



C-Gate Server Application

CGI User's Guide

5000 CG Series



Table of Contents

| Section..... | Page |
|--|------|
| 1.0 Introduction..... | 4 |
| 1.1 Scope..... | 4 |
| 1.1 Referenced Documents | 4 |
| 1.3 Acronyms and Abbreviations | 4 |
| 1.4 Presentation Format for Numbers..... | 4 |
| 1.5 Typographic Presentation | 4 |
| 1.6 Syntax Diagram Notation..... | 5 |
| 1.7 Escaped Text..... | 5 |
| 2.0 System OPERATION | 7 |
| 2.1 Web Browser Access..... | 7 |
| 2.2 WAP Phone Access..... | 8 |
| 2.3 I-Mode Access | 9 |
| 3.0 Command Format | 10 |
| 3.1 Get Level Commands | 11 |
| 3.2 Get Physical Parameter Commands..... | 12 |
| 3.3 General-Purpose Commands | 13 |
| 4.0 Using the CGI Commands..... | 14 |
| 4.1 HTML / CHTML..... | 14 |
| 4.2 WML | 16 |
| 4.3 Command-Line Usage | 16 |
| 5.0 SYSTEM CONFIGURATION..... | 18 |
| 5.1 Web Server..... | 18 |
| 5.2 WAP Set-up | 18 |

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FIGURES

| | |
|--|----|
| Figure 1 Syntax Diagram notation | 5 |
| Figure 2 : Web Browser Access via Modem | 8 |
| Figure 3 : Web browser Access via Permanent Internet Connection..... | 8 |
| Figure 4 : WAP Phone Access via Modem | 9 |
| Figure 5 : WAP Phone Access via Permanent Internet Connection | 9 |
| Figure 6 : CGI Command Format | 10 |
| Figure 7 : Parameter List Format..... | 11 |
| Figure 8 : GA Format..... | 11 |
| Figure 9 : Response Text Format | 12 |
| Figure 10 : UA Format | 13 |
| Figure 11 : Example HTML File | 15 |
| Figure 12 : Command Response..... | 15 |
| Figure 13 : WAP Phone Card | 16 |
| Figure 14 : WAP Response | 16 |

TABLES

| | |
|--|----|
| Table 1 : Reserved Characters and their Escape Codes..... | 6 |
| Table 2 : Restricted Characters and their Escape Codes | 6 |
| Table 3 : Response Tags..... | 12 |

1.0 Introduction

1.1 Scope

This document describes the methods used to access C-Bus via the Internet using the CGI scripts provided with C-Gate. The format of the commands is provided and brief details of the system configuration are given.

1.2 Referenced Documents

| Document | Title | Summary / Purpose |
|------------------|--|--|
| Online Documents | C-Gate Command Interface | Describes the format of C-Gate Commands. |
| RFC2396 | Uniform Resource Identifiers (URI): Generic Syntax | Describes the format of URLs. |

1.3 Acronyms and Abbreviations

| Term | Description |
|-------|--|
| CGI | Common Gateway Interface |
| CHTML | Compact HTML |
| GA | Group Address |
| HTML | Hyper Text Mark-up Language |
| HTTP | Hyper Text Transport Protocol |
| MIME | Multi-Purpose Internet Mail Extensions |
| RFC | Request for Comment |
| SEP | SEPARATOR |
| SP | SPACE |
| UA | Unit Address |
| URI | Uniform Resource Identifier |
| URL | Uniform Resource Locator |
| WAP | Wireless Application Protocol |
| WML | Wireless Mark-up Language |

1.4 Presentation Format for Numbers

Throughout this document, numbers are presented in decimal (base 10), hexadecimal (base 16) and binary (base 2). The following conventions are used:

- Numbers without any prefix are decimal (for example, 127);
- Numbers with a \$ prefix are hexadecimal (for example, \$7F);
- Numbers with a % prefix are binary (for example %01111111).

1.5 Typographic Presentation

The following conventions are used in this guide:

- Normal descriptive text (like this) is presented in a standard Arial font with no emphasis;

- Section headings are always numbered. Major section (level 1) headings are all upper case.
- Commands and responses are shown in Courier, Bold.
- Cross reference between syntax diagrams uses the name in the diagram, underlined>. For example Status Report.

1.6 Syntax Diagram Notation

In this User Guide, the syntax for commands sent to the Serial Interface and replies received from the Serial Interface are shown using syntax diagrams. These diagrams show the sequence of information needed. Figure 1 shows the notation.

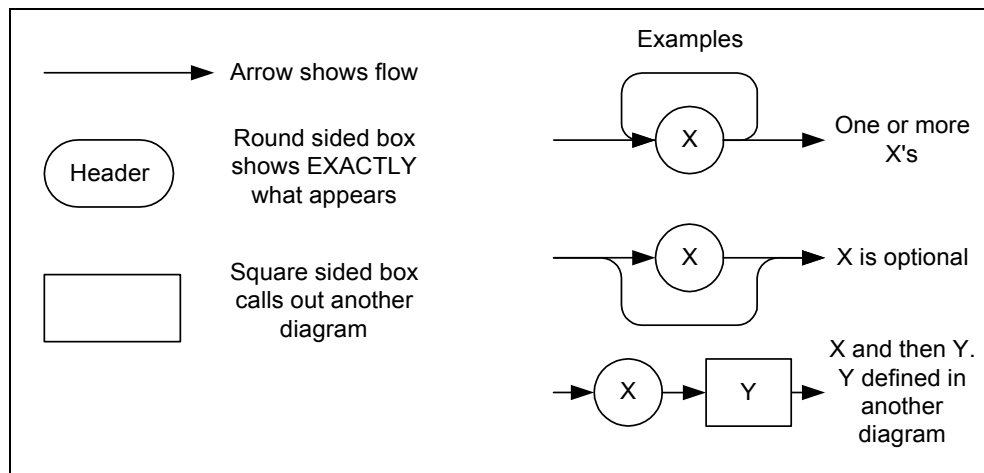


Figure 1 Syntax Diagram notation

1.7 Escaped Text

In URLs, certain “reserved” characters, such as % and ?, have particular meanings and it is not advisable to put these into the text. If one of these characters is to be used, it is necessary to use a special “escape code” to indicate that the character should be put in the text. To do this, put %XY in the text where you want the special character to appear where XY is the hexadecimal value of the ASCII character you want inserted. A list of the characters that are restricted and their escape codes are given in Table 1. There are other characters which have special uses for the CGI. These restricted characters are shown in Table 2, with their escape codes.

So, for example, if you wanted to have the text “lounge & dining room” in a URL, it would have to be escaped to :

`"lounge%20%26%20dining%20room"` or `"lounge_%26_dining_room"`.

In certain circumstances, reserved and restricted characters can be used, but their use is best avoided if possible.

| Character | Escape Code |
|-----------|-------------|
| ; | %3B |
| / | %2F |
| ? | %3F |
| : | %3A |
| @ | %40 |
| & | %26 |
| = | %3D |
| + | %2B |
| \$ | %24 |
| % | %25 |
| , | %2C |

Table 1 : Reserved Characters and their Escape Codes

| Character | Escape Code |
|-----------|-------------|
| space | %20 or _ |
| ~ | %7E |
| _ | %5F |
| | %7C |

Table 2 : Restricted Characters and their Escape Codes

Refer to RFC2396 for more information on escape codes.

2.0 System OPERATION

C-Gate can be accessed via the Internet using the provided CGI scripts. Provision is made for access via web browsers (using HTML or CHTML) or WAP phones (using WML).

This document describes the use of the CGIs only. The configuration of the other devices in the system is the responsibility of the user.

In general, to control C-Gate from a HTML or WML page :

- A specially formatted hyperlink containing a C-Gate command is inserted in an HTML/WML page
- When the user clicks on the hyperlink, an HTTP request is sent to the web server
- The Web server executes the CGI script with the command passed as a parameter
- The CGI script opens a socket to C-Gate and sends the command
- The CGI script obtains a response from C-Gate
- The CGI script returns a HTML/WML page to the user containing the result via the web server
- The CGI closes

There are three CGI scripts provided, depending on the type of access required :

| CGI Name | Reply Format | Usage |
|--------------|--------------|--|
| CGateCGI.exe | HTML | Web Browsers |
| IModeCGI.exe | CHTML | I-Mode phones or any other devices using CHTML |
| WAPCGI.exe | WML | WAP Phones |

HTML and CHTML are nearly identical, and are treated together in this document.

2.1 Web Browser Access

To access C-Gate from a Web Browser via a dial-up modem connection, or via a permanent Internet connection, the set-ups in Figure 2 and Figure 3 are used respectively. Note that it is also possible that C-Gate could be running on a remote machine, and that it could be connected to C-Bus via a terminal server instead of a PC Interface.

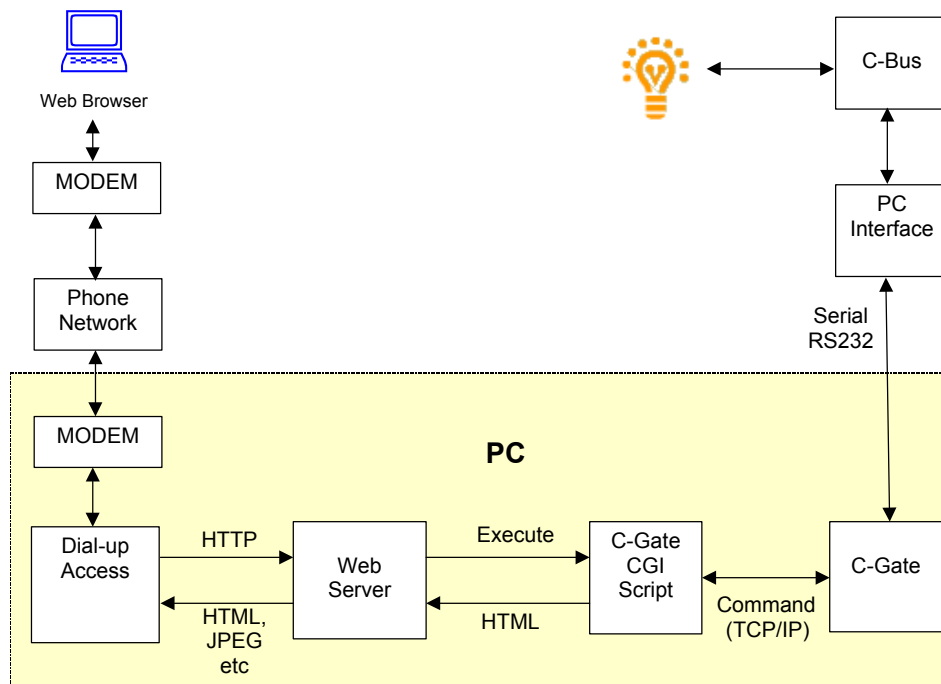


Figure 2 : Web Browser Access via Modem

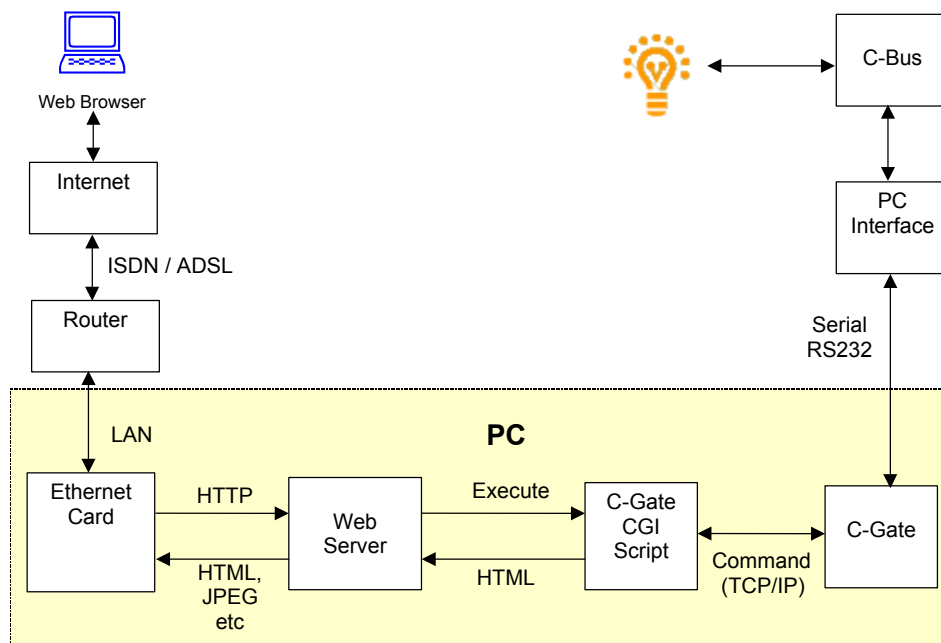


Figure 3 : Web browser Access via Permanent Internet Connection

2.2 WAP Phone Access

To access C-Gate from a WAP Phone via a dial-up modem connection, or via a permanent Internet connection, the set-ups in Figure 4 and Figure 5 are used respectively.

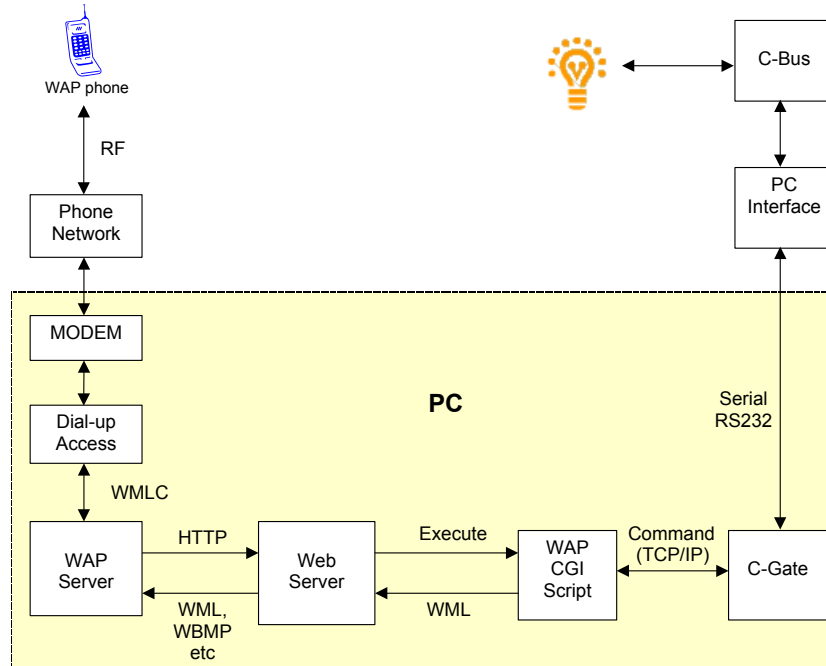


Figure 4 : WAP Phone Access via Modem

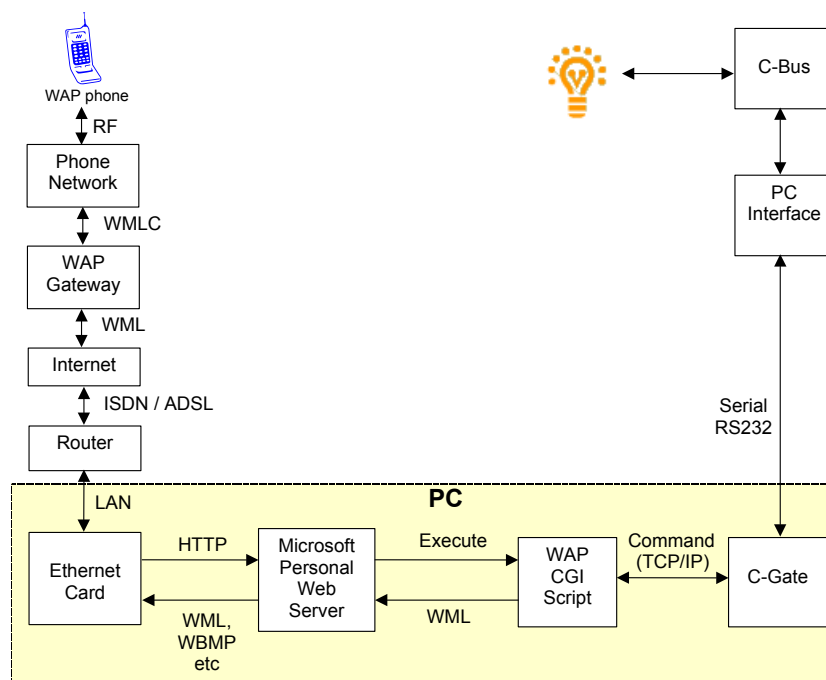


Figure 5 : WAP Phone Access via Permanent Internet Connection

2.3 I-Mode Access

I-Mode phones or other CHTML devices connect in much the same way as a web browser, except that they have an RF connection into the Internet, in a similar way to WAP phones.

3.0 Command Format

The commands to the CGI scripts are same, regardless of which CGI script is being used. The response content is also identical, except they are presented in the appropriate MIME type (ie. HTML, CHTML or WML). All commands are sent as HTTP requests, and are embedded in the HTML, CHTML or WML source as hyperlinks. Examples of using the command within source text are given in section 4.0.

The format of the CGI commands is shown in Figure 6.

The CGI URL is the URL of the CGI executable file. The question mark is the standard separator between the URL and the command. The Parameter List format is shown in Figure 7. The separator character (SEP) is either a pipe character “|” or a tilde “~”.

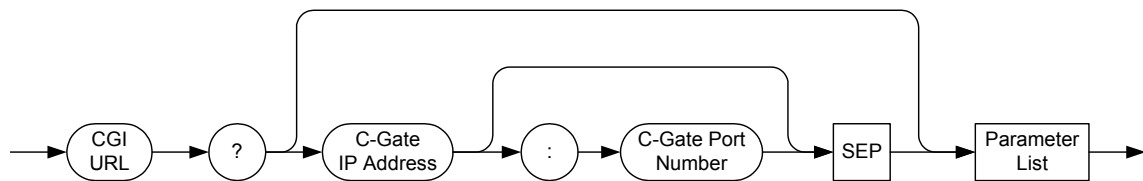


Figure 6 : CGI Command Format

If C-Gate is on the same machine as the CGI, then the C-Gate IP Address and Port Number can be left out. If C-Gate is on a remote machine, the IP Address must be included. In this case, the C-Gate Command Port Number may also be included if it is not the default (20023).

For example to send a command (Parameter List) “abcdef” to the C-Gate CGI at your home (URL mycouse.com) with C-Gate on the same machine as the web server, the format of the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?abcdef
```

To send the command to the web server at your home, but controlling C-Gate on IP Address 1.2.3.4 on the default port, the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?1.2.3.4~abcdef
```

To send the command to the web server at your home, but controlling C-Gate on IP Address 1.2.3.4 and port 5555, the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?1.2.3.4:5555~abcdef
```

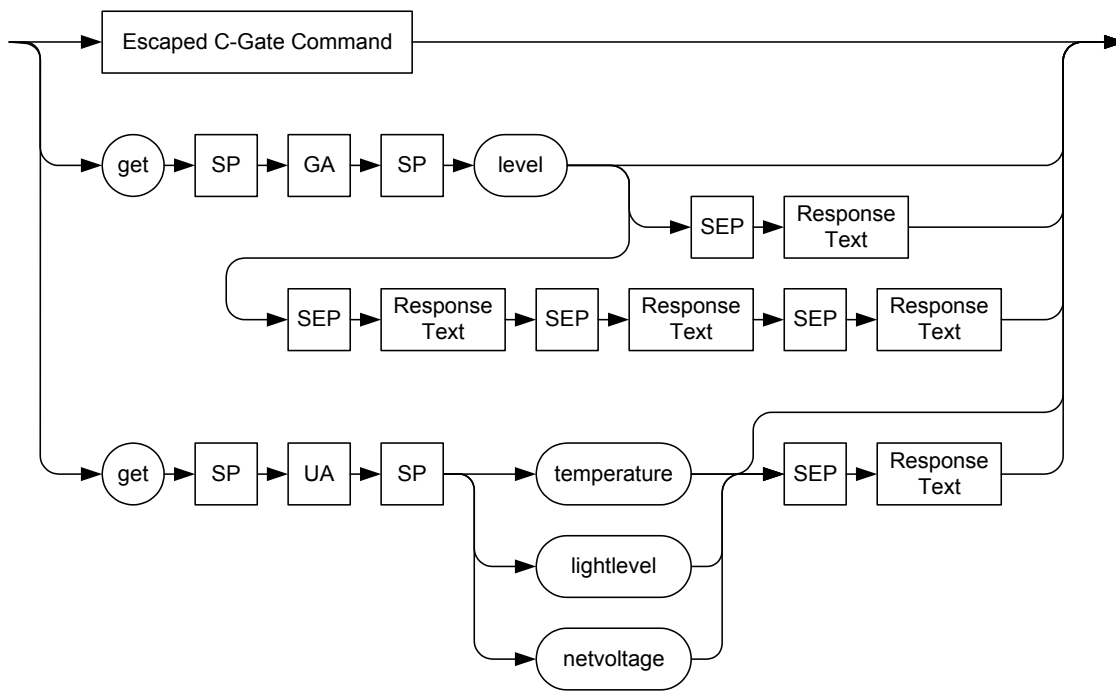


Figure 7 : Parameter List Format

The first part of the Parameter List is a C-Gate command. Following this there are optional parameters providing details of the response format. Each parameter must be separated by a separator character (SEP), which is either a pipe character “|” or a tilde “~”.

There are three basic types of commands that can be executed, as shown in the Parameter List Format syntax diagram.

3.1 Get Level Commands

The C-Gate Get Level commands can be issued to obtain the level of a Group Address. Note that there must be an escaped space (SP) between the word “get”, the Group Address (GA) and the word “level” (see section 1.7). The GA format is the format supported by C-Gate version 1.5 and above as shown in Figure 8.

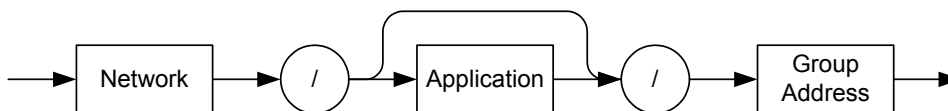


Figure 8 : GA Format

There are two basic formats for the get level command. One returns a simple response and the other returns a response which differs depending on the level. With the version of the command which has three lots of response text, the first response text is returned if the level is 0, the second is returned if the level is 1 – 254 and the third is returned if the level is 255.

The Response Text format is described in Figure 9.

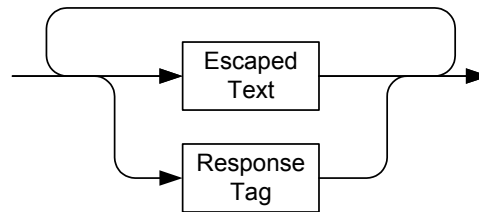


Figure 9 : Response Text Format

The Response Tags shown above are used to embed data into a response. The tags and their use are shown in Table 3.

| Response Tag | C-Gate Command Used With | Data Inserted In Response |
|--------------|--------------------------|---------------------------|
| {level} | Get level | Level (0-255) |
| {percent} | Get level | Level (%) |
| {hex} | Get level | Level (\$00 - \$FF) |
| {tempC} | Get temperature | Temperature in °C |
| {tempF} | Get temperature | Temperature in °F |
| {lightlevel} | Get light level | Light level in lux |
| {voltage} | Get netvoltage | Voltage |

Table 3 : Response Tags

For example, to get the level of group address 20 on the lighting application and return the level as a percent, the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?get_1//20_level~Level_={percent}
```

If the level was 50%, then the returned text would be :

```
Level = 50%
```

If group address 20 is the kitchen light, and you want to return a more meaningful response, the command could be :

```
http://myhouse.com/scripts/CGateCGI.exe?get_1//20_level~Kitchen_Off~Kitchen_={percent}~Kitchen_On
```

In this case, if the light was off the response would be :

```
Kitchen Off
```

If the light was at 50%, the response would be :

```
Kitchen = 50%
```

If the light was on (100%), the response would be :

```
Kitchen On
```

Note that if there is no Response Text included, it is equivalent to having a Response Text of "Level_={percent}".

3.2 Get Physical Parameter Commands

To obtain a physical parameter, such as the temperature or a light level, the command format is very similar to the command to get the levels, except that unit addresses (UA) are used as shown in Figure 10, and the parameter type has to be specified. It is important to ensure that any Response Tags in the Response Text match up with the type of data being requested.

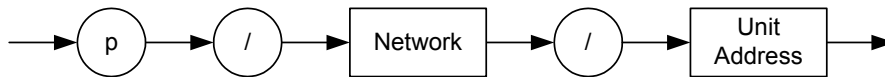


Figure 10 : UA Format

For example, to read the temperature from Unit Address 9 and display in degrees Centigrade, the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?get_p/1/9_temperature~House_
Temperature_={tempC}
```

If the temperature was 25C, the text returned would be :

```
House Temperature = 25.0C
```

Note that if there is no Response Text included, it is equivalent to “Temperature = {tempC}”, “Light Level = {lightlevel}” or “Voltage = {voltage}” depending upon which type of data was requested.

3.3 General-Purpose Commands

Any other C-Gate command can also be sent as escaped text (see section 1.7). For example, to switch on Group Address 20 on application 56, the command would be :

```
http://myhouse.com/scripts/CGateCGI.exe?on_1/56/20
```

The response returned will be the C-Gate reply. In the above case, this will be :

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

If the C-Gate command returns multiple lines of text, the response will contain just the first line.

See the C-Gate documentation for more details.

4.0 Using the CGI Commands

To use the CGI commands, they are generally embedded in HTML, CHTML or WML documents. Examples of their use are given in the following sections.

4.1 HTML / CHTML

To embed the CGI commands in a HTML or CHTML document, the commands are placed in an HREF tag. For example, to have the text "Kitchen Light On" displayed as a hyperlink with the command switching on Group Address 20, the HTML text would be :

```
<A HREF="scripts/CGateCGI.exe?on_1//20">Kitchen Light On</A>
```

Note that the URL is a relative link to the scripts folder which contains the CGateCGI.exe file (see section 0).

A more complex example to return the state of the kitchen light would be :

```
<A HREF="scripts/CGateCGI.exe?127.0.0.1~get_1//20_level~
Kitchen_is_off~Kitchen_is_at_{percent}~Kitchen_is_on">
Get Kitchen Light State</A>
```

A complete example of an HTML page is :

```
<HTML>
<HEAD>
<META HTTP-EQUIV="Content-Type" CONTENT="text/html; charset=windows-
1252">
<TITLE>HTML Test Page for use with Web Browser</TITLE>
</HEAD>
<P>C-Bus Test Page for Web Browser.</P>
<P><A HREF="scripts/CGateCGI.exe?on_1//20">Kitchen ON</A></P>
<P><A HREF="scripts/CGateCGI.exe?off_1//20">Kitchen OFF</A></P>
<P><A HREF="scripts/CGateCGI.exe?ramp_1//20_127_0">Kitchen
50%</A></P>
<P><A HREF="scripts/CGateCGI.exe?get_1//20_level~Kitchen_is_off~
Kitchen_is_at_{percent}~Kitchen_is_on">Get Kitchen Level</A></P>
</BODY>
</HTML>
```

The web page will look like that shown in Figure 11.

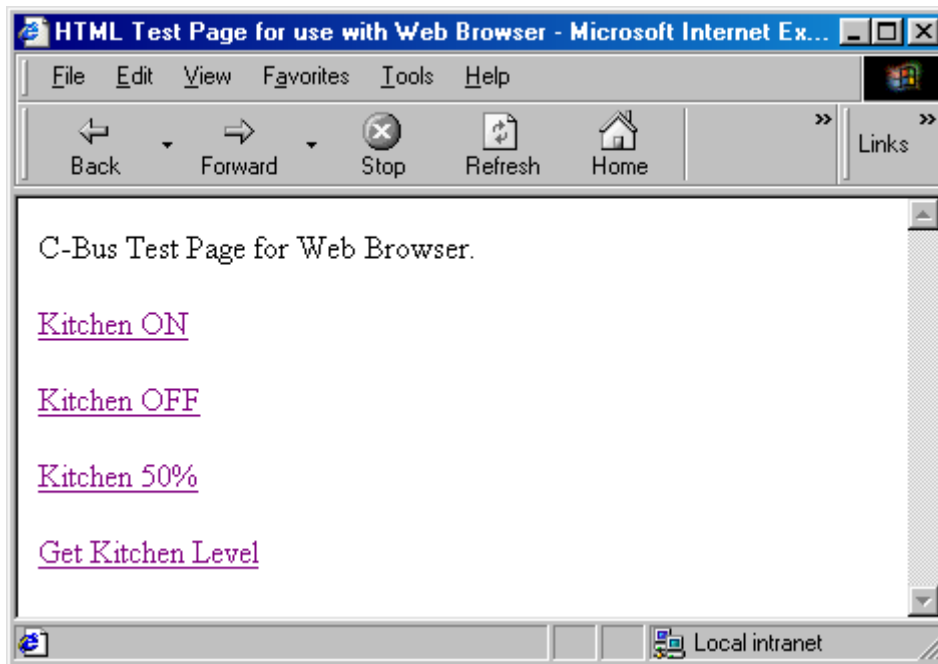


Figure 11 : Example HTML File

An HTML page will be returned containing either :

- The response requested;
- A message saying that C-Gate could not be found;
- A message saying that there was no response from the network; or
- A message saying that there was an error in the format of the command.

A typical response will look like that shown in Figure 12.

To return to the previous page, click on the Back button.

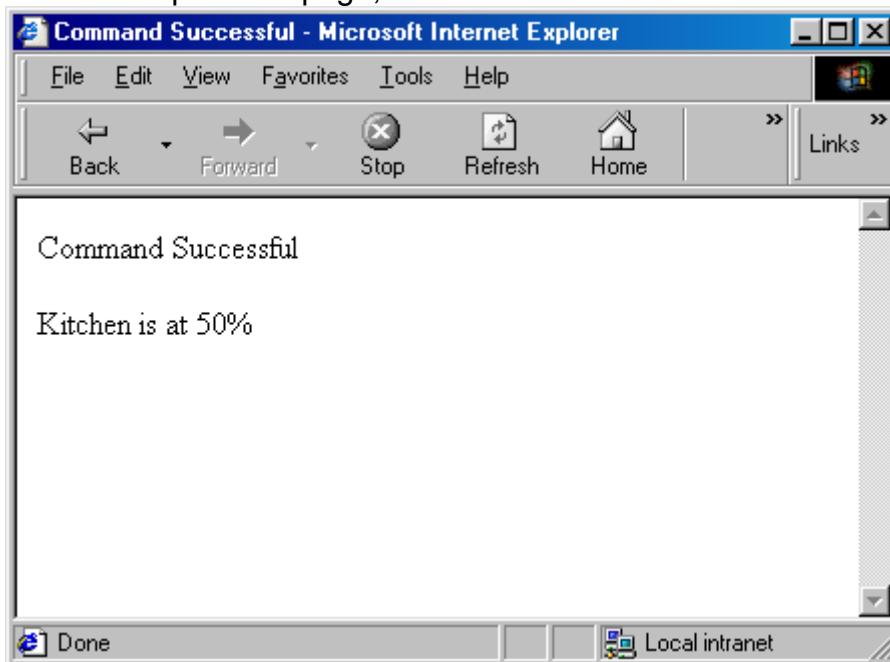


Figure 12 : Command Response

4.2 WML

The use of C-Gate commands from WML is the same as for HTML, except that the commands are written in WML and the response is a WML card. An example of a WML card is shown below. It allows the user to switch on or off Group Address 20, or to get the level.

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.1//EN"
"http://www.wapforum.org/DTD/wml_1.1.xml">
<wml>
  <card id="init" title="WAP C-Bus Test" newcontext="false"
ordered="true">
    <do type="options" label="on">
      <go href="/scripts/wapcgi.exe?on_1//20"/>
    </do>
    <do type="options" label="off">
      <go href="/scripts/wapcgi.exe?off_1//20"/>
    </do>
    <do type="options" label="get level">
      <go href="/scripts/wapcgi.exe?get_1//20_level"/>
    </do>
  </card>
</wml>
```

When displayed on a phone this will look something like that in Figure 13. The exact appearance will depend on the type of phone.



Figure 13 : WAP Phone Card

The response will look something like Figure 14.



Figure 14 : WAP Response

4.3 Command-Line Usage

The CGIs can also be executed from the command-line passing in the Parameter List as a command-line parameter. This is primarily used for debugging purposes, but can also be of use if you want to have a desktop icon that executes a particular C-Gate command.

For example, to switch on Group Address 20 from the command-line, the command would be :

CGateCGI.exe on_1/56/20

This can be executed in several ways :

- From a DOS prompt
- By clicking on Start, then Run, then entering the command
- By placing a short-cut to the CGI on the desktop. Right click on it and select properties. Enter the Parameter List.

5.0 SYSTEM CONFIGURATION

5.1 Web Server

This section is not intended to provide intricate detail about setting up your web server, since there are considerable variations between the different types. It just provides some general guidelines.

5.1.1 Directory Structure

Place any CGI files in the scripts directory. This is not compulsory, but is standard practice.

All other files can be placed in other directories as required.

5.1.2 Directory Options

The scripts directory properties need to be set to allow the running of executable files.

All other directories need to have read access enabled.

5.1.3 Security

The CGI scripts provided do not provide any degree of security.

It is up to the user to utilise security features in C-Gate and/or a firewall or other mechanisms to provide adequate security.

5.2 WAP Set-up

5.2.1 MIME types

Windows has to be set up to respond to the necessary MIME types (double click "my computer", select view | Folder Options, select "File Types" and click "New Type" to add the new types) :

- WML is "text/vnd.wap.wml"
- WMLScript is "text/vnd.wap.wmlscript"
- Compiled WML is "application/vnd.wap.wmlc"
- Compiled WMLScript is "application/vnd.wap.wmlscriptc"
- WAP Images (WBMP format) are "image/vnd.wap.wbmp"

In the Windows ME and Windows NT environments these new types can be added by selecting Windows Explorer and choosing the Tools | Folder Options menu selection. Choose the File Types tab and proceed as above.

5.2.2 WAP Server

If you are using dial-in modem access for a WAP phone, you will need to have a WAP server running on your PC. Refer to the WAP Server product documentation for more details.