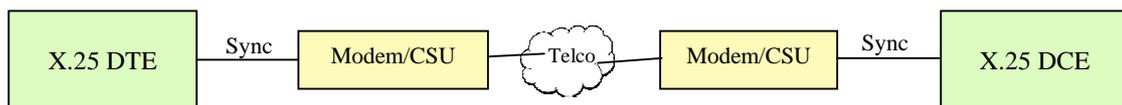


## Gcom Protocol Appliance X.25 Configuration

Configuring the GPA for X.25 operations involves a number of parameters. These parameters are used to tailor the operation of the link layer (called frame level in X.25 parlance), the packet level and the virtual circuits of X.25. This document explains the different parameters and relates those to configuration screens in the Gcom Management Console (GMC).

### X.25 Reference Model

The following diagram shows the standard model for an X.25 setup.



In the standard model an X.25 DTE (user equipment) is connected to an X.25 DCE (Network node) via a pair of synchronous modems or CSU/DSUs over a telephone network. The modems/CSUs in effect create a synchronous "cable" between the X.25 DTE and X.25 DCE.

Note that there is a difference between an X.25 DTE/DCE and the RS232 sense of DTE/DCE. An X.25 DTE/DCE is operating in the packet mode whereas the RS232 DTE/DCE refers to electrical signaling. It is important to keep this distinction in mind with X.25 because the terminology can be confusing.

Of course, one can simplify this diagram and connect the X.25 DTE and DCE via a simple RS232 or V.25 cable with one or the other of the devices providing the synchronous clocks. In this case the modems and the Telco network are not present.

And one can make the setup more complicated by introducing a router on each end of the setup with the router mimicking the operation of the modem and routing the packets over an IP network using the XOT protocol using RFC 1613.

For purposes of this document we will confine the discussion to either the standard model or the simplified version using a simple cable.

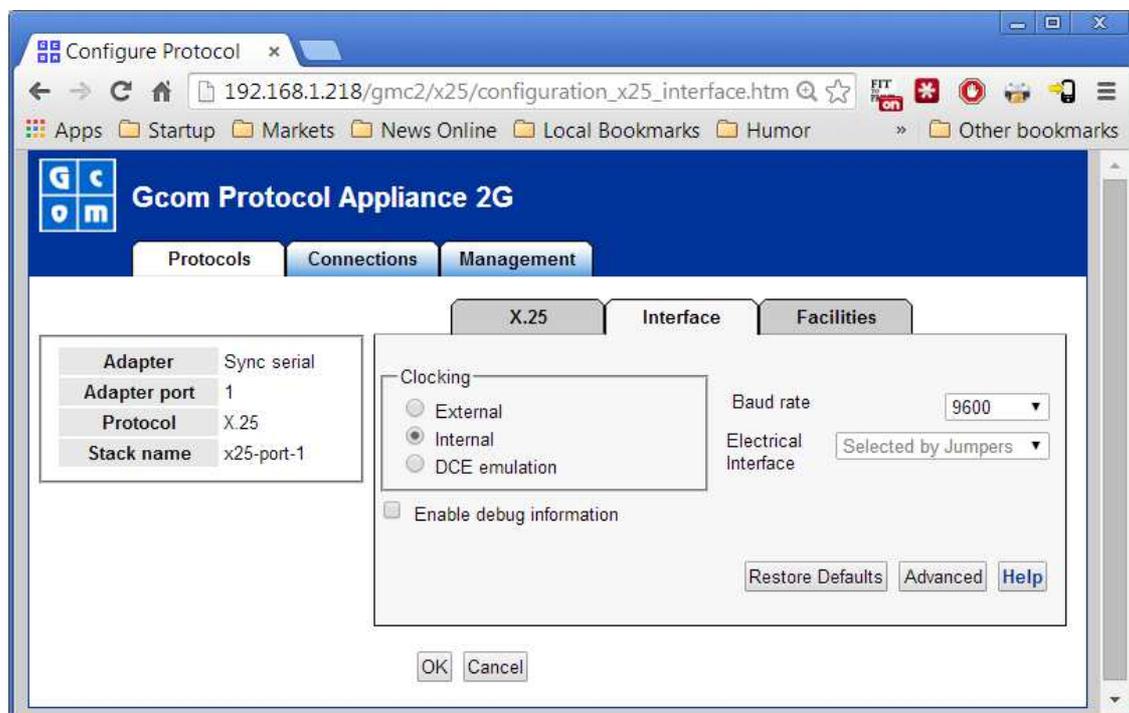
In addition to obtaining information sufficient to set the parameters discussed below *it is also advisable to obtain a trace from the customer showing link layer setup plus some*

*examples of virtual circuit setups.* There may be some questions that the user cannot answer and the information is likely revealed in a trace.

## Configuring the Link Layer

Configuring the link layer involves the electrical layer parameters more than the LAPB frame level parameters. Most parameters for LAPB are customarily set to the same values these days and the Gcom LAPB will negotiate the role of X.25 DTE or DCE automatically.

Here is the GMC configuration screen for the Interface layer of X.25.



The only options to be set are for clcking and for baud rate.

Use External clcking of connecting to a CSU/DSU or any external device that provides both transmit and receive clocks. Use Internal clcking if the GPA is expected to provide the transmit clocks (on pin 24 in RS232C); this is the option used when testing two ports back to back using the Gcom orange colored back-to-back cable. Use DCE emulation if the GPA is expected to provide both transmit and receive clocks; use in conjunction with the Gcom yellow colored DCE emulation cable.

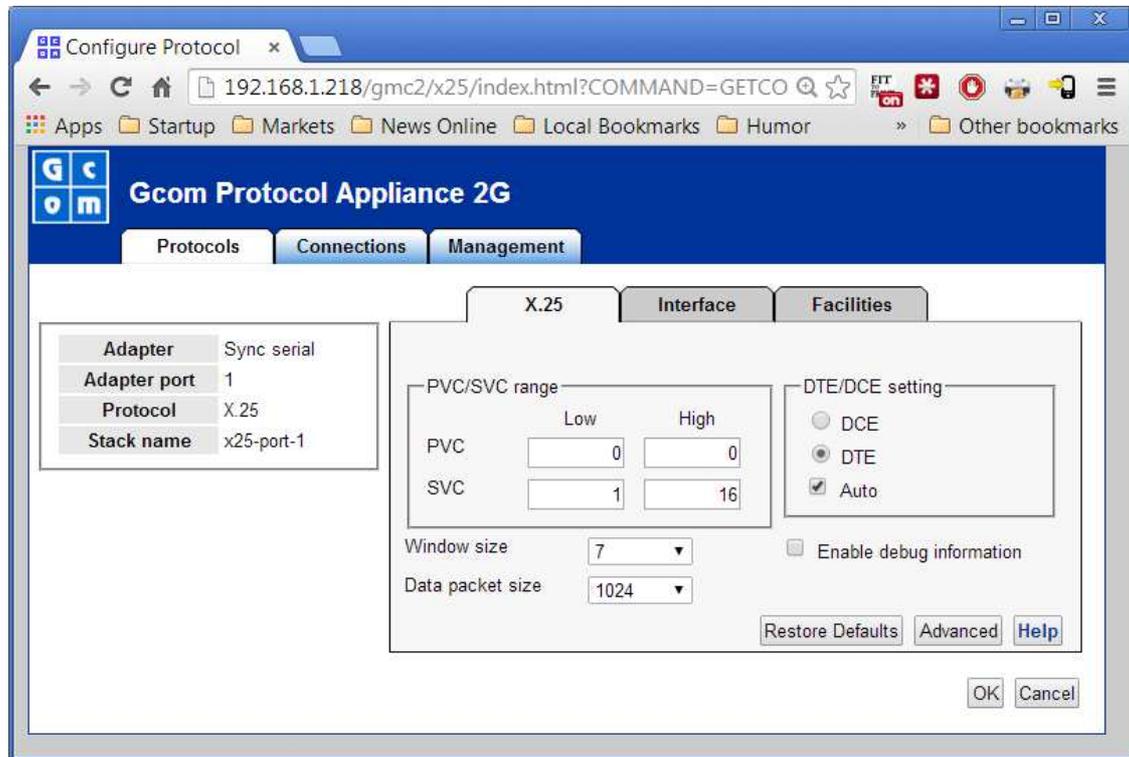
Set the Baud Rate if either Internal or DCE emulation clcking is being used. The pinouts for the DCE emulation cable are shown at the end of this document.

The electrical interface is set via jumpers on the synchronous adapter card. *Therefore, you should know the electrical interface type at the time that you order the GPA from Gcom so that the jumpers can be set to the proper positions prior to shipment.*

Link Layer Check List	
Clocking	
Baud rate	
Cable type (RS232, V.35, EIA530)	Obtain from user before ordering GPA.

## Configuring the X.25 Packet Layer Settings

Once the interface is set up we can turn our attention to the X.25 packet layer. Here is a screen shot of the X.25 packet layer setup screen.



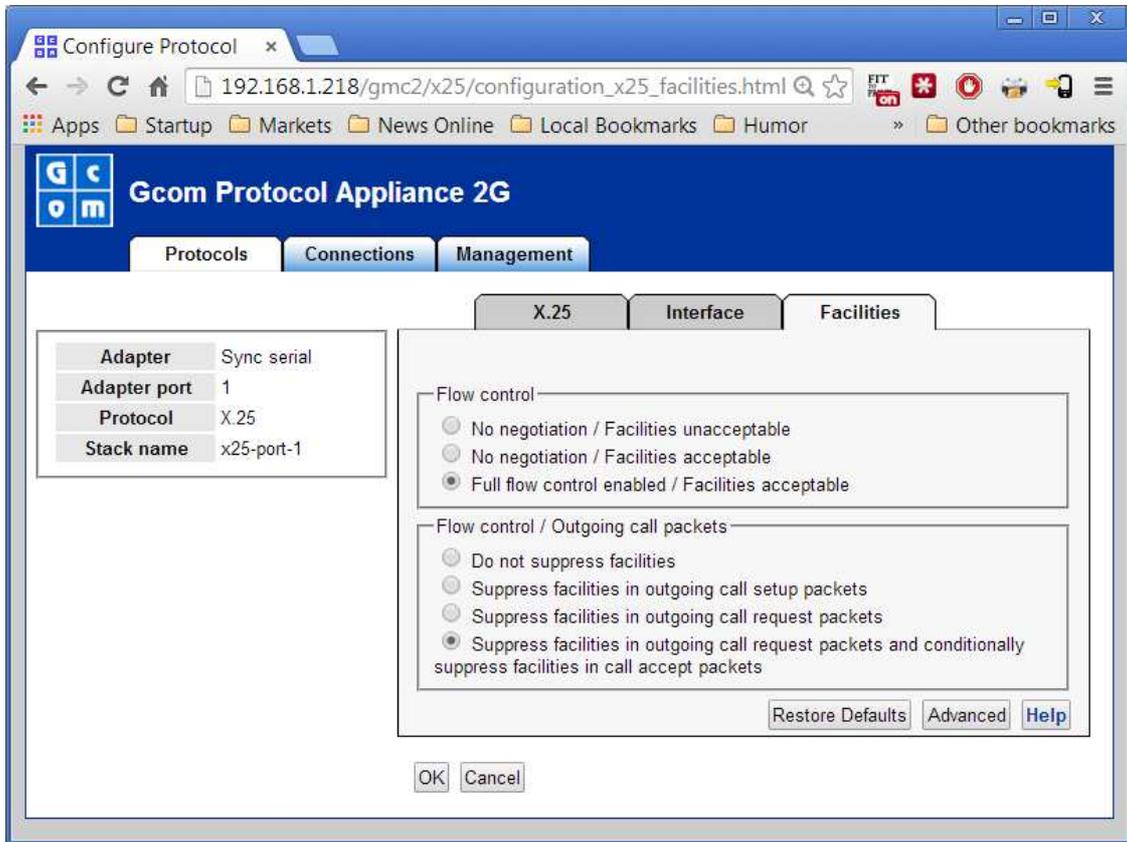
You need to know whether you are configuring PVCs (permanent virtual circuits) or SVCs (switched virtual circuits) or both. PVCs and SVCs each have a range of logical channel numbers. The channel numbers for PVCs and for SVCs must not overlap. Set the channel range to zeros if that type of virtual circuit is not being used. So, in the example, there are no PVCs and SVCs operate using channels 1 through 16.

The Window size parameter sets the default window size that is used for all virtual circuits. The window size can also be set on a per virtual circuit basis using a negotiating mechanism, see below.

The Data packet size parameter sets the default packet size. It sets just the data field length, excluding any headers. Like window size, packet size can be negotiated on a per circuit basis, see below.

The following screen shows the configuration of X.25 facilities. The term "facilities" essentially means options that are applied on a per virtual circuit basis. The ones that mainly concern us are the window size and packet size negotiating facilities. These are referred to as "flow control facilities".

It is unfortunately the case that most X.25 implementations are not capable of negotiating these parameters and will reject call setup packets in which these facilities are present.



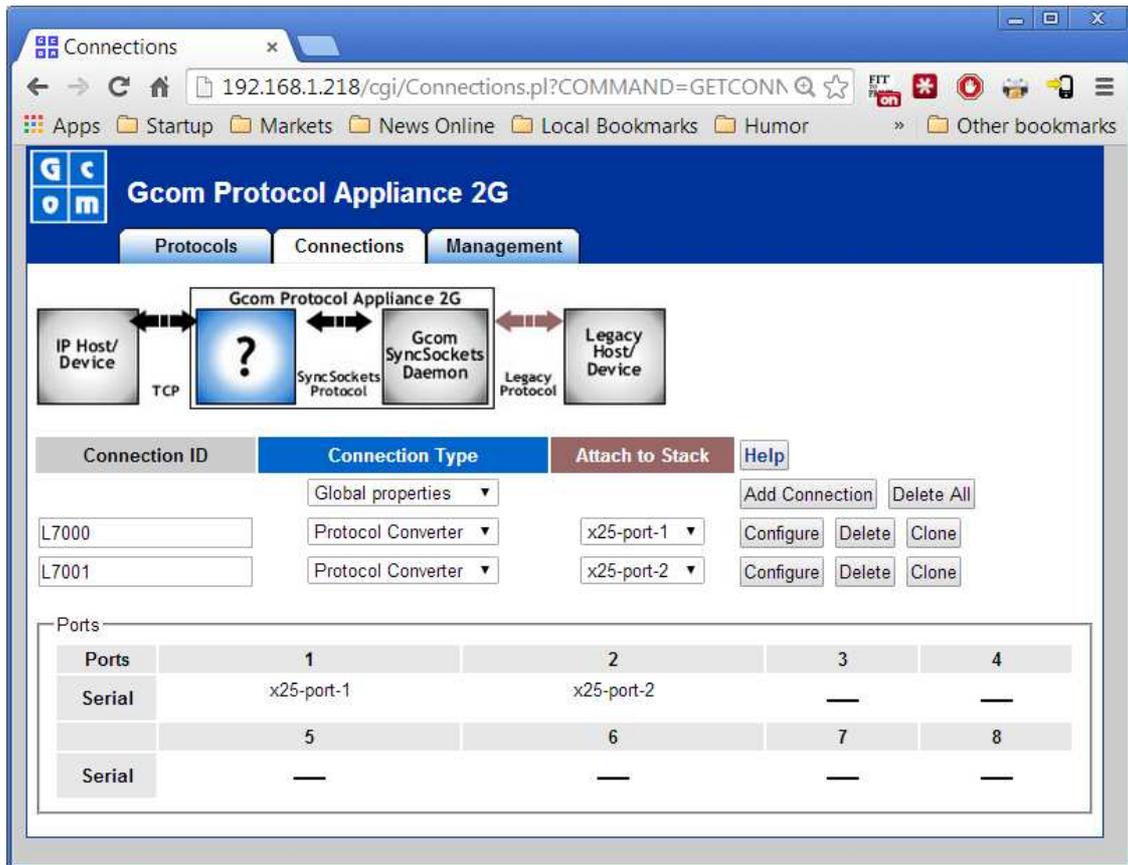
In the default case the GPA will fully participate in flow control facility negotiations. In addition it will not insert these facilities into outgoing call request packets and will only insert them into call accept packets if the corresponding incoming call packet had them. This is intended to cover the case in which the peer X.25 either does or does not implement these negotiations.

Please note that if these flow control parameters cannot be negotiated then you must configure them correctly on the first configuration panel.

X.25 Packet Level Check List	
PVC channel range	
SVC channel range	
Default window size	
Default packet size	
Flow control negotiation	User likely does not know whether their equipment implements this.

## Configuring Virtual Circuit Settings

Each X.25 protocol stack is capable of operating multiple virtual circuits. In the parlance of the GPA and GMC, a virtual circuit is a "Connection" and is configured under the Connections tab of the GMC. This screen looks like the following.



Each connection is given a name (by you). Connection type of Protocol Converter means translate to TCP/IP; there are other options which we will not discuss here.

Each connection is attached to a protocol stack by name. Select the name given the stack when configuring on the Protocol page. The Configure button opens up the connection for configuration. The Clone button makes a copy of it with a generated name so that you can use existing connections to make new similar ones. You can also click on the Add Connection button just to get a blank connection form to fill out.

Because we are working with Protocol Converter connections there will be a "TCP side" and an "X.25 side" of each connection to configure. The following screen shots illustrate the TCP side and the X.25 side of the connection definition.

Connections-X.25-Cc x

192.168.1.218/gmc2/connections/x25\_pcd\_converter.html

Apps Startup Markets News Online Local Bookmarks Humor Other bookmarks

## Gcom Protocol Appliance 2G

Protocols Connections Management

X.25 Converter

Connection ID	L7000
Connection type	Protocol Converter
Stack Name	x25-port-1

Connection to IP host/device

```

graph LR
    IP[IP Host/Device] <--> GPA[Gcom Protocol Converter Daemon]
    GPA <--> GSD[Gcom SyncSockets Daemon]
    GSD <--> LH[Legacy Host/Device]
  
```

Connection mode

- Actively connect to IP host
- Listen for IP host
- Connection can be cloned
- Connect/disconnect coupled together

Listen (GPA Server)

GPA local IP address

GPA local port number

Connect (GPA Client)

Remote host IP address

Remote host port number

GPA local IP address

GPA local port number

Encapsulation

Encapsulation

Byte Count Length Mode

- Byte count does not include header
- Byte count includes header

Byte Order

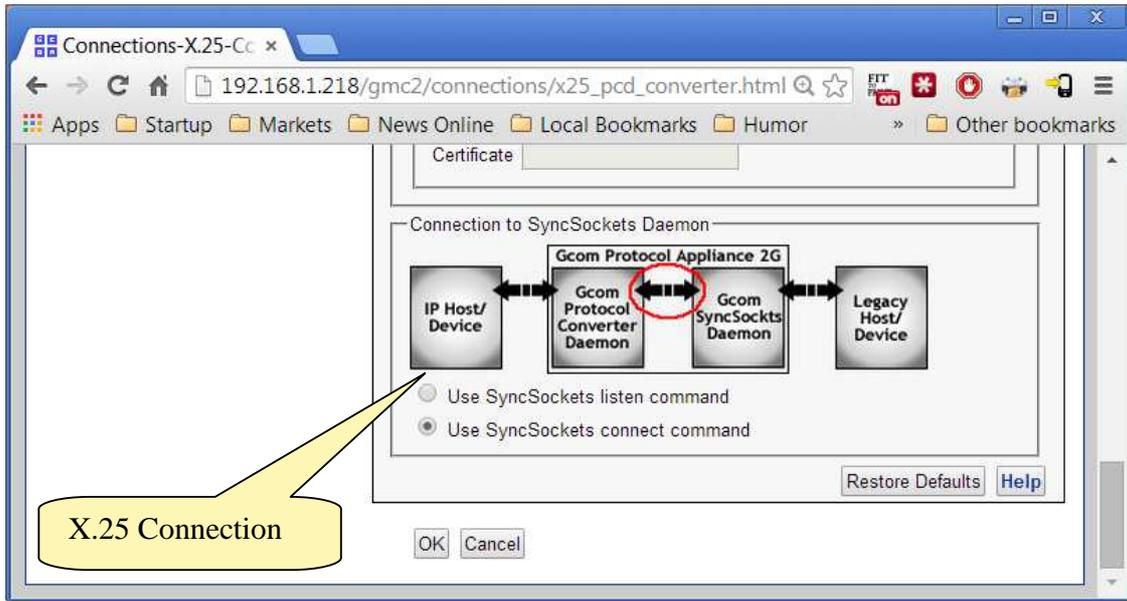
- High order byte first
- Low order byte first

SSL Encryption

Use SSL

Certificate

TCP Connection



The top half of this screen addresses the TCP connection into which X.25 is translated. The bottom box is concerned with how the Protocol Converter module connects to the X.25 virtual circuit. (Note that it is virtual circuits that are translated to TCP, one TCP connection for each virtual circuit).

For the TCP connection, the GPA can act as TCP server, listening for incoming TCP connections, or it can act as TCP client, connecting to a TCP capable host computer, usually the user's mainframe.

In the case of the GPA acting as server it is necessary to specify the port number on which the GPA is to listen. Optionally you can specify a local IP address. If you specify this address then the GPA will configure a virtual Ethernet port on eth0 having this IP address. In this way the GPA can listen for incoming connections on many different IP addresses, pretending to be multiple IP devices.

In the case of the GPA acting as client it is necessary to specify the IP address and port number of the TCP host. The local IP address and port number are both optional. If specified they supply the source IP address and port number in packets sent to the indicated TCP host. If the local IP address is left blank the source address will be the address assigned to eth0. If the local port number is left blank a random port number will be provided. By specifying these parameters the GPA can pretend to be multiple IP devices, each with its own IP address, connecting to the TCP host. This allows the TCP host to view the network as pure IP with each device having a unique IP address.

TCP is a byte stream protocol with no inherent message boundaries. You will need to select an encapsulation method that establishes these message boundaries. There are quite a number of them to choose from. The most popular ones are 2-byte, 4-byte ASCII decimal, and 4-digit BCD. The encapsulation method must agree with the settings on the remote TCP host.

The TCP connection setup screen also contains options for using SSL connections and for whether or not the TCP connection setup and teardown is coupled with the X.25 virtual circuit establishment and clearing.

The TCP connection setup and teardown can be either coupled to the X.25 virtual circuit setup and teardown, or the two can proceed independently. Use the coupled mode when it is desirable to have loss of connectivity on one connection reflected in the other. Use the uncoupled mode when it is desirable to keep the X.25 virtual circuit active if the TCP connection is closed. This mode may make the most sense if the X.25 side is a permanent virtual circuit.

The lower box is used to instruct the Protocol Converter module how to set up connections to X.25 virtual circuits. It can either passively listen for an incoming call or actively issue a call request packet to establish the virtual circuit. When considered in combination with the TCP connection mode the following cases can be specified.

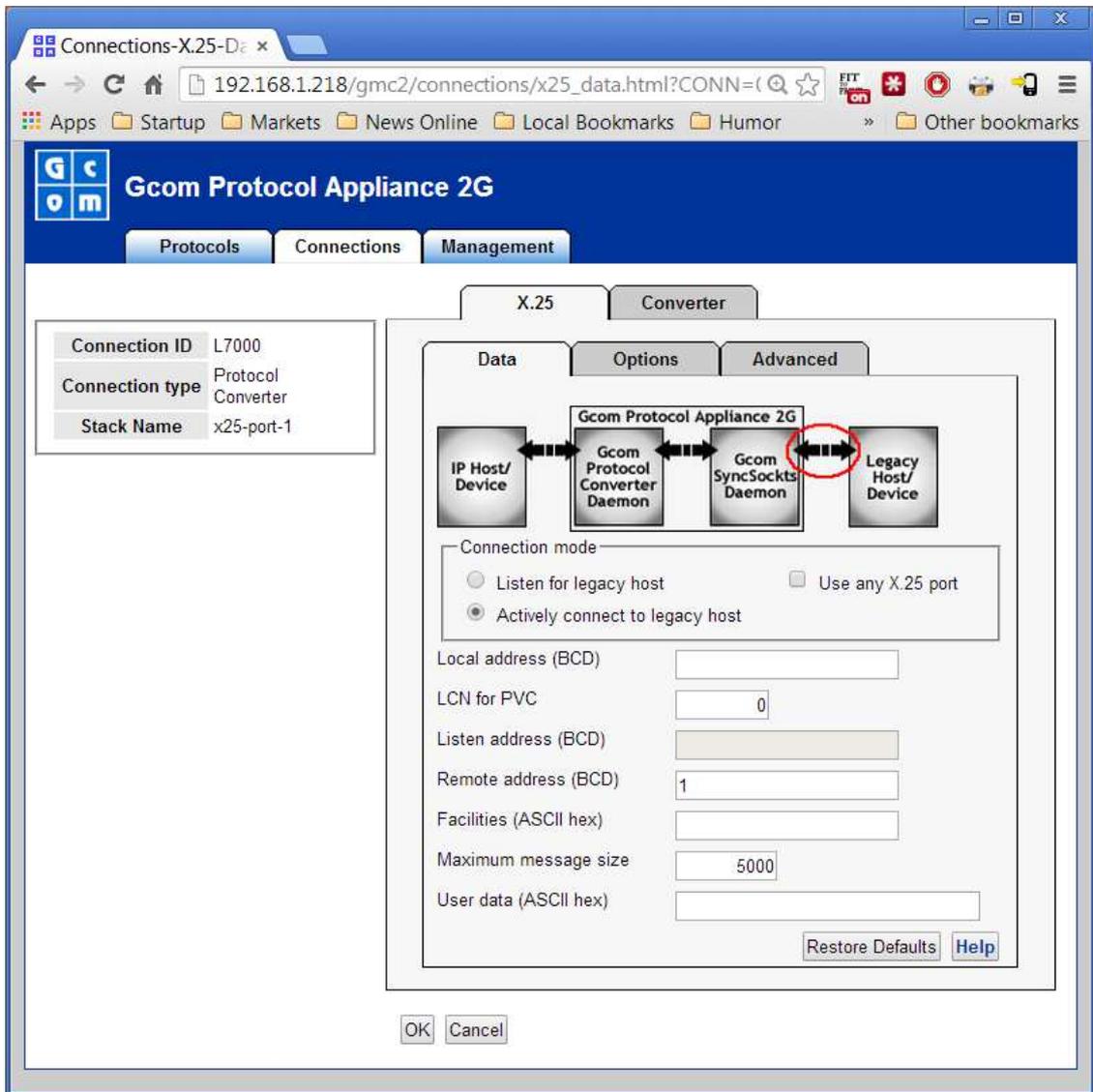
TCP vs X.25 Connection Mode, Coupled		
<i>TCP mode</i>	<i>X.25 mode</i>	<i>Action</i>
Listen	Listen	Both sides listen. The connection is complete when both sides are in the data transfer state. If one connection is disconnected then disconnect the other as well.
Listen	Connect	X.25 virtual circuit initiated when TCP connection completes. If one connection is disconnected then disconnect the other as well.
Connect	Listen	TCP connection initiated when X.25 virtual circuit setup completes. If one connection is disconnected then disconnect the other as well.
Connect	Connect	TCP connection and X.25 virtual circuit initiated simultaneously. The connection is complete when both sides are in the data transfer state. If one connection is disconnected then disconnect the other as well.

TCP vs X.25 Connection Mode, Uncoupled		
<i>TCP mode</i>	<i>X.25 mode</i>	<i>Action</i>
Listen	Listen	Both sides listen. The connection is complete when both sides are in the data transfer state. If one connection is disconnected it has no effect on the other.
Listen	Connect	TCP listens and X.25 connects simultaneously. The connection is complete when both sides are in the data transfer state. If one connection is disconnected it has no effect on the other.
Connect	Listen	TCP connection initiated and X.25 listen simultaneously. The connection is complete when both sides are in the data transfer state. If one connection is disconnected it has no effect on the other.
Connect	Connect	TCP connection and X.25 virtual circuit initiated simultaneously. The connection is complete when both sides are in the data transfer state. If one connection is disconnected it has no effect on the other.

Here is the check list for configuring the Protocol Converter.

Protocol Converter Check List	
TCP listen or connect	
Local address:port if listening	Leave address blank if not emulating multiple IP hosts.
Remote address:port if connecting	
Optional local address:port	Leave blank if not emulating multiple IP hosts.
X.25 listen or connect	
TCP and X.25 connections coupled or not.	Select "coupled" as the default.
Encapsulation type	
Using SSL encryption or not	

The next step is to look at the X.25 tab for the connection.



The connection mode should be set to connect or listen to match the setting at the bottom of the previous screen.

The Local address is the X.25 address assigned to the GPA. This address, if set, is included in call setup packets. Chances are you can leave this field blank.

If this is to be a connection that uses a PVC then you must specify the X.25 logical channel number of the PVC here. Each PVC connection must use a different LCN and they all must lie within the range of PCV channels that was configured on the Protocol tab above.

The Listen address is for listening type of virtual circuits. It sets the X.25 address that must be in the called address field of the X.25 incoming call packet. You can set this

parameter to different values in order to associate different incoming call destinations with different TCP connections, say to different IP addresses and/or port numbers. On the other hand, if all incoming X.25 calls are to be sent to the same IP address and port number then you can set this parameter to '\*' (without the quote marks). This is a wild card that will match any incoming call address.

The Remote address is used for outgoing X.25 calls. It is the X.25 address of the remote DTE to which the GPA is connecting. The user will need to supply this information, or it must be gleaned from examining a trace.

The maximum message size is not related to the X.25 packet size. It is the maximum length of a TCP message that can be accepted. Messages longer than the X.25 packet size will be broken into packet sized segments automatically by the GPA.

X.25 Virtual Circuit Check List	
Local X.25 address	Can leave blank.
PVC channel number	If this is a PVC connection.
Listen address	If listening for incoming calls.
Remote address	If connecting with call request.
Maximum message size	Default value will probably work just fine.

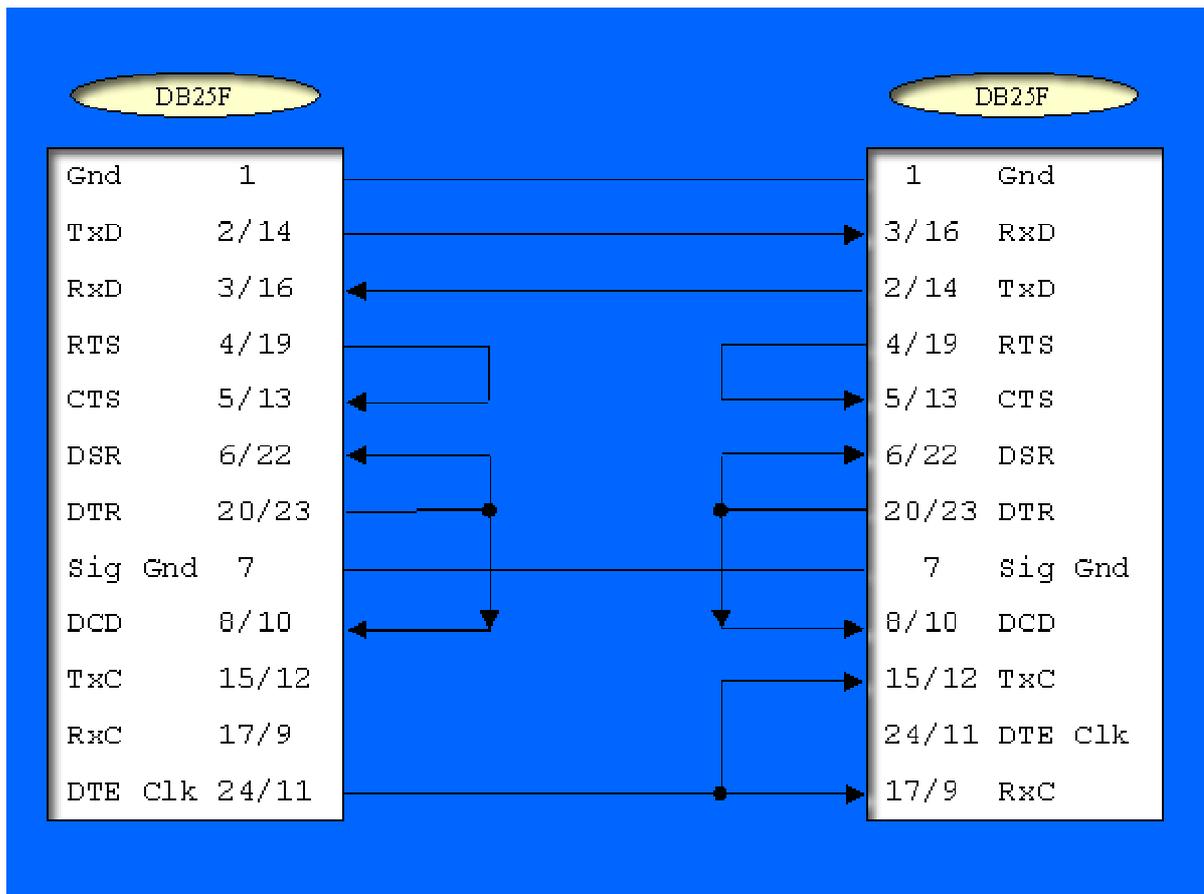
## Consolidated Check Lists

Link Layer Check List	
Clocking	
Baud rate	
Cable type (RS232, V.35, EIA530)	Obtain from user before ordering GPA.
X.25 Packet Level Check List	
PVC channel range	
SVC channel range	
Default window size	
Default packet size	
Flow control negotiation	User likely does not know whether their equipment implements this.
Protocol Converter Check List	
TCP listen or connect	
Local address:port if listening	Leave address blank if not emulating multiple IP hosts.
Remote address:port if connecting	
Optional local address:port	Leave blank if not emulating multiple IP hosts.
X.25 listen or connect	
TCP and X.25 connections coupled or not.	Select "coupled" as the default.
Encapsulation type	
Using SSL encryption or not	
X.25 Virtual Circuit Check List	
Local X.25 address	Can leave blank.
PVC channel number	If this is a PVC connection.
Listen address	If listening for incoming calls.
Remote address	If connecting with call request.
Maximum message size	Default value will probably work just fine.

## Gcom "Yellow" DCE Emulation Cable Pinouts

### RS232/EIA530 DCE Emulation Cable Pinouts

Use this RS232 and EIA530 asymmetrical cable to emulate a DCE from a port on a Gcom synchronous adapter. The pin numbers are shown in the form *x/y*. The *x* pin is for both RS232 and EIA530 and is the A side of the EIA530 circuit. The *y* pin is for EIA530 only and is the B side of the circuit.



Both RS232 and EIA530 use a DB25 connector. Typically a DTE ends in a DB25M (male connector) and a DCE ends in a DB25F (female connector). Thus, the diagram shows a DB25F on both ends where it plugs into a DTE.

The arrows indicate the signal flow direction, from DTE to DCE or vice versa. When constructing special cables, make sure the signals flow in the proper directions.

The left end of the cable connects to a Gcom synchronous adapter. The right end connects to a DTE. The Gcom adapter provides clocking on pins 24/11, which are routed to the TxC and RxC on the DCE (right) end of the cable. This clock routing makes the cable asymmetrical. The cable does not function correctly unless the left connector is connected to a port on a Gcom adapter.

The modem control signals RTS, CTS, DTR, DCD, and DSR are fed back on each end of the cable. The RTS/CTS looping allows a connected DTE to operate in either half-duplex or full-duplex mode. In half-duplex mode, the DTE perceives that CTS changes state immediately upon a change in RTS state. The DTR/DSR/DCD looping gives the appearance of modem readiness and connection as soon as the DTE asserts DTR.

If you use this cable with a Gcom adapter, the appropriate clocking option value is 2.