Packet Assembler/Disassembler (PAD) Configuration and Use
Revision 1.02

Application Note: GSM0000AN011

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Objective: The intent of this document is to give the user a basic understanding of the Enfora architecture that addresses the Configuration and use of the internal Packet Assembler/Disassembler or PAD.

Overview: Many basic serial devices exist and support legacy applications that could benefit from the ability to use a packet data network like GPRS. The existing devices do not have the processing power or ability to support an IP stack that is required of the device to facilitate communication to the network. The PAD and associated serial interface commands provide an architecture that can be configured for connection to a legacy device. Once configured and connected, the PAD accepts data passed over the serial lines and packetizes the data for delivery over the network. A PAD is required at the host end to reverse the process. The PAD will accept IP data over the network, de-packet the data, and pass it to the connected device in the reverse order. Currently, only UDP IP is supported in the PAD. The following figure demonstrates the basic architecture.

GPRS Packet Data Interface Overview

Wireless Modem Packet Assembler/Disassembler (PAD)

Configuration Parameters

- AT&HSTIP = 1 (Establish a UDP PAD session upon ATD command)
- AT&PADDST = 168.121.100.1,5502 (Destination IP address and port)
- AT&PADSRC = 5502 (Source port)
- AT&PADLENK = 100 (Amount of data, in bytes, to be buffered before sending)
- AT&PADDMD = 1B (Virtual parameter that controls PAD operation features)
- AT&PADCHS = 0 (Data forming character)
- AT&PADO = 50 (Inter-Character-Time-out Amount of time before sending data buffer)
**Basic PAD Parameters**

The following commands are used to define the PAD interface and functionality. Please refer to the **Enfora Enabler-GGSM/GPRS Radio Modem AT Command Set Reference (GSM0102PB001MAN)** for detailed command syntax and function. Additional information related configuration and use in different network transparency environments is available in **GSM0000AN012 - Network Transparency Configuration for PAD**.

**Destination IP Address and Port. (AT$PADST)**

This parameter provides the destination IP address and port number to be used in communication with a host. The destination IP address is the IP for PAD data. PAD data is sent to and received from this IP. A destination IP address of 0 will allow PAD access from any IP destination, and will cause all locally generated PAD data to be sent to the IP address associated with the last remotely received PAD data. The destination port is the port for PAD data. PAD data is sent to and received from this port. A destination port of 0 will allow PAD access from any port, and will cause all locally generated PAD data to be sent to the port associated with the last remotely received PAD data.

**Source Port. (AT$PADSRC)**

The source port defines the port number provided in the data packet header from the PAD. The source IP address will be the IP address obtained from the network. PAD source port is used as the source port in all outgoing PAD data messages. The remote host must use this port number as the destination port for PAD data sent to the device.

> **Please note that the port number configured using the AT$UDPI command cannot be the same as the one used in the AT$PADSRC command. An ERROR will be returned by the modem if the same port is used.**

**PAD Block Size. (AT$PADBLK)**

This parameter defines the size of the PAD data buffer used to trigger the transmission of data based on the amount of data buffered. PAD data will be created at the requested PAD block size (number of bytes) unless an enabled forward character or PAD timeout forces the data to be sent out at a smaller block size. Block size does NOT include the IP or TCP/UDP header size.

**PAD Command Features. (AT$PADCMD)**

This command allows for the configuration of various PAD features. The command controls items like forwarding character, backspace, and escape sequence processing.

**PAD Forwarding Character. (AT$PADFWD)**

This command defines the PAD forwarding character. If PAD forward is enabled via AT$PADCMD, receipt of this character will immediately forward all currently buffered PAD data.
PAD Timeout Value. (AT$PADTO)

This command defines the PAD timeout value. Data will be forwarded to the PAD destination even if the PAD block size has not been reached if <pad timeout> period has elapsed since the last PAD character was received from the local host.

PAD Backspace Character. (AT$PADBS)

This command allows the definition of the PAD backspace character. If PAD edit is enabled via AT$PADCMD, this character will cause the previous character to be deleted from the PAD output buffer. If the previous character has already been forwarded due to a PAD timeout or receipt of an enabled forward character, receipt of the PAD edit character will have no affect.

Additional Commands for PAD Operation

The following commands are necessary for the proper definition of the physical serial port of the Enabler-G and automated PAD initiation. The serial interface commands allow for proper matching of serial port speed, character framing, and flow control.

Serial Port Speed. (AT+IPR)

This command allows the user to define the port speed from 75 to 115,200.

Character Framing. (AT+ICF)

This command determines the number of data/stop/parity bits that will be used by the serial interface.

Flow Control. (AT+IFC)

This command determines the flow control interface. The parameters include hardware, software, or no flow control.

Host to Modem Interface. (AT$HOSTIF)

This command configures the desired Host to Modem interface. This parameter determines the behavior of the ATD command. The command allows for automated UDP PAD initiation. The PAD will only function properly if the value of $HOSTIF is 1.

Automated Context Activation. (ATSAREG)

This command controls the ability of the modem to automatically context activate. If the value of this command is a 2, the modem will context activate upon powerup. If the value is a 1, the modem will only context activate when the ATD*99# is issued.

If you are operating in a non-transparent GPRS network, please refer to application note GSM0000AN012 - Network Transparency Configuration for PAD for further information. The PAD feature will not function properly if the configuration is not followed.
Basic PAD Operation

The PAD can be configured to forward data based on several parameters. The PAD can forward data based on a forwarding character as defined by the ATSPADFWD. Additionally, the forwarding character can be included or excluded in the data packet using the ATSPADCMD command. The PAD can forward data based on a timeout value. The data will be forwarded regardless of the ATSPADFWD and ATSPADBLK definitions if the timer value expires prior to the other definitions. The PAD can forward data based on data buffer size using the ATSPADBLK command.

To invoke the PAD, issue the ATD*99# command.

Proper analysis of terminal device requirements and application timing and control are required to fine-tune the PAD for proper operation. Some experimentation may be required adjusting command settings to gain the best configuration settings for a particular solution. Each terminal device will have unique requirements and time should be spent in testing various configurations.
## Revision History

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<th>Date</th>
<th>Rev</th>
<th>Author</th>
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<tr>
<td>11/6/02</td>
<td>1.00</td>
<td>Matt Glover</td>
<td>Initial Release.</td>
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| 2/14/03 | 1.01| Matt Glover |  - Added reference to GSM0000AN012 - Network Transparency Configuration for PAD.  
                     - Added AT$AREG information.                                           
                     - Added ATD*99# reference to invoke the PAD.                            |
| 4/14/03 | 1.02| Matt Glover |  - Corrected AT$HOSTIF value for UDP PAD operation from 3 to 1.              
                     - Added reference to GSM0000AN012 - Network Transparency Configuration for PAD.  
                     - Added note regarding UDP API port.                                    |