**Data**tek

# DT-6061

## USER'S MANUAL

## *IP-PAD APPLICATION*



**VERSION 1.0.16**

**721 Route 202-206**
**Bridgewater, NJ 08807**
**fax: 908.218.1736**
**phone: 908.218.0500**
**email: sales@datatekcorp.com**
**http://www.datatekcorp.com**

**Data**tek
APPLICATIONS, INC

## CONTENTS

## 1 INTRODUCTION

The IP-PAD Application eliminates the need, complexity, or expense of specialized X.25 equipment and allows any available port on a DT-4000, DT-2020 connected SAM, or BNS endpoint such as a SAM port, to be used for Network Element (NE) access.

The IP-PAD Application of the DT-6061 allows an X.25 device to be connected to a synchronous port anywhere in the network. Supporting both **X.3 PAD** and **Pass-Through** functionality on a per virtual circuit basis, IP-PAD Application connections to virtual circuits on an X.25 port are provided with a telnet TCP/IP connection.

The following diagram depicts a configuration of BNS network elements and non-BNS network elements with BNS/non-BNS hosts that require access to those network elements.

### 1.1 DT-6061 WITH IP-PAD APPLICATION (TYPICAL CONFIGURATION)
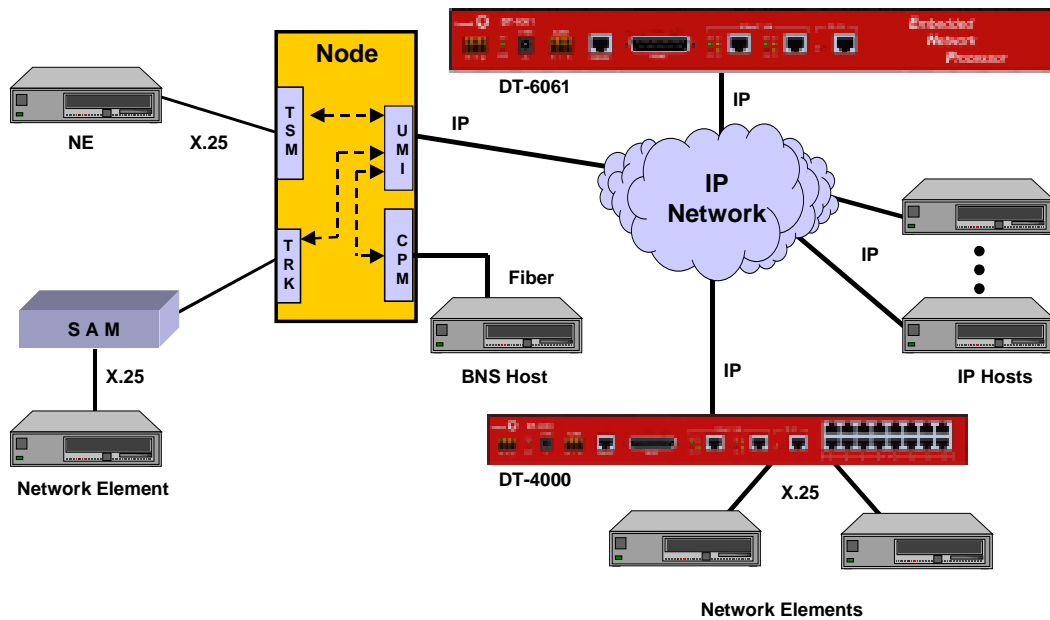


In the above configuration, there is one circuit carrying X.25 LAPB frames from the DT-6061 to a DT-4000 connected Network Element (NE) or a SAM connected NE. The X.25 Network Element may be anywhere on the available networks *(both BNS and IP)* as the above diagram depicts. IP Hosts access the virtual circuits on these Network Elements via a TCP port number. BNS Hosts

access the virtual circuit via the UMI[1]. The same is true of terminal and PC devices on either the BNS or the IP network.

## 1.2   APPLICATION SPECIFICATIONS

| Number of X.25 devices per DT-6061 | 30+ |
|---|---|
| Number of Virtual Circuits per X.25 Device | 1-100 |
| PAD Service | Yes (Per Virtual Circuit) |
| X.25 Pass-Through Service | Yes (Per Virtual Circuit) |
| Number of OA&M Channels available | One per X.25 device. |
| Measurements Available | LAPB, Packet Layer PAD, Byte Counts,Error Counts |
| Alarms | Yes |
| SNMP (DT-6061 Agent) | Yes |

## 1.3   APPLICATION BASIC ARCHITECTURE & OPERATION

### 1.3.1   INTERFACE TYPES

There are three distinct interface types on the IP-PAD application.

**The Configuration Circuits**

This interface type is used for configuration and administration of the IP-PAD application for a particular X.25 connection via Telnet.

**The Virtual X.25 Line Circuits**

For this interface type, one virtual X.25 line is configured to receive on a TCP Port. This TCP port will then listen for the TCP call from the DT-4000, UMI, etc. The specific TCP port used is the configured base + 0.

**The X.25 VCC (via X.3 PAD) Circuits.**

For this interface type, one TCP port is configured per VCC on the X.25 line. These TCP ports will listen for a call from an endpoint that requires access to the VCC. The specific TCP ports used begin at the configured base + 1 for X.25 VCC 1, and increment in proportion.

### 1.3.2   CIRCUIT USAGE EXAMPLE

The IP-PAD application would have its X.25 line, and per circuit configuration entered. This includes the base TCP port number that establishes the range of TCP ports relating to that X.25 line.

Once restored to service, the X.25 line TCP port (offset 0 from the base) listens for in inbound call from a DT-4000, UMI, or DT-2020/SAM port. This establishes the connectivity with the remote X.25 network element endpoint.

The VCC TCP ports (offset 1 – Number of Virtual Circuits) will listen on their respective TCP ports for inbound calls as well. Any host, or other IP endpoint, may make a telnet call to these TCP ports for per virtual circuit connectivity to the X.25 network element.

---

[1] The UMI allows both synchronous and asynchronous endpoints connected to a BNS network to access endpoints on an IP network.  Similarly, endpoints on an IP network can access both synchronous and asynchronous endpoints on a BNS network.

### 1.4 IP-PAD APPLICATION CONFIGURATION

The configuration of the X.25 application takes place on its OA&M port. That is TCP port number 10000 + its instance number in the DT-6061.

The configuration required for the IP-PAD application is:

- **Per application:** This is the TCP port number to be used as a base for a range of TCP ports the application instance shall use. The synchronous transport to the X.25 network element occurs at offset zero to this base TCP port number. The individual X.25 virtual circuits are identified by the base TCP port number plus the X.25 virtual circuit port number.

- **Per X.25 line:** These consist the LAPB transmission window size and other link layer parameters.

- **Per X.25 VCC:** These consist of the PAD profile associated with the VCC, the window size to be used for transmission in the X.25 packet layer, and other parameters associated on a per virtual circuit basis.

## The Per X.25 Line Configuration parameters are as follows:

| Parameter | Values | Default | Units |
|---|---|---|---|
| X.25 Logical Line Type[2] | DTE, DCE | DCE | |
| Number of X.25 VCs | | 16 | |
| Default Max Packet Size[3] | 128, 256 | 256 | Bytes |
| LAPB Tx Window Size | 1-7 | 2 | Frames |
| Waiting ACK Time (T1) | 1-60 | 3 | Seconds |
| Maximum Attempts to complete a Transmission (N2) | 1-255 | 7 | Seconds |
| Action when N2 Count Exceeded[4] | Disc, reset. | Reset | |
| Action when DISC received[5] | Disc, reset. | Reset | |

## The per VCC configuration parameters are as follows:

| Parameter | Values | Default | Units |
|---|---|---|---|
| Packet Layer Window | 1-7 | 2 | Packets |
| PAD Inactivity Timer (T) | 2-20, OFF | OFF | Seconds |
| Profile ID | Value, Transparent | Transparent | |

[2] The IP-PAD application currently supports only the DCE end of the X.25 connection. All Network Elements known to date are DTE.
[3] The 1980 standard provided for 128 byte packet sizes. The 1984 standard increased the maximum size to 256 bytes. Later standards have optionally increased that number. However, nearly all implementations of X.25 follow the 1984 standard, and it is considered the default for all implementations known to date.
[4] The IP-PAD application currently supports only X.25 PVCs. As such a DISC action is not defined.
[5] Receipt of a DISC on an X.25 PVC is not valid. This is not currently supported.

## 2  APPLICATIONS COMMANDS

The DT-6061 software is composed of two components. One component, called the *Platform,* exists to support all applications. The second component is comprised of the individual **application***(s)*.

The *Platform* provides Operating System functions, selected interfaces, protocol stacks, SNMP functions, and system OA&M while each **application** uses the services of the resident *Platform*.

### 2.1  INPUT CONVENTIONS

All parameters may be given on the command line. Parameters of the form **name=<value>** may be given in any order.

For several complex commands, listed below, missing parameters, or corrections of errors in given parameters, of the form **name=<value>** are collected by prompting the console user. The user responds to a prompt for the **name** by typing the required **<value>** followed by *newline*. Defaults are supplied in some cases, so the user need only enter *newline*.

❑  Commands may be entered in upper or lower case.

❑  Parameters of the form **name=value** may use upper or lower case for **name**.

❑  Default values, if any, are shown in parenthesis as part of the prompt.

❑  Case is preserved for values.

❑  When a password is being requested by a prompt, input is not echoed.

❑  Backspace erases one character and **@** deletes the current line of input. Most commands are killed by **del** key.

### 2.2  LOGIN

**Syntax: login PASSWD=<password>**  *(The default password is "**initial**")*

The **login** command is used to allow access to the other configuration commands.

The **PASSWD** parameter is not echo suppressed. However, if the **PASSWD** parameter is not provided, the console prompts for a password; the response *is* echo-suppressed in this case.

If the password is valid, the user is placed in the *logged in* mode. Once the console user is logged *in*, the balance of the commands are accessible.

*Note: Every application instance might be assigned a different password.*

### 2.3  LOGOUT

**Syntax: logout**

The **logout** command is only allowed if the console user is logged *in*.  It uses no arguments. It will set the console to the logged *out* mode. The console may also be logged out by typing *exit* or *ctrl-D*.

Passwords are up to seven characters in length. The characters are alphanumeric and special characters are not allowed.

### 2.3.1 HELP

**Syntax: help**

The **help** command is always visible. The **help** command displays the currently allowed commands for the mode that the unit is currently entered.

### 2.3.2 VERSION

**Syntax: ver**

The **version** command is only visible when the application is *logged in*. The command has no arguments. It displays the current software and database revisions of the application.

### 2.3.3 PLACING COMPONENTS IN SERVICE

**Syntax: rs <link | <vc XXX>>**

The **restore** command is only visible when the application is *logged in*. The command is used to place the X.25 Link, or any of the X.25 virtual circuits, into service. A TCP connection is not available until the component is placed into service.

At least one argument is required. That argument is the component type to be placed into service. There is only a single X.25 link, and multiple X.25 virtual circuits on that link which may be individually brought into service.

Once the component is brought into service, it will await a TCP session if the connection type is **rcv**. If the connection type is **orig**, a TCP session will be established with the endpoint specified in the component configuration. Please see the sections that follow for configuration of both the link, and the virtual circuits.

### 2.3.4 TAKING COMPONENTS OUT OF SERVICE

**Syntax: rm <link | <vc XXX>>**

The **remove** command is only visible when the application is *logged in*. The command is used to place the X.25 Link, or any of the X.25 virtual circuits, out of service. Any TCP connection using those components is automatically taken down when the component is removed from service.

At least one argument is required. That argument is the component type to be removed from service. There is only a single X.25 link, and multiple X.25 virtual circuits on that link which may be individually removed from service.

### 2.3.5 CONFIGURING GENERAL & LINK PARAMETERS

**Syntax: link [base=<TCP Port#>] [type=<RCV|ORIG>] [dest=<IP Address>] [dport=<TCP Port>] [numvcc=<#VCC>] [win=<#>] [T1=<#>] [N2=<#>]**

The **link** command is only visible when the application is logged in. The command is used to configure a Virtual X.25 line termination.

The **base** parameter is the TCP port number base at which the X.25 line, and the associated X.25 virtual circuits, are to be IP terminated. The default is computed as follows:

```
Default TCP Base=((<Application Instance# > -1)*200)+30000
```

For example, instance #1 of the application will have its base address at 30000. The X.25 link would be connected at that TCP port number. The first VC would be at TCP 30001, and so on.

When the X.25 link is to be on an incoming TCP session, the **type** would be set to **rcv**. The X.25 link would reside at the TCP port specified by the **base** parameter.

---

When the X.25 link is to be on an outgoing TCP session, the **type** would be set to **orig**. The IP address would be specified by the **dest** parameter, and the TCP port at that IP address would be specified by the **dport** parameter.

The **numvcc** parameter is the number of X.25 virtual circuits to be supported. The default is 16.

The **win** parameter specifies the LAPB window size to be used for transmission. The Window size is always 8 frames for receive. The default transmission window size is 2 per the ITU specification X.25.

The **t1** parameter specifies the value of the T1 timer. The timer defaults to the recommendation of the ITU specification X.25. It is provided as an option for non-standard configurations.

The **n2** parameter specifies the value of the N2 retry counter. The value defaults to the recommendation of the ITU specification X.25. It is provided as an option for non-standard configurations.

### 2.3.6 VIRTUAL CIRCUIT CONFIGURATION

**Syntax: vc <vc#> [win=<#>] [svc=< pad|pass>] [type=<RCV|ORIG>]
[dest=<IP Address>] [dport=<TCP Port>]**

The **VC** command is only visible when the application is logged in. The command is used to configure a virtual circuit connection to a Virtual X.25 line.

The **<VC#>** parameter refers to the virtual circuit configured on the X.25 line. It has the range of 1 through the number of circuits configured.

When the X.25 virtual circuit is to be placed on an incoming TCP session, the **type** would be set to **rcv**. The X.25 virtual circuit would reside at the TCP port specified by the **base** parameter offset by its virtual circuit number.

When the X.25 virtual circuit is to be placed on an outgoing TCP session, the **type** would be set to **orig**. The IP address would be specified by the **dest** parameter, and the TCP port at that IP address would be specified by the **dport** parameter.

The **win** parameter refers to the packet layer window size to be used for transmission purposes. It defaults to the value of 2 per the ITU Recommendation X.25.

The **svc** parameter allows the type of service to be performed on the virtual circuit. When the value of **PAD** is selected, the virtual circuit is terminated in a X.3 PAD service. When the value of **PASS** is selected, an X.25 pass-through service is selected.

### 2.3.7 CONFIGURING PAD PARAMETERS

**Syntax: pad <vc #>[echo=<ON|OFF>] [fwd=< none|cr|all>] [idle=<#ticks>]
[break=<none|intr|reset|brkind>] [crlf=<none|rmt|vc|both>]
[inact=<# seconds>|OFF]**

The **PAD** command is only visible when the application is logged in. The command is used to configure the X.3 PAD parameters of a virtual circuit. These parameters have relevance only if the service selected on the virtual circuit is *PAD.*

The **<VC #>** parameter refers to the virtual circuit configured on the X.25 line. It has the range of one through the number of circuits configured.

The **echo** option refers to reference #2 in the X.3 parameter list. When set to **OFF**, the IP-PAD will not echo characters back to the IP endpoint. When set to the value of **ON**, all characters are to be echoed back to the IP source.

The **fwd** parameter specifies reference #3 in the X.3 parameter list. This is the forwarding condition (outside the PAD timer) which will forward data towards the X.25 virtual circuit. A value of **NONE** indicates that there are no character forwarding conditions. A value of **CR** indicates that a carriage return will forward any accumulated data (including the carriage return). A value of **ALL** indicates that all data is to be forwarded immediately. The **ALL** option has the effect of generating single user character X.25 packets on this virtual circuit.

The **idle** parameter refers to reference #4 in the X.3 parameter list. This is the time forwarding condition. When it expires, it will forward any data collected to the X.25 circuit. The timer is reset to the specified value whenever a forwarding condition is reached. The value is based on ticks of $1/20^{th}$ of a second each per the X.3 specification.

The **break** parameter refers to reference #7 in the X.3 parameter list. This is the action to be taken when a break indication (a standard telnet encapsulated value) is received from the remote IP endpoint. The value of **NONE** will ignore the break, and it is deleted from the data stream. The value of **INTR** will generate an X.25 interrupt packet. The value of **RESET** will generate an X.25 virtual circuit reset. The value of **BRKIND** will generate an X.29 "indication of break" message on the X.25 virtual circuit.

The **crlf** parameter refers to reference #13 in the X.3 parameter list. This is the action to be taken when a CR is received in the data stream from the remote IP endpoint. A value of NONE indicates that there is to be no LF (line feed) insertion. A value of **RMT** will insert an LF following a CR whenever it is sent towards the remote IP endpoint. A value of **VC** will insert an LF following a CR whenever it is sent towards the X.25 virtual circuit. A value of **BOTH** will insert an LF following a CR in either direction.

The **inact** option refers to the PAD inactivity timer. If enabled, the TCP session on that X.25 virtual circuit is disconnected when the inactivity timer expires. The value defaults to OFF.

### 2.3.8  DISPLAY MEASUREMENTS

**Syntax: dmeas [link|vc <#>]**

The **dmeas** command is only visible when the application is logged in. The command is used to display the current measurements on either the X.25 link or per virtual circuit.

The **LINK** parameter will display the measurement information for the X.25 link being supported by this instance of the application.

The **VC <#>** option will display the measurement information for a particular X.25 virtual circuit on the link. The virtual circuit number is in the range of one through the maximum number supported by the application.

### 2.3.9  VERIFY CONFIGURATION

**Syntax: vfy [link|vc <#>]**

The **vfy** command is only visible when the application is logged in. The command is used to display the configured options on the X.25 link, or a virtual circuit resident on the X.25 link.

The **LINK** parameter will display the configuration information for the X.25 link being supported by this instance of the application.

The **VC <#>** parameter will display the configuration information for a particular X.25 virtual circuit on the link. The virtual circuit number is in the range of 1 through the maximum number supported by the application.

### 2.3.10 DISPLAYING CURRENT CONNECTIONS

**Syntax: dc**

The **dc** command is used to display all of the current connections into the IP-PAD application. This includes the X.25 link, and any X.25 virtual circuit connections. The command will issue a report that shows the connection peer for each active connection.

### 2.3.11 SNOOPING X.25 TRAFFIC

**Syntax: snoop [OFF | L2 | <VC#>]**

The IP-PAD application has a diagnostic ability to snoop on either X.25 link at the LAPB layer, or on an individual circuit at the packet layer. This is done with the **snoop** command. All output is directed to the OA&M connection.

If the command is invoked with no arguments, it produces a report of all active snooper configurations.

If the command is invoked with the **OFF** option, all of the snooper configurations are disabled.

If the command is invoked with the **L2** option, the LAPB interface to the X.25 device is snooped. Output is displayed on the OA&M session. Please note that this could be extensive for a moderately busy X.25 line.

If the command is invoked with a virtual circuit number in the range of 1 through the maximum number of X.25 circuits; the packet layer of the circuit specified is snooped.

### 2.3.12 RESTART X.25 OPERATION

**Syntax: restart**

The **restart** command is only visible when the application is logged in. The command is used to manually initiate a protocol restart of the X.25 link and packet layers.

## 3   A PPLICATION  S OFTWARE  I NSTALLATION  &  U PGRADE

An application may be initially installed, or upgraded, using the **install** command.

*Refer to the DT-6061 Platform User's Manual and refer to the section titled:* **Application Software Installation & Upgrade**

## 4  APPENDIX A – IP-PAD MEASUREMENTS AVAILABLE

This appendix itemizes the measurements available using the *display measurements* (**dmeas**) command. There are two options to the **dmeas** command. These are **link** and **vc**.

The **link** option provides X.25 Link level measurements, and the **vc** option provides per virtual circuit measurements.

The base measurements are always displayed, and the error and exception counters are only displayed if nonzero.

## The link level measurements available are as follows:

| Measurement Description | Type |
|---|---|
| Number of LAPB Frames Received | Base |
| Number of LAPB Frames Transmitted | Base |
| Number of LAPB Bytes Received | Base |
| Number of LAPB Bytes Transmitted | Base |
| Number of Invalid Frames Received. | Base |

## The per virtual circuit measurements available are as follows:

| Measurement Description | Type |
|---|---|
| Number of Packets Received from X.25 Link | Base |
| Number of Packets Sent to X.25 Link | Base |
| Number of Bytes Received from X.25 Link | Base |
| Number of Bytes Sent to X.25 Link | Base |
| Number of Call Request Packets Received | Exception |
| Number of Call Accept Packets Received | Exception |
| Number of Clear Request Packets Received | Exception |
| Number of Clear Confirmation Packets Received | Exception |
| Number of Interrupt Packets Received | Exception |
| Number of Interrupt Confirm Packets Received | Exception |
| Number of REJ Packets Received | Exception |
| Number of RNR Packets Received | Exception |
| Number of Reset Request Packets Received | Exception |
| Number of Reset Confirmation Packets Received | Exception |

## 5 SUPPORT FOR X.3 PAD PARAMETER VALUES

The IP-PAD supports the relevant X.3 PAD parameters. Since the IP-PAD is not a physical device, some of the parameters are not readily applicable. Responses via X.29 will carry default values if queried.

The table below will indicate all the X.3 parameters, and the support of these parameters by the IP-PAD application.

| Ref # | Description | Supported Options | Note | Config |
|---|---|---|---|---|
| 1 | PAD recall | 0 – None | User Command session provided by Datakit CC or DT-4000 or DT-2020. | No |
| 2 | Echo | 0 – No Echo <br> 1 – Echo | | Yes |
| 3 | Data Forwarding Characters | 0 – None <br> 2 – CR <br> 126 – All Characters | | Yes |
| 4 | Idle Delay | 0-255 | Ticks are in $1/20^{th}$ of a second. | Yes |
| 5 | Ancillary Device Control | 0 – None | Configured on DT-4000 or SAM/DT-2020 port configuration | No |
| 6 | Control of PAD service signals and PAD command signals. | 0 – No PAD service signals are transmitted. | DT-4000 or SAM is DTE service center. | No |
| 7 | Operation of PAD on receipt of break from IP | 0 – Nothing <br> 1 – Send X.25 Interrupt <br> 2 – Send X.25 Reset <br> 4 – X.29 "Indication of Break" | | Yes |
| 8 | Discard Output | 0 – Normal Data Delivery | | No |
| 9 | Padding after CR | 0 – No Padding after CR | | No |
| 10 | Line Folding | 0 – No line folding | | No |
| 11 | Binary Speed | 18 – 64000bps | For Reporting Only | No |
| 12 | Flow Control of the PAD | 0 – No use of X-ON and X-OFF | These are functions of the DT-4000 and SAM devices. | No |

| 13 | LineFeed Insertion after CR | 0 – No Linefeed Insertion<br>1 – Insert Linefeed after CR towards IP.<br>2 – Insert Linefeed after CR from IP | | Yes |
|---|---|---|---|---|
| 14 | Padding after Linefeed | 0 – No Padding after LF | | No |
| 15 | Editing | 0 – No use of editing. | User command session performed via the DK CC, the DT-4000, and the DT-2020. | No |
| 16 | Character Delete | None | User command session performed via the DK CC, the DT-4000, and the DT-2020. | No |
| 17 | Line Delete | None | User command session performed via the DK CC, the DT-4000, and the DT-2020. | No |
| 18 | Line Display | None | User command session performed via the DK CC, the DT-4000, and the DT-2020. | No |
| 19 | Editing PAD service signals | 0 - None | | No |
| 20 | Echo Mask | 0 - None | | No |
| 21 | Parity | 0 – No generation or checking. | Parity performed by DT-4000 or SAM. | No |
| 22 | Page Wait | 0 - Disabled | | No |
| 23 | Input field size | 0 - Undefined | User command session performed via the DK CC, the DT-4000, and the DT-2020. | No |
| 24 | End of Frame Signals | 0 – Undefined Size | EOF is determined and encoded per the RFC since this is an IP application. | No |
| 25 | Extended Data Forwarding Signals | 0 – No extended Data | | No |
| 26 | Display Interrupt | 0 – No display interrupt | | No |
| 27 | Display Interrupt Confirmation | 0 – No display interrupt confirmation. | | No |
| 28 | Diacritic Character Coding | 0 – Basic Coding | | No |
| 29 | Extended Echo Mask | 0 – No Extended Echo Mask | | No |

## 6   WARRANTY

The warranty period for hardware shall be one year from the date of delivery, and the warranty for software shall be 90 days from the date of delivery. Replacements and repairs are guaranteed for the longer of the remaining original warranty period or 90 days.