IPG - Internet Paging Gateway
Version 2.13

Hark Technologies

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Chapter 1

Introduction

1.1 Conventions used in this manual

- Names of keys are shown in <>. For example, <TAB>, <ENTER>, <SHIFT>, and <CTRL>.

- Certain actions require the simultaneous use of multiple key strokes. For example, <CTRL>+<A> means that you must hold down the Control key while you press the A key.

- Certain functions are to be performed from the command line. The command to be types will be displayed in the Courier font. For example, type `cat /etc/hosts`, means to type 'cat /etc/hosts' from the command line.

- Some programs such as rtview require cursor navigation. This is performed with the arrow keys. Up arrow will go up a line, and down arrow will go down one line. If there are more ports defined than can fit on the screen, the Page Up and Page Down keys can be used to go a page up and a page down respectively. Also the Home and End keys can be used to go to the first entry on the screen and the last entry on the screen respectively.

- Any time you see a line ending with \, it is a continuation line. You may see these in a configuration file listing. It means that the line should be entered as a complete line without pressing <ENTER> between the lines. There may be more than one line ending with \ if the line is very long.

1.2 Functional Overview

The IPG consists of a hardware device that is used to receive paging traffic over the Internet. Specifically, the IPG accepts HTTP, SMTP, SNPP, and WCTP messages, converts them using common paging protocols such as TAP and TNPP, then sends them to your paging terminal using an RS-232 connection. The IPG software allows you to configure and define how you will be using the IPG. Various configuration

parameters that you can identify include the ethernet interface and serial port information.

Three different serial protocols are supported for sending messages to local paging terminals. First, GCP (Glenayre Computer Protocol) can be used to quickly send paging messages to Glenayre paging terminals and other terminals that support the Glenayre @PO command. Second, TAP (Telecator Alphanumeric Protocol) sends to any terminal which supports the TAP standard. This is a slow high-overhead protocol and is not recommended for heavy usage. Finally, TNPP (Telecator Network Paging Protocol) is also a higher throughput paging protocol. In addition TNPP supports link tests so your paging terminal can alarm on link failure (if it supports this). Regarding throughput, the TAP protocol can send one message about every 7 seconds, while GCP and TNPP can send at least 1 packet every 1 second.

The IPG uses an idblock table to determine the protocol and destination used to send messages. The pager ID from the message is used when searching through the routing table. Once a match is found the IPG uses the programmed destination string to determine the protocol and the port used to send the message.

1.3   Features and Benefits

- Convert incoming HTTP (web), SMTP (email), SNPP, or WCTP to GCP, TAP, or TNPP over RS-232.

- Connects to the internet using a 10base/T (or 100base/T) connection.

- Four port version supports four serial ports for routing messages to different paging terminals based on ID blocks.

- Can send messages via SMTP, SNPP, or WCTP.

- Embedded Linux for quick boot and minimal maintenance.

- No fans or hard drives to wear out and fail.

1.4   Support Services

If you have any questions about the IPG, please refer to this manual first.

The support email address listed in the beginning of this manual is the best way to contact us for non-emergency technical support.

If you cannot find the answer, contact technical support at the following numbers. High quality, responsive technical support is available 24 hours a day, 7 days a week, including holidays.

For technical support between the hours of 7:30 AM and 4:30 PM Eastern Time, Monday through Friday, excluding holidays, call 843-821-6888. For technical support outside of normal business hours or on holidays, call 843-821-6888. The voice mail operator will answer your call. This number allows you to leave a message for normal business matters, or initiate a page for immediate technical support. The voice mail attendant will lead you through the appropriate procedures. For matters that do not require an urgent response, leave a voice mail message within the general mailbox.

For urgent matters that require that you speak to an on-call technician, select the appropriate key identifying the product for which you need technical support. After the technician's greeting, leave a short message with the area code and phone number at which you can be reached. The on-call technician will be paged and will return your call.

Phone:	843-821-6888
Fax:	843-821-6894
Web:	http://harktech.com
Sales email:	sales@harktech.com
Support email:	support@harktech.com

Chapter 2

Installation

2.1 Hardware

The IPG comes in a small enclosure and doesn't require any special mounting procedures. Included is a 5VDC wall transformer. The power supply uses a special screw-on connector to prevent accidental unplugging.

> CAUTION! Use only the 5 volt power supply provided with the IPG device. Use of a higher voltage power supply will cause serious damage to the equipment and will void the warranty

Perform the following to setup the IPG network hardware connections:

1. If using a network interface, connect the Ethernet cable to the RJ-45 connector located on the front of the IPG device.

2. If using a dialup ISP, connect the modem to the PORT4 located on the rear of the IPG device.

3. Connect an RS-232 cable from the paging terminal to PORT1, PORT2, or PORT3 located on the rear of the IPG device. The RS-232 ports are wired as a DTE device. If you are replacing a modem a NULL MODEM adapter will be needed. The number of serial ports that are functional is dictated by the IPG model that was purchased and the number of paging terminals that are being connected. Single port IPG use the Aux port to communicate with the paging terminal.

4. Connect a laptop or dumb terminal to the CONSOLE port located on the front of the IPG device. The RS-232 ports are wired as a DTE device. If you are connecting to another PC a NULLMODEM adapter will be needed. Note that the Communication software on the terminal must be running at 115200

baud. The laptop or dumb terminal will be used to access the configuration, setup, and diagnostic applications.

5. The AUX port is used for displaying system messages. A laptop or dumb terminal can be connected to the this port located on the rear of the IPG device. The RS-232 ports are wired as a DTE device. If you are connecting to another PC a NULLMODEM adapter will be needed. Note that the Communication software on the terminal must be running at 38400 baud to communicate with the Aux port.

2.2   Operating System

The IPG uses the Linux Operating System. The system is preconfigured from the factory and most operating system configuration can be performed from the main menu.

2.2.1   Logging in

In order to perform any maintenance or setup procedure in the IPG, you must first login. You may login directly through the console port on the front of the IPG using a terminal or terminal emulation software running on a computer like HyperTerminal. The console port on the front of the IPG uses standard PC DB-9 pinout so you will need a null modem cable. The console baud rate is 115200, No parity, 8 Data bits, and 1 Stop bit. Also make sure to set the handshaking in your terminal emulator to None.

To login remotely you will need to use an ssh client. Ssh is an encrypted shell access that works over the network connection. Most Unix and Linux systems include an ssh client now. A Windows ssh client is available at http://www.chiark.greenend.org.uk/ sg-tatham/putty/download.html .

The username for logging in is **root**. At the

```
Hark Technologies
http://harktech.com

ipg.harktech.com login:
```

prompt enter **root**. Next you will see:

```
Password:
```

Enter the password written on the temporary sticker on the IPG chassis. If your system doesn't have a temporary sticker, call Hark support for the password. Each

shipment of IPG's use different passwords for security reasons.

Once logged in you will see the main menu. For example:

```
 IPG version..: 2.13
 Host name....: ipg.harktech.com (Please update hostname)
 IP address...: 10.100.1.108
 Netmask......: 255.255.255.0
 MAC address..: 00:d0:69:40:34:42
 Date/time....: 2006/05/05 20:37:39 TZ=EST5EDT,M3.2.0/2,M11.1.0/2


 1) Stop Syslog and View Errors
 2) Stop Syslog and View Debug
 3) Edit Routing Entries
 8) System Utilities
 9) System Configuration

Enter selection (or L to Log Off):
```

2.2.2   Date and time

The date and time are set to US/Eastern by default. You may need to adjust the time and/or time zone for your installation. To do this select menu option 9 from the IPG Main Menu. Then select 4) Set date/time and timezone. You will see the following prompt:

```
The system will automatically be rebooted after setting the timezone.
Do you wish to continue (Y/N) [N]:
```

Enter Y to continue. Entering anything else will abort. Next you will see:

```
Enter date (yyyy/mm/dd) [2006/05/05]:
```

The date must be entered with the 4-digit year first then a two-digit month number and two-digit day-of-month using / for the separator. The value in the square brackets is the default. Just press <ENTER> to use the value in brackets. Next the time is entered.

```
Enter time (HH:MM) [20:42]:
```

The time is entered as a two-digit hour and two-digit minute with a colon separating them. Next you will see:

```
Timezones are entered with the 3 letter code for standard time
followed by the hours west of UTC followed by the 3 letter code
for daylight saving time.  For example, EST5EDT
```

```
NOTE: EST is always 5.  If your location honors Daylight Saving
      enter EST5EDT otherwise enter EST5EST.

NOTE: New timezone rules add ,M3.2.0/2,M11.1.0/2 after EST5EDT
      this means 2nd Sun of Mar at 2am and 1st Sun of Nov at 2am

Enter timezone [EST5EDT]:
```

Now you should see:

```
About to set the clock to 2006/05/05 20:42 EST5EDT and reboot
Are you sure (Y/N) [N]:
```

2.2.3   Network settings

The network configuration is also in the System Configuration menu. Select option 1 for Ethernet settings. The following shows the ethernet configuration prompts with values:

```
Enable Ethernet Interface (Y/N) [Y]:
Ethernet device name (normally eth0) [eth0]:
Use DHCP (Y/N) [Y]:

Save changes?
```

If you choose to enter static IP information you will see something similiar to the following:

```
Enable Ethernet Interface (Y/N) [Y]:
Ethernet device name (normally eth0) [eth0]:
Use DHCP (Y/N) [Y]: n
IP Address []: 10.100.1.108
Netmask []: 255.255.255.0
Default gateway []: 10.100.1.254
Nameserver 1 []: 10.100.1.1
Nameserver 2 []: 10.100.1.2

Save changes?
```

2.2.4   System security and auditing

The Linux system chosen has proven to be secure against typical attacks. First, only essential system services are enabled. The sshd daemon provides a secure shell for remote access. Unlike telnet, the username and password are encrypted before being

sent. Ssh can also be used to copy files using the companion utility scp. Scp also uses encrypted username and password unlike ftp. To see a list of ports currently listening, type the following:

```
netstat -ln
```

You should see something similiar to the following:

```
Proto Recv-Q Send-Q Local Address    Foreign Address    State
tcp        0      0 127.0.0.1:2351   0.0.0.0:*          LISTEN
tcp        0      0 0.0.0.0:22       0.0.0.0:*          LISTEN
```

The Local Address shows the IP address and the port the system is listening on. For example, if you see 127.0.0.1, the system is listening on the local interface only and will not be able to receive any connections from outside computers. If you see :: or 0.0.0.0, the system is listening on all interfaces. This includes the local interface (lo0), and all of the ethernet ports (eth0 and eth1). The port number the system is listening on comes after the last :.

In the above example the Local Address of 127.0.0.1:2351 shows that the ipgcom program is listening on the loopback interface on port 2351. This is so that only the IPG may send packets to the ipgcom program. The 0.0.0.0:22 shows the sshd program is listening on all interfaces.

2.3 Application

The IPG consists of a few applications working together to route packets and maintain the TNPP router configuration.

2.3.1 ipgconfig

The operating system config portions of the main menu have been described in the "Operating System" section. The ipgconfig program is the menu that is displayed when you first login. To setup the serial communication ports, select #9 System Configuration then #2 Port Settings.

Upon first entering the port settings menu you will see the following prompt:

```
Enter Port to Edit (l=list, q=quit) (1234QL) [1]: 1
```

At this point you may enter a port number from 1 to 4 (for the 4-port IPG), or L
to list the ports, or Q to return to the System Configuration Menu.

The following set of prompts are displayed when the port is set to the TAP protocol:

```
Enable this Port (Y/N) [Y]:
Comport device name (e.g. /dev/ttyAM1 or /dev/tts/0) [/dev/tts/0]:
Enter modem type (? for list, or none) [none]:
Enter protocol (? for list) [5]:
Enable TAP Transparent Characters (Y/N) [N]:
Enable TAP Extension Blocks (Y/N) [N]:
Disable TAP 1.6 response codes (Y/N) [N]:
Listen port [2351]:
Max message length [240]:
Port Baudrate (300-115200) [9600]:
Port Parity (NEO) [E]:
Port Data Bits (7-8) [7]:
Port Stop Bits (1-2) [1]:

Save changes?
```

The following set of prompts are displayed when the port is set to the TNPP protocol:

```
Enable this Port (Y/N) [Y]:
Enter modem name []:
Enter protocol (? for list) [6]:
Enable TNPP Transparent CRC (Y/N) [N]:
Enable TNPP Simplex (Y/N) [N]:
TNPP Source ID [0001]:
TNPP inertia [2]:
TNPP TICT in ms (1-120000) [2000]:
TNPP TNRI in ms (1-120000) [10000]:
TNPP TNRE in ms (1-120000) [10000]:
TNPP TIDLE in ms (1-120000) [60000]:
TNPP CRETRYMAX (1-10) [6]:
TNPP CHOLDMAX (1-50) [24]:
TNPP CENQMAX (1-10) [6]:
Listen port [2351]:
Max message length [240]:
Port Baudrate (300-115200) [9600]:
Port Parity (NEO) [N]:
Port Data Bits (7-8) [8]:
Port Stop Bits (1-2) [1]:

Save changes?
```

After changing a serial port, go into #8 System Utilities from the main menu. You will see a menu like the following:

```
System utility menu
1) Update system network files and restart ethernet interface
2) Restart a specific Communication Port
3) Reload IPG daemon configs and restart communication ports
4) Stop IPG Daemon Process
5) Start IPG Daemon Process
6) Reboot IPG
7) Shutdown IPG

Enter selection (or Q to quit):
```

Select option #2 to restart the communication port that was just modified.

To setup the general settings, select #9 System Configuration then #5 General Settings.

```
Debug level [65535]:
Our fully-qualified internet hostname [ipg.harktech.com]:
Email from address [ipg1.example.com]:
Email subject [IPG message]:
No email older than (in seconds) (0-129600) [86400]:
No email newer than (in seconds) (0-43200) [3600]:
Max sequential ID (0-100) [20]:
Max recipients (0-100) [20]:
Max message length (16-1024) [1024]:
Max email length (0-5000000) [100000]:
Max email from length (0-80) [16]:
Max email subject length (0-80) [16]:
Output rate (packets per second, 0=disable) [0]:

Save changes?
```

Now that the base configuration is set, idblocks will need to be setup to specify how to route the incoming messages. To setup the routing entries, select #3 Edit Routing Entries from the main menu.

The following menu will be displayed:

```
Idblock Entry menu
 (A)dd Idblock Entry
```

```
(M)odify Idblock Entry
(D)elete Idblock Entry
(L)ist idblock entries
```

```
Enter selection (or Q to quit and save changes):
```

Modifying an existing route will display the first route and ask if you want to modify it. If you do, enter a Y and you will be prompted for the changes. If the route displayed is not the one you want to modify enter N, and the next route will be displayed. This will continue until there are no more routes to be displayed.

When adding or modifying the following prompts are displayed:

```
Starting ID or (dn, sub, or tnppdest):
Ending ID or (Dialed Number / Subscriber ID / TNPP dest):
Enabled:
Name:
Destination (? for Help):
Backup Connection (? for Help):
```

Enter the starting and ending ID for the range you wish to route.

Enter whether or not this route is enabled. To temporarily disable a range of numbers you may set this to N.

You may also enter a descriptive name for this range of numbers.

You may enter ? for the destination or backup connection to get the following help screen:

```
    TCP/IP connections: protocol://server:port:idformat:maxlen:maxtries
      - protocol is one of: snpp, smtp, smpp, wctp
        For example: snpp://pager.example.com:444:%10i:240:1

    Serial connections:
      tap://device:idformat:maxlen:modemnum:baud:parity:data:stop:tappassword
      tnpp://device:idformat:maxlen:modemnum:baud:parity:data:stop:tnppdest
      - device is the com port (port1 to port4)
        For example: tap://port1:%7i:240:5551212:9600:e:7:1:000000
                or: tnpp://port2:%7i:240:none:9600:n:8:1:E001
```

See the [idblock] section of ipg.ini in the next chapter for information on setting the destination and backup connection string.

Chapter 3

ipg.ini

All IPG configuration settings are stored in /usr/local/etc/ipg.ini.

There are multiple sections in the ipg.ini file. First is the [settings] section. This stores settings that are common to multiple programs. Next is [ethernet]. This section stores the network configuration settings. The [idblock] section contains the ID block routing entries. The [dnsbl] section sets up checking DNS-based blocklists for incoming email to help cut down on incoming spam. The [modem] section describes the modem init strings used when an outgoing serial port is set to modem. Finally there are the [port] sections. These are individually numbered with a logical port number. For example, [port1] is the first logical port.

The ipg.ini file consists of several sections defining the configuration for separate parts of the Integrated TAP/TNPP Concentrator.

3.1   [settings]

DEBUG_LEVEL   Sets the amount of debugging information logged to the debug directory. The following is a list of the values for each type of information that can be logged. Add the values together for the value to set the DEBUG_LEVEL.

0	No debug
1	Logging (a lot of miscellaneous debug info)
2	Functions (log entering functions)
8	Queues
16	Semaphores
32	ComLib (log serial port calls and info)
64	NetLib (log network calls and info)
128	Read
256	Write
4096	Tap Library logging
8192	Tnpp Library logging
16384	Thread information

ENABLE_HTTP	Enable the HTTP web server for incoming paging via a web browser.
ENABLE_SMTP	Enable the SMTP server for incoming paging via an email client.
ENABLE_SNPP	Enable the SNPP server for incoming paging via an SNPP paging client.
ENABLE_WCTP	Enable the WCTP server for incoming paging via a WCTP paging client.
HOST_NAME	Our fully qualified internet hostname. For example, ipg.example.com.
EMAIL_FROM_ADDRESS	The full email address to use as the from address for outgoing email and outgoing wctp.
EMAIL_SUBJECT	The subject to use on outgoing email messages.
NO_EMAIL_OLDER_THAN	Do not accept an email message if the date is older than this setting. Specified in minutes.
NO_EMAIL_NEWER_THAN	Do not accept an email message if the date is newer than this setting. Specified in minutes.
MAX_SEQUENTIAL	The maximum number of sequential ID's allowed on incoming messages. Typically only used in SMTP and SNPP. This allows for cutting down on SPAM, by not allowing clients to send to a sequence of numbers in a row.
MAX_RECIPIENTS	Limit the number of recipients a message can be sent in a session.
MAX_MSGLEN	The maximum length of an incoming message. Messages longer than this will be silently truncated. This setting varies based on the paging carrier, but is typically 240 or 230 for TAP messages.

MAX_FROMLEN	Allows setting the maximum length of the email from address which will be sent to the pager. If the from exceeds this value it will be truncated at this value. Set to 0 to disable sending the from header. The maximum value for this field is 80.
MAX_SUBJECTLEN	Allows setting the maximum length of the email subject which will be sent to the pager. If the subject exceeds this value it will be truncated at this value. Set to 0 to disable sending the subject. The maximum value for this field is 80.
OUTPUT_RATE	Limit the number of packets sent per second for outgoing RS-232 connections. These are the GCP, TAP, and TNPP outputs. Set to 0 to disable output rate limiting. For example, setting this field to 5 would allow 5 packets to be sent every second (effectively sending one message every 200ms). This value may be set from 0 to 255.

3.2   [ethernet]

ENABLED	Should always be set to Y to enable the ethernet interface.
DEVICE_NAME	The ethernet device name. Should always be eth0.
USE_DHCP	Enable the DHCP client so the individual IP address settings will not need to be specified.
IP_ADDRESS	Specifies the IP address if DHCP is not being used.
NETMASK	Specifies the network mask if DHCP is not being used. Typically 255.255.255.0.
GATEWAY	Specifies the default router for this subnet.
NAMESERVER1	The first name server's IP address for internet domain lookups.
NAMESERVER2	The second name server's IP address for internet domain lookups. This is optional and is used as a backup in case the first name server is not available.

3.3   [idblock]

The idblock section is different from most of the ini settings. This section specifies multiple values per line. The line format is:

`startid|endid|enabled|name|destination|backupdest`

The startid is the first number of a number range to allow for this route. The endid is the ending number. If two ID blocks overlap the block with the smaller range will be used.

Enabled may be set to 0 to disable this range, or 1 to enable the range.

Name is a descriptive name for this ID block.

Destination and Backup Destination describe how the outgoing message will be sent. They are in the format of:

`protocol://port:idformat:maxlen:dial:baud:parity:dbits:sbits:tnppdest`

Only TNPP outputs will have :tnppdest. Only RS-232 ports will have :dial:baud:parity:dbits:sbits. Outgoing TCP ports are in the form of:

`protocol://host:port:idformat:maxlen`

The allowable outgoing protocols are GCP, TAP, and TNPP for RS-232 ports, and SMTP, SNPP, and WCTP for TCP/IP ports.

The idformat allows certain formatting variables to specify how the incoming pager ID is formatted for output. For example, if your TAP output expects 7 digits, use %7i. The caller can send 7 or more digits in the ID and this will take the last 7 digits of the id for the output. If your callers typically send 7 digits and your paging terminal expects 10 digits you may prefix a number. For example, to prefix 843 use 843%7i. The 7 used in these examples can be other values. Some typical values are 4, 5, or 10.

The backup destination allows the message to be sent to another destination if the primary is down.

The maxlen parameter specifies the maximum length of the outgoing message. If the incoming message is longer than this it will be truncated.

3.4   [dnsbl]

The dnsbl section is also formatted like the idblock section. Its fields are:

```
hostname|enabled|string
```

The hostname is the DNS-based blocklist to use. Enabled specifies whether or not to use this list for checking if a message is spam and string specifies the return string to send to clients if their message is not accepted.

3.5   [modem]

The modem section is also formatted like the idblock section. Its fields are:

```
modemname|init1|init2
```

The modemname must start with out-. For example, a US Robotics modem would be named out-usr. The init1 field specifies the first init string to send to the modem, and init2 specifies the second init string to send to the modem.

3.6   [port...]

This is where each logical port is defined. There are several fields which control different aspects of the port and its settings. The following is a list of the port fields and their function:

ENABLED	Enable or disable the port.
DEVICE_NAME	The actual device used by this port. For example, /dev/tts/0. Four port IPG will have a device name of /dev/tts/0 through /dev/tts/3. Single port IPG will use /dev/ttyAM1.
DEVICE_UART	The UART type on the serial I/O board. For the Hark 4-port serial port the value is 4. This should be set to 0 for single port IPG using the Aux port.
DEVICE_PORT	The UART port address. For the Hark 4-port serial port the port addresses are: port1=0x89c00200, port2=0x89c00208, port3=0x89c0210, port4=0x89c00218. Set this to 0 for single port IPG using the Aux port.
DEVICE_IRQ	For the Arm-based systems, PC/104 IRQ5=22, IRQ6=33, and IRQ7=40. IPG's shipped from the factory using IRQ6, so this value should be set to 33. This value should be 0 for single port IPG using the Aux port.

PROTOCOL   This is either GCP, TAP or TNPP. The proto-
                                        col number is also acceptable. TAP=5, TNPP=6,
                                        GCP=7.

LISTEN_PORT   The internal port to listen for messages. Each
                                        port must use a unique port number. Typically
                                        these are set to 2351, 2352, 2353, 2354 for the four
                                        serial ports.

MAX_MSGLEN   The maximum message length the paging termi-
                                        nal will accept. If the imcoming message length
                                        in the [settings] section or in the destination is
                                        longer than this and the message is being sent
                                        via TAP, the message will be split into multiple
                                        pieces before being sent to the paging terminal.
                                        This setting does not have an effect on

BAUD   The baud rate of the serial port.

PARITY   The parity of the serial port. The TNPP standard
                                        is to use no parity (N). For TAP, even parity (E)
                                        should be used.

DATABITS   The number of data bits for the serial port. The
                                        TNPP standard is to use 8 data bits. For TAP, 7
                                        data bits should be used.

STOPBITS   The number of stop bits for the serial port. This
                                        will almost always be 1.

The following parameters are only used for TAP ports:

TAP_EXTENSION_BLOCK   Allow TAP extension blocks. This allows more
                                        than 240 characters to be sent in a single mes-
                                        sage. The paging terminal will need to support
                                        this option. This is described on Page 7 of the
                                        TAP 1.8 protocol specification in the fourth full
                                        paragraph on the page. (See <US>).

TAP_TRANSPARENT_CHAR
                                        Allow TAP transparency character insertion.
                                        This was added to the TAP protocol in version
                                        1.6. See TAP 1.8 page 6 paragraph 3-5 and Page
                                        7 the first table on the page.

TAP_NO_RESPONSE_CODE
                                        Disable the sending of the TAP response code to
                                        the client software. This feature was also added in
                                        TAP version 1.6. For more information see TAP
                                        1.8 Appendix A. This option may be disabled for
                                        client software that can not handle the response
                                        codes.

The following paramters are only used for TNPP ports:

TNPP_SOURCE_ID	The TNPP source ID to use in the TNPP packet.
TICT	The TNPP inter-character timer. The amount of time once we receive a character we will wait for the next character. This is specified in milliseconds. The default is 2000.
TNRI	The TNPP no response idle timer. The amount of time after sending a packet before waiting for a reponse times out. There is also a TNRB timer in TNPP, but we don't use it because our transmitter is never busy. The Omega sends an entire packet at once and will not look for an incoming character until it is done. Hence the transmitter is never busy. The default value for TNRI is 10000 milliseconds.
TNRE	TNPP no response ENQ. The amount of time to wait for a response after sending and ENQ (link test). The default value is 10000 milliseconds.
THOLD	The amount of time in the future to reschedule the packet when an RS is received. The default value is 10000 milliseconds.
TIDLE	If there is no activity on this port in TIDLE milliseconds a link test is sent. The default value is 60000.
CRETRYMAX	The maximum number of times a packet may be resent before it is discarded. The default is 6.
CHOLDMAX	The maximum number of times a packet may be RS'd by the remote before it is discarded. The default is 24.
CENQMAX	The maximum number of link test failures before the port is marked faultoff. The default is 6.
TNPP_SIMPLEX	Normally N. This is typically used for satellite links which have no way of sending an ACK or NAK response.
TNPP_TRANSPARENT_CRC	Some serial links may be limited to 7-bit data. One typical place this is seen is in statistical multiplexers. Transparent CRC was created to allow the 2 byte binary CRC to be broken up into 4 printable characters. See section 6.1 of the TNPP 3.8 specification.

SIMPLEX_TRANSMITS   The number of times to transmit packets on out-
                          going simplex ports. Because there is no acknowl-
                          edge (positive or negative) on simplex links a
                          method was devised to retransmit packets a set
                          number of times with the hope that at least one
                          of the packets will get through. This can be done
                          because the same serial number is used for each re-
                          transmit which the receiving TNPP device knows
                          to ignore if the serial number matches one it re-
                          cently received.

3.7   Example ipg.ini

```
[settings]
DEBUG_LEVEL=65535
ENABLE_HTTP=Y
ENABLE_SMTP=Y
ENABLE_SNPP=Y
ENABLE_WCTP=Y
HOSTNAME=ipg.harktech.com
POSTMASTER_ADDRESS=
EMAIL_FROM_ADDRESS=ipg1@example.com
EMAIL_SUBJECT=IPG Message
NO_EMAIL_OLDER_THAN=86400
NO_EMAIL_NEWER_THAN=3600
MAX_SEQUENTIAL=50
MAX_RECIPIENTS=50
MAX_MSGLEN=1024
MAX_FROMLEN=16
MAX_SUBJECTLEN=80
OUTPUT_RATE=5

[ethernet]
ENABLED=1
DEVICE_NAME=eth0
USE_DHCP=0
IP_ADDRESS=10.100.1.150
NETMASK=255.255.255.0
GATEWAY=10.100.1.254
NAMESERVER1=10.100.1.254

[idblock]
#start|end|enabled|name|dest|backupdest
# dest format prot://port:idformat:maxlen:mdmnum:baud:parity:data:stop:tnppdest
```

```
#0|9999999999|1|Local|tap://port1:%7i:240:9,103:9600:E:7:1|
0|9999999999|1|Local|tnpp://port1:%7i:240:none:9600:N:8:1:E001|
#0|9999999999|1|Local|tap://port1:%7i:240:none:9600:E:7:1|
#0|9999999999|1|Local|gcp://port1:%7i:240:none:9600:N:8:1|
#0|9999999999|1|Local|snpp://10.100.1.187:1444:%7i:240|

[dnsbl]
bl.spamcop.net|1|mail rejected; see http://www.spamcop.net
relays.ordb.org|1|mail rejected; see http://www.ordb.org
sbl-xbl.spamhaus.org|1|mail rejected; see http://www.spamhaus.org

[modem]
out-usr|AT&FE|ATE&B1&K0&M0&N3S7=45S10=1S12=0&W
out-mt|AT&FE|ATE&K4&Q6%C0S37=6&W
out-uds|AT&FE|ATE&C2&D2\N1\Q&W
out-ltwin|AT&FE|ATE&K4&Q6%C0S37=6&W

[port1]
ENABLED=Y
DEVICE_NAME=/dev/tts/0
DEVICE_UART=4
DEVICE_PORT=0x89c00200
DEVICE_IRQ=33
PROTOCOL=GCP
LISTEN_PORT=2351
MAX_MSGLEN=240
#MODEM_TYPE=out-usr
BAUD=9600
PARITY=N
DATABITS=8
STOPBITS=1
TNPP_ID=A001
TNPP_INERTIA=2
TNPP_TRANSCRC=N
TNPP_SIMPLEX=N
TNPP_LINKTEST=30
TICT=2000
TNRI=10000
TNRE=10000
THOLD=10000
TIDLE=60000
CRETRYMAX=6
CHOLDMAX=24
CENQMAX=6

[port2]
```

```
ENABLED=N
DEVICE=/dev/tts/1
DEVICE_UART=4
DEVICE_PORT=0x89c00208
DEVICE_IRQ=33
PROTOCOL=TAP
LISTEN_PORT=2352
MAX_MSGLEN=240
PORT_TYPE=MODEM
MODEM_TYPE=usr-out
BAUD=9600
PARITY=E
DATABITS=7
STOPBITS=1
TAP_PASSWORD=000000
TAP_TRANSCHAR=N
TAP_EXTBLOCK=Y
```

Chapter 4

Change summary

4.1   Changes from 2.12 to 2.13

- add support for new daylight saving rules

4.2   Changes from 2.11 to 2.12

- port DEVICE changed to DEVICE_NAME

- support incoming max message length

- port add DEVICE_UART, DEVICE_PORT, DEVICE_IRQ

4.3   Changes from 2.10 to 2.11

- uses new config routines

- support incoming max message length

4.4   Changes from 2.9 to 2.10

- wctp now supports wctp-SubmitRequest

4.5   Changes from 2.8 to 2.9

- support a TAP password in destination string

4.6   Changes from 2.7 to 2.8

- Fix potential problem with sending TNPP to some paging terminals

- Updated for new onixlib

- Documentation update CHOLDMAX, idblock settings

- Documentation update NO_EMAIL_OLDER_THAN and NO_EMAIL_NEWER_THAN are actually in seconds

4.7   Changes from 2.6 to 2.7

- Fix potential problem if email text portion is longer than max message size and the email has attachments

- Add support for setting the max incoming email size separately from the max message size

4.8   Changes from 2.5 to 2.6

- copy comport TNPP ID into tnpp source

- ipgconfig/main change /bin/bash to /bin/sh

4.9   Changes from 2.4 to 2.5

- Single port IPG support (use AUX port to connect to paging terminal)

- ipgconfig now supports selecting modem type from list

- ipgconfig now supports setting max msglen, max recipients, and max sequential

- send_message now uses 127.0.0.1 instead of localhost

- support setting TNPP inertia

4.10   Changes from 2.3 to 2.4

- send_wctp output close network port when finished

- send_smtp output close network port when finished

- add output_rate for serial output

- web page javascript counter fix

- send_wctp fix memory leak if connection to remote server fails

4.11   Changes from 2.2 to 2.3

- web template parsing fix

4.12   Changes from 2.1 to 2.2

- write idblock changes to ini file

4.13   Changes from 2.0 to 2.1

- Support TNPP transparent data

- process_smtp support multiple blank lines between headers and body

- process_smtp support two MIME boundaries

Chapter 5

Warranty Information

<u>WARRANTIES</u>

For a period not to exceed one year from the date of purchase, Hark Technologies, guarantees that the electronic equipment sold will be fit for the ordinary purposes for which they are supplied, and will conform to the property description and statements of fact contained within any applicable brochure and labels provided with the product. However, upon the cessation of the one year warranty, Hark makes no warranty, expressed or implied, that the equipment is merchantable and/or fit for any particular purposes.

The Seller warrants that the goods covered by this agreement shall be free from defects in material and workmanship for one year when use under normal conditions and for the purpose for which they are sold. However, the warranty period for expendable parts, such as bulbs and fuses shall be limited to thirty days.

This warranty does not extend to damage incurred by natural causes such as lightning, fire, floods, or other catastrophes, damages caused by environmental extremes such as power surges and/or transients or willful, malicious, reckless, negligent acts or misuse by the purchaser or third parties.

All warranty work must be performed at Hark Technologies. No credit will be given for unauthorized repair work attempted by the customer or other unauthorized repair facilities. In/warranty merchandise must be shipped freight prepaid to the nearest Hark Technologies facility.

A Return Materials Authorization (RMA) Number must be obtained from Hark Technologies customer service department prior to returning any equipment, in-warranty, or otherwise to Hark Technologies for repair. Equipment received without the proper RMA number will be returned to the shipper.

All goods and materials are carefully tested and inspected before leaving the point of manufacture; however, as it is impossible to always detect imperfections, the only guarantee that is given by us, or for which we are in any way liable, is to repair or replace such goods as prove defective, when used for the purposes for which manufactured. All replaced goods are to be returned to us transportation prepaid. Under

no circumstances are we responsible for any other damages, incidental, consequential, or otherwise, nor in any case shall we be responsible for any damages beyond the price of the goods. No damages or charges of any kind, for labor, expenses, or otherwise suffered or incurred by the customer in replacing or repairing defective goods or otherwise occasioned by the customer will be allowed.

Written notice must be promptly given to the Seller of any perceived failure of the equipment sold, in order to fulfill the warranty, and in no event shall notice be given more than ten days after the discovery of the product defect. The notice shall state in what parts and wherein the warranty has failed and reasonable time shall be given to the Seller to remedy the difficulty. Failure to provide adequate notice within the required time frame shall be conclusive evidence of due fulfillment of the warranty on the part of the Seller, and that the product is satisfactory to the Purchaser, and that the Seller shall be released from all liability under the warranty.

<div align="center">DISCLAIMER OF WARRANTIES</div>

THE WARRANTY PRINTED ABOVE IS THE ONLY WARRANTY APPLICABLE TO THIS PURCHASE. ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.

IT IS UNDERSTOOD AND AGREED THAT UNDER NO CIRCUMSTANCES SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, WHETHER THE THEORY OF LIABILITY IS BASED IN CONTRACT, TORT, UNDER ANY WARRANTY, OR IN NEGLIGENCE. THE PRICE AS STATED FOR THE WARRANTY IS A CONSIDERATION FOR LIMITING SELLERS WARRANTY. FURTHER, NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS UNDER THIS AGREEMENT MAY BE BROUGHT BY THE PURCHASER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

<div align="center">BREACH OF AGREEMENT</div>

In the event that the terms or conditions of this Agreement are breached, then Hark is entitled to have the customer pay all reasonable court costs, attorney fees and expenses that shall be made or incurred by Hark in enforcing this Agreement; and the parties agree that the terms and conditions of this Agreement shall be binding on, apply and inure to their respective heirs, executors, administrators, successors and assigns.

This invoice shall be construed and governed by the laws of the State of South Carolina AND VENUE IN ANY LITIGATION PURSUANT TO THIS INVOICE SHALL BE IN DORCHESTER COUNTY, SOUTH CAROLINA.

<div align="center">ALTERATIONS AND CHANGES</div>

Any alterations for deviations from the above specifications that involve extra material, costs or additional or more costly labor will require extra charges. These extra charges will be billed over and above the proposal amount.

PROPOSAL GOOD FOR THIRTY (30) DAYS

The price given in the proposal for material and labor is an offer that shall bind Hark for 30 days. If the proposal is not accepted within 30 days, then Hark has the option of revoking its proposal.

AGREEMENT SUBJECT TO APPROVAL BY MANAGEMENT

This offer is subject to management's approval. If terms of payment are: cash on completion, or if this is a credit sale, this offer is also subject to approval by Hark's credit manager.

ACTS BEYOND HARK'S CONTROL

Hark is not responsible for delays in delivery or for delays in installation due to weather, fire, strikes, governmental regulations, or other causes unforeseen or beyond it's control.

SECURITY AGREEMENT

Hark may require as a condition to this Agreement that the customer execute a security agreement to safeguard its position as a creditor in extending payment terms to the customer. In the event that Hark requires collateral, the customer agrees to provide a promissory note and a security agreement (and UCC-1) in the manner acceptable to Hark.

BAD CHECKS & C.O.D.

A service charge of $25.00 will be applied to each returned check. Accounts 60 days old will be placed on C.O.D. and technical service shall be withheld. Legal action will be taken after the account is 90 days old.

RETURNS

No returned goods will be accepted without a Returned Merchandise Authorization Number.

HANDLING/RESTOCKING CHARGE

A restocking charge of 20% will be made on all goods returned unless due to error caused by Supplier.

EQUIPMENT PACKING

Packing instructions: Equipment to be returned to Hark Technologies for repair must be packed in the original packing supplied by the factory. If the original packing is not available, Hark Technologies will provide it to you for a nominal fee. Customer packing materials can be used, providing the precautions are taken to provide adequate static protection for the equipment.

DO NOT PACK HARK EQUIPMENT IN STYROFOAM PEANUTS ONLY

Repairs necessitated due to improper packing will be billed at the standard factory repair rate.

Hark Technologies will repair or replace equipment and return to customer, freight prepaid, within the continental United States. Equipment found not to be defective will be returned at purchaser's expense and will include cost of handling, testing and returning of equipment.

Out-of-warranty repairs will be billed at the established factory flat rate per hour, plus components needed for replacement.

TITLE

Title to and all goods or material hereafter purchased shall remain with Supplier until full purchase price has been paid.

ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the parties hereto; and this Agreement shall not be modified, amended, altered, or changed except by a written agreement signed by the party sought to be charged. However, change orders may be made by an oral agreement as enumerated in the "Alterations and Changes" section above.

Chapter 6

Cancellation

Buyer may by written notice to Seller within five (5) days of the merchandise received date cancel any contract or agreement arising here under, for other than the default of the Seller and at its convenience, in which the Buyer shall pay the Seller twenty percent (20%) of the above total price for all products and accessories as a restocking charge.

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