

**HOST LINKS**



***Ggate***

**TM**

***Transparent  
Gateway to Bull  
Mainframes***

<http://www.gar.no/hostlinks/>



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# Host Links Ggate

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## Installation

The G&R emulations and gateways are independent programs, but part of the *G&R Host Links* product set available on all major UNIX/Linux platforms. Many of the products are also available for Windows servers. For details on platforms supported, software delivery and installation refer to the *Host Links Installation and Configuration* manual.

## Host Links product overview

### Terminal environment

Host links products that run on UNIX or Linux servers with a terminal driven user interface include emulators and concentrators, as well as various utilities.

- **G3270** provides synchronous IBM3270 functionality. G3270 emulates IBM LU type 2, including base and extended colour together with extended highlighting.
- **Qsim** provides synchronous Questar terminal functionality. Qsim simulates all Questar models, including the DKU7007, DKU7107, DKU7105 and DKU7211 (Mono, four colour A/B and seven colour modes are supported). It also simulates the VIP7760 and the VIP7700.
- **V78sim** provides Bull VIP78xx (BDS) functionality. V78sim emulates all models of the VIP7800 family; the actual reference is the BDS7. All visual attributes including colour are supported.
- **Pthru** provides transparent VIP7800 visibility to Bull mainframes for users with asynchronous VIP7800 terminals or emulators. The terminals are used in text or forms mode.

### Server environment

Host Links products that run on UNIX, Linux or Windows servers.

- **Ggate** is a transparent gateway to the Bull native network. It is uniquely scalable in that it runs on UNIX/Linux and Windows servers. It avoids all need for Front-ends (MainWay/Datanet) or other gateways. It can be used to connect clients running G&R/Glink (for Windows or Java) emulators or any of the terminal emulators, terminal concentrators, network printer emulators and file transfer clients/servers in the Host Links product set. It also supports connections from third party clients using the Bull TNVIP and standard asynchronous Telnet protocols.
- **Gweb** provides a web browser interface to any host application that is otherwise accessible using the *Host Links Qsim, V78sim, or G3270* emulations.
- **Gspool** is designed to run as an unattended process and accept transparent print output from any type of host application (GCOS8, GCOS7, GCOS6, IBM) that normally sends print data to network printers (ROPs), or to a remote spooling system (DPF8-DS). On the Gspool system the print may be directed to a physical printer or to the local spooling system. Gspool operates in different modes, Connect mode, Terminal Writer mode, DPF8 mode, SNM mode, IBM mode, TN3270 mode and TN3270E mode.
- **GUFT** is an implementation of the Bull UFT file transfer protocols. These protocols enable transfer of data files between heterogeneous systems. The systems must be interconnected in a DSA/OSI network running over a private or public X25 network or over a local area network (LAN).
- **Gproxy** is a network management program used for supervision, management, load balancing and license sharing of G&R *Host Links* applications. *Gproxy* can be set up as a freestanding monitor program and/or report generator in a small network, or play a bigger role in a larger network.



## Scope of the product

G&R/Ggate is a transparent gateway to the Bull native network. It is uniquely scalable in that it runs on UNIX/Linux and Windows servers. It avoids all need for Front-ends (MainWay/Datanet) or other gateways. It can be used to connect clients running *G&R/Glink* (for Windows or Java) emulators or any of the terminal emulators, terminal concentrators, network printer emulators and file transfer clients/servers in the *Host Links* product set. It also supports connections from third party clients using the Bull TNVIP and standard asynchronous Telnet protocols.

The native Ggate protocol moves all terminal handling down to the local *Glink* workstation or *Host Links* client, giving the client native Bull network functionality for all GCOS connection modes, including DAC, DACQ and CXI for GCOS8 and native Bull mode for GCOS7. The client can set all network parameters (user, password, billing, etc.).

The TCP/IP-connected client has native Bull network functionality, even if the mainframe requires OSI transport and OSI/DSA session layers. Ggate makes it possible to centralize these expensive, and often hard to configure pieces of software, by running Ggate gateways close to the Bull mainframes.

If the Bull mainframes have support for native Bull network connections over TCP/IP (RFC1006) then Ggate gateways can be spread anywhere in the TCP/IP network.

For native Ggate clients no configuration is needed on a Ggate platform beyond the GCOS mainframes available in the native network. TNVIP and Telnet clients generally require that more configuration work be done in Ggate. Communication from Ggate client to Ggate gateway is most efficiently done utilizing the well-proven G&R native Ggate protocol, but third party (non-G&R) emulators and other clients can use Bull's TNVIP or standard Telnet protocols.

Ggate optionally supports the Secure Sockets Layer (SSL) protocol between Ggate clients (native, TNVIP and Telnet) and Ggate.

## Ggate

Ggate is designed to run as a daemon (background) process under UNIX/Linux or as a Windows server service. It enables TCP/IP connected clients to connect directly to Bull (and IBM) mainframes through the native Bull network, without logging in to the Ggate platform. The Ggate system is not visible to the user, and the UNIX/Linux Operating System license does not need to include these users. If the system is only used for Ggate and other background processes (*Gspool* etc.), a single user license is sufficient. You may view the Ggate system as a commodity server providing native Bull network services.

An internal copy of Ggate is included as a standard component of the GCOS8 GNSP, and is an optional component of GCOS7 Diane systems.

## Run-time licenses

In order to run Ggate, the following license keys must be present in your `licenses` file:

<code>basic</code>	For the base G&R run-time system
<code>ggate</code>	For Ggate

If SSL is used, you also need the following license key:

<code>ssl</code>	For the SSL versions of the DSA/DIWS line handler
------------------	---

If TNVIP/Telnet is used, you also need the following license keys:

<code>tnvip</code>	For use of TNVIP (RFC1921)
<code>telnet</code>	For use of Telnet (RFC854 and subsequent)

The licenses file is located:

<b>Windows Server</b>	<code>\gar\config\licenses</code>
<b>UNIX/Linux</b>	<code>/usr/gar/config/licenses</code>

# Network connections

DSA connections can be made in the traditional way using OSI-transport, which is a requirement when connecting via old-style Datanets. The Bull systems can be accessed over an X.25 WAN or Ethernet LAN through a Datanet or MainWay front-end. Alternatively access can be direct to GCOS6 using a LAN adapter or direct to GCOS7 using ISL. Access can be by an FDDI LAN direct to GCOS7 using FCP7 or direct to GCOS8 using FCP8 (both support OSI-transport).

DSA connections can also be made over a TCP/IP network, using the Internet standard RFC1006 transport protocol to replace OSI-transport. MainWay front-ends with an ONP (Open Network Processor) have RFC1006 support in the standard product, allowing DSA sessions over TCP/IP into the MainWay. RFC1006 can also be installed in the FCP7 and FCP8 cards to support DSA connections direct to the mainframes without passing through the front-end. The GNSP of newer GCOS8 systems and the Open System personality of GCOS7 Diane systems both support RFC1006 connections.

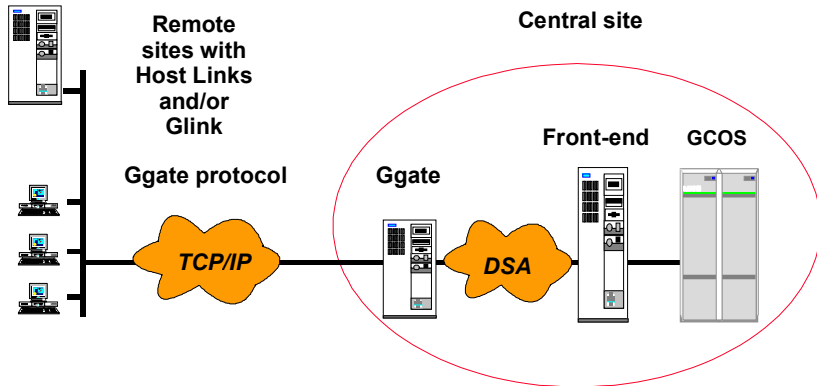
The *G&R/Ggate* product off-loads the DSA session protocol into gateways. By running Ggate on the system(s) with the mainframe connections the emulator platforms need only the very small and efficient Ggate protocol layer to connect over TCP/IP to a Ggate gateway with full native Bull network functionality. Ggate can make the mainframe connection using OSI-transport or RFC1006. If you must use OSI-transport for the mainframe connection, using Ggate will limit the need for OSI-stacks to the Ggate platforms.

The *Host Links Installation and Configuration* manuals cover the OSI stack installation and setup for the supported UNIX and Windows server systems.

Bull systems can be accessed using Telnet or Telnet VIP (TNVIP) to connect to a Bull front-end. However, Ggate with RFC1006 increases throughput as compared to these gateways. Ggate also gives a real, fully functional DSA session over the TCP/IP network, as compared to the limited terminal session offered by TNVIP. Third-party clients with only Telnet/TNVIP protocol can connect via Ggate, which supports these protocols on the client side.

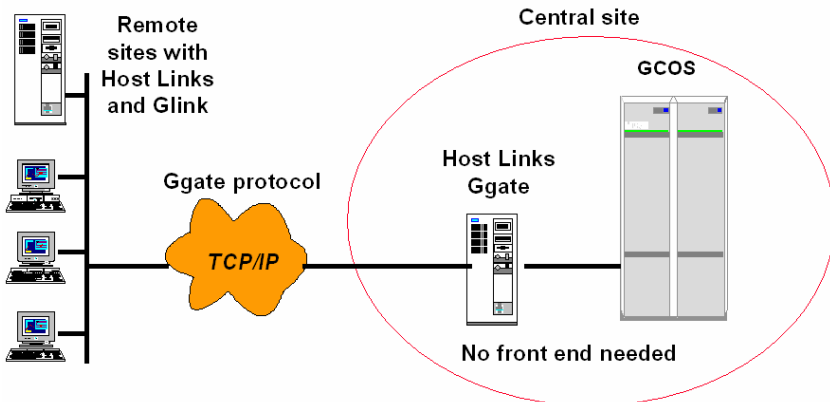
# Network components overview

## Older GCOS systems with Datanet/MainWay front-end



Ggate protocol gives DSA functionality over a TCP/IP network  
Ggate protocol records map 1-1 to DSA protocol records  
OSI-transport is needed only for the central site

## Newer GCOS systems with no front-end



- Ggate protocol gives 'simplified DSA' over a TCP/IP network
- Ggate connects directly to GCOS8 GNSP
- Ggate connects directly to GCOS7 Diane systems

# Mode of operation

---

The `gg_tcp` program automatically places itself in the background, and listens for incoming TCP connections to the listeners enabled in the Ggate configuration. Note that the listener for native clients is enabled by default on port 7879 (decimal 30841). Telnet and TNVIP listeners must be enabled specifically. Listeners for secure communications using SSL for encryption must also be enabled specifically.

You can override default port numbers, but if you do then the port must be explicitly configured in the client setup.

If you are using the *Gproxy* network administration program to load balance a configuration consisting of several Ggate systems, then *Gproxy* will take over Ggate's default port number and Ggate **must** be configured to use a different port. The connection request from the client (e.g. *Glink*) will in that case be received by *Gproxy* and redirected to the Ggate system with the lowest load. For a detailed description of *Gproxy*, see the *Gproxy Network Manager & SNMP Proxy Agent* manual. See also the section entitled ***Fail-safe networks with Gproxy***.

# Ggate for UNIX/Linux

## Starting Ggate

You start Ggate by running the program `gg_tcp`. You can do it manually, but typically you should set it up such that the command is run each time the server system boots. Note that because the `gg_tcp` program forks a new process for each connection, it needs to be run by a user ID that has privileges to fork very many processes. Typically this means running `gg_tcp` as `root` and not as the *Host Links* administrator user ID.

On systems running AIX or HP-UX you can do that by starting it directly from `/etc/inittab`, by placing a line like this at the end of the file:

```
gg_tcp:2:once:/usr/gar/bin/gg_tcp
```

On other UNIX or Linux systems you can create a shell script called for instance `S99ggate` with the content below, and place it in the `/etc/rc2.d` directory:

```
/usr/gar/bin/gg_tcp
```

## Architecture

When `gg_tcp` receives a connection, it starts a new process and runs the `gl_dsa` line handler in it. One of the parameters to this program is the IP-address of the client. You can list program parameters and other process information (e.g. using the `ps` command), so you can identify the current Ggate users. Information about the Ggate client connections can be found in Ggate's log file, on the `Gmanager` screen or in several monitor displays if you use `Gproxy`.

The `gl_dsa` process handles all communication with the host on behalf of the client for which it was forked.

# Ggate for Windows

## Starting Ggate

Ggate runs as a Windows server service. You start it by instructing *Gservice* to run `gg_tcp.exe`. You can do this manually, from *Gmanager*, but typically you should set it up such that the command is run each time *Gservice* starts.

You configure *Gservice* to launch Ggate every time it starts by placing a line like this in the `gservice.cfg` file:

```
c:\gar\bin32\gg_tcp.exe
```

where `c:\gar` is your Host Links system directory. This can be done using a text editor but it is simpler to use the Gconfig utility, which can be started from *Gmanager*.

## Architecture

When `gg_tcp` receives a connection, it looks for a line module server configured for the requested connection type (DSA/DIWS). If the requested line module server is not running, it returns an error message to the client that attempted the connection. For a description of how to configure and start the line module servers, see the *DSA/DIWS handler on Windows servers* chapter in the *Gline* manual.

Ggate passes the connection parameters to the server, which launches a new thread to run the line handler and handle the session. Information about the Ggate client connections can be found in Ggate's log file, on the *Gmanager* screen or in several monitor displays if you use *Gproxy*.

The `n1_dsa` thread handles all communication with the host on behalf of the client for which it was launched.

# **The Ggate Monitor**

The Windows version of Ggate includes a monitor program, Ggate Monitor. The Ggate monitor program is a Windows GUI program that shows the Host Links administrator all active Ggate users and each user's session attributes in a 'tree-view' style. Ggate maintains the load information in a mapped memory file when you use the Ggate parameter `-MON`. The following user- and session-information is optionally available in the tree-view:

For each user:

- The IP-address of the user
- The station ID of the user
- The UID of the user
- Number of sessions (if session view is disabled)
- Last update time (if session view is disabled)

For each session:

- Session number
- Session thread ID
- Session start time
- Host application (mailbox name)
- IO-count upstream (to host)
- IO-count downstream (from host)
- Last update time
- Gline parameters used to establish the session

Most of the information mentioned above can be enabled/disabled from the View menu. You may want to run with session information disabled and then selectively open the user item when necessary.

The Action menu offers the following:

Refresh

request screen update (to be used if automatic update is disabled).

Send message to user

sends the message to all sessions for the selected user.

Send message to session

sends the message only to the selected session.

Send message to all

sends the message to all users and sessions.



## Kill user

send request to Ggate to terminate all the sessions belonging to the selected user.

## Kill session

send request to Ggate to terminate the selected session.

## Save Data as

generate a hard copy of the current User and session information to specified file.

The Option menu offers the following:

## Screen refreshing

Choose between manual refresh, automatic refresh each time a Ggate event occurs and periodic refresh with a configurable number of seconds between each.

## Update warning

if you want Gate Monitor to warn you when/if Ggate is not updating the load information.

## Sort users

sort users alphabetically (on IP-address).

## Toggle IP address format

toggle host IP address between symbolic and numeric format.

## Ggate

### **Important Ggate and Gline parameters**

In order to have a high precision level in Ggate Monitor's event reporting, you may want to adjust some Ggate and Gline parameters:

#### **Ggate**

```
-CI n (seconds, default 10).
```

The check interval parameter tells Ggate how often it should update administrative information and e.g. detect and clean up sessions that have been terminated.

#### **Gline**

```
-IOC n (seconds, no default)
```

This parameter is necessary in order to see communication IO counts (i.e. host messages sent or received) in Ggate Monitor. The parameter can be configured as part of the resource/coname used for the connection or set as additional parameters in Glink's host communication dialog box. If you want to see the IO counts for all client connections, you could tell Ggate to supply the `-IOC` parameter automatically by means of the Ggate parameter `-CPARA` as show in the example here:

```
gg_tcp.exe .... -mon -ci 5 '-cpara "-ioc 10"'
```

In this case Ggate will look for terminated sessions every 5 seconds and the Ggate line handlers will update IO counts every 10 seconds.

# Network configuration

---

Ggate requires no specific network configuration files. The only file you need to set up is `dsa.cfg` plus possibly configuration files specific to your OSI transport provider. These configuration files are shared between all *Host Links* applications that utilize the DSA/DIWS line handler. The `dsa.cfg` configuration file is described in the *Gline* manual. Transport provider specific configuration details can be found in the ***Installation and Configuration*** manual. The only required configuration elements are the remote nodes in your native Bull network.

Ggate by default lets its native clients e.g. *Glink* configure all Bull DSA network parameters such as user, password, node, mailbox, billing etc.

Optionally you may configure some or all of the DSA parameters centrally in `dsa.cfg` on the Ggate system. If you use TNVIP or Telnet clients then you will need to configure more of the DSA session parameters. It is possible to enforce access through the centrally defined configuration only, and to selectively block access to certain hosts, applications etc. This is again configured in the `dsa.cfg` file and is described in the *Gline* manual.

Finally a set of Ggate command line parameters allows the administrator to dynamically change some or all parameters set in the client configuration. When used, they will apply for all client connections. Parameters can be appended to those supplied by the client - allowing the administrator to override client settings, parameters can be inserted before those supplied by the client - allowing client parameters to override, or parameters can completely replace all parameters supplied by the client. In that all command line parameters can be given to Ggate interactively after startup (using the *Gmanager* operator interface), this is a very powerful and flexible feature that can be used e.g. in case of temporary configuration changes on the host side.

Configuration of Ggate clients is explained in detail in the section entitled ***Client configuration***.

## DSA configuration example

```

# This file configures the DSA network.
# The Gline configuration compiler, glcc, must be run to
# activate any changes made here.
#
# Your local DSA RFC1006 node name is 'mypc'.
# You want to connect with remote DSA RFC1006 node name 'ph21'
# that has IP address 1.2.3.4 and 'ka01' that has 5.6.7.8

# mypc needs a dsa200 address when connecting to GCOS7

sc mypc -addr 05:44

#Remote node GCOS8 ph21

rsc ph21 -ts ph21_rfc
ts ph21_rfc -class 0 -ns 1.2.3.4 -tp rfc

#Remote node GCOS7 ka01 needs a dsa 200 address

rsc ka01 -addr 176:072 -ts ka01_rfc
ts ka01_rfc -class 0 -ns 5.6.7.8 -tp rfc

tp rfc -who gar

# You want to use a coname 'tp8ws2' to access TP8
# that references a pool of mailbox extensions so it
# can be shared by a group of users.

coname tp8ws2 -desc "TP8 workstation 2" -pool lidpool
-dn ph21 -da tpws2mbx -hm dps8

pool lidpool
-dx mg01
-dx mg02
-dx mg03
-dx mg04

# conames are also used for configuration of merged print,
# where data from a separate print session is merged into the
# terminal session, marked as print data.

# Merged print from Twriter on GCOS7. Use -pco to get a printer
# The printer coname must wait for a connect from Twriter to
# the printer mailbox mypctw
#
coname mytlds -desc "TDS on GCOS7"
-dn ka01_rfc -da tdsmbx -hm dps7 -pco a2_print

coname a2_print -desc "Twriter print to MYPCTW"
-ln -mn mypctw -tm a2

```

# Gateway configuration

---

In most cases you start `gg_tcp` without any options for native Ggate clients. If you are using SSL to secure the client network, or have TNVIP or Telnet clients you will need to initiate the listeners for these protocols. If you are using the *Gproxy* network administration program to load balance a configuration consisting of several Ggate systems, then *Gproxy* will take over Ggate's default port number and Ggate **must** be configured to use a different port.

You can configure ports using the Ggate command line options e.g.:

```
gg_tcp -gga 30843
```

If you start the listeners with no port (`-tel`, `-tnv`) you can specify the ports in the `services` file, in directory:

<b>Windows server</b>	<code>%SystemRoot%\System32\Drivers\Etc</code>
<b>UNIX/Linux</b>	<code>/etc</code>

If you wanted to use port number 30843 for native client connections, this file would contain a line:

```
ggate      30843/tcp
```

The list of listeners you can configure in the `services` file is:

<b>Listener</b>	<b>default</b>	<b>parameter in Ggate</b>
<code>ggate</code>	<code>30841/tcp</code>	<code># -gga (default on)</code>
<code>ggate-ssl</code>	<code>30851/tcp</code>	<code># -ggassl</code>
<code>ggate-telnet</code>	<code>23/tcp</code>	<code># -tel</code>
<code>ggate-telnet-ssl</code>	<code>992/tcp</code>	<code># -telssl</code>
<code>ggate-tnvip</code>	<code>7323/tcp</code>	<code># -tnv</code>
<code>ggate-tnvip-ssl</code>	<code>7325/tcp</code>	<code># -tnvssl</code>

Specifying the ports in this way makes them visible to utilities such as the `netstat -a` command by listener name, rather than just a port number.

## Command line options

Option	Option value	Explanation
-ba	on/OFF	Banalize. Use the default TNVIP resource for clients using a non-existent resource
-ci	n/10	Number of seconds between <i>Gproxy</i> statistics. Must be less than the Gproxy Check interval timer. Default = 10 seconds
-cna	Up to 4 IP addresses (space separated)	Generate -na parameter for all client connection (client will send session information to given IP addresses)
-cnb	on/OFF	Generate -nb parameter for all client connections (client will broadcast session information)
-coi	ON/off	CONAME list information for Glink
-cpara	Parameter(s)	Append given parameter(s) to parameters supplied by the client
-cpari	Parameter(s)	Insert given parameters(s) before parameters given by the client
-cparr	Parameter(s)	Replace all client parameters by parameter(s) given here
-dbg	ON/off	Write debugging information to the debug file ( <i>gga.dbg</i> ) in the debug directory
-gga	off port port port port	Default on, port 30841. Can be turned off Or list of up to four space separated ports
-ggassl	port port port port	Without port gives default port 30851 Or list of up to four space separated ports
-idt	guid/ip/ANY	Type of user/client identifier. <i>guid</i> is a unique identifier generated by G&R clients. The IP-address option is often not useful because the client's IP address may be generated dynamically by a firewall or other network component. The default is 'any'

Option	Option value	Explanation
-k	300	Number of seconds of inactivity before Ggate sends a 'check' packet to the client. Default no checking. If set defaults to 300. Max is 32000
-kl	10	Max number of client session matches for a 'kill all' to be performed. Defaults to 10
-ks	10	Keep-alive 'slack'. The idle time before Ggate disconnects the client is the keep-alive interval of the client, plus this 'slack'.
-na	Up to 4 IP addresses (space separated)	Load balancing information is sent (only) to <i>Gproxy</i> on the IP addresses given here
-nb	on/OFF	Load balancing information is broadcasted to all <i>Gproxy</i> systems. This parameter defaults to ON if a Ggate site limit is set in the license file
-tel	port port port port	Telnet listener. No port defaults to port 23 Or list of up to four space separated ports
-telssl	port port port port	Telnet SSL. No port defaults to 992 Or list of up to four space separated ports
-telbs	ON/off	Backspace support for Telnet clients
-teld	on/OFF	Enable Telnet/TNVIP tracing to: \\gar\debug\telnet.dbg
-telecho	ON/off	Echo for Telnet clients. This is on by default, and starts Telnet negotiation with ECHO and SGA (Suppress Go-Ahead)
-th	Threshold value	This value is passed on to the <i>Gproxy</i> load balancer. The value represents the maximum number of sessions to be handled by this gateway (regardless of the licensed number). Refer to the <i>Gproxy</i> manual for more information
-tnv	port port port port	TNVIP listener. No port defaults to 7323 Or list of up to four space separated ports

## Ggate

Option	Option value	Explanation
-tnvssl	port port port port	TNVIP SSL. No port defaults to 7325 Or list of up to four space separated ports
-tnvsm	on/OFF	Send informative service messages (e.g. "Connected to application") to the client TNVIP application.

### **Examples of Ggate command lines:**

```
gg_tcp -gga 30843 -na h11 h12
```

starts Ggate to listen for client connections on TCP/IP port 30843. Sends load statistics to *Gproxy* executing on IP-addresses h11 and h12.

```
gg_tcp -gga 30843 -na h11 h12 -tnv
```

starts Ggate to listen for client connections on TCP/IP port 30843. Sends load statistics to *Gproxy* executing on IP-addresses h11 and h12. Initiates the listener for TNVIP clients on the default port (7323).

```
gg_tcp -k 60 -cpara '"-da iof -dp ourproject"'
```

starts Ggate using a 60 seconds keep-alive timer on client sessions. Appends the parameters `-da iof` and `-dp ourproject` to all client connections.



## Secure Socket Link parameters

You enable SSL support by adding the SSL parameters to the Ggate command line. A single instance of Ggate can mix non-SSL and SSL operation. On Windows servers it must use the SSL version of the listener. e.g.:

```
nl_dsas
gg_tcp -gga 31111 -ggassl 5555 -tnvssl 7777 -sslcf ggate.pem
```

The name of the file containing the server certificate to be used by Ggate is required. Other SSL parameters are optional.

```
gg_tcp [standard Ggate parameters ...]
  [-sslcf | -SSLCertificateFile] (required)
  [-sslckf | -SSLCertificateKeyFile]
  [-sslckp | -SSLCertificateKeyPass]
  [-sslca | -SSLCaCertificateFile]
  [-sslcap | -SSLCaCertificatePath]
  [-sslv | -SSLVerifyClient]
  [-sslvd | -SSLVerifyDepth]
  [-sslto | -SSLSessionCacheTimeout]
```

SSL parameters are described in separate document entitled *Using SSL for security in G&R products, and Stunnel as a Glink Telnet server* and will not be described further here.



# Gateway usage

---

## Handling defunct client sessions

Defunct sessions occur when a client with active Ggate sessions, e.g. a PC or Macintosh running *Glink*, is switched off or rebooted. If this is not detected Ggate and host resources will be tied up in these defunct sessions. If the host system is of the type that does not allow multiple sessions from the same user the defunct session occupies the one available log-on. This is especially problematic if the host does not have some sort of idle time-out that kills inactive sessions.

The default in Ggate is to depend on the 'keep-alive packets' sent by TCP/IP stacks in order to detect dead peers. This is in many cases not satisfactory because the TCP default keep-alive interval is often as high as two hours, and difficult to adjust. However, if you can reduce the TCP keep-alive interval on the Ggate platform this is the preferred way to deal with the problem.

If the TCP/IP keep-alive default cannot be adjusted `gg_tcp` has a command-line option `-k` for native clients that specifies the number of seconds of inactivity that can pass before Ggate sends a packet to the client to check if it's still there. This is not available for Telnet/TNVIIP clients. Because of the way the TCP retry logic works it can still take a few minutes from when this packet is sent until Ggate is informed by TCP that the connection is dead.

In *Glink* 5.3 and later there is a configuration option in *Glink's* Ggate setup to cause *Glink* to send a 'dummy' packet at least once each configured interval. If Ggate no longer sees the packets arriving it assumes the client has died and terminates the session. This mode of operation overrides the `-k` option.

In *Glink* 5.3 and later there is also a 'kill all' button in the connection menu when using the Ggate protocol. Clicking it sends a command instructing Ggate to terminate all sessions originating from the computer that sent the command. The computer is identified by GUID or IP-address (`-idt`).

## Ggate

If the connection between your Ggate clients and Ggate is not billed per packet or by connect time you can use a keep-alive based setup. There are three different ways to do this, and you should try them in this order:

- Lower the TCP/IP keep-alive interval on the Ggate platform to 30 seconds
- Enable keep-alive packets in *Glink* (Glink specific)
- Use the `gg_tcp -k` option (native clients only, not Telnet/TNVIP)

If you have a WAN between your Ggate clients and Ggate that is billed per packet or by connect time, e.g. a public X.25 or ISDN network, then avoid keep-alive options and instead instruct the *Glink* users to use the 'kill all' function after they reboot their computers. No changes are needed in *Glink* or Ggate in this case. This function is specific to Glink native clients.

When a 'kill all' request is received from a client session, Ggate will try to identify other sessions originated from that client. *Glink* (version 6.1 and onwards) supplies a unique GUID in the initial Ggate 'logon', and in the 'kill all' packet. Ggate can use it to find active sessions originating from the same workstation as the 'kill all'. If the client does not supply a GUID Ggate identifies it by the IP address. In many networks the clients are allocated an IP address dynamically so that the IP-address is of no use as an identifier. In other networks a firewall or other component may allocate all the clients the same IP-address. In these cases you must upgrade Glink and select `-idt guid`. In case many workstations have the same IP-address the kill-all function has a safety limit (default 10), beyond which it will not kill sessions.

## Fail-safe networks with Gproxy

If you need a fault tolerant network configuration with multiple Ggate systems sharing the traffic from native Ggate clients (e.g. *Glink*), you need *Gproxy* for load balancing and license sharing. *Gproxy* is run on the systems to which the Ggate clients connect. When a native client connection request comes in on the default Ggate socket (30841/30851, normal/SSL), *Gproxy* rather than Ggate receives it and sends back a redirect message containing the network address of the Ggate gateway that has reported the lowest 'load factor'. The native client automatically reconnects using the suggested address. This redirection is completely transparent for the user and there is no need to change any configuration parameters on the client side.

Load balancing is based on statistical information distributed by Ggate when started with `-na` or `-nb`. Information can be directed to *Gproxy* on up to 4 given network addresses (`-na`), or to all systems in the network (`-nb`). It is sent out in a UDP record every 10 seconds (default) and contains information about the load.

### Port number for load sharing

In load balancing mode *Gproxy* takes over the TCP/IP port number otherwise used by Ggate to accept client connections. Ggate must be set up to use another port. You can do this by choosing another port number on the Ggate (`gg_tcp`) command line using the `-gga` parameter e.g. if you choose to use port 30843 for Ggate:

```
gg_tcp -nb -gga 30843 -log ...
```

You can also configure the Ggate port in the `services` file in directory:

<b>Windows server</b>	%SystemRoot\System32\Drivers\Etc
<b>UNIX/Linux</b>	/etc

If you wanted to use port number 30843 for Ggate client connection, this file would contain a line such as:

```
ggate 30843/tcp
```

### ***Client configuration for load sharing***

The client configurations are not changed. They are configured to connect to Ggate as before. See chapters on ***Glink/UNIX/Linux client configuration***. The client connects are received by Gproxy, and redirected to the Ggate with the lowest load.

Note that the clients should be configured with an alternate Ggate (Gproxy) address so that if the first they connect to is down, they can still connect to the second. Glink clients have a field for an alternate server in the communications configuration dialog box. UNIX/Linux clients use the `-li dsa` syntax:

```
-li dsa:gateway1/gateway2
```

# Administration with Gmanager

The *Gmanager* program is a tool for monitoring G&R server activity. For an overview of the *Gmanager* program, see the ‘*Host Links Administration*’ appendix.

## Commands accepted from Gmanager

### Standard commands

The commands that are accepted by all servers are:

- DOWN - terminates the server
- STATUS - reports server-specific status information to the log file
- PARAM - brings up a dialog box that allows the operator to give a command line parameter to the server. Note that some parameters do not work when given interactively i.e. they can only be handled at server startup time
- DEBUG ON/OFF - toggles on and off tracing interactively

### Ggate-specific commands

- DISC        disconnects all users
- MSG        followed by text that is broadcasted to all users; no quotes needed
- CPARA     append line parameters after client parameters
- CPARI     insert line parameters before client parameters
- CPARR     replace client line parameters with these parameters

The last three are equivalent to the `-cpara` `-cpari` and `-cparr` command line parameters described in the section *Gateway configuration*.





# Clients

## Glink clients

### Configuration

In the *Settings, Communications, Interface* menu, pick TCP/IP, and then choose *G&R DSA Gateway* or *G&R DIWS Gateway* as the protocol in the *Settings, Communications, Options* menu. In the same menu you may select a pre-configured host profile in the *Host* field, or press the *Hosts* button to see/configure GCOS connection parameters.

**DIWS/DSA host configuration**

Profile name: **tp8v2** Description: TP8 the new demo

Use check mark for interactive prompting

Ggate coname: **tp8v2**  x **OK**

Host application mailbox: garv2  x **Cancel**

Host node: ph8a  x **New**

User ID:  x **Save**

Password:  x **Save as...**

Project:  x **Rename**

Billing:  x **Delete**

Host type: **CXI**  x **Browse...**

Terminal mode: **TXT7801**  x

GRTS/LID user string:  x

Mailbox extension:  x

Local mailbox name:  x

Printer connection name: **bit8prt**  x

Printer connect to host

Additional parameters:  x

Script after connect: **tp8logon.scrpl**  x

## Ggate

You can choose a centrally configured Ggate coname, or manually configure Host application mailbox, Host node, User ID, Password, Project, Billing, Host type, Terminal mode, GRTS/LID user string, Mailbox extension, Local mailbox name, printer connection name, a field where you may supply additional *Ggate/Gline* parameters and a field for a post-connect script procedure.

You can add a description and save the configuration with a profile name. These parameters can later be renamed, modified or deleted.

The option of choosing a Ggate coname allows you to move some of the configuration from Glink to the Ggate system. The Ggate coname corresponds with CONAME as described in the *dsa.cfg* section of the Gline manual. Unless it is suppressed (`-coi OFF`) Ggate will send the Glink client a list of available CONAMES to populate the drop down list, and when one is selected it will send the parameters that are already configured centrally for display in the dialog box. Any parameters you set manually override those set in the CONAME, assuming that you are allowed to do so in the CONAME configuration.

Your profiles are stored in a file *GLHOST.INI* residing in your *Glink* 'user' directory. Any changes you make are stored back to that file when you choose 'Save' from the setup dialog box. Note that if you change parameters for the current host and exit from the dialog box without saving, then the changes will be used for the current session only.

You can share profiles with other users by setting up a second *GLHOST.INI* file in a shared *Glink* directory (the same directory as the *GL.EXE* file) on a file server. Any profiles found in that file will also be available in the setup dialog. Modifications you make to such profiles are stored back to the copy in your own *Glink* 'user' directory and will therefore remain specific to you, assuming you have a private *Glink* 'user' directory. Such modifications are stored by saving only those parameters that differ from the ones specified in the base copy. Subsequent modifications in the base copy of items you have not changed will apply to your copy. You may 'revert' to default values as set in the *Glink* directory simply by blanking the fields in question and re-saving the data. If you need to go back to the default setup for all values use the 'delete' button; this will bring back the original if it still exists.

In a multi-user situation, a system administrator typically sets up a list of the most commonly used host profiles in a private copy of `GLHOST.INI`, testing them as they are set up to ensure that they function correctly. The administrator copies this version of `GLHOST.INI` to the *Glink* directory for shared use after removing parameters such as user IDs and passwords that are user-specific. If an application should at some point in the future be moved to another host, then changing the host name in the *Glink* directory will automatically apply to all users sharing the *Glink* installation.

The `GLHOST.INI` file can be edited with a normal text editor. The format is provided in *Glink* on-line help and in this manual.

## ***glhost.ini* reference**

The `GLHOST.INI` file follows the normal MS-Windows INI file format, with a section header containing a title in square brackets, followed by separate lines for each host that is configured. In other words:

```
[dsa]
HostName1=Parameters for HostName1  -** comment
HostName2=Parameters for HostName2  -** comment
etc
```

`HostName1` and so on are the profile names. The parameters are standard DSA and DIWS parameters as documented in the *Host Links Gline* manual. The parameters corresponding with the fields in the host profile configuration menu are:

<b>Parameter</b>	<b>Host Profile Menu Field</b>
-CO	CONAME to select a central configuration
-DA	Host application mailbox
-DN	Host node
-DU	User ID
-D?	Password
-DP	Project
-DB	Billing
-HM	Host type

Parameter	Host Profile Menu Field
-TM	Terminal mode
-UR	GRTS/LID user string
-DX	Mailbox extension
-MN	Local mailbox name
-PCO	Printer CONAME
-**	Description (comment)

Parameters not in this list may be used as needed and are displayed in the 'additional parameters' field. If you have chosen interactive entry for any of the parameters, this will be marked with a single asterisk (\*) in the parameter for that field.

The description field is not sent to the gateway and has only local significance. It must be the last parameter on the line (this is because it may contain embedded spaces and hyphens).

A typical line in the GLHOST.INI file might therefore look like this:

```
[dsa]
DPS8TSS=-da TSS -dn B8DL -du robertson -d? * -dp garps
-hm DPS8 -tm VIP7804 -** My DPS8 machine
```

## Connecting via a menu of profiles

If you prefer to have a single icon and choose the target host entry each time, or if, for administrative reasons, a group of users are sharing the same *Glink* configuration but might be connecting to different hosts, then you can set up the *Glink* icon for the single configuration but leave the connection name blank in the *Settings, Communications, Options* menu. *Glink* with this configuration displays a list of all configured profiles. The list is constructed by merging the shared GLHOST.INI file from the *Glink* directory with the private version in the *Glink* user directory.

Any attempt to connect (CTRL-F7 or Connect button) will bring up the same connection menu. The connect menu will also be presented whenever CTRL-F6 is pressed in an unconnected state.

## Connecting to a fixed host application

Select the desired host profile by name in the Host field in the *Settings, Communications, Options* menu and save the *Glink* configuration using 'save as' to generate and name a specific configuration file. Make an icon with a *Glink* command line that selects this configuration. *Glink* will connect automatically to that host application whenever *Glink* is started with that icon.

A series of such icons can be produced, each one starting a *Glink* with its own configuration file, with a specific host pre-selected in each configuration.

## Connecting from a script

The `GWCONNECT` script command is used to connect using the DSA or DIWS gateway interface in *Glink*, and will connect using the specified host profile. It takes two parameters, first the symbolic or numeric IP address of the system on which the gateway is running, and second the profile name of the host profile to which the gateway should provide a connection e.g.

You connect to a host profile `DPS8` via a Ggate gateway running on a system with IP address `192.150.211.7` by using:

```
GWCONNECT "192.150.211.7" "DPS8"
```

You connect to profile `DPS7` via the Ggate gateway already in the *Glink* configuration by leaving the IP address blank:

```
GWCONNECT "" "DPS7"
```

You can also specify host connection parameters directly in the `GWCONNECT` script command instead of the profile name:

```
GWCONNECT "" "-DA TSS -DN PH13 -TM VIP7804 -HM DPS8"
```

You select the 'G&R DSA Gateway' interface from a script with the command:

```
SET TCP GWDSA
```

You select the 'G&R DIWS Gateway' interface from a script with the command:

```
SET TCP GWDIWS
```

## **Service messages**

The DSA handlers accept DSA service messages for disconnect `$$$DIS`, break `$$$BRK` (attention, and possibly purge undelivered data, depending on configuration of the host, and/or application), the two attention signals `$$$A1` (attention type 1), `$$$A2` (attention type 2), lower case support `$$$LC ON/off` and identification query `$$$ID`. Additionally there is an extended disconnect `$$$DI [-HOLD/-OFF]`. HOLD leaves any associated printer session connected when you disconnect the screen session. This allows you to disconnect from the application, but leave the printer session connected, or listening for connects, and able to accept print, for example during the night. The default if no parameter is used with `$$$DI` is to disconnect the printer session, but this can be overridden using the Gline `-LO ON/off` parameter in `dsa.cfg`, or as an additional Gline parameter in the Glink/Ggate connection dialog box.

You can type `$$$` messages and transmit them. The line handler will recognize messages starting with `$$$`. Unknown service messages (messages beginning with `$$$` but where the 2-3 following characters are not recognized) will cause an error message. If you need to be able to transmit data messages that start with `$$$` then you can fix Glink (CFIX 2875) to send `$$$` messages as data. The DSA service messages can still be sent using the Local Dialog, which, when you are already connected, displays a menu of service messages.

## G&R/emulators (UNIX/Linux)

The G&R terminal emulators running on UNIX or Linux systems (*Qsim*, *V78sim*, *G3270* and *G5250*) can connect using DSA directly if it is configured, but if not they can also connect via Ggate.

```
-li dsa                                (no Ggate)
-li dsa:gateway[:port]                 (with Ggate)
```

`gateway` is the IP address of the system running Ggate. `:port` defaults to the Ggate port. If there are two gateways the client can be configured to try both e.g. try the default port on `gars`, and then `30843` on `raider`:

```
-li dsa:gars/raider:30843
```

A command line to start the G&R UNIX/Linux DKU emulator might be:

```
qsim -pp qprint -li DSA:ggate -hm dps7
```

## G&R/Gweb clients

*Gweb* is a HTML front-end running on UNIX/Linux or Windows web-server systems that allows browsers to connect to mainframe systems with the appearance of a standard mainframe terminal (DKU, VIP7800, 3270 or 5250). *Gweb* uses the G&R terminal emulations to provide the connectivity, and maps the mainframe screens to HTML on the fly for display on a browser. If the web server on which *Gweb* runs has DSA configured, then *Gweb* can use it directly, otherwise *Gweb* can connect via Ggate.

```
host tp8test
-gweb
-unlock tm
-user
-snd off
-rw 10
-li dsa:ggate.gar.no
-co tp8test
```

## ***TNVIP and Telnet clients***

DSA is the only host protocol supported for these TELNET and TNVIP clients (i.e. the DIWS protocol is not supported).

Telnet is a byte stream protocol with the Telnet commands embedded in the data as escape sequences. Each side must merge its commands into the outgoing stream, and scan the incoming stream looking for Telnet commands. The initial Telnet negotiation decides the mode of the connection, and the standard Telnet rules apply, except that the Ggate `-telecho` parameter is default ON to start negotiation with Echo and Suppress Go-Ahead for compatibility with the MainWay Telnet server. Setting it OFF starts negotiation with standard Telnet 'old line mode' i.e. no Echo and Go-Ahead. Echo and Suppress Go-Ahead are tied together during negotiation as in the MainWay; setting or resetting Echo sets or resets Suppress Go-Ahead.

TNVIP is basically the Telnet byte scanning protocol, with options that help overcome some of the disadvantages of using a byte-stream oriented protocol, designed for dumb echo mode terminals, to control an intelligent block mode terminal device.

We have implemented the TNVIP and Telnet server-side protocol in Ggate in order to support customers with third-party emulators or communications applications that are dependent on the TNVIP/Telnet protocol. You initiate the TNVIP/Telnet listeners in Ggate with the Ggate parameters:

```
-tnv on/port number [port number]
-tel on/port number [port number]
```

### ***Port number***

The default port for TNVIP is 7323. For Telnet it is 23. You can override the defaults by specifying the port number in the `-tnv` and `-tel` commands. You can specify multiple ports for each of the protocols. Up to four ports can be specified, space separated.



## **Terminal type**

Terminal type is mapped by Ggate to the Sender Identifier seen by GCOS applications. It is important to define the correct terminal type in order for the application to generate suitable dialog. This is critical when using forms mode applications, where the control sequences defining a form are specific to a terminal type.

### **TNVIP**

TNVIP clients must specify a terminal type known to TNVIP in the TNVIP configuration of the client. It is used in the Telnet negotiation during connect as the Telnet terminal type, and is combined with the resource name if configured:

```
VIP7814@MYRESOURCE
```

### **Telnet**

Telnet clients can use any terminal type in the Telnet terminal type response. If Ggate recognizes the terminal type as a GCOS type, the local dialog will adapt to use the terminal features and it will be used as the terminal type in the GCOS connection. Otherwise a TTY type dialog is forced, and the terminal type will be taken from the local dialog \$\$ 4200 or CONAME.

### **Terminal type in Telnet as CONAME**

When a Telnet client connects, by default Ggate looks for CONAME TELNET. If it is not found, Ggate will issue a \$\$ 4700 prompt, and use the reply as a CONAME.

Ggate/Telnet clients can configure a terminal type, which can be delivered to the Ggate Telnet server during Telnet negotiation (Telnet 0x18 terminal type, RFC1091). If Ggate/Telnet does not recognize the terminal type it looks for a CONAME/RESOURCE of the same name. If found it is used to establish the session. This allows you to set Gline parameters and Terminal manager dialog specific to a Telnet client identified by a pseudo 'terminal type'.

## **Resource in TNVIP as CONAME**

Ggate TNVIP clients can configure a resource name, and this is interpreted as a CONAME in `dsa.cfg`. You can use RESOURCE as an alternative to CONAME in `dsa.cfg`; they are synonymous. The CONAME/RESOURCE must be preconfigured to connect the user to a specific GCOS application. A RESOURCE can be shared by many users using POOLS for LID, USERID, BILLING, PROJECT as needed, or using local dialog in order to obtain the connection parameters. The Ggate administrator can configure a default CONAME with the name TNVIP. Clients can use TNVIP specifically as a resource, but if the Ggate banalize parameter (`-ba`) is set TNVIP clients that specify no resource, or a non-existent resource, are allocated the default TNVIP resource.

## **Line parameters for Telnet/TNVIP**

The CONAME or RESOURCE used by a TNVIP or Telnet client can be configured with any legal Gline parameters to establish the desired mainframe connection. There are two Gline parameters that might be of special interest for these clients.

### **The `-TELBS` parameter**

This parameter is only applicable to Ggate connections, where Ggate is acting as a Telnet server for asynchronous terminals. It causes the Ggate/Telnet terminal manager to interpret Backspace (0x08) as an editing command that cancels the preceding byte.

### **The `-TELECHO` parameter**

This parameter is only applicable to Ggate connections, where Ggate is acting as a Telnet server for asynchronous terminals. It is default ON to start negotiation with echo and Suppress Go-Ahead for compatibility with the MainWay Telnet server. Setting it OFF starts negotiation with standard Telnet 'old line mode' i.e. no echo and Go-Ahead. Echo and Suppress Go-Ahead are tied together during negotiation as in the MainWay; setting or resetting Echo sets or resets Suppress Go-Ahead.

## ***The -E8 parameter***

This parameter can be used to override the Gline default, which is to allow 8 bit bytes on the communication line. A number of mainframe applications were developed in a period when communications were restricted to 7 bit characters (the eighth bit being used for parity, and stripped by the terminal). These applications sometimes set the eighth bit, but work because the terminals stripped it. Setting `-E8 off` will give the same effect for Gline connections.

## ***Line parameters in resource***

Gline parameters can be delivered via the 'Resource' mechanism. A string of parameters enclosed in quotes can be entered in the 'resource' field of the emulator's TNVIP configuration, and if they are correctly delivered to Ggate, these can be used to configure the connection. Most third party emulators do not have a large enough resource field to make this useful e.g.:

```
Resource: "-dn ph8a -da garv2 -tm dku7107"
```

## ***Local dialog***

Ggate supports three styles of local dialog. These can be forced in `dsa.cfg` by setting the `-TYPE` parameter for the `CONAME/RESOURCE`:

`-TYPE` is an optional identifier:

`AUTO/MENU/TM` are used to specify TNVIP/Telnet dialog style for TNVIP/Telnet clients. Auto gives no local dialog. Menu displays the Gline parameters in a formatted screen for terminal types supporting formatted screens. TM gives a 'Terminal Manager' style dialog with prompts and replies.

## ***AUTO***

TNVIP clients default to the menu style (see below). If the configuration is complete, and you want an immediate connection with no display of the parameters you must force `AUTO` e.g.:

```
RESOURCE autosample -type auto
-dn BE01 -da iof -hm dps7 -du jim -pw jimpsw -pcn jimprt
```

## Menu

This is the default style and results in a formatted connection screen being sent to the client. The form contains the following fields:

```
User ID:  
Password:  
Project:  
Billing:  
Host Mailbox:  
Host Node:  
Host Type:  
Local Mailbox:  
Mailbox extension:  
User string:  
Printer resource name:  
Printer mode (Listen/Connect):
```

A RESOURCE configured as follows:

```
RESOURCE menusample -type menu  
-dn +BE01 -da +iof -hm dps7 -du usern -pw *mustdo -pcn myprt
```

results in the following form:

```
User ID: usern  
Password: xxxxxx      1  
Project:  
Billing:  
Host Mailbox: iof     2  
Host Node: be01      2  
Host Type: 7  
Local Mailbox:  
Mailbox extension:  
User string:  
Printer resource name: myprt  
Printer mode (Listen/Connect): L
```

<sup>1</sup> The '\*' in the parameter value gives a 'must enter' type of field.

<sup>2</sup> The '+' in the parameter value gives a 'protected transmittable' type of field.

The leader texts of the connection form can be configured in the standard Host Links text library (message series 800).

## Terminal manager

The terminal manager style of local dialog is engaged by using `-CODE` parameters for the `CONAME` (RESOURCE).

`-CODE` NNNN – forces ‘Terminal Manager’ dialog. The following codes may be configured to display information or prompt to ask for user logon parameters:

- 0000 displays banner information
- 1000 displays logon information with parameters
- 1300 generates a `-DB` parameter (Billing)
- 1400 generates a `-DU` parameter (User ID)
- 1500 generates a `-DP` parameter (Project)
- 1600 generates a `-PW` parameter (Password)
- 1800 generates a `-DN` parameter (SCID)
- 4200 generates a `-TM` parameter (Model)
- 4700 generates a `-CO` parameter (CONAME)
- 5800 displays a ‘logged in’ message
- 7900 generates a `-DA` parameter (remote mailbox)
- 8100 generates a `-DX` parameter (remote mailbox extension)
- 8800 generates a `-CO` parameter (CONAME)
- 8900 generates a local dialog command prompt (`$*$`)

Ggate submits the parameters to *Gline* as they are collected. If an error is detected the prompt is repeated after an error message.

`-TEXT` is used in conjunction with `-CODE`. It overrides the standard prompt in the local dialog e.g.:

```
RESOURCE tmsample -TYPE TM
  -DN BE01 -DA IOF
  -CODE 0000
  -CODE 1000 -TEXT "ID:???? SC:???? MD:????"
  -CODE 1400 -TEXT Utilisateur
  -CODE 1600 -TEXT "Mot de passé"
  -CODE 1500
```

Would result in the following Terminal manager style dialog:

## Ggate

```
$$ 0000 Banner information (G&R style)
$$ 1000 ID:PHX SC:PH8A MD:DKU7211
$$ 1400 Utilisateur:
$$ 1600 Mot de passe:
$$ 1500 PROJECT:
```

The default texts for the codes are:

```
0000 G&R Host Links ***Ggate*** version
1000 YOUR ID IS ????????? SC: ???? MODEL: ?????? MB: ???
1300 BILLING:
1400 USER ID:
1500 PROJECT:
1600 PASSWORD:
1800 SC:
4200 MODEL:
4700 CONNECT TO:
5800 LOGIN SUCCESSFUL
7900 MB:
8800 CONNECT TO:
8900 $*$
```

The parameters available to the 1000 text are the CONAME, the SCID of the Ggate system, the terminal type and the local mailbox. They can only be used in that order and a group of 4 question marks is needed to indicate the positions where they are to be inserted.

The standard texts can be modified using the `gcptexts` utility. See the *Host Links Installation* manual for details.

Example:

```
RESOURCE TNG -desc "USERS type RH" -type TM
-code 0000 -text "*DNS-E V3U4.A00 P1.002 P2.006 P3 etc."
-code 1000 -text "VOTRE ID EST ???? SC:???? MODELE:???? MB:???"
-code 1600 -text "MOT DE PASSE:"
-code 5800 -text "VOUS ETES ENREGISTRE"
-code 4700 -text "CORRESPONDANT: "
-code 8800 -text "CORRESPONDANT: "
```

If the 4700 directive is not the last, and is answered with a null, then the next directive will be used immediately. In this case it is an 8800. Because the 8800 directive is the last, it will be repeated three times. On the third null response we go to the command prompt (`$*$`).

If a 4700 or 8800 is followed by more directives:

```
-code 8800 -text "CORRESPONDANT: "
-code 1800 -text "SCID: "
-code 7900 -text "MBX: "
```

Then a single null response to the 4700 or 8800 goes to the next directive. These will normally be directives that collect line parameters. Ggate submits the parameters to *Gline* as they are collected. If an error is detected the prompt is repeated after an error message. After three consecutive errors on any directive we go to the command prompt. For directives 1800 (SCID) or 7900 (mailbox) a null response is considered an error. For all other line parameter prompts a null response is accepted and skips to the next directive.

## ***Extensions to local dialog***

### ***Responses to 4700 and 8800***

CONAME            any coname in dsa.cfg. The CONAME can be complete, resulting in a connect attempt, or it can be a new TM CONAME that uses more dialog to collect line parameters.

SCID\$MBX        a session control identifier and mailbox resulting in an immediate connection attempt

```
-sc scid -mb mbx -usr user -pw pass -pj proj
```

a string of line parameters using a subset of DNS syntax, or using the complete *G&R/Gline* syntax. This results in a connection attempt. If you use the parameter `-str` to set multiple application options for IOF you must enclose them in quotes e.g. `-str "!NM NEW"`.

## Ggate

### **Response to the command prompt (\$\*\$)**

- CN SCID\$MBX or line parameters, as for 4700 and 8800 above
- ID identification in the same format as the 1000 display
- DI [-HD/HD/-HOLD/HOLD/-OFF/OFF]  
where HD/HOLD means do not log out (physically disconnect) from the TNVIP/Telnet server, and OFF means log out. Without a parameter the disconnect command takes the default from Gline, which is log out, but the default can be changed in `dsa.cfg` with the Gline `-LO ON/OFF` parameter.
- LC [ON/off]  
lower case to host on or off. Setting OFF maps messages to the host to upper case.
- EC [ON/OFF]  
Turn on or off echo mode in Telnet. This command also toggles SGA (Suppress Go-ahead). When echo is turned on, SGA is also turned on. When echo is turned off, SGA is turned off.

### **Entering TNVIP local dialog**

While connected to Ggate you can call up local dialog. Different emulators have different ways of calling up local dialog. In Affinity this is on `SHIFT/F10` and also under the `Session` menu item. Glink has it on `CTRL/F6` and under the `Line` menu item. In both Terminal manager mode and menu mode local dialog during a session brings up the \$\*\$ prompt. You can then enter any of the \$\*\$ responses. When the output is complete you are returned to your session, and your next input goes to the application. In Terminal manager mode you can enter Local dialog during the log-on phase. On exiting Local dialog you are returned to the log-on dialog.



## Printing through Ggate

Bull mainframes often send print output over an independent print session. The printer session has to be associated with a terminal session so that the print can reach the terminal's printer. The `-pco <coname>` option is used for this. The `CONAME` has to be configured centrally in the `dsa.cfg` and must expand into the set of parameters needed to establish the printer session.

### Host Links clients

*Host Links* emulators can accept print output directed by the host system to an independent print session if the `-pco` parameter is used. For example, print directed to a GCOS7 Twriter queue or TDS LID assigned as a ROP printer can be printed on the configured print path of *V78sim* or *Qsim*:

```
qsim -li dsa:ggate.gar.no -co tp8_app -pco tp8prt -pcn
```

### Glink clients

In *Glink* (version 6.2 and later), the `-pco` name can be specified explicitly:

The screenshot shows a dialog box with the following elements:

- A label "Printer connection name:" followed by a text input field containing "tw7prt".
- A small square checkbox to the right of the input field, with an "x" next to it.
- Below the input field, there is another checkbox labeled "Printer connect to host", which is currently unchecked.

If you want *Glink* to initiate the host printer session, you must check the 'Printer connect to host' entry. The default is to wait for the host to establish the print session.

For earlier *Glink* versions, the `-pco` parameter can be set in the 'Additional parameters' field of the same menu, and the `-pcn` parameter may be set here also in order to initiate the print session to the host.

The screenshot shows a dialog box with the following element:

- A label "Additional parameters:" followed by a text input field containing "-pco tw7prt".

## **CONAMES for Glink/Host Links printers**

The corresponding `dsa.cfg` CONAME entries could be configured like this:

```
coname tw7prt -desc "Twriter from GCOS7" -type print  
-ln -mn b7dlprn1
```

```
coname tp8prt -desc "TP8 printer" -type print  
-dn b8df -da tp8mbx
```

## **TNVIP clients**

TNVIP clients can handle print, but the printer CONAME must be associated with the terminal RESOURCE (CONAME) in `dsa.cfg`.

```
resource IOFPrt -desc "IOF with printer" -type menu  
-hm dps7 -da iof -dn ka48 -pco tw7prt
```

```
coname tw7prt -desc "Twriter from GCOS7" -type print  
-ln -mn b7dlprn1
```

In the case of GCOS7 the print session is usually established from the GCOS7 side, and so the CONAME for the printer is configured to listen `-ln`, and given a local mailbox name `-mn`. GCOS7 applications must be configured to connect to the mailbox configured for the printer CONAME that is associated with the terminal CONAME.

## **Telnet clients**

Telnet clients support only print embedded in the terminal data by the application, using terminal specific print start and print stop terminal control sequences.

# Troubleshooting

---

Error messages from Ggate always start with \$\$GGATE, \$\$DSA or \$\$DIWS, and are normally displayed on the status line by Ggate clients such as *Glink*. The \$\$GGATE messages are meant to be self-explanatory. The \$\$DSA and \$\$DIWS messages are explained in the *Gline* manual.

## Log

As with all other Host Links server programs, Ggate writes an event log in a product specific directory under the `servers` directory in the G&R system directory.

<b>Windows server</b>	<code>\gar\servers\<scid&gt;.gga< code=""></scid&gt;.gga<></code>
<b>UNIX/Linux</b>	<code>/usr/gar/servers/&lt;scid&gt;.gga</code>

The log file name is `_logfile.tcp`

e.g. `/usr/gar/servers/is2c.gga/_logfile.tcp`

```
[1997/10/21 15:47:38] G&R/Ggate 5.1.0a Sep 16 1997 started
[1997/10/21 15:50:02] PID 16220: dsa session for arild2.gar.no
[1997/10/21 15:50:06] PID 16220: Normal termination
[1997/10/21 15:54:40] PID 21370: dsa session for lion.gar.no
[1997/10/21 15:54:40] PID 21370: Normal termination
```

The event logs are 64k long, and the last three generations are kept for reference.

**Directory :** `/usr/gar/servers/is2c.gga`

```
file  _log_001.tcp
file  _log_002.tcp
file  _logfile.tcp
```

## Tracing Ggate traffic

Use the `-s_` parameter in the 'Additional parameters' field of *Glink* or on the UNIX/Linux command line of a *Host Links* emulator to get verbose session tracing from the DSA or DIWS line handlers. A line handler trace is necessary when documenting communication problems (e.g. problems connecting to the host). Use the `-d_` parameter to get a data trace only when documenting an emulation problem.

The trace information is written to a file in the following directory:

<b>Windows server</b>	<code>\gar\debug\NODE</code>
<b>UNIX/Linux</b>	<code>/usr/gar/debug/NODE</code>

NODE is the local DSA node name used by the Ggate system.

The name of the trace file consists of the prefix 'ggaNN-' followed by the IP-address of the client and suffixed by `.dbg` for a terminal session or `-dbp` for a printer session. The following is an example of a trace file name for Ggate session sequence number 5 executing on a *Host Links* system GRDL initiated from a *Glink* client on IP-address `jim.gar.no`:

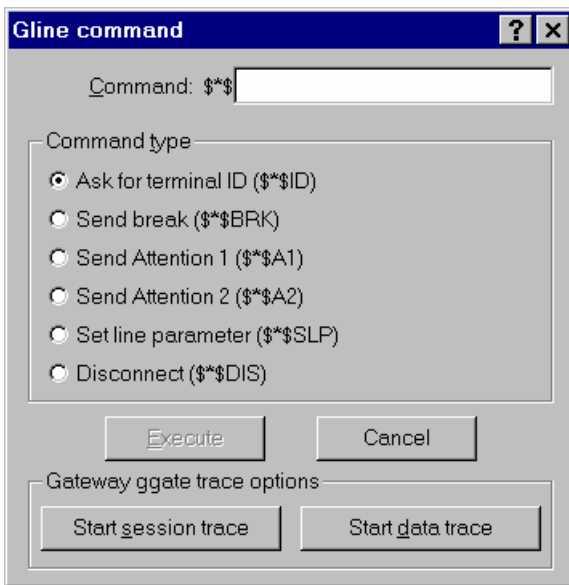
`gga05-jim.gar.no.dbg`

This file, and possibly also a *Glink* debug file and a *Glink* communication trace file activated by the `/J` command line parameter, will be needed by the support engineer investigating any problem.

## Starting the trace dynamically

The session trace (`-s_`) and the data trace (`-d_`) can be enabled dynamically when it is inconvenient to change the *Glink* configuration, or *Host Links* command line. Remember that this applies only to the established session, and will not trace the start of the session. It may not be sufficient for investigation of a problem that is due to incorrect connection, or the first dialog steps.

In *Glink*, once a connection is established the Glink 'Line' menu line item, sub-entry 'Connection menu', brings up a *Gline command menu*. The shortcut `CTRL-F6` enters the same menu.



The Host Links emulators have a command key that allows line parameters to be entered from the emulator in the course of a session. The parameters `-s_` and `-d_` can be entered, just as any others.

See the appendix *Host Links Trace* for a full discussion on how to generate G&R/Host Links trace files.

## ***Tracing TELNET/TNVIP dialog***

The TELNET or TNVIP dialog cannot be traced by means of the standard trace and debug routines because the Gline trace routines are not activated yet. A new Ggate command line parameter:

```
-TELD [on/OFF]
```

can be supplied to enable tracing of this dialog. The trace will be written to:

```
\gar\debug\telnet.dbg
```

Note that TELNET/TNVIP tracing can be toggled dynamically using the standard Gmanager command interface – just hit the command button in Gmanager and enter the TELD on/off command.

# Appendix: Host Links Manuals

---

Below you find a complete list of all available Host Links manuals:

<b>Installation</b>	
Host Links Servers	Installation and Configuration on UNIX/Linux
Host Links Emulators	Installation and Configuration on UNIX/Linux
Host Links	Installation and Configuration on Windows
<b>Line handling</b>	
Gline	Line Handler and DSA/OSI Configuration
Ggate	Transparent Gateway
Gproxy	Network Manager & SNMP Proxy Agent
G&R SSL	Using SSL for security in G&R products
GIAPI	Application Programming Interfaces
<b>Emulations</b>	
Gspool	Network Printer Emulation
GUFT	Unified File Transfer
G3270	Emulating IBM 3270 Terminals
G5250	Emulating IBM 5250 Terminals
Pthru	Gateway to the Bull Primary Network
Qsim	Emulating Questar DKU7107-7211 & VIP7700-7760
V78sim	Emulating VIP7801 & VIP7814
Gweb	Web Browser Front-end for DKU, VIP7700-7760, VIP7800, IBM3270 and IBM5250 Emulations





# Appendix: Host Links Server Administration

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Gmanager is the Host Links administration tool. It can be used to control, configure and monitor all the G&R Host Links server programs.

The dialog and interaction between the server programs and Gmanager is based on information located in a database file `_active.srv` that is located in the Host Links `servers` directory. The first time a Host Links server program starts up it registers itself in this 'active' file. Thereafter the server program updates this database with status information whenever the server is active.

The Gmanager program is available in 2 different versions – a Windows GUI based version `gmanw.exe` and a character based subset `gman` (UNIX/Linux binary) or `gman.exe` (PC console application).

The basic functionality of the two versions is the same, but the Windows version interfaces directly to other Windows-only Host Links administrative tools (*Gconfig*, *Gservice*), and can also start the browser directly to view HTML reports produced by *Gproxy*, if enabled, or to view the HTML pages associated with a *Gweb* or *Glink for Java* installation.

The *Gproxy* reports, *Gweb* and *Glink for Java* web pages are of course available to administrators of UNIX/Linux Host Links systems, and can be viewed by starting a browser manually, and connecting to the appropriate URLs:

```
http://mysite.mydomain.com/Gproxy  
http://mysite.mydomain.com/Gweb  
http://mysite.mydomain.com/GlinkJ
```

A summary of the available functions follows. The Windows-only functions are marked.

## Ggate

Gmanager can be used to perform the most common Host Links administrative tasks i.e.:

- View the last reported status information from the servers
- Stop or restart all servers, start a new server, stop, restart or delete a server
- Send a command to a server
- Load the DSA configuration into an editor, compile the DSA configuration
- Start the server configuration program or the configuration wizard (Windows)
- Load the *Gservice* configuration into an editor (Windows)
- Edit the product specific configuration files
- View a server log file, a server trace file or the server configuration file
- View program version numbers, program link information (Windows)
- View license info and license usage (Windows)
- View Host Links environment information, the 'VMAP' (Windows)
- Start Gdir directory administrator, Ggate monitor, Gspool monitor
- Gather all traces and logs for trouble-shooting by support
- Gping a DSA node to check the connection, use Gerror to explain error code
- Set a transport route state (down, enbl, lock, used)
- Check if a printer is on-line, request a list of bins
- Connect directly to the *Gproxy*, *Gweb*, *GlinkJ* HTML pages(Windows)

The commands that are accepted by all servers are:

- DOWN - terminates the server
- STATUS - reports server-specific status information to the log file
- PARAM - allows the operator to give a command line parameter to the server. Note that some parameters do not work when given interactively i.e. they can only be handled at server startup time
- DEBUG ON/OFF - toggles on and off tracing interactively

Additionally, the server in question might support other interactive commands. For a description of the supported commands, check the server-specific documentation.



# Appendix: Host Links DSA Utilities

---

The Gline package includes a set of Gline communication utilities. These are used when testing and debugging connection problems. The utilities are delivered as part of the Gline package and can be used without any additional configuration. The nodes to be tested must of course be configured in the `dsa.cfg` file.

## Gconame

Lists the parameters generated from a given CONAME. The utility works for both CONAME and RESOURCE e.g.:

```
gconame tnviptm

Checking 'dsa.cfg' for coname 'tnviptm'
Coname: tnviptm, type TM, parameters:
-DA misfld
-S_
-D_
-CODE 0000
-CODE 1000
-CODE 1800
-TEXT Remote SCID?:
-CODE 4700
-TEXT Remote application?:
-CODE 1400
-CODE 1600
-TEXT Password?:
```

### Gerror

Shows the text message associated with a DSA reason code. Only the most common codes are supported i.e. the ones related to network, transport and session communication layers. Errors generated by the OSI-stack on the Host Links platform are not covered by this utility; please refer to the documentation from the vendor of the stack e.g.:

```
gerror 0109
Reporting component: Session control (01) 0109, Dialog
protocol error or negotiation failed (wrong logical
record).
```

For a detailed description of all reason codes, please consult the Bull manual *OSI/DSA Network System Messages and Return codes* (39A2 26DM).

### Glnode

List and verify the communications parameters of the local node e.g.:

```
glnode
Local node name : GRDL
Local session control id : GRDL
DSA200 address (area:tsm): 54:60 (36:3C)
```

### Gmacfix

When you connect to FCP cards on Bull mainframes via an Ethernet port on the LAN-Extender the mainframe address is given in Ethernet (LLC) format. If you connect to an FDDI adapter you must convert the MAC address to SMT. e.g.:

```
gmacfix 080038000fab
MAC address 080038000fab = 10001c00f0d5
```

### Gping

Connects to a remote system using the Gline parameters set on the command line. If successful it returns 'connected to application', otherwise it shows the error code returned e.g.:

```
gping -li dsa -dn b7dl -da iof -du jim -pw mydogsname
Gping - $$DSA: Connected to application
```

## Grnode

Return the parameters (in `dsa.cfg`) and the state of a remote node e.g.:

```
grnode b6dl
Checking 'dsa.cfg' for node 'b6dl'
Session control id : B6DL
DSA200 address (area:tsm) : 1:5 (1:5)
Inactivity interval : 0
Route 0
Load balance percentage : 0
TP class : 2
TP expedited : 0
TPDU size : 0
Network address : 130405
```

## Gtrace

Same as `gping` but writes the DSA communication trace on the user's terminal (applicable to UNIX versions) e.g.:

```
gtrace -li dsa -dn ln40 -da snm151
D6:Application event @ 14:17:17.6003. tokenitem = 00
D6:Application event @ 14:17:17.6082. tokenitem = 00
D6:Connect request called, node = LN40
D6:OurBufferSizes. ApplMaxXmit = 511, ApplMaxRecv = 500
Rec:4000 0002 s:2
Rec:506B 0010 s:16
etc etc
Gtrace - line trace ending.
Gtrace - $$DSA: Connected to application.
```

## Gtsupd

Update the state of a transport route. Transport routes can be set automatically in a disabled state if a backup route is configured. When such a state change occurs the route will be set back to the enabled state after a configurable timer has expired. The default is 15 minutes. You can reset the state of such a route with the `gtsupd` utility e.g.:

```
gtsupd hipp -st enbl
TS-entry 'hipp' updated OK. Old state = LOCK, new state =
ENBL
```





# Appendix: Host Links Trace

---

If you experience any kind of problem when using a Host Links application, the application trace file and/or the line handler trace file will provide useful documentation of the problem.

## Trace activation

The Host Links products automatically create sub-directories in the debug directory when debug is activated: at product level using the `-dbg` parameter, or at line level using the `-d_` or `-s_` parameters to the line module.

<b>Windows server</b>	<code>gspool -id gs1 -dbg -ps \\SERVER\LEXMARK -li dsa -da tptst -d_ on</code>
<b>UNIX Linux</b>	<code>gspool -id gs1 -dbg-pc lp -li dsa -da tptst -d_ on</code>

Most G&R products include a facility for setting product or line parameters dynamically. It is therefore generally possible to turn on debug or trace without modifying the command line or configuration of a production system.

## Trace types

All Host Links products accept a parameter `-dbg`, which starts an application level trace of internal events. This is useful when investigating malfunctions or looking closely at product behaviour.

All Gline line handlers accept a parameter `-d_` to turn on a data trace. It records data and enclosure level being exchanged with the line handler. It is useful when documenting product malfunction e.g. an emulation error, because it records exactly what the host sends and what the G&R application replies. It can be used to simulate a customer situation, reproduce a problem and to verify that a correction fixes the documented problem.

## Ggate

All Gline line handlers accept a parameter `-s_` to turn on a session trace. It records the raw data being exchanged between the line module and the underlying transport layer (e.g. OSI Transport, or TCP socket), as well as internal events and protocol states. It is useful when investigating protocol failures such as unsuccessful connect attempts or abnormal disconnections.

## Structure

The Host Links file structure includes a debug directory to collect the trace and debug files in one location where the permissions can be adjusted as required for security. By default only the Host Links administrator can access the directory. The debug directory is created by the initialization procedure and located (by default) in:

<b>Windows server</b>	<code>\gar\debug</code>
<b>UNIX Linux</b>	<code>/usr/gar/debug</code>

If the application is a client type of application, a debug sub-directory with the same name as the user (UNIX username or PC login name) is created and all debug files are located there. This includes the line level trace except in the special case where the client application connects via Ggate and the line level trace is written on the Ggate system using the Ggate DSA node name as a debug sub-directory.

If the application is a server type of application, then a sub-directory will be created using the DSA node name on behalf of which the server application is executing. If the server does not use DSA the default local session control name is still used if there is a `dsa.cfg` file. If there is no `dsa.cfg` file then the system's UNIX or Windows communications node name is used. You can find this name using the command `uname -n` on UNIX systems, or the Network section of the control panel on Windows systems. This covers situations where several instances of a server are executing on the same system and accepting incoming calls to different DSA node names, or where several Host Links systems using the same server product share a file system.

# Tracing Ggate

When Glink, a Host Links client or a customer application based on GI-API connects through Ggate to the application, the line handler trace is generated on the Ggate system, with the name and location shown in the table:

<b>Windows server</b>	<code>\gar\debug\NODE\ggaNN-PPPP.dbg</code>
<b>UNIX Linux</b>	<code>/usr/gar/debug/NODE/ggaNN-PPPP.dbg</code>

NODE is the local DSA node name used by the Ggate system.

The trace file name consists of the prefix `ggaNN-` followed by the IP-address of the client, suffixed by `.dbg` for a terminal session or `-dbg` for a printer session. The following is a trace file name for Ggate session sequence number 5 executing on Host Links system GRDL initiated from a Glink client on IP-address `jim.gar.no`:

```
gga05-jim.gar.no.dbg
```

This file, and possibly also a Glink debug file and a Glink communication trace file activated by the `/J` command line parameter will be needed by the support engineer investigating any problem.

To enable a line handler trace through Ggate the product's start-up command or configuration file would look like this:

```
-LI YYY:ZZZZ -S_ -D_
```

(YYY =line handler identification, i.e. DSA or DIWS)

(ZZZZ =IP-address of the system running Ggate)

## Examples - G&R products

Examples of directory and file names in the debug structure are:

<code>/usr/gar/debug/jim</code>	<b>Debug directory for user 'jim'</b>	
<code>qsm.dbg</code>	Qsim emulator debug file	<code>-dbg</code>

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qsm-gli.dbg	Qsim host line trace	-li dsa -s_
pth-glit.dbg	Pthru terminal line trace	-term -s_
pth-glih.dbg	Pthru -host line trace	-li dsa -s_
g32.dbg	G3270 emulator debug file	-dbg
g32-gli.dbg	G3270 host line trace	-s_
<b>/usr/gar/debug/mike</b>	<b>Debug directory for user 'mike'</b>	
v78.dbg	V78sim emulator debug file	-dbg
v78-gli.dbg	V78sim host line trace	-li dsa -s_
guf.dbg	GUFT client debug file	-dbg
guf-gli.dbg	GUFT client host line trace	-li dsa -s_
<b>/usr/gar/debug/en01</b>	<b>Debug directory for node 'en01'</b>	
guf.def	GUFT server debug file	-dbg
guf-gli.def	GUFT server host line trace	-li dsa -s_
gli-gli.dsa	DSA listener host line trace	-s_
gli-gli.diw	DIWS listener host line trace	-s_
gsp.def	Gspool (default -id) debug file	-dbg
gsp-gli.def	Gspool (default -id) host trace	-li dsa -s_
gga01-mike.gar.no.dbg	Ggate line trace, first Glink	-s_
gga02-mike.gar.no.dbg	Ggate line trace second Glink	-s_
<b>/usr/gar/debug/en02</b>	<b>Debug directory for node 'en02'</b>	
gsp.abc	Gspool (-id abc) debug file	-dbg
gsp-gli.abc	Gspool (-id abc) host trace	-li dsa -s_
gspc-gli.def	Gspool DPF8 command trace	-li tcp -s_
gspd-gli.def	Gspool DPS8 data trace	-li tcp -s_

<code>gsp._00</code>	Gspool started on demand debug	<code>-dbg</code>
<code>gsp-gli._00</code>	Gspool started on demand trace	<code>-li dsa -s_</code>

## CPI-C and Gweb trace files

Gweb uses the CPI-C libraries so the Gweb debug structure is exactly the same as for CPI-C, except that Gweb inserts its own product identifier into the file name structure. CPI-C applications use the ‘client’ style of debug and create a debug directory with the UNIX username or PC login name used by the process that started them.

The application level debug (`-dbg`) and line trace (`-s_` and `-d_`) are set in the `cpic.cfg` file. The line trace goes to the debug directory, with the name built up as follows:

```
<product_id><session_id>-<process_id>.<debug_type>
```

<b>product_id</b>	<i>Value</i>	<i>Comment</i>
	<code>cpi</code>	CPI-C API
	<code>cp3</code>	CPI-C 3270
	<code>cp7</code>	CPI-C 7800
	<code>cpd</code>	CPI-C DKU
	<code>gw3</code>	Gweb3270
	<code>gw7</code>	Gweb7800
	<code>gwd</code>	Gwebdku
<b>session_id</b>	<code>(nn)</code>	If multi-session application, 1-63
<b>process_id</b>	<code>n (n n n...)</code>	Varies by platform
<b>debug_type</b>	<code>dgb</code>	Application level debug
	<code>gli</code>	Line trace

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Example:

\gar\debug\system		debug directory for user "system"
cpi-16.dbg	CPI-C single session debug	-dbg
cpi-16.gli	CPI-C single session line trace	-li dsa -s_
cpi2-123.dbg	CPI-C session 2 application debug	-dbg
gw7-20172.gli	Gweb7800 host line trace	-li dsa -s_

# Appendix: Error Codes

---

## OSI/DSA error codes

Below is a list of OSI/DSA error codes and the corresponding description. These are the same descriptions that the `G&R/Gerror` utility will display when given the DSA code as a parameter.

code	Description
<b>00xx</b>	<b>General Errors</b>
0001	Open Failure in LC - Reject for unknown reason
0002	Open Failure in LC - Acceptor customer node inoperable
0003	Open Failure in LC - Acceptor customer node saturated.
0004	Open Failure in LC - Acceptor mailbox unknown.
0005	Open Failure in LC - Acceptor mailbox inoperable.
0006	Open Failure in LC - Acceptor mailbox saturated.
0007	Open Failure in LC - Acceptor application program saturated
0008	Connection refused. Transport protocol error or negotiation failed.
0009	Open Failure in LC - Dialog protocol error or negotiation failed
000A	Open Failure in LC - Presentation protocol error or negotiation failed
000B	Open Failure in LC / Connection refused lack of system resources
000C	Open Failure in LC / Connection refused from GCOS7 duplicate user
000D	Open Failure in LC, Duplicate implicit LID / Q class not started
000E	Open Failure in LC, Duplicate GRTS Id / lack of memory resources
000F	Open Failure in LC, No Logical line declared for DACQ / 7 connection refused
0010	Open Failure in LC, GCOS 8 GW Missing translation / Incorrect device length in ILCRL.
0011	Open Failure in LC, DAC connection not initialized / Too many jobs executing
0012	Open Failure in LC, No binary transfer / impossible to start the IOF job
0013	Open Failure in LC, connection is not negotiated in FD mode / impossible to start the IOF job

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0014	Disconnection - Timeout resulting from absence of traffic.
0016	Option missing for an RBF mailbox.
0017	Connection refused - Incorrect access right for MB.
0018	Connection refused - Incorrect access rights for the application.
0019	Connection refused - Unknown pre-negotiated message path
001A	Connection refused - Security validation failed.
001B	Connection refused - Unknown acceptor mailbox extension.
001C	Connection refused - Inoperable acceptor mailbox extension.
001D	Connection refused - Invalid Message group number.
001F	Disconnection - no more memory space.
0020	Connection refused - Unknown node.
0021	Connection refused - inaccessible node or Host down.
0022	Connection refused - saturated site.
0023	Connection refused - inoperable mailbox.
0024	(X.25) Packet too long. Problem with packet size. / Connection block already used.
0030	Syntax Error - option not known (received on close VC).
0031	(X.25) No response to call request packet - timer expired.
0033	(X.25) Timer expired for reset or clear indication.
0039	Disconnection - transport protocol error (MUX).
003C	Presentation Control Protocol Error
003E	The application has not the turn
003F	Message group closed
0040	(X.25) Facility code not allowed. / Connection refused - unknown node
0041	Connection refused - path not available.
0042	Connection refused - Duplicate USER ID / Facility parameter not allowed
0044	(X.25) Invalid calling address.
0045	(X.25) Invalid facility length.
0047	(X.25) No logical channel available.
004F	DNSSC: (X.25) Invalid call packet length.
0050	Normal disconnection (GCOS3/8)
0051	Error or Event on LC initiated by GW
0052	Error or Event on LC initiated by GW.
0053	Error or Event on LC initiated by GW. TCall
0054	Error or Event on LC initiated by GW. DIA in LOCK State
0055	Error or Event on LC initiated by GW. DIA error
0056	Error or Event on LC initiated by GW. GW has no known explanation.
0057	Error or Event on LC initiated by GW. Reject mailbox permanent



0058	Error or Event on LC initiated by GW. No more input lines in DACQ
0059	Time-out on GCOS 3/8 gateway.
005A	Error or Event on LC initiated by GW. Disconnect from terminal without reason
005B	Error or Event on LC initiated by GW. Wrong letter or wrong record
005C	Error or Event on LC initiated by GW. Forbidden letter received
005D	Error or Event on LC initiated by GW. Forbidden letter received
005E	Error or Event on LC initiated by GW. No buffer for secondary letter
005F	Error or Event on LC initiated by GW. No buffer for fragmented letter
0060	Error or Event on LC initiated by GW. Disconnect on end of phase record
0061	Error or event on LC initiated by GW. No buffer for control letter.
0062	Error or event on LC initiated by GW. Mailbox in closing phase
0064	Error or event on LC initiated by GW. Flow control error.
0065	Error or event on LC initiated by GW. CH locked by operator.
0066	Error or event on LC initiated by GW. Disconnect with a normal TMG F2 exchange.
0067	Error or event on LC initiated by GW. Teletel rerouting error from DACQ
0068	Error or event on LC initiated by GW. Teletel routing error from DACQ
0069	Error or event on LC initiated by GW. Teletel rerouting error from TM
006A	Error or event on LC initiated by GW. Teletel rerouting error from TM
006B	Syntax error - text too long.
006C	Syntax error - illegal object in a GA command.
006D	Syntax error - unknown node Id.
0078	Syntax error - illegal command for this object.
0079	Syntax error - illegal date.
007F	(X.25) No route available for X.25 switching.
0081	No more network routes available for switching.
0082	(X.25) Hop count reached for X.25 switching.
0083	(X.25) Flow control negotiation error.
0085	(X.25) Frame level disconnection.
0086	(X.25) Frame level connection.
0087	(X.25) Frame level reset.
0090	Frame level not set.
0092	(X.25) X.25 Echo service in use.
0093	(X.25) Incorrect password for PAD connection.

0094	(X.25) No more PAD connections allowed.
0096	(X.25) TS SX25 or NU X25 objects locked.
009C	(X.25) Invalid packet header. X.25 protocol error.
009D	(X.25) Incompatible header. X.25 protocol error.
009E	(X.25) Logical Channel Number too high.
009F	(X.25) Incorrect packet type.
00B2	Use of invalid password through PAD
00B6	Unknown mailbox selection for PAD connection using the PAD password.
00C0	(X.25) Normal disconnection.
00D7	(X.25) TS image (of type DSA or DIWS) in LOCK state.
00DE	(X.25) NS RMT or NR SW in LOCK state.
00E1	Connection refused. Mailbox is not in ENBL state.
00E6	QOS not available permanently.
<b>01xx</b>	<b>Session Control</b>
0100	Logical connection accepted or normal termination
0101	Rejection for unknown reason or abnormal termination
0102	Acceptor node inoperable.
0103	Acceptor node saturated. When a node has no available resources
0104	Acceptor mailbox unknown.
0105	Acceptor mailbox inoperable.
0106	DNS: Acceptor mailbox saturated.
0107	DNS: Acceptor application program saturated.
0108	Transport protocol error or negotiation failed (DSA 200 only).
0109	Dialog protocol error or negotiation failed. (Wrong logical record).
010A	Time-out on session initiation / unknown LID
010B	Acceptor mailbox extension unknown.
010C	Acceptor mailbox extension inoperable.
010D	Invalid Session Number.
010E	Unknown node.
010F	System error. System generation error or insufficient memory space
0110	Application abnormal termination. Subsequent to an abnormal occurrence in the dialogue
0111	Normal terminate rejected.
0112	Protocol not supported.
0113	Session control service purged by user.
0115	Disconnection Time-out on message group initiation.
0117	Incorrect Access Right for MB
0118	Incorrect Access Right for the Application
0119	Pre-negotiated Message Path Descriptor unknown
011A	Security validation failed
011E	Incorrect object status

011F	Not enough memory space available.
0120	Node unknown.
0121	The channel object (CH) is in LOCK state
0122	Saturation - no plug available
0123	Object status = LOCK
0124	Connection block (TSCNX) already used
0125	Disconnection already running
0126	The connection block (TSCNX) is disconnected (or not connected)
0127	Change Credit value < 0
0128	Ineffective Change Credit ( delta = 0 )
0129	No more deferred letters
012B	"Reinitialization" Request
012C	"Reinitialization" in progress
012D	"Reinitialization" in progress, letters are dropped
012E	Close virtual circuit. Either no mapping exists between PA/NR or CL and VC/NS
012F	Null connection object index.
0130	Undefined function at Sysgen time.
0131	Letter too large with respect to the negotiated size.
0132	The received letter is longer than the size which was
0133	Disconnection of the session control user
0134	Interface error on EOR (End-Of-Record) processing.
013C	Presentation control protocol error.
013E	You do not have the turn.
013F	Message group closed.
0140	Session is closed.
0151	Request refused, no system buffers available.
0152	Incorrect addressing record.
0153	No presentation record in the ILCAL or ILCRL
0154	Negotiation failed on session mode
0156	Negotiation failed on resynchronization.
0157	Negotiation failed on END to END ACK
0158	No presentation record in the connection letter
0159	Negotiation failed on session mode
015A	Negotiation failed on letter size (in the Logical Connection record).
015B	Negotiation failed on resynchronization (in the Logical Connection record).
015C	Negotiation failed on end-to-end ACK (Logical Connection record).
015D	No support of the "letter" interface because Multirecord is not negotiated.
0160	Incorrect TSPACNX table.
0161	Protocol error on letter reception.

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0162	Negotiation failure.
0163	Record header length error.
0164	Protocol error.
0165	Protocol error reception of control letter.
0166	Type or length error on interrupt letter.
0167	Protocol error on reception of data letter.
0168	Dialog protocol error.
0169	Unknown event.
016A	Protocol error on data transfer.
016B	Invalid status for a disconnection request.
016C	Invalid status for a recover
016D	Invalid status for a suspend/resume request.
016E	Negotiation failure.
016F	Unknown command.
0170	Error in presentation protocol
0171	Letter header length error in
0172	ILCAL is not DSA 200 protocol.
0173	Error in session record.
0174	Normal disconnection, without complementary reason code.
0175	Letter is not in ASCII or EBCD.
0176	Connection protocol letter header
0177	Letter header protocol error.
0178	Record header protocol error.
0179	Record header length error.
017A	Mbx record header length error.
017B	Error on buffer transfer.
017C	DSA 200 record header protocol
017D	DSA 300 record header protocol
017E	Unsupported connection options.
017F	Character error in ASCII string.
0180	No segmented record size.
0181	Invalid mailbox object index.
0182	Mapping error for a remote connection.
0190	No more buffers.
0191	Byte count is greater than GP.
0192	Byte count is greater than GP.
0193	Byte count is greater than GP.
0194	Byte count is greater than GP.
0195	Byte count is greater than GP.
0196	Byte count is greater than GP.
0197	Byte count is greater than GP.
0198	No more buffers.

0199	Byte count is greater than GP.
019A	Byte count is greater than GP.
019B	Byte count is greater than GP.
019C	Byte count is greater than GP.
019D	Byte count is greater than GP.
019E	Byte count is greater than GP.
019F	Byte count is greater than GP.
01A0	Invalid transfer state.
01A1	Suspend protocol running.
01A2	Suspend protocol running.
01A3	Recover protocol running.
01A4	Forbidden function in write request. (\$WRITE)
01A5	Conflicting parameters for segmented record. (SWBREC)
01A6	Protocol conflict - suspend/recover.
01A7	Protocol not supported - letter/end-to-end ACK. (SWBLET)
01A8	Multi-record letter in progress.
01A9	Interrupt request forbidden.
01AA	Send control record request forbidden. (SCTROL)
01AB	Forbidden for TWA session - turn is here. (SREAD)
01AC	Termination forbidden - suspend or recover in progress. (STERM)
01C0	No space available for downstream connection request. (SMECNX)
01C1	No space available for upstream connection request. (SMUCNX)
01C2	No space available for upstream SCF connection. (SMRCNX)
01C3	No space available for session context. (\$SCTX)
01E0	Enclosure or data length error for a write request. (\$WRITE)
01E1	Enclosure or data length error for a write segment record request. (SWBREC)
01E2	Enclosure error for 'give turn' request. (SGVTRN)
01E3	Interrupt request is not demand turn, attention/data attention, or purge record.
01E4	Input status for a send control letter is not permitted.
01E8	Write request without turn.
01E9	Write segmented record request without turn.
01EA	Write segmented letter request without turn.
01EB	Send control letter request without turn.
01EC	Disconnection request without turn.
<b>02xx</b>	<b>Presentation Control</b>
0201	Protocol level not supported
0202	Application designation protocol error.
0203	Character encoding error. TM cannot support the proposed encoding.
0204	Character set error. TM cannot support the proposed character set.

0205	Character subset error. TM cannot support the proposed character subset.
0206	Incorrect record encoding.
0207	Incorrect parameter encoding.
0230	Data presentation control error. The presentation control proposed for this session cannot be used
0231	Device type is incompatible with the configuration.
0232	TM control protocol is incorrect.
0233	Device-sharing attributes are invalid.
0234	Initiator or acceptor configuration is not correct.
0235	Logical device index error.
0236	Number of logical devices is incompatible with the configuration.
0237	TM protocol record not supported.
<b>03xx</b>	<b>Terminal Management</b>
0300	Sysgen error WARNING. There is no mapped object; some objects will be spare.
0301	Operator requested session abort or logged.
0302	Idle time run out after secondary network failure.
0303	Idle time run out for no traffic.
0304	Form not found.
0305	Operator requested suspension.
0306	Destructive attention send on the session.
0307	Unknown TX addressed in this session. TM is unable to a the session.
030A	Protocol error. A record was received which did not comply with current standards
0310	Insufficient resources. The receiver cannot act on the request because of a temporary
031E	Incorrect value for Retry or Wait parameters on UP LL command.
0320	Function not supported.
0321	Parameter error. This can result
0322	Resource not available. The
0323	Intervention required (on principal device).
0324	Request not executable.
0325	EOI required.
0326	Presentation space altered, request executed.
0327	Presentation space altered, request not executed.
0328	Presentation space integrity lost.
0329	Device busy. The device is busy and cannot execute the request.
032A	Device disconnected.
032B	Resource not configured.
032C	Symbol set not loaded.

032D	Read partition state error.
032E	Page overflow.
0330	Subsidiary device temporarily not available.
0331	Intervention required at subsidiary device.
0332	Request not executable because of subsidiary device.
0340	TM cannot accept a new connection.
0341	Object status incorrect.
0342	The TM configuration is not correct.
0343	Unknown TX addressed on this session.
0344	Data presentation protocol error.
0345	Device type is incompatible with the configuration, or is not supported.
0346	TM control protocol incorrect.
0347	Device shareability attributes are invalid.
0348	Initiator or acceptor configuration is not correct.
0349	Logical device index error.
034A	Number of logical devices incompatible with the configuration.
0350	Disconnection of TM after reinitialization of the network.
0360	File not found. (Welcome and Broadcast Messages)
0361	Site not found. (Welcome and Broadcast Messages)
0362	NASF error. (Welcome and Broadcast Messages)
0370	No-session timeout. Device disconnected.
0371	No-input timeout. Device disconnected.
0372	No-output timeout. Device disconnected.
0373	Timeout due to no backup session being initiated.
0374	Timeout due to no backup session being established.
0375	Connection refused because of late activation of back up session.
0376	Disconnection of current session to switch to backup session.
0380	AUTOCN parameter not declared.
0381	Mixed ETB in data sent by VIP screen and cassette
0382	Data header sent by the terminal incorrect.
0383	Desynchronization in the exchange of data.
0384	KDS block count error.
038C	Remote terminal is not connected
0390	Unknown mailbox.
0391	No call packet to return.
0392	No "Possibility" command to return Protocol error
03C0	Slave device disconnection.
<b>17xx</b>	<b>Network Layer</b>
1701	PAD connection refused.
1702	Flow control error.

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1706	Logical channel number not zero in restart packet.
1707	Illegal packet length or use of D-bit forbidden.
1708	Illegal header.
1709	Illegal Logical Channel Number.
1710	Invalid packet type for the automaton state. Protocol error
1711	Incorrect packet type.
1712	Inconsistent network parameters in the generation file.
1713	No more space.
1714	DSAC network layer object not usable.
1717	USED/ENBL transition. Transport station is locked.
1718	USED/ENBL transition. This is a back-up NR.
1719	USED/ENBL transition. Dynamic close due to load.
171A	USED/ENBL transition. Transfer time-out has elapsed.
171B	USED/ENBL transition. This is a back-up NR.
171C	USED/ENBL transition. Transport station is idle.
171E	USED/ENBL transition. NR object is locked.
171F	ENBL/LOCK transition. NR HDLC has no more memory space.
1721	Remote station is inaccessible via the configured network. Check
1723	Incorrect PAD password.
1724	Virtual circuit already in use. LCN (Logical Channel Number) too high.
1725	Invalid virtual circuit.
1726	Packet too short. Protocol error for the equipment directly connected to the Bull Datanet.
1727	Incompatibility between the generation parameters of two communicating systems on window or packet size.
1729	Packet size in communicating systems not the same.
1731	Timer runs out while waiting for call confirmation.
1732	Timer runs out while waiting for clear confirmation.
1733	Timer has run out while waiting a reset confirm.
1740	Call setup or call clearing problem.
1741	Open failure on virtual circuit. No flow control on this NS.
1742	Incorrect facility. Protocol error for the equipment directly connected to the Bull Datanet.
1744	Unknown subscriber.
1745	End of time-out on reset confirm. Invalid facility length. Protocol error for the equipment directly
1747	No logical channel available.
1749	End of time-out on call confirm.
174F	Incorrect packet length. Protocol error for the equipment directly connected to the Bull Datanet.
1755	Flow control, window, packet size or reset error.



1760	Frame disconnection.
1770	Frame connection.
1771	Frame reset.
1781	No more network routes available for X.25 switching.
1782	Maximum of 15 switches have been used,
1783	Flow control negotiation error.
1785	Frame level disconnection.
1786	Frame level connection.
1787	Frame level reset.
1790	Frame level not established.
1791	No more logical paths available for the PAD.
1792	Echo service busy.
1793	Incorrect PAD password.
1794	All the PAD virtual circuits are used
1795	X.25 initialization not possible.
179B	LCN not null in restart packet
179D	Incompatible header (receive error: all VC of concerned NS
179E	LCN greater than NBVC in NS directive
179F	Incorrect packet type
17A0	Invalid facility.
17B0	Normal disconnection.
17B1	X.25 Echo in use.
17B2	No more logical channels available.
17B3	No more PAD connections allowed.
17B4	TS SX25 or NU X25 object locked.
17B5	Buffer capacity overflow.
17B6	Normal disconnection.
17B8	Unknown calling SNPA (Sub-Network Point of Attachment).
17B9	Internet problem.
17CB	Call collision on VC
17CC	Incompatible generations (NR object without mapping).
17CE	Invalid status NR locked.
17CF	Lack of space.
17D0	Unknown subscriber.
17D4	TSCNX already used for another connection. SCF internal error.
17D7	Transport station locked.
17DD	Proper NS locked.
17DE	Invalid status NR locked.
17DF	Lack of space.
17E0	Forbidden parameter or invalid value.
17E1	Invalid transition.
17E2	Upward-mapped object (TS) not locked.

17E3	No object mapped above.
17E4	NR not locked (MP NR -ADD/-SUB) or virtual circuit already open.
17E5	NR is last in list and the TS is not locked.
17E6	No object mapped above (UP NR -PRIO). NR not mapped on TS.
17E7	Upward mapped object not locked
17E9	Mix of datagram and connection network
17EB	Class inconsistent with NR.
17EE	Incompatible generations. NR object without mapping.
17FF	Wrong parameter in administrative CALL
<b>18xx</b>	<b>Transport Layer</b>
1800	Normal disconnection initiated by the correspondent
1801	Local saturation at connection request time.
1802	Failed negotiation at connection time.
1803	Duplicate connection. Two or more requests have been issued for the same connection.
1804	Redundant request.
1805	Retransmission Time-out at transport level.
1806	Survey time-out at transport level.
1807	Transport protocol error.
1808	Session Control specified is not available (inaccessible).
1809	Requested Session Control Id unknown by remote transport.
180A	Termination because of disconnection by administration.
180B	Session Control/Transport interface error.
180C	Connection request on non-sharable VC in case of ISO Transport. ISO: header or parameter length is invalid.
1817	Station in shut-down state.
181F	No memory space at connection time.
1821	Session Control inaccessible by configured session routes. ISO: Session entity not attached to TSAP.
1824	Collision between Close NC and Open TC.
182E	Remote station not configured.
182F	Resource saturation.
1831	ISO: No route for the called NSAP.
1832	ISO: Received NSAP addresses are wrong.
1833	Segmentation violation.
1834	ISO:QOS priority not available temporarily, due to a local condition (for example, lack of resources).
1835	ISO:QOS priority permanently unavailable locally (for example, due to an error in the system generation).
183A	ISO: Remote reason not specified.
183C	ISO: Remote transport entity congestion at connect request time.
1840	Server in terminating state. TC has been re-assigned on another NC.

18A1	An additional NC has been assigned to a TC.
18B0	NC has been re-assigned on another VC.
18EF	Disconnection at Transport level caused by reception of RESTART DSA during the transfer phase.

## Windows Sockets error Codes

Below is a list of Windows Sockets return codes and the corresponding description.

Hex code	Windows Sockets Access Error name	Description
2714	WSAEINTR	The (blocking) call was cancelled via WSACancelBlockingCall()
2719	WSAEBADF	The socket descriptor is not valid.
271E	WSAEFAULT	An invalid argument was supplied to the Windows Sockets API.
2726	WSAEINVAL	An invalid call was made to the Windows Sockets API.
2728	WSAEMFILE	No more file descriptors are available.
2733	WSAEWOULDBLOCK	The socket is marked as non-blocking and no connections are present to be accepted.
2734	WSAEINPROGRESS	A blocking Windows Sockets call is in progress.
2735	WSAEALREADY	The asynchronous routine being cancelled has already completed.
2736	WSAENOTSOCK	The descriptor is not a socket.
2737	WSAEDESTADDRREQ	A destination address is required.
2738	WSAEMSGSIZE	The datagram was too large to fit into the specified buffer and was truncated.
2739	WSAEPROTOTYPE	The specified protocol is the wrong type for this socket.
273A	WSAENOPROTOOPT	The option is unknown or unsupported.
273B	WSAEPROTONOSUPPORT	The specified protocol is not supported.

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273C	WSAESOCKTNOSUPPORT	The specified socket type is not supported in this address family.
273D	WSAEOPNOTSUPP	The referenced socket is not a type that supports connection-oriented service.
273E	WSAEPFNOSUPPORT	
273F	WSAEAFNOSUPPORT	The specified address family is not supported by this protocol.
2740	WSAEADDRINUSE	The specified address is already in use.
2741	WSAEADDRNOTAVAIL	The specified address is not available from the local machine.
2742	WSAENETDOWN	The Windows Sockets implementation has detected that the network subsystem has failed.
2743	WSAENETUNREACH	The network address can't be reached from this host. There is probably a problem in the way you have set up TCP/IP routing for your PC (most likely you have not defined a default router).
2744	WSAENETRESET	The connection must be reset because the Windows Sockets implementation dropped it.
2745	WSAECONNABORTED	The connection has been closed.
2746	WSAECONNRESET	
2747	WSAENOBUFS	Not enough buffers available, or too many connections.
2748	WSAEISCONN	The socket is already connected.
2749	WSAENOTCONN	The socket is not connected.
274A	WSAESHUTDOWN	The socket has been shutdown.
274B	WSAETOOMANYREFS	
274C	WSAETIMEDOUT	Attempt to connect timed out without establishing a connection.
274D	WSAECONNREFUSED	The attempt to connect was forcefully rejected. The service on the other side is not available.
274E	WSAELOOP	Too many symbolic links were encountered in translating the path name.
274F	WSAENAMETOOLONG	
2750	WSAEHOSTDOWN	The host machine is out of service.
2751	WSAEHOSTUNREACH	The host machine is unreachable.

2752	WSAENOTEMPTY	
2753	WSAEPROCLIM	
2754	WSAEUSERS	
2755	WSAEDQUOT	
2756	WSAESTALE	
2757	WSAEREMOTE	
276B	WSASYSNOTREADY	Indicates that the underlying network subsystem is not ready for network communication.
276C	WSAVERNOTSUPPORTED	The version of Windows Sockets API support requested is not provided by this particular Windows Sockets implementation.
276D	WSANOTINITIALISED	A successful WSStartup() must occur before using this API.
2AF9	WSAHOST_NOT_FOUND	Authoritative answer host not found.
2AFA	WSATRY_AGAIN	Non-authoritative answer host not found, or SERVERFAIL.
2AFB	WSANO_RECOVERY	Non-recoverable errors, FORMERR, REFUSED, NOTIMP.
2AFC	WSANO_DATA	Valid name, no data record of requested type.