



**AN-185**

# Configuring a Protege GX Controller's 3G Modem

Application Note



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# Introduction

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The inbuilt 3G modem of a Protege GX controller can act as a second Ethernet interface operating over a mobile network. The configuration of the modem must be carried out via commands in the Protege GX controller programming.

This application note applies only to the Protege GX controller with inbuilt 3G modem (product code: PRT-CTRL-DIN-3G).

# Configuration

## Enabling the 3G Modem

Changes made to the firewall settings won't take effect until the controller has been power cycled. Restarting the controller from the web interface will not update the firewall settings.

To configure the 3G modem, navigate to **Sites | Controllers** and enter the following parameters into the **Commands** field:

```
3GEnable = true
3GUser = admin
3GPass = admin
3GAPN = internet
3GDebug = 1
3GFirewall = true
Allow3GPing = true
Allow3GDownload = true
Allow3GControl = true
Allow3GWebInt = true
```

Line	Parameter	Description
Line 1	<b>3GEnable</b>	Enables and disables 3G modem processing. This must be set to 'true' to use the 3G modem functionality.
Line 2	<b>3GUser</b>	The username required by your service provider to access the network you are trying to connect to. Many service providers do not require a username to be entered and in most cases this can be set to 'admin' or even omitted.
Line 3	<b>3GPass</b>	The password required by your service provider to access the network you are trying to connect to. Many service providers do not require a password to be entered and in most cases this can be set to 'admin' or even omitted.
Line 4	<b>3GAPN</b>	The access point name provided by your service provider.
Line 5	<b>3GDebug</b>	Allows debug events to be viewed from the event log. These events show the dialing process and can aid in diagnosing problems.
Line 6	<b>3GFirewall</b>	Enables and disables the 3G modem's firewall. It may be useful to disable the firewall while commissioning but it is recommended that the firewall be enabled during normal operation. When enabled, all inbound traffic will be blocked unless specifically allowed by the following commands.
Line 7	<b>Allow3GPing</b>	With the firewall enabled this command will set an exception to allow the controller to respond to ping requests.
Line 8	<b>Allow3GDownload</b>	With the firewall enabled this command will set an exception to allow the controller to accept programming packets on the configured download port.
Line 9	<b>Allow3GControl</b>	With the firewall enabled this command will set an exception to allow the controller to accept control packets on the configured control port.
Line 10	<b>Allow3GWebInt</b>	With the firewall enabled this command will set an exception to allow the controller to expose the web interface over the 3G connection.

## Event/Status Reporting

Any changes made to the **EventAdaptor#** settings won't take effect until the controller has been power cycled, or restarted from the web interface.

For reporting purposes, you are able to define which adapters the system uses for event/status reporting. To do this, add the following lines into the **Commands** field:

```
EventAdaptor1 = 1
EventAdaptor2 = 2
EventAdaptor3 = 1
EventFallback = 15
```

Line	Parameter	Description
Line 1	<b>EventAdaptor1</b>	<p>Defines which adapter(s) to use for the first event server. This is only valid if the first event server has a valid IP address (i.e. not 0.0.0.0) programmed via the web interface.</p> <p>Following the = sign:</p> <ul style="list-style-type: none"><li>• If a 1 is entered the service uses the cable.</li><li>• If a 2 is entered the service uses the 3G modem.</li><li>• If a 3 is entered the service uses the cable first, then the 3G modem if there is no response, and alternates between connections until a valid path is found.</li></ul>
Line 2	<b>EventAdaptor2</b>	<p>Defines which adapter(s) to use for the second event server. This is only valid if the second event server has a valid IP address (i.e. not 0.0.0.0) programmed via the web interface.</p> <p>Following the = sign:</p> <ul style="list-style-type: none"><li>• If a 1 is entered the service uses the cable.</li><li>• If a 2 is entered the service uses the 3G modem.</li><li>• If a 3 is entered the service uses the cable first, then the 3G modem if there is no response, and alternates between connections until a valid path is found.</li></ul>
Line 3	<b>EventAdaptor3</b>	<p>Defines which adapter(s) to use for the third event server. This is only valid if the third event server has a valid IP address (i.e. not 0.0.0.0) programmed via the web interface.</p> <p>Following the = sign:</p> <ul style="list-style-type: none"><li>• If a 1 is entered the service uses the cable.</li><li>• If a 2 is entered the service uses the 3G modem.</li><li>• If a 3 is entered the service uses the cable first, then the 3G modem if there is no response, and alternates between connections until a valid path is found.</li></ul>
Line 4	<b>EventFallback</b>	<p>Defines the number of minutes before the system retries the first event server IP address with the first (cable) adapter again. If this is not specified, the default value of 15 is used. The maximum time is 255 minutes.</p>

## Reporting Service

You can configure whether IP Reporting Services on the controller use the fixed or wireless connection for communications. The adapter used for IP Reporting Services can be configured in the Service programming.

1. Navigate to **Programming | Services**. In the toolbar, set the **Controller** required, then **Add** a new Service.
2. Set the **Service Type** to Report IP.
3. In the **General** tab, fill out the **Primary Channel Settings** and **Secondary Channel Settings**.

4. Set the **Adapter** for each channel to either Cable or 3G Modem. The secondary channel will act as a backup for the primary channel if it fails to communicate.

## Debug Messages

When the Debug Events (**3GDebug=true**) option is enabled, the event log displays Debug 009 messages. These messages show the status of the connection and can be helpful when troubleshooting is required.

Debug messages are transmitted in the following format:

```
System Debug Event 009 Sub 1 Data 0000:0020:0000:0000
```

The four numbers after the word Data are hexadecimal and represent a code, in order from lowest to highest. For example, the event above is a type 01 code with the data 00,20,00,00 - this corresponds to the RASCS\_Connected event.

For Debug 009 Sub 1 messages, the data section represents a code that corresponds to one of the following events:

Code (Decimal)	Code (Hexadecimal)	Description
0	00	RASCS_OpenPort
1	01	RASCS_PortOpened
2	02	RASCS_ConnectDevice
3	03	RASCS_DeviceConnected
4	04	RASCS_AllDevicesConnected
5	05	RASCS_Authenticate
6	06	RASCS_AuthNotify
7	07	RASCS_AuthRetry
8	08	RASCS_AuthCallback
9	09	RASCS_AuthChangePassword
10	0A	RASCS_AuthProject
11	0B	RASCS_AuthLinkSpeed
12	0C	RASCS_AuthAck
13	0D	RASCS_ReAuthenticate
14	0E	RASCS_Authenticated
15	0F	RASCS_PrepareForCallback
16	10	RASCS_WaitForModemReset
17	11	RASCS_WaitForCallback
18	12	RASCS_Projected
-	-	-
4096	10 00	RASCS_Interactive
4097	10 01	RASCS_RetryAuthentication
4098	10 02	RASCS_CallbackSetByCaller
4099	10 03	RASCS_PasswordExpired

Code (Decimal)	Code (Hexadecimal)	Description
-	-	-
8192	20 00	RASCS_Connected
8193	20 01	RASCS_Disconnected

Debug 009 type 02 messages indicate errors. The data section represents code that corresponds to one of the following events:

Code (Decimal)	Code (Hexadecimal)	Description
600	02 58	PENDING
601	02 59	ERROR_INVALID_PORT_HANDLE
602	02 5A	ERROR_PORT_ALREADY_OPEN
603	02 5B	ERROR_BUFFER_TOO_SMALL
604	02 5C	ERROR_WRONG_INFO_SPECIFIED
605	02 5D	ERROR_CANNOT_SET_PORT_INFO
606	02 5E	ERROR_PORT_NOT_CONNECTED
607	02 5F	ERROR_EVENT_INVALID
608	02 60	ERROR_DEVICE_DOES_NOT_EXIST
609	02 61	ERROR_DEVICETYPE_DOES_NOT_EXIST
610	02 62	ERROR_BUFFER_INVALID
611	02 63	ERROR_ROUTE_NOT_AVAILABLE
612	02 64	ERROR_ROUTE_NOT_ALLOCATED
613	02 65	ERROR_INVALID_COMPRESSION_SPECIFIED
614	02 66	ERROR_OUT_OF_BUFFERS
615	02 67	ERROR_PORT_NOT_FOUND
616	02 68	ERROR_ASYNC_REQUEST_PENDING
617	02 69	ERROR_ALREADY_DISCONNECTING
618	02 6A	ERROR_PORT_NOT_OPEN
619	02 6B	ERROR_PORT_DISCONNECTED
620	02 6C	ERROR_NO_ENDPOINTS
621	02 6D	ERROR_CANNOT_OPEN_PHONEBOOK
622	02 6E	ERROR_CANNOT_LOAD_PHONEBOOK
623	02 6F	ERROR_CANNOT_FIND_PHONEBOOK_ENTRY
624	02 70	ERROR_CANNOT_WRITE_PHONEBOOK
625	02 71	ERROR_CORRUPT_PHONEBOOK
626	02 72	ERROR_CANNOT_LOAD_STRING
627	02 73	ERROR_KEY_NOT_FOUND
628	02 74	ERROR_DISCONNECTION



Code (Decimal)	Code (Hexadecimal)	Description
629	02 75	ERROR_REMOTE_DISCONNECTION
630	02 76	ERROR_HARDWARE_FAILURE
631	02 77	ERROR_USER_DISCONNECTION
632	02 78	ERROR_INVALID_SIZE
633	02 79	ERROR_PORT_NOT_AVAILABLE
634	02 7A	ERROR_CANNOT_PROJECT_CLIENT
635	02 7B	ERROR_UNKNOWN
636	02 7C	ERROR_WRONG_DEVICE_ATTACHED
637	02 7D	ERROR_BAD_STRING
638	02 7E	ERROR_REQUEST_TIMEOUT
639	02 7F	ERROR_CANNOT_GET_LANA
640	02 80	ERROR_NETBIOS_ERROR
641	02 81	ERROR_SERVER_OUT_OF_RESOURCES
642	02 82	ERROR_NAME_EXISTS_ON_NET
643	02 83	ERROR_SERVER_GENERAL_NET_FAILURE
644	02 84	WARNING_MSG_ALIAS_NOT_ADDED
645	02 85	ERROR_AUTH_INTERNAL
646	02 86	ERROR_RESTRICTED_LOGON_HOURS
647	02 87	ERROR_ACCT_DISABLED
648	02 88	ERROR_PASSWD_EXPIRED
649	02 89	ERROR_NO_DIALIN_PERMISSION
650	02 8A	ERROR_SERVER_NOT_RESPONDING
651	02 8B	ERROR_FROM_DEVICE
652	02 8C	ERROR_UNRECOGNIZED_RESPONSE
653	02 8D	ERROR_MACRO_NOT_FOUND
654	02 8E	ERROR_MACRO_NOT_DEFINED
655	02 8F	ERROR_MESSAGE_MACRO_NOT_FOUND
656	02 90	ERROR_DEFAULTOFF_MACRO_NOT_FOUND
657	02 91	ERROR_FILE_COULD_NOT_BE_OPENED
658	02 92	ERROR_DEVICENAME_TOO_LONG
659	02 93	ERROR_DEVICENAME_NOT_FOUND
660	02 94	ERROR_NO_RESPONSES
661	02 95	ERROR_NO_COMMAND_FOUND
662	02 96	ERROR_WRONG_KEY_SPECIFIED
663	02 97	ERROR_UNKNOWN_DEVICE_TYPE

Code (Decimal)	Code (Hexadecimal)	Description
664	02 98	ERROR_ALLOCATING_MEMORY
665	02 99	ERROR_PORT_NOT_CONFIGURED
666	02 9A	ERROR_DEVICE_NOT_READY
667	02 9B	ERROR_READING_INI_FILE
668	02 9C	ERROR_NO_CONNECTION
669	02 9D	ERROR_BAD_USAGE_IN_INI_FILE
670	02 9E	ERROR_READING_SECTIONNAME
671	02 9F	ERROR_READING_DEVICETYPE
672	02 A0	ERROR_READING_DEVICENAME
673	02 A1	ERROR_READING_USAGE
674	02 A2	ERROR_READING_MAXCONNECTBPS
675	02 A3	ERROR_READING_MAXCARRIERBPS
676	02 A4	ERROR_LINE_BUSY
677	02 A5	ERROR_VOICE_ANSWER
678	02 A6	ERROR_NO_ANSWER
679	02 A7	ERROR_NO_CARRIER
680	02 A8	ERROR_NO_DIALTONE
681	02 A9	ERROR_IN_COMMAND
682	02 AA	ERROR_WRITING_SECTIONNAME
683	02 AB	ERROR_WRITING_DEVICETYPE
684	02 AC	ERROR_WRITING_DEVICENAME
685	02 AD	ERROR_WRITING_MAXCONNECTBPS
686	02 AE	ERROR_WRITING_MAXCARRIERBPS
687	02 AF	ERROR_WRITING_USAGE
688	02 B0	ERROR_WRITING_DEFAULTOFF
689	02 B1	ERROR_READING_DEFAULTOFF
690	02 B2	ERROR_EMPTY_INI_FILE
691	02 B3	ERROR_AUTHENTICATION_FAILURE
692	02 B4	ERROR_PORT_OR_DEVICE
693	02 B5	ERROR_NOT_BINARY_MACRO
694	02 B6	ERROR_DCB_NOT_FOUND
695	02 B7	ERROR_STATE_MACHINES_NOT_STARTED
696	02 B8	ERROR_STATE_MACHINES_ALREADY_STARTED
697	02 B9	ERROR_PARTIAL_RESPONSE_LOOPING
698	02 BA	ERROR_UNKNOWN_RESPONSE_KEY

Code (Decimal)	Code (Hexadecimal)	Description
699	02 BB	ERROR_RECV_BUF_FULL
700	02 BC	ERROR_CMD_TOO_LONG
701	02 BD	ERROR_UNSUPPORTED_BPS
702	02 BE	ERROR_UNEXPECTED_RESPONSE
703	02 BF	ERROR_INTERACTIVE_MODE
704	02 C0	ERROR_BAD_CALLBACK_NUMBER
705	02 C1	ERROR_INVALID_AUTH_STATE
706	02 C2	ERROR_WRITING_INITBPS
707	02 C3	ERROR_X25_DIAGNOSTIC
708	02 C4	ERROR_ACCT_EXPIRED
709	02 C5	ERROR_CHANGING_PASSWORD
710	02 C6	ERROR_OVERRUN
711	02 C7	ERROR_RASMAN_CANNOT_INITIALIZE
712	02 C8	ERROR_BIPLEX_PORT_NOT_AVAILABLE
713	02 C9	ERROR_NO_ACTIVE_ISDN_LINES
714	02 CA	ERROR_NO_ISDN_CHANNELS_AVAILABLE
715	02 CB	ERROR_TOO_MANY_LINE_ERRORS
716	02 CC	ERROR_IP_CONFIGURATION
717	02 CD	ERROR_NO_IP_ADDRESSES
718	02 CE	ERROR_PPP_TIMEOUT
719	02 CF	ERROR_PPP_REMOTE_TERMINATED
720	02 D0	ERROR_PPP_NO_PROTOCOLS_CONFIGURED
721	02 D1	ERROR_PPP_NO_RESPONSE
722	02 D2	ERROR_PPP_INVALID_PACKET
723	02 D3	ERROR_PHONE_NUMBER_TOO_LONG
724	02 D4	ERROR_IPXCP_NO_DIALOUT_CONFIGURED
725	02 D5	ERROR_IPXCP_NO_DIALIN_CONFIGURED
726	02 D6	ERROR_IPXCP_DIALOUT_ALREADY_ACTIVE
727	02 D7	ERROR_ACCESSING_TCPCFGDLL
728	02 D8	ERROR_NO_IP_RAS_ADAPTER
729	02 D9	ERROR_SLIP_REQUIRES_IP
730	02 DA	ERROR_PROJECTION_NOT_COMPLETE
731	02 DB	ERROR_PROTOCOL_NOT_CONFIGURED
732	02 DC	ERROR_PPP_NOT_CONVERGING
733	02 DD	ERROR_PPP_CP_REJECTED

Code (Decimal)	Code (Hexadecimal)	Description
734	02 DE	ERROR_PPP_LCP_TERMINATED
735	02 DF	ERROR_PPP_REQUIRED_ADDRESS_REJECTED
736	02 E0	ERROR_PPP_NCP_TERMINATED
737	02 E1	ERROR_PPP_LOOPBACK_DETECTED
738	02 E2	ERROR_PPP_NO_ADDRESS_ASSIGNED
739	02 E3	ERROR_CANNOT_USE_LOGON_CREDENTIALS
740	02 E4	ERROR_TAPI_CONFIGURATION
741	02 E5	ERROR_NO_LOCAL_ENCRYPTION
742	02 E6	ERROR_NO_REMOTE_ENCRYPTION
743	02 E7	ERROR_REMOTE_REQUIRES_ENCRYPTION
744	02 E8	ERROR_IPXCP_NET_NUMBER_CONFLICT
745	02 E9	ERROR_INVALID_SMM
746	02 EA	ERROR_SMM_UNINITIALIZED
747	02 EB	ERROR_NO_MAC_FOR_PORT
748	02 EC	ERROR_SMM_TIMEOUT
749	02 ED	ERROR_BAD_PHONE_NUMBER
750	02 EE	ERROR_WRONG_MODULE
751	02 EF	ERROR_PPP_MAC
752	02 F0	ERROR_PPP_LCP
753	02 F1	ERROR_PPP_AUTH
754	02 F2	ERROR_PPP_NCP
755	02 F3	ERROR_POWER_OFF
756	02 F4	ERROR_POWER_OFF_CD
757	02 F5	ERROR_DIAL_ALREADY_IN_PROGRESS
758	02 F6	ERROR_RASAUTO_CANNOT_INITIALIZE
778	03 0A	ERROR_UNABLE_TO_AUTHENTICATE_SERVER

## Common Debug Messages

- When dialing follows the normal, correct sequence you will see the following events:

```
System Debug Event 009 Sub 1 Data 0000:0020:0000:0000
System Debug Event 009 Sub 1 Data 000E:0000:0000:0000
System Debug Event 009 Sub 1 Data 0005:0000:0000:0000
System Debug Event 009 Sub 1 Data 0004:0000:0000:0000
System Debug Event 009 Sub 1 Data 0003:0000:0000:0000
System Debug Event 009 Sub 1 Data 0001:0000:0000:0000
Controller Online (Event Server)
```

- When a connection is established, the IP address will be shown as a debug event. For example:

```
System Debug Event 009 Sub 3 Data 0079:005A:003D:00B0
```

The IP Address is displayed in hexadecimal form. In this example the IP address is:

- 0x79 = 121
- 0x5A = 90
- 0x3D = 61
- 0xB0 = 176
- IP = 121.90.61.176
- ERROR\_PORT\_NOT\_AVAILABLE (633 = 0x0279)  
This is often seen when first connecting. If it appears repeatedly, it could indicate that there is no SIM card inserted.
- ERROR\_DEVICE\_NOT\_READY (666 = 0x029A)  
This indicates an error state in the RAS subsystem. If this is detected the controller automatically restarts to clear the error.
- If you see the connection progressing up to 'System Debug (009) 010E000000', then disconnecting and repeating, the APN entered may be incorrect.

## Important Notes

While installing and configuring the 3G Controller, it is important to note that:

- If no debug messages are logged, the SIM card may not be present or inserted correctly, or the antenna is not connected.
- There is a known issue where if you set the IP address of the controller to the same IP address used by the Event Server or a Reporting Service, you can lock up communications. If this occurs, you will be required to default the controller.
- Changes made to the event adapter settings won't take effect until the controller has been restarted from the web interface.
- Changes made to the firewall settings won't take effect until the controller has been power cycled. Restarting the controller from the web interface will not update the firewall settings.
- If your SIM card is not configured with a static IP address, the IP address of the controller's 3G modem will change every time the connection is lost and then reconnected. This should not be an issue if you are using the 3G mobile network to send events to a monitoring station. However, this should be considered if you are sending programming changes and control commands to the controller
- Updating firmware over the 3G mobile network will appear to fail as the last step of the update is to restart the controller (changing the IP address) and then check for a connection. Although you can ignore the Update Interrupted message, we do not recommend updating firmware over the 3G mobile network.

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