System Galaxy Communication Latency

A solution for identifying and resolving latency and data communication delays.

· Abstract ·

This paper describes the symptoms and issues associated with communication latency which can occur when communication channels experience heavy traffic between the *Client Gateway Service* and multiple *Client Applications*. This paper offers an effective solution for addressing latency by adjusting configurable settings and adding *Client Proxy Servers* to the affected clients.

Overview

For systems that are experiencing delays or latency in data communication, there are some configuration changes that can be implemented to address this problem of latency. These symptoms most commonly occur where there are a significant number of client applications and / or a high rate of system activity such as access control, door, input and alarm events. These symptoms can also appear or be made worse when the *GCSDataLoader service* is running and pushing data to the control units. Below is a list of typical symptoms that may indicate that a system is experiencing these issues:

- Event messages are not displayed immediately and are delayed by several seconds or minutes from the actual occurrence of the event
- Commands do not take effect immediately upon issuance to the hardware. For example, if issuing a Get Controller Info or Ping command, the response does not appear immediately in the application
- When monitoring the *GCSClientGW service* with the Service Monitor utility, messages similar to this may appear in the Status tab. *'Not enough quota is available to process this command'.*
- The GCSClientGW.log file may contain messages similar to this: *'Not enough quota is available to process this command'.*

Galaxy has developed a strategy to address this issue. After extensive analysis and troubleshooting efforts, it has been determined that these symptoms occur when the GCSClientGW service is unable to keep pace with the amount of data that must be processed and distributed to the number of client applications that are connected to it.

The Solution

In the standard system configuration, each client application communicates directly to the *GCSClientGW service*. For a system with heavy traffic, off-loading the majority of client connections will lighten the work-load on *GCSClientGW service*, and thereby reduce or eliminating the latency. To achieve this, Galaxy has developed the *Client Gateway Proxy service* (*GCSClientGWProxy*).

Inserting the *Client Gateway Proxy service* between the client applications and the *Client Gateway service (GCSClientGW) will* reduce the number of connections the *Client Gateway service* will handle. The proxy service acts as a client to the *gateway service* and a server to the System Galaxy applications. The System Galaxy client applications connect to the proxy service instead of connecting directly to the gateway service.

The proxy service acts as a distribution agent on behalf of the gateway service. The diagram below illustrates the system configuration when proxies are utilized.

Figure 1 *Concept Diagram of Client Proxy Services*

Software Architecture w/Client Gateway Proxy
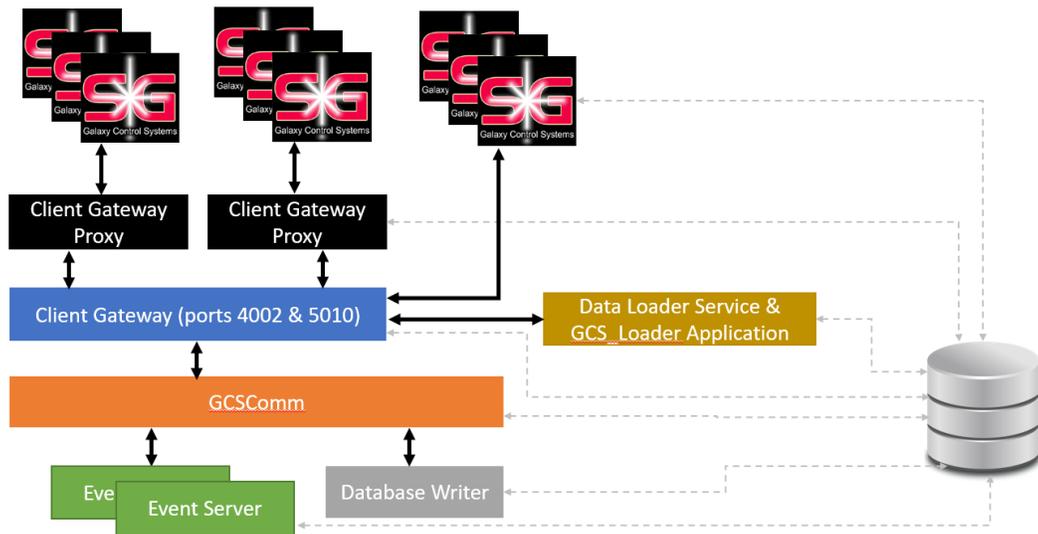
Installing and Configuring the Proxy Services

To effectively eliminate latency, there will need to be at least one, preferably two or more proxy services configured. The System Galaxy clients will be divided equally across the proxies so that each proxy will serve a portion of the client applications. The proxy services will automatically connect to the GCSClientGW service and as a result, the GCSClientGW service will have a few connections instead of many.

If only a single proxy is configured, the client applications should be divided equally between the proxy and GCSClientGW service. By moving at least half of the System Galaxy clients to the proxy, the load on the GCSClientGW service will be lessened significantly.

If the Galaxy server machine has sufficient resources (CPU & memory), these proxies could potentially be installed on the same machine as the GCSClientGW. They could also be installed on separate machines.

The GCSClientGW service is used for two important functions as it pertains the System Galaxy client applications:

- The System ID # is provided to the System Galaxy client applications. This occurs when the System Galaxy client application launches. System Galaxy establishes a transient (short-lived) IP connection on port # 5010 (default port) to obtain this data.
- All other communication (commands, status requests, activity and alarm event messages, etc.) are exchanged between the System Galaxy client application and the GCSClientGW service after the client application establishes a persistent (long-term) connection on port 4002 (default port)

When using a proxy service, the proxy service provides the above functions to the System Galaxy client application. In order to do so, the proxy service(s) must act as a pass-through agent for all messages. It must connect to the GCSClientGW as if it is a System Galaxy client application and it must accept connections and requests from System Galaxy client applications as if it is a client gateway service. In other words, it must function as both a client to the GCSClientGW and a server to the System Galaxy applications.

If installed on the same machine, configuration must be done to each proxy instance to ensure that there are no IP port conflicts. Each proxy must be configured to use unique port #s relative to the GCSClientGW and other proxy services.

Since the GCSClientGW is already using IP port #s 4002 and 5010, each proxy (if running on the same machine as GCSClientGW), must use other available port #s for the client applications to connect to. These port #s are configured in an INI file which is located in the same folder as the GCSClientGWProxy.exe file. The INI filename is GCSClientGWProxy.ini and can be edited with Notepad.exe or other text editor. The default values are 24001 and 24101.

If installing more than one proxy service on a given machine, each service executable must be named uniquely and it's corresponding .INI file must be named the same. In addition, each INI file must have unique port # values specified. The first proxy can use the default ports while any additional proxies must have their INI file edited manually and unique values specified.

Below is an example of three proxies configured in a common folder. Notice that each pair of exe and INI files are named appropriately. Also shown are the contents of each INI file with unique port numbers for each.
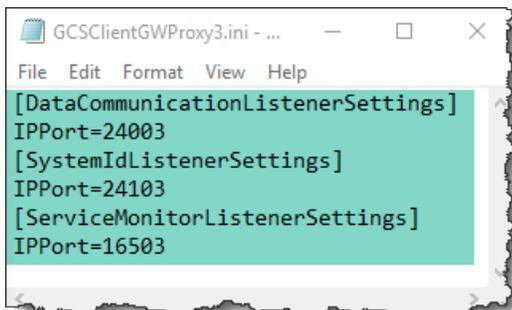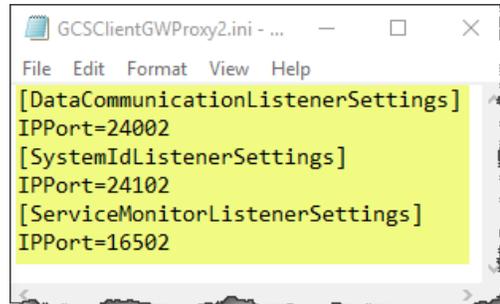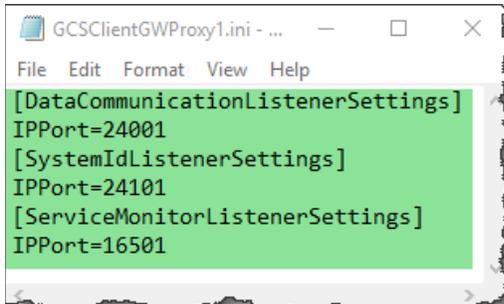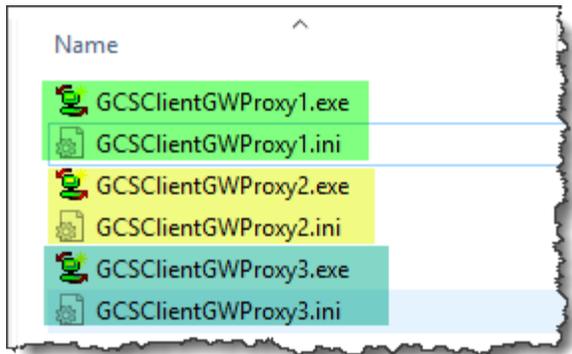
To install the services so that Windows can start them automatically, each exe must be manually executed as an Administrator as shown below. When the User Account Control prompt appears, grant permission to proceed. When the operation completes, a *'Service was installed successfully!'* message should be displayed. After this, the proxy services can be started manually using the GCSServiceMonitor, GCSServiceManager or the Windows provided Services application in Control Panel. Alternately, they could be started automatically by rebooting the machine.
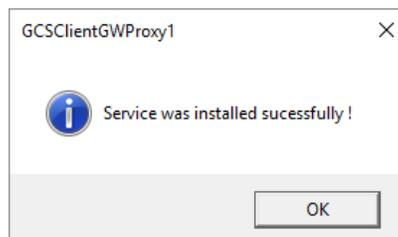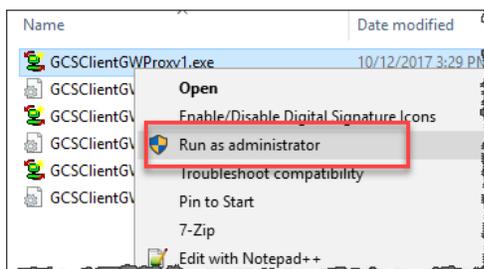
Configuring System Galaxy to Use a Proxy

To direct System Galaxy to connect to a proxy instead of the GCSClientGW service, the SGSettingsEditor must be used to override the default IP address and port #. *Prior to Version 10.5.3, these settings must be added manually. Beginning with Version 10.5.3, these settings exist, but must be manually edited.*

The settings are located in the Client Gateway branch for each workstation and are named **Override IPAddress**, **Override IPPort** and **Override System Id IPPort** respectively as shown below:
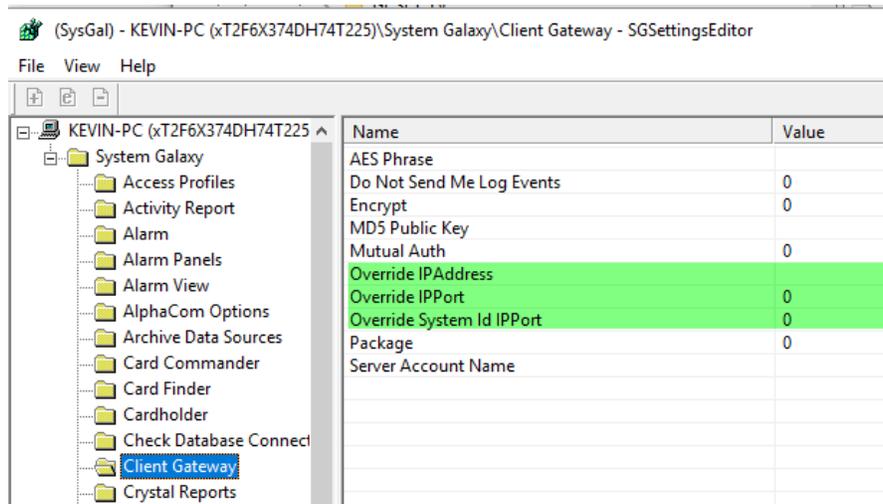
If the default values are specified as shown above, then the System Galaxy application will connect directly to the GCSClientGW as before. To direct System Galaxy on a specific workstation to use a proxy, the appropriate values must be entered.

In the example below, the application is configured to connect to the first proxy on port 24001 (for data communication) and 24101 (to obtain the System Id value). With the **Override IPAddress** blank, the application will look to the same IP address that the GCSClientGW is running on. If the proxy is located on a different machine than the GCSClientGW, then that specific IP address must be entered in the **Override IPAddress** setting.
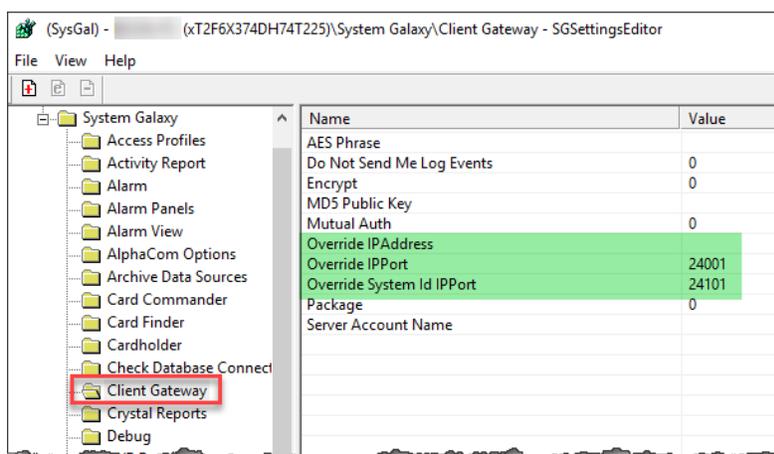
With these configuration changes in place, System Galaxy will communicate via the proxy service instead of directly to the GCSClientGW. The system should operate as before so that the configuration changes will be transparent to the user.