.



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.

Like the CNI the network connection to the terminal server can be:

- Across a local LAN network
- Across a backbone stretching across a building, or potentially
- Across the world via a private network or the Internet.

10.5 C-Gate Limitations

There is an important limitation of C-Gate that must be taken into account when configuring C-Gate to work with C-Bus networks.

- C-Gate can monitor and control C-Bus networks that are connected via only five levels of C-Bus bridge version 1.0. Use a C-Bus Bridge V2.0 or later to perform monitoring of up to seven levels of bridge depth.
- Bridges must be used carefully since all bridged traffic is still carried by a local network, and as a result, congestion of the local C-Bus network can result. Congestion of the local network may cause synchronization failures of one or more networks.

10.6 C-Gate Configuration Files

There are two main files that control the configuration of C-Gate:

- The **CGateConfig.txt** file, and
- The **Networks.txt** file.

The normal user may well be able to disregard the CgateConfig.txt file, however the Networks.txt file, which defines the list of networks under control of a given instance of C-Gate will have to be configured.

By default, the configuration files are located in the C:\Clipsal\C-Gate\config directory.

Both of the configuration files are plain text files. They may be edited by any text editor, such as notepad in Windows or vi in the Linux environment.

C-Gate must be restarted before any changes in these files will take effect.

10.6.1 The Networks.txt File

The Networks.txt file defines the C-Gate networks which will be served by a given instance of C-Gate when running.

Each C-Bus network is named in this file, and the type of interface to it and the interface details are given.

When C-Gate is started, each network listed in the file is connected in turn.

A C-Bus network must be given a name in the networks file. This name is then used to refer to this network when sending commands, receiving events or interacting in any other way.

Network names are generally numbers, starting at 1 for the first network, then to 2 and so on. Symbolic names may also be used (e.g. net1 or lobby) but other systems that are controlling C-Gate such as C-Lution require numeric network descriptors.

The type of connection to the C-Bus network must be given in the definition as well. This is either:

- **Serial** - for connection to a local serial port
- **CNI** – for connection to a C-Bus Network Interface
- **Socket** - for connection to a TCP/IP terminal server serial port, or
- **Bridge** – for connection to a network across a C-Bus Bridge device

The next parameter is the name of the port or connection. This is a function of the type of connection.

For a serial connection, the port name is COM1 or COMx where x is the port number.

For a CNI connection, the port name is in two parts:

1. the host name or IP address of the CNI unit followed by a colon character “:”,
2. then the port or socket number, typically 10001

An example would be 10.1.1.100:12345 which would indicate port 12345 on the CNI at IP address 10.1.1.100.

For a socket connection, the port name is also in two parts:

1. firstly: the host name or IP address of the terminal server followed by a colon character “:”,
2. then the port or socket number

An example would be 10.1.1.99:2001 which would indicate port 2001 at IP address 10.1.1.99.

Examples of some complete network lines are shown below.

A network called 1 on a single serial interface to a PCI on COM1 would be:

```
1 serial COM1
```

A network called 3 on a CNI at 10.8.99.2 and port number 10001 would be:

```
3 CNI 10.8.99.2:10001
```

A network called 22 on a socket connection at 10.8.77.7 and port number 3002 would be:

```
22 socket 10.8.77.7:3002
```

Several lines may be used in the networks file to define multiple networks that this instance of the C-Gate server can manage.

A network joined by a bridge must be described by the bridge interface on the adjoining network. For example, if there were 6 networks in a row, numbered 162 through 167 the entries would look like this:

```
1 serial COM1
2 bridge p/1/162
3 bridge p/2/163
4 bridge p/3/164
5 bridge p/4/165
6 bridge p/5/166
7 bridge p/6/167
```

The first network is a conventional network joined to a COM port (COM1). The first bridge is, in fact, a unit on the first network, hence it is denoted by p/1/162. Similarly, the second bridge, which connects the third network in the chain is actually a unit on network 2. So the designation of that bridge is p/2/163.

The actual syntax of these entries determines the topology of the network. If a bridge and associated network is not explicitly described then C-Gate will not see that network.

Comment lines may be placed in the networks file by making the first character of the line #. Blank lines are ignored, so they may be used to make the file easier to read.

An example Networks.txt file is shown below.

```
# C-Gate networks file
# This file is called networks in the directory config
# off the C-Gate main directory
```

```
#
#
# The format of this file:
# - each line defines a network interface to a C-Bus network
# in the format:
# <network-name> <type-of-interface> <interface-address>
# For a local serial port, <type-of-interface> is set to serial
# and the port is named COM1 or COM2 ... etc.
# e.g. 1 serial COM1
# For a CNI, <type-of-interface> is set to CNI
# and the <interface-address> is in the form of IP address:port number
# e.g. 1 CNI 10.99.1.99:10001
# For a terminal server, <type-of-interface> is set to socket
# and the <interface-address> is in the form of IP address:port number
# e.g. 1 socket 10.120.160.99:10002
# For a C-Bus Bridge, <type-of-interface> is set to bridge
# and <interface-address> is set to the address of the bridge unit
# e.g. 9 bridge p/1/99

# network 1: the local connected network on PC COM1
1 serial COM1

# network 3: CNI at 10.8.99.2:10001

3 CNI 10.8.99.2:10001

# network 22: attached to a terminal server across the network
22 socket 10.8.77.7:3001
```

Once the Networks file has been configured C-Gate may be started. The default configurations will be used. For more detailed control of the C-Gate server the CGateConfig.txt file must be used.

10.6.2 The CGateConfig.txt File

This file is used to set values for a number of operating parameters that C-Gate will use when running. Once again, C-Gate must be stopped and re-started for any changes in this file to take effect.

All parameters are given in the file as a single line of the form:

```
<parameter-name>=<value>
```

where `<parameter-name>` is as shown in the Parameter column of the table below, and `<value>` is shown in the Values and Impact column.

Comment lines may be placed in the CGateConfig file by making the first character of the line `#`. Blank lines are ignored, so they may be used to make the file easier to read.

If there is no line in the CGateConfig.txt file that sets a parameter, then a default value will be used. Default values for each parameter are listed in the table.

The table outlines the parameters that can be given in this file, and the effect on the operation of C-Gate. Refer to the Operation section of this guide to get a more detailed understanding of the effect of these parameters on the operation of C-Gate.

Parameter	Values and impact	Default value	Set in configuration file?	Set by SET command?
cgate-name	Name of this C-Gate server – delivered in the 201 service ready message. If this is not set, the hostname of the cgate will be used in place of this.	NULL	Yes	Yes
command-port	TCP/IP port to wait for a connection on for the command interface	20023	Yes	No
accept-connections-from	A list of IP addresses or hostnames (each entry separated by a space) that command connections will be accepted from.	all	Yes	No
config-path	Path to the directory containing configuration files. This can be relative to the base directory for C-Gate.	config	Yes	No
macro-path	Path to directory containing macros to be executed with the RUN command.	macros	Yes	No
report-new-objects	If set to Yes, will send events for all new objects detected on C-Bus networks.	No	Yes	No

Parameter	Values and impact	Default value	Set in configuration file?	Set by SET command?
cbus-application	Sets the default application supported by C-Bus network interfaces. The default application can be addressed using 1.0 addressing syntax or by using the special value '~' in place of the application number. This value can be set for an individual network in a network startup file or from a set command directed at the C-Bus network.	56 (hex 38 C-Bus lighting)	Yes	No
event-mode	" socket " causes events to be delivered to the event-port at the event-host via a TCP/IP socket. " server " open a socket on the cgate server that remote software can connect to in order to retrieve events.	server	Yes	No
event-port	port number to wait for a connection on or to establish a connection on, depending on mode	20024	Yes	No
event-host	host IP address where event socket is to be opened	localhost	Yes	No
heartbeat-time	Time in seconds between heartbeat events. 0 indicates do not send heartbeat	0	Yes	Yes
event-filename	Local filename to store events in.	event.log	Yes	No
event-printer	Local printer ID to print events to. NULL means do not print to printer.	NULL	Yes	No
global-event-level	The level of events that will be produced for all new objects created after startup. This parameter is used to set the event-level parameter of any new object	5 (Normal level of events)	Yes	Yes
use-cgroups	Yes: loads and supports cgroups. no: does not support cgroups.	No	Yes	No
cgroups-file	A filename that is the name of the file holding CGroup information.	Cgroups.txt	Yes	No
response-delay	Time in milliseconds to wait for a response to a command issued to a C-Bus network	10000 (10 seconds)	Yes	No
cbus-tx-delay	Delay in milliseconds between commands <i>sent</i> to a C-Bus network when a V2 or earlier C-Bus PC Interface is used. Setting this delay smaller than 250ms may result in the loss of data to and from C-Bus networks.	250 (250 milliseconds)	Yes	No
allow-recall-write	If set to "Yes", allows cgate commands to perform recall write operations. This must be used with care and must be left disabled for an operating environment to prevent rogue programming.	No	Yes	No
sync-time	Default sync-time for all C-Bus networks. See sync-time under C-Bus Network.	300 seconds or 5 minutes	Yes	No
scan-time	Default scan-time for all C-Bus networks. See scan-time under C-Bus Network.	60 seconds	Yes	No
psync-time	Default time between psync operations for C-Bus Units. See psync-time under the C-Bus Unit object.	300 seconds or 5 minutes.	Yes	No

Parameter	Values and impact	Default value	Set in configuration file?	Set by SET command?
report-new-objects	If set to Yes, issues an event for every new C-Bus unit detected on a network	No	Yes	No
pci-flow-control	If set to Yes, uses XON/XOFF flow control for information transmitted to the PCI, if supported by the PCI. Set this parameter to no if flow control problems are suspected.	Yes	Yes	No
allow-v3-pci	If set to Yes, allows higher performance and command verification options if a version 3 PCI is detected.	Yes	Yes	No
networks-file	The name of the file containing the information about the C-Gate networks to be connected to.	Networks.txt	Yes	No
use-event-file	Sends events to a file.	No	Yes	No
use-scenes	If set to Yes, enables the processing of scenes.	No	Yes	No
use-load-change-port	If set to Yes, enables the load change port, which provides a connection that delivers a list of ON, OFF and RAMP commands as events are recorded from C-Bus networks.	Yes	Yes	No
load-change-port	The socket or port number that the load change port accepts connections on.	20025	Yes	No
use-config-change-port	If set to Yes, enables the configuration change port, which provides a connection that delivers a list of network and unit Ids that have had their configuration (programming) or addressing changed.	Yes	Yes	No
config-change-port	The socket or port number that the configuration change port accepts connections on.	20026	Yes	No
sweep-timeout	The timeout in milliseconds between runs of the queue sweeper thread.	2000	Yes	No
speed-write	When set to Yes, enables cached writes to C-Bus networks to accelerate the transmission of commands to the network	No	Yes	No
use-flow-control	When set to Yes (the default) enables flow control where supported by the a network's PCI. This improves network performance significantly.	Yes	Yes	No
local-flow-control	When set to 'Yes', uses C-Gate's XON/XOFF implementation rather than the flow control provided by the operating system. Use local flow control when the operating system has flow control problems. You should generally use the operating system's built in flow control.	No	Yes	No
sync-fast-pci	If set to Yes, runs version 3 PCIs in a synchronous mode – making sure that No messages are sent before the confirmation of the previous message has been received.	Blank corresponds to Yes for Windows ME, 98, 95, 2000 and no for Windows NT and other platforms.	No	No

Parameter	Values and impact	Default value	Set in configuration file?	Set by SET command?
comms-debug	If set to Yes, writes all sent and received bytes to a debugging log called comm-debug-<network name>. There is one file created per network. This produces large files. Do not leave enabled. Use for debugging purposes only.	No	Yes	No
use-queue-sweeper	If set to Yes, enables the queue sweeping function to clear network's transmit and received queues and check for a stuck transmitter	Yes	Yes	No
command-local-address	If an IP address is given here, then C-Gate will bind it's command interface to this interface only, thus preventing access from all interfaces, which is the default if this parameter is Not defined.	[No default]	No	No
access-control-file	The name of the access control file.	access.txt	Yes	No
use-1.0-addressing	If set to Yes, C-Gate will output 1.0-compatible address syntax in event and command streams.	No	Yes	No
event-millis	If set to Yes, include millisecond timing in event output, added as a '.' and 3 digits of milliseconds onto the end of the event date-time string	No	Yes	No

A sample CGateConfig.txt file is shown below. Note that the defaults for parameters are given, as well as a description, before each parameter is defined.

```
# Clipsal C-Gate(TM) configuration file
# C-GateConfig.txt
# This file sets the startup configuration for the C-Gate server
# YOU MUST RESTART C-Gate to cause changes to take effect.
# Last modified on 9/18/2001 2:41:25 PM by neathm

# Name of this C-Gate server - delivered in the 201 service ready
message.
# If this is not set, the hostname of the cgate will be used in place of this.
#
# level=standard
# Default=NULL
# Set by config file=Yes
# set by SET command=Yes
cgate-name=null

# TCP/IP port to wait for a connection on for the command interface
#
# level=standard
# Default=20023
# Set by config file=Yes
# set by SET command=No
```

```
command-port=20023
```

```
# A list of IP addresses or hostnames (each entry separated by a space)  
# that command connections will be accepted from.
```

```
#  
# level=standard  
# level=standard  
# Default=all  
# Set by config file=Yes  
# set by SET command=No  
accept-connections-from=all
```

```
# Path to the directory containing configuration files.  
# This can be relative to the base directory for C-Gate.
```

```
#  
# level=standard  
# Default=config  
# Set by config file=Yes  
# set by SET command=No  
config-path=config
```

```
# Path to directory containing macros to be executed with the RUN  
command.
```

```
#  
# level=standard  
# Default=macros  
# Set by config file=Yes  
# set by SET command=No  
macro-path=macros
```

```
# If set to yes, will send events for all new objects detected on C-Bus  
networks.
```

```
#  
# level=standard  
# Default=no  
# Set by config file=Yes  
# set by SET command=No  
report-new-objects=no
```

```
# Sets the default application supported by C-Bus network interfaces.  
# The default application can be addressed using 1.0 addressing syntax or  
# by using the special value '~' in place of the application number.
```

```
# This value can be set for an individual network in a network startup file  
# or from a set command directed at the C-Bus network.  
# Enter as an integer value. (hex is 38 -> C-Bus lighting)
```

```
#  
# level=standard  
# Default=56  
# Set by config file=Yes  
# set by SET command=No  
cbus-application=56
```

```
# "socket" causes events to be delivered to the event-port at the event-
host
# via a TCP/IP socket."server" open a socket on the cgate server that
remote
# software can connect to in order to retrieve events.
#
# level=standard
# Default=server
# Set by config file=Yes
# set by SET command=No
event-mode=server

# port number to wait for a connection on or to establish a connection on,
# depending on mode
#
# level=standard
# Default=20024
# Set by config file=Yes
# set by SET command=No
event-port=20024

# host IP address where event socket is to be opened
#
# level=standard
# Default=localhost
# Set by config file=Yes
# set by SET command=No
event-host=localhost

# Time in seconds between heartbeat events. 0 indicates do not send
heartbeat
#
# level=standard
# Default=0
# Set by config file=Yes
# set by SET command=Yes
heartbeat-time=0

# Local filename to store events in.
#
# level=standard
# Default=event.log
# Set by config file=Yes
# set by SET command=No
event-filename=event.log

# Local printer ID to print events to. NULL means do not print to printer.
#
# level=standard
# Default=NULL
# Set by config file=Yes
# set by SET command=No
event-printer=null
```

```
# The level of events that will be produced for all new objects created after
# startup. This parameter is used to set the event-level parameter of any
# new object
#
# level=standard
# Default=5
# Set by config file=Yes
# set by SET command=Yes
global-event-level=5

# yes: loads and supports cgroups.no: does not support cgroups.
#
# level=standard
# Default=No
# Set by config file=Yes
# set by SET command=No
use-cgroups=no

# A filename that is the name of the file holding CGroup information.
#
# level=standard
# Default=Cgroups.txt
# Set by config file=Yes
# set by SET command=No
cgroups-file=cgroups.txt

# Time in milliseconds to wait for a response to a command issued to a C-
# Bus network
#
# level=standard
# Default=10000
# Set by config file=Yes
# set by SET command=No
response-delay=10000

# Delay in milliseconds between commands sent to a C-Bus network
# when a V2 or
# earlier C-Bus PC Interface is used. Setting this delay smaller than
# 250ms
# may result in the loss of data to and from C-Bus networks.
#
# level=standard
# Default=250
# Set by config file=Yes
# set by SET command=No
cbus-tx-delay=250

# If set to "yes", allows cgate commands to perform recall write
# operations.
# This must be used with care and must be left disabled for an operating
# environment to prevent rogue programming.
#
```

```
# level=standard
# Default=yes
# Set by config file=Yes
# set by SET command=No
allow-recall-write=no
```

```
# Set the Default sync-time for all C-Bus networks. See sync-time under
C-Bus Network.
```

```
# in seconds
#
# level=standard
# Default=300
# Set by config file=yes
# set by SET command=no
sync-time=300
```

```
# Default scan-time for all C-Bus networks. See scan-time under C-Bus
Network.
```

```
# in seconds
#
# level=standard
# Default=60
# Set by config file=yes
# set by SET command=no
scan-time=60
```

```
# Default time between psync operations for C-Bus Units. See psync-time
under
```

```
# the C-Bus Unit object.
# in seconds
#
# level=standard
# Default=300
# Set by config file=yes
# set by SET command=no
psync-time=300
```

```
# If set to yes, issues an event for every new C-Bus unit detected on a
network
```

```
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
report-new-objects=no
```

```
# If set to yes, uses XON/XOFF flow control for information transmitted to
the
```

```
# PCI, if supported by the PCI. Set this parameter to no if flow control
problems are suspected.
#
# level=standard
# Default=yes
```

```
# Set by config file=yes
# set by SET command=no
pci-flow-control=yes

# If set to yes, allows higher performance and command verification
options
# if a version 3 PCI is detected.
#
# level=standard
# Default=yes
# Set by config file=yes
# set by SET command=no
allow-v3-pci=yes

# The name of the file containing the information about the C-Gate
networks to
# be connected to.
#
# level=standard
# Default=Networks.txt
# Set by config file=yes
# set by SET command=no
networks-file=networks.txt

# Sends events to a file.
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
use-event-file=no

# If set to yes, enables the processing of scenes. See the C-Gate User
Guide
# for details of scene operation
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
use-scenes=no

# If set to yes, enables the load change port, which provides a connection
# that delivers a list of ON, OFF and RAMP commands as events are
# recorded from C-Bus networks.
#
# level=standard
# Default=yes
# Set by config file=yes
# set by SET command=no
use-load-change-port=yes
```

```
# The socket or port number that the load change port accepts
connections on.
#
# level=standard
# Default=20025
# Set by config file=yes
# set by SET command=no
load-change-port=20025

# If set to yes, enables the configuration change port, which provides a
# connection that delivers a list of network and unit IDs that have had their
# configuration (programming) or addressing changed.
#
# level=standard
# Default=yes
# Set by config file=yes
# set by SET command=no
use-config-change-port=yes

# The socket or port number that the configuration change port accepts
connections on.
#
# level=standard
# Default=20026
# Set by config file=yes
# set by SET command=no
config-change-port=20026

# The timeout in milliseconds between runs of the queue sweeper thread.
#
# level=standard
# Default=2000
# Set by config file=yes
# set by SET command=no
sweep-timeout=2000

# When set to yes, enables cached writes to C-Bus networks to accelerate
the
# transmission of commands to the network
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
speed-write=no

# When set to 'yes' (the default) enables flow control where supported by
the
# a network's PCI. This improves network performance significantly.
#
# level=standard
# Default=yes
# Set by config file=yes
```



```
# set by SET command=no  
use-flow-control=yes
```

```
# When set to 'yes', uses C-Gate's XON/XOFF implementation rather than  
the flow  
# control provided by the operating system. Use local flow control when  
the  
# operating system has flow control problems.You should generally use  
the  
# operating system's built in flow control.  
#  
# level=standard  
# Default=no  
# Set by config file=yes  
# set by SET command=no  
local-flow-control=no
```

```
# If set to yes, runs version 3 PCIs in a synchronous mode - making sure  
that  
# no messages are sent before the confirmation of the previous message  
has  
# been received.  
# WARNING : default should be yes for Windows ME, 98, 95, 2000 but no  
for  
# Windows NT and other platforms.  
#  
# level=standard  
# Default=  
# Set by config file=no  
# set by SET command=no  
sync-fast-pci=
```

```
# If set to yes, writes all sent and received bytes to a debugging log called  
# comm-debug-<network name>. There is one file created per  
network.This produces  
# large files. Do not leave enabled. Use for debugging purposes only.  
#  
# level=standard  
# Default=no  
# Set by config file=yes  
# set by SET command=no  
comms-debug=no
```

```
# If set to yes, enables the queue sweeping function to clear network's  
transmit  
# and received queues and check for a stuck transmitter  
#  
# level=standard  
# Default=yes  
# Set by config file=yes  
# set by SET command=no  
use-queue-sweeper=yes
```

```
# If an IP address is given here, then C-Gate will bind it's command
interface
# to this interface only, thus preventing access from all interfaces,
# which is the default if this parameter is not defined.
#
# level=standard
# Default=
# Set by config file=no
# set by SET command=no
command-local-address=

# The name of the access control file.
#
# level=standard
# Default=access.txt
# Set by config file=yes
# set by SET command=no
access-control-file=access.txt

# If set to yes, C-Gate will output 1.0-compatible address syntax in event
and command streams.
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
use-1.0-addressing=no

# If set to yes, include millisecond timing in event output, added as a '.'
# and 3 digits of milliseconds onto the end of the event date-time string
#
# level=standard
# Default=no
# Set by config file=yes
# set by SET command=no
event-millis=no
```

10.6.3 The Access.txt File

The access.txt file contains settings to enable control of access to the C-Gate server.

C-Gate 1.5 has a stronger focus on access control, which is controlled by the **access.txt** file in the **config** directory (where the Networks.txt and CGateConfig.txt files reside).

This file has a list of types of access based on three keywords:

- **interface** defines an access level for a TCP/IP interface on the computer
- **remote** defines an access level for the IP address of a remote computer attempting to establish a connection
- **user** defines a user & password and access level set by the new **login** command

The access control file is checked every time a connection is made to C-Gate command event or status port, or a **login** command is received. At these times, the list of rules in the config file are reviewed, and the access level granted is the result of the most favourable rule. However, using the login command, it is possible to set your access level to a lower level than would normally be configured by the interface and remote rules. Rules are as follows:

interface <IP address> <access level>

remote <IP address> <access level>

user <userid> <password> <access level>

Where the fields are:

- **<IP address>** a full IP address, either for the interface that the connection comes in on, or a remote address. This can be a hostname, or it can be a dotted quad (ie. 10.234.2.23). If a dotted quad is used, then any part of the address that is set to 255 will match any address, allowing whole networks to be allowed access.
- **<userid>** a username that is used in the login command along with the password.
- **<password>** the password that goes with the username.
- **<access level>** are as in the table below, with each later level incorporating the functions of the previous level.

Access Level	Meaning
None	No access at all. Use this to refuse connections.
Connect	Allow a connection to be established (to the command interface only) and execute the login command
Monitor	Allow monitoring and query of status of objects and C-Bus, but do not allow any changes. This is the minimum level to allow connection to the event or load or configuration change ports.
Operate	Allow set, on, off, ramp operations – allow changes to be made to the system
Admin	Allow C-Gate shutdown and C-Gate administration functions
Program	Allow C-Bus networks to be programmed
Debug	Allow debugging functions to be performed

1.3 A sample access control file

The following depicts a valid access control file:

```
#sample access control file
interface 127.0.0.1 admin
interface 10.50.1.2 monitor
remote 10.50.1.255 operate
user debugger xxAA1 debug
```

This file would set access control in the following way:

1. All sessions from the local computer on the localhost interface would get admin level access.
2. All sessions on the ethernet interface 10.50.1.2 (ie all accesses from the external network) would get monitor level
3. All sessions on the 10.50.1.* subnetwork would get operate access. (IP addresses 10.50.1.1, 10.50.1.2, 10.50.1.3 and so forth)
4. A user that typed the command:
login debugger xxAA1
would be granted debug access level.

Note that the access.txt file is scanned every time a connection is made or a login command is entered, so changes can be made to it and the new rules will apply without restarting C-Gate, though they won't change the behaviour of existing connections, unless a login command is executed).

10.7 Using C-Groups

C-Groups provide a mechanism to bring a number of C-Bus Group addresses together in order to operate them as one C-Bus group for some functions, particularly control of the group level.

A C-Group has a name and a type. There are two types of C-Group:

A Control C-Group allows several C-Bus group addresses to be controlled as one using the ON, OFF and RAMP commands.

A Power C-group allows the power across a number of terminals to be monitored and reported as one.

10.7.1 C-Groups.txt Configuration File

C-Groups are defined in the **C-Groups.txt** configuration file (or in the file named in the **cgroups-file** parameter in the C-GateConfig.txt file), in the **config** directory. Each line of the file is either a comment, or a line defining a C-Group.

Comment lines start with the **#** character. Blank lines are ignored.

A line defining a C-Group is in the form, with the parameters separated by spaces:

```
<name> <type> <options> <group-or-terminal> <group-or-terminal>
<group-or-terminal> ...
```

Where

<name> is the desired name of the C-Group - it can be a name or a number.

<type> is **control** for a Control C-Group, or **power** for a Power C-Group

<options> should be a '-' character

<group-or-terminal> is either a C-Bus group name or terminal name.

One or more group or terminal names can be provided. For example, the definition:

```
c1 control - 1.1 1.2
```

Defines a C-Group called **c1** which controls groups 1 and 2 on network 1.

And another example:

```
p1 power - #1.3.1 #1.3.2
```

Here, **p1** is a power C-Group which can be used for summing the power of terminals 1 and 2 on network 1, unit 3.

A sample C-Groups.txt file is shown below:

```
# C-Groups file for C-Gate
# syntax is:
# <name> <cgroup-type> <options> <included entities>
#
# sample C-Group c1
c1 control - 1.1 1.2

# sample power C-Group
p1 power - #1.3.1 #1.3.2
```

10.8 Network Startup Files

There is a network startup file for each network that is opened. Network startup files are contained in the net directory off the C-Gate base directory. This directory will normally be called C:\Clipsal\C-Gate\net for a standard installation. The network startup file is named the same as the network, so the startup file for network 1 is named 1. Note, this filename has no extension added to it, the filename is exactly the same as the network name.

A network startup file contains a number of commands, particularly the new command to define groups and units.

To define a new group 1 in the lighting application on network 3, use the command:

```
new group 3/56/1
```

which would define the group so it could be used in a C-Group definition.

To define units, you need to know the unit type. Common unit types are shown in the table, or they can be retrieved from any unit by using the get <address> type command from a C-Gate Command Interface.

C-Bus Unit	Unit type
4 Channel Dimmer	DIMMER4
4 Channel Relay	RELAY4
1 Channel Relay	RELAY1

Once the type has been determined, a new command can be added to the network startup file, such as:

```
new unit p/1/3 DIMMER4
```

This would define a 4 channel dimmer one network 1, unit 3. This would allow the four terminals, p/1/3/1, p1/3/2, p1/3/3 and p1/3/4 to be used in C-Group definitions.

11.0 C-Gate Operation

C-Gate is designed as a tool for day-to-day management and control of C-Bus networks.

The management task could include control of C-Bus loads, collecting and using information from the network, noting when buttons were pushed or providing monitoring and control interfaces for a building management system that is managing lighting and other building subsystems.

This section shows how to run and operate the C-Gate server to manage one or more C-Bus networks.

11.1 Starting C-Gate

To start C-Gate, select the C-Gate option from the Clipsal C-Gate group in the Windows Start menu or, in the case of Linux, select the C-Gate file drawer in the Gnome window manager. C-Gate will start silently running in the background without a console window.

Alternatively, you can start C-Gate by running the program from a command prompt in the C-Gate directory. (for a Windows installation this would usually be C:\Clipsal\C-Gate\). When in this directory type `java -jar C-Gate.jar` and the program will commence, displaying event information in that window.

11.2 Connecting to the C-Gate Server

The C-Gate server is used to ease interfacing between one or more C-Bus networks other systems or programs that are going to manage those networks. In addition to the software interface, a user may connect to C-Gate and interact with it and the C-Bus networks it is connect to using the 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. These interfaces are the Command Interface, Event Interface, Load Change Port and the Configuration Change Port.

These Command and Event Interfaces are described in detail in Clipsal C-Gate Command and Event Interface Specification. This document is available as a PDF document in the Online Documentation directory of the C-Gate installation. For a typical Windows™ installation this will be
C:\Clipsal\C-Gate\Online Documentation\C-Gate Command Interface.pdf.

The Command Interface allows a control system or program (or even a Perl script or Java applet) to control and get the status of the C-Bus groups and units on the networks that C-Gate is controlling. 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 CGateConfig.txt configuration file. This port is normally 20023, but it can be set in the configuration file to any valid port number.

One or more clients can then connect to this port and access the command interface. A program or other system will do this by using TCP/IP to open a socket connection, and then sending and receiving commands over this socket connection. These commands may be provided manually by typing in a connected telnet client.

11.2.1 Automated Connection

When connecting to C-Gate with an automated interface, driven by a script or program the following protocol should be observed to ensure valid responses:

- Enter “get CBus networks” and record the last network number displayed <last_network>
- Enter “get <last_network> state” and keep asking until the state is “ok”
- Once the last network is synchronised enter “get CBus networks” again and check that the last network displayed has not changed. If so then repeat the above.

The rationale behind this is that the networks.txt file may not be fully read at the time of the first “get” command. By waiting for synchronisation of the last network, sufficient time will have elapsed for the complete networks.txt file to have been read and corresponding network objects instantiated. The last command is simply a “double check” that everything is now synchronised.

11.3 Connection to C-Gate with Telnet

When the C-Gate server is running, an event interface is available for connection.

The Windows operating system as installed includes a standard telnet client.

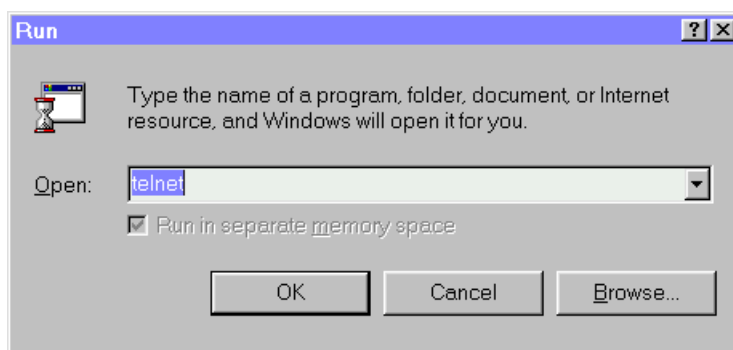
The Windows installation has a shortcut defined in the Start menu under Programs | Clipsal | C-Gate | C-Gate Command Interface. This shortcut uses the appropriate port and the local host name.

In the Linux case, running Gnome as the presentation manager, the shortcut which results from following the installation directions is in the file drawer with a C-Gate logo.

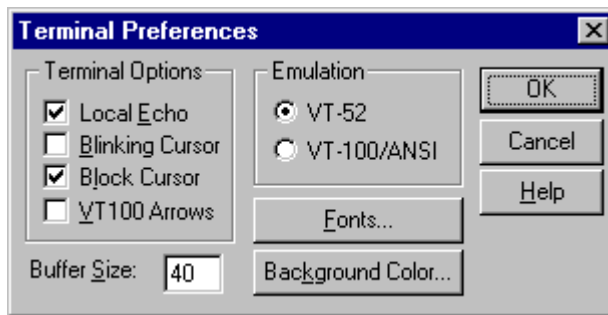
If another instance of C-Gate running on another machine is to be connected then a manual procedure must be used to establish the connection.

To connect with telnet in this case the following information must be provided:

- The host name or IP address of the computer that C-Gate is running on, and
- The C-Gate command port
- To start telnet, select the Run... option on the Windows Start menu. When the box appears, type telnet and select OK.

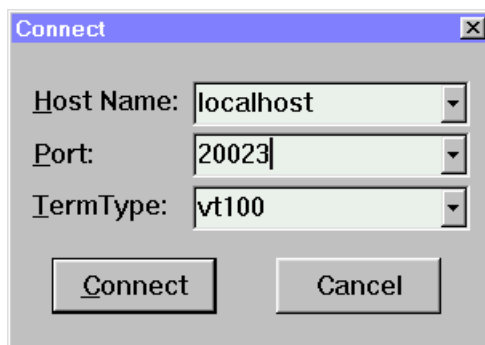


When telnet starts the local echo mode must be set to see the commands being typed in. The menu items Terminal |Preferences...| produce a dialogue box as shown,



(The Windows 2000 version of telnet does not include a local echo option)

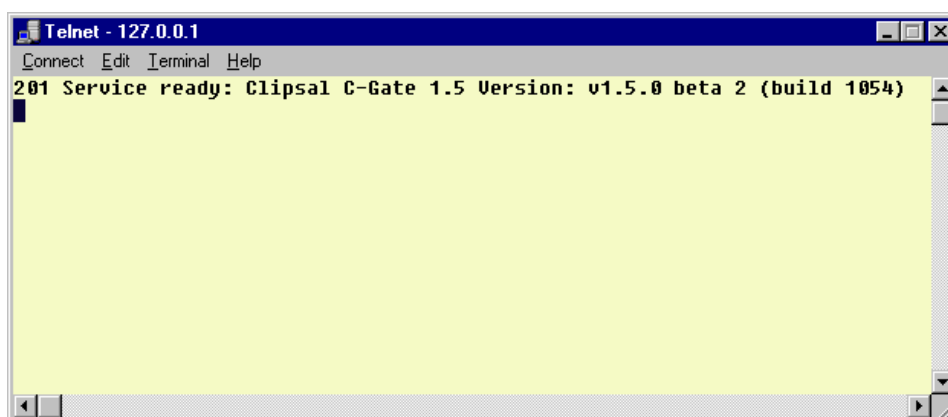
The connect menu | select Remote system menu item produces another dialog box. The connection details to C-Gate are entered.



In the Host Name box, the name of the computer C-Gate is running on is typed in. If it is running on the same computer that the telnet session is running on the value "localhost" may be entered. Then a port number is entered, which in most cases is 20023. Clicking "Connect" will attempt to establish a connection.

An introductory message from C-Gate will appear indicating the connection has been established.

The initial message from C-Gate is typical of messages from C-Gate. It starts with a three-digit response code. Response codes make it easy for other software using the interface to determine the meaning of the response. A text description or additional information follows the response code.



The command interface handles one command at a time. All commands have a response.

More than one command interface to the C-Gate server can run at one time. Thus one, several, or many telnet windows may be open at one time and all of them may be used to send commands to C-Gate.

There are a range of commands that can be issued to C-Gate. Basic commands allow the setting and querying of information about the C-Bus networks and devices (SET and GET commands), and the ability to send ON, OFF and RAMP C-Bus commands. (See the C-Gate command interface manual for details of these commands and their usage)

11.4 Addressing

Many commands use an addressing system to refer to C-Bus networks, groups and devices. Events also use the addressing system to provide information about C-Bus networks, groups and devices.

This addressing system includes the name of a network, then either a C-Bus unit or an application and then a group number. Additionally, a terminal of an output unit can be addressed also. The group, unit and terminal numbers are in decimal, or hexadecimal if preceded by a dollar sign '\$'. All output from C-Gate is given in decimal only.

To minimise confusion, the C-Bus Installation software should be set to operate in decimal. This is done from within the C-Bus installation software browser by selecting, File | Decimal addressing. (Although this has the effect of displaying the unit addresses in decimal format, group addresses which have not been assigned user friendly descriptions are still shown in the original hexadecimal regardless of whether decimal or hexadecimal addressing is chosen.)

To address a C-Bus group using C-Gate, a network name, an application and a group number must be included in the command. These three items are separated by a slash "/". So, to address group 1 on application 56 on network 15, use the address 15/56/1 (network/application/group address)

To address physical C-Bus units, a slightly different addressing system is used. This is based on a leading p character (p stands for "physical"), the network name, and then the unit number. So, to address unit 22 on network 15, the address p/15/22 is used. (p/network/unit)

To address a terminal on that unit, another slash is applied followed by the terminal number. For example, to address terminal 2 (the second relay or dimmer) on the unit above, the address p/15/22/2 would be used.

To refer to the network itself the name alone suffices. In the examples given, this would be 15.

This addressing is used throughout C-Gate to reference the C-Bus network devices and groups.

11.4.1 Wildcards

The addressing scheme allows for the use of wild cards to specify more than one entity with an address. A * character may be used as a wildcard

in one or more address fields, meaning that the command will be applied to all the matching objects.

For example, the command:

on 1/56/*

will turn on *all* the groups in application 56 on network 1. The power and flexibility of this addressing syntax demands particular attention to avoid unanticipated actions.

In the event interface, one result will be displayed for each object which acts upon the command, or a failure if applicable message if the action does not occur.

This may be applied to any command with an address, including get and set operations, recall, getstatus, store and tree.

11.4.2 Summary of Addressing

In summary then:

- To address a group, the form network/application/group is used,
- To address a unit p/network/unit is used
- To address a terminal on an output unit, p/network/unit/terminal is used,
- To address an application wildcards may be used as in, network/application/*.

11.5 Using the Command Interface

While connected to the command interface with a telnet window the available networks may be displayed with the command:

```
get cbus networks
```

(Examples of commands in this manual all assume that a Return or Enter key is typed after entering the command.)

This will return a response of this form:

```
300 cbus: networks=1,2,3
```

The 300 is a normal response code showing successful execution, the numbers separated by commas are the networks connected in this case. The network numbers shown may then be used to perform further queries on the groups or units in those networks.

For each network, the defined groups or units on that network may be obtained by using the get command. In these hypothetical examples the network number is 1.

```
get 1 applications
300 1: applications=56,202
```

or

```
get 1 units
300 1: units=0,1,2,3,4,5,6,7,8,12
```

In both cases, a list of defined applications and units for the network are returned.

A list of groups from application 56, the lighting application on this network is obtained with the command:

```
get 1/56 groups
300 1/56: groups=32,33,34,35,36,37,38,39,40,41
```

indicating that 10 groups are defined for the lighting application of this network.

The current level of one of these groups may be obtained by the get command:

```
get 1/56/32 level
300 1/56/32: level=0
```

This return message indicated that for group 1/56/32, the C-Bus group level is currently 0. This level can range between 0 (off) and 255 (fully on) for each group.

The on, off, or ramp commands are used to set a group level.

```
on 1/56/322
200 OK: 1/56/32
```

The reply 200 means that the command was successful, confirmed by the OK message. The actual object involved is also supplied.

We can show that the on command corresponds to 255 by getting the level.

```
get 1/56/32 level
300 1/56/32: level=255
```

The ramp command allows a slow ramping of loads over a predetermined time.

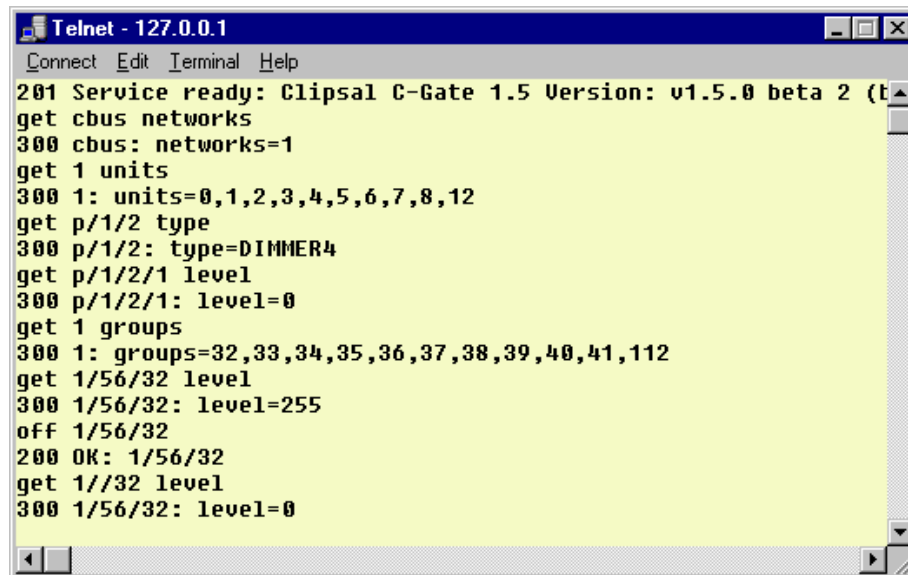
For example, the following ramp command will ramp group 32 on application 56, network 1 to level 127 over (approximately) the next minute.

```
ramp 1/56/32 127 1m
200 OK: 1/56/32
```

The object model used in C-Gate 1.5 allows the interrogation of group levels within the interval (1 minute in this case). The resulting levels will mirror the actual level of the load at that time. This information is estimated based upon the time the command was issued.

The picture on the next page shows a few commands and their results.





```

Telnet - 127.0.0.1
Connect Edit Terminal Help
201 Service ready: Clipsal C-Gate 1.5 Version: v1.5.0 beta 2 (t
get cbus networks
300 cbus: networks=1
get 1 units
300 1: units=0,1,2,3,4,5,6,7,8,12
get p/1/2 type
300 p/1/2: type=DIMMER4
get p/1/2/1 level
300 p/1/2/1: level=0
get 1 groups
300 1: groups=32,33,34,35,36,37,38,39,40,41,112
get 1/56/32 level
300 1/56/32: level=255
off 1/56/32
200 OK: 1/56/32
get 1/32 level
300 1/56/32: level=0

```

The basic commands shown here and their responses enable basic control of C-Bus groups and devices. The full command specification gives the detail of C-Gate commands that perform more complex functions, and also lists a number of parameters of groups, units and networks that can be manipulated and retrieved using the `set` and `get` commands.

11.6 Events

C-Gate constantly monitors 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.

- To a file that is named in the C-GateConfig.txt parameter event-file. The *use-event-file* parameter must be set to *yes*.
- To a TCP/IP socket interface on a remote computer
- To a connection made to the C-Gate event-port port number
- To a local printer.

If `java -jar cgate.jar` is used to start C-Gate, then events are automatically distributed to the command window. The picture below shows a list of events in a console window.

11.7 Event Formats

All events are formatted in a standard way to allow easy processing by other systems that wish to use the event stream.

Every event gives:

- 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 useful information

The two examples below show the format of events. The date and time are given first, in the form `yyyymmdd-hhmmss` in local time. Then the 3 digit event code, then the object associated with the event, then the description or details.

```
20010911-122610 800 cgate C-Gate started.  
20010911-122613 740 1 Opened cbus network: 1
```

The first event is an '800' event, it indicates that C-Gate has started. This code is only used for this purpose. The associated object is C-Gate itself, hence the `cgate` object name.

The second event is a '740' event, indicating that a C-Bus network has been opened. This event is associated with a C-Bus network, in this case network 1.

Events may be filtered by level and object. The `global-event-level` parameter in the `C-GateConfig.txt` file can be used to set the level of event production.

At level 9, all events are produced, at level 5 a normal level of events reporting is enabled.

At level 1, only alarm events are sent.

Similarly, the event-level parameter can be set for any network, unit or device using the `set` command to allow you to collect events for only certain objects.

Refer to the Command and Event Interface Specification for further details of the type and range of events.

11.8 Stopping C-Gate

To stop C-Gate, you can use one of the following methods:

- Open the Window that C-Gate is running in, then hold down the control key and strike `C`, or
- Open a telnet session to connect to C-Gate and enter `shutdown` and when prompted enter `confirm`. The C-Gate server will shutdown and the connection to the telnet session will close.

12.0 Scene module

The C-Gate server enables software driven scenes to allow several commands to be actuated by means of a single C-Gate command.

12.1 *About the scene module*

The scene module provides additional functionality to C-Gate to allow a series of C-Bus groups to be recorded and played back using C-Bus groups to control the record and playback.

A scene allows one button to be pushed, resulting in multiple changes to lighting based on the scene that has been recorded or specified in a scene file. Scene files can be recorded from the network or edited in the local file at any time.

12.2 *Enabling the scene module*

The scene module is made active by setting the `use-scenes` configuration parameter to `yes` in the `C-GateConfig.txt` configuration file. By default, this parameter is set to `no` so the setting must be placed in the file for scenes to operate.

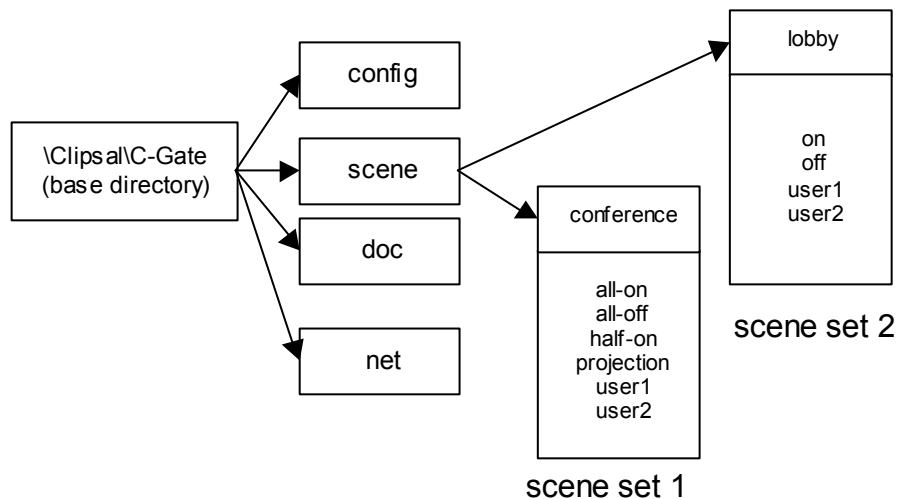
12.3 *Scene sets*

Scenes are grouped into Scene Sets. A scene set contains a number of scenes that are defined for a similar set of groups (and ultimately lights). A scene set will be typically defined for a room, and a number of scenes in that set will be used to set the room lights to a specified condition.

For example, the scene set for a conference room (named `conference`) might contain the scenes `all-off`, `all-on`, `half-on`, `projection`, `user1`, and `user2`. Because the scenes are grouped in a scene set, only one can be activated at one time. This prevents confusion for users as multiple scenes cannot be set simultaneously.

Scene sets are named by the disk directory that contains the scene files for that scene set.

Scene set names must be legal filenames and must not contain spaces.



The C-Gate server supports the notion of a scene base directory which can contain information about scenes. The location of this directory is defined by the `scene-base` configuration parameter in the `C-GateConfig.txt` configuration file. This scene base directory in turn may have several scene set directories. Each of these scene set directories has named scenes to produce the desired lighting configuration.

The diagram above shows an example directory structure. This example shows the default scene-base location which is a scene directory within the C-Gate base directory. Here there are two scene sets defined, conference and lobby. Both of the scene sets have several scenes defined.

12.4 Scenes

Each scene is defined in a scene file contained in the directory of its scene set. A scene file is a plain text file that contains:

- a play line that specifies the C-Bus group used to play back the scene commands
- an optional record line that specified the C-Bus group that can be used to record the scene
- a number of set lines that define the C-Bus groups that are a part of the scene and the levels they should be set to when the scene is played.

A sample scene file is shown below:

```

#
# sample scene file
#
play 1/56/5
record 1/56/6
set 1/56/1 0
set 1/56/2 255
set 1/56/3 150
set 1/56/4 110 30

```


The sample scene file shows:

- The scene will be played when group 5, application 56 on network 1 is turned on.
- The scene would be re-recorded when group 6, application 56 on network 1 is turned on. Note, the record line is optional for a scene.
- On playback, group 1/56/1 will be set to off, group 1/56/2 to on, group 1/56/3 to level 155, and group 1/56/4 will ramp to level 110 over 30 seconds.

Blank lines are ignored, and comments can be placed in the file with the # character in the first position on the line, but it must be noted that a record operation will remove any comments and blank lines placed in the scene file.

12.4.1 Playing Scenes

When a scene is read at startup, C-Gate arranges a trigger on the group defined as the play group. When this group is set to a value greater than 0 (either with an on or ramp command), C-Gate performs the following functions:

C-Gate checks that the scene file on disk has not changed. If it has, C-Gate re-reads the scene definition.

C-Gate executes the set commands in the scene, so the groups are set as described in the scene.

C-Gate sets the play group off.

When a user presses a input unit button that triggers scene playback, the unit light will come on and remain on until the scene has been fully played back. For complex scenes, this may take a number of seconds.

Scene playback can be triggered also by issuing an ON command at the C-Gate command interface.

12.4.2 Scene Recording

Scene recording takes place when the scene record group is set to a level greater than zero.

When this occurs, C-Gate takes the following action:

- C-Gate captures the levels of all the groups that are defined for the scene.
- C-Gate re-writes the scene file containing these new values.
- C-Gate sets the record group to off.

Scene recording can also be triggered from the C-Gate command line by issuing an ON command to the recording group.

12.5 *Editing scenes*

Scene files can be edited while C-Gate is operating. A third party editor or Scene Editor package may be used to edit the scene files. The following notes should be taken into consideration when editing scene files:

- Edited scenes will become active as soon as the next play command is received for the scene. If the scene play group is changed when the scene is edited, the old scene play group must be used to re-load the scene.
- New scenes or scene groups will not be active until C-Gate is re-started. Refer to the C-Gate manual for information on re-starting C-Gate.
- Syntax errors in scene files will be indicated by the events 963-965. Syntax errors will render the scene inoperative until the syntax error is corrected, at which time the scene will be loaded and operated correctly.