



# **Application Note 33**

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## **Using TPAD in direct mode with ISDN**

**UK Support**

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# 1 INTRODUCTION

## 1.1 Outline

This document describes how TPAD can be used in direct mode with ISDN. When a TransPort router unit is configured for direct mode the terminal does not need to initialise the modem or send “ATD style” dial strings. Instead the connection information is stored in the configuration of the TransPort router.

## 1.2 Assumptions

This guide has been written for use by technically competent personnel with a good understanding of the communications technologies used in the product, and of the requirements for their specific application.

It is assumed that the reader is already familiar with the use of TPAD NOT in direct mode and that TPAD is already bound to the necessary serial ports.

## 1.3 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: [uksupport@digicom.com](mailto:uksupport@digicom.com)

Requests for new application notes can be sent to the same address.

## 1.4 Version

Version Number	Status
0.1	Internal Draft only
0.2	Change to tcpdial command
0.3	Removed change to tcpdial command.
1.0	Published
1.1	Digi branded
1.2	GUI Update

## 2 IMPLEMENTATION

### 2.1 Configuring TPAD for direct mode

It is necessary to configure each TPAD instance in use with the ISDN / X.25 connection information and also to switch it to direct mode.

Navigate to **Configuration - Network > Legacy Protocols > TPAD > TPAD** and change the following parameters:

Parameter	Setting	Description
B-channel #:	e.g. 0800123456	The ISDN number of the on-line authorisation host
NUA:	e.g. 23421234561234	The NUA of the on-line authorisation host (if applicable)
NUI:	e.g. natwest_any01	The NUI of the on-line authorisation host (if applicable)
Boot to direct mode:	Yes	Causes the serial port to start in direct mode whenever the TransPort router is rebooted.
Include LRC:	Yes	Indicates that the terminal will be sending an LRC at the end of the APACS <STX> <ETX> style message. This is useful when long serial cables are used.
DTE re-transmit:	Yes	Indicates that the TransPort router should re-transmit the APACS response to the terminal if the terminal does not <ACK> the APACS response. (The terminal should check the LRC before "ACKing" the response.) This is useful when long serial cables are used.

Stage 2.1 needs to be repeated for each instance of TPAD in use. (e.g. each TPAD instance that is bound to a serial port .. you can check this on the **Configuration - Network > Interfaces > Serial > Protocol Bindings** web page or with the "bind?" command.)

### 2.2 Using direct mode

Using direct mode is essential very simple. The terminal need not do any initialisation of the serial port. When an OLA (**O**n **L**ine **A**uthorisation) is required the terminal should simply send the APACS style request into the serial port and wait for a response.

The following table details a typical direct mode authorisation

Terminal Sends	TransPort router Sends	Reason
<STX><APACS DATA><ETX><LRC>		The terminal sends the APACS style message to the TransPort router including an LRC.
	<ACK>	The TransPort router sends an ACK to acknowledge that the LRC is correct. *1

	<STX><APACS RESPONSE><ETX><LRC>	The TransPort router sends the reply from the bank. See *2 for what happens in the event of a communication problem.
<ACK>		The terminal should send an ACK to indicate that it has received the message and that the LRC was correct. If the LRC is incorrect the terminal should reply with a NAK. See * 3

\*1 – If the LRC is wrong the TransPort router will send a <NAK>. If the TransPort router does not send an <ACK> or a <NAK> within one second then the terminal should re-transmit the APACS message.

\*2 – If the TransPort router is unable to connect to the OLA host, or does not receive a reply within the timeout period specified in the TPAD parameter “Response timeout (s):” the TransPort router will reply with an APACS 30 style message containing the message “Unable to authorise”. Upon receipt of this message the terminal should either abort or retry. This can easily be tested by disconnecting the ISDN line and attempting an authorisation.

\*3 – If the terminal does not reply at all, or replies with a <NAK> then the TransPort router will retransmit the APACS response. This behaviour is governed by the TPAD parameter “DTE re-transmit:” configured in section 3.1.

## 2.3 Automatic detection that direct mode is required.

If at any point the terminal sends an <STX><DATA><ETX> message to the TransPort router when the TransPort router is NOT in direct mode, the TransPort router should detect that direct mode is required even if the “boot to direct mode” parameter is not enabled. However it is best not to work under this assumption because problems have been experienced with this for certain terminals and at certain baud rates. If you wish to rely on this feature for any reason you need to check that it works for your particular:

- Terminal
- Length of message
- Baud rate

If it does not work then contact Digi support for assistance.

## 2.4 Escaping from and returning to direct mode.

It may be necessary to escape from direct mode (and return to the normal command/response mode) for some reason.

e.g. to send a command such as:

```
tcpdial 192.168.0.1 4000<CR>
```

If this is a requirement simply send AT<CR> command. If the AT command is received fast enough then the TransPort router will escape out of direct mode. Note that no “OK” response will be received for this command, however the next command that is sent should be replied to. NB In the above sentence “fast enough” means that the AT<CR> characters are sent without significant delay between them. Any

hardware should be capable of sending characters fast enough to do this. To illustrate this point, if you can type fast you can do this with your fingers on a keyboard!

Once the operation in normal command/response mode is complete you can either rely on the auto detection (see section 2.3) to return to direct mode or send the AT\DIR<CR> command. It is recommended that in most cases the AT\dir command is used.

The following analyser trace shows the TransPort router being put into direct mode, escaped from direct mode and then put back into direct mode again.

```
First the TransPort router is put into direct mode by the AT\dir command:
----- 7-6-2006 11:02:47.660 -----
ASY 0 DTE to DCE:

41 54 5C 64 69 72 0D          AT\dir.
-----
The TransPort router replies with OK:
----- 7-6-2006 11:02:47.660 -----
ASY 0(TPAD 0) DCE to DTE:

0D 0A 4F 4B 0D 0A          ..OK..
-----
As a test we send the "msgs" command, as the TransPort router is in direct mode the
command is ignored and no reply is sent:
----- 7-6-2006 11:02:51.400 -----
ASY 0(TPAD 0) DTE to DCE:

6D 73 67 73 0D          msgs.
-----
Next the Sarain is sent an AT command:
----- 7-6-2006 11:02:59.440 -----
ASY 0(TPAD 0) DTE to DCE:

41 54 0D          AT.
-----
Note that no reply is received to this AT command, but it has switched the TransPort
router out of direct mode. The next command line command (which can be either an AT or
non-AT command) then receives a response. As a test we send the msgs<CR> command:
----- 7-6-2006 11:03:06.260 -----
ASY 0 DTE to DCE:

6D 73 67 73 0D          msgs.
-----
This command DOES receive a response, this means the TransPort router is no longer in
direct mode:
----- 7-6-2006 11:03:06.260 -----
ASY 0 DCE to DTE:

0D 0A 4E 62 20 6F 66 20 66 72 65 65 20 6D 73 67          ..Nb.of.free.msg
73 20 3D 20 31 39 39 20 0D 0A 4D 69 6E 20 6D 65          s.=.199...Min.me
73 73 61 67 65 20 70 6F 6F 6C 20 31 37 32 0D 0A          ssage.pool.172..
4F 4B 0D 0A          OK..
-----
As a futher confirmation that we are not in direct mode we send the AT<CR> command and
receive an OK back:
----- 7-6-2006 11:03:11.280 -----
ASY 0 DTE to DCE:

61 74 0D          at.
-----
----- 7-6-2006 11:03:11.280 -----
```

```

ASY 0 DCE to DTE:

0D 0A 4F 4B 0D 0A                ..OK..
-----

To put the TransPort router back into direct mode the at\dir<CR> command is sent:
----- 7-6-2006 11:03:18.740 -----
ASY 0 DTE to DCE:

61 74 5C 64 69 72 0D             at\dir.
-----

An OK response is received for this command:
----- 7-6-2006 11:03:18.740 -----
ASY 0(TPAD 0) DCE to DTE:

0D 0A 4F 4B 0D 0A                ..OK..
-----

The TransPort router is now in direct mode, we can prove this by sending the non-AT
command msgs<CR>. The TransPort router sends no reply to this command, this is
confirmation that the TransPort router is back in direct mode:
----- 7-6-2006 11:03:23.020 -----
ASY 0(TPAD 0) DTE to DCE:

6D 73 67 73 0D                   msgs.
-----

```

**NB the use of the non-at style command “msgs” above is intended simply to illustrate the fact that the TransPort router is or is not in direct mode. This command should not be sent by a terminal !**

The following table shows a sequence of command that could be used to escape from direct mode, connect to a TCP host and then return to direct mode when complete:

Terminal Sends	TransPort router Sends	Reason
AT<CR>		To switch the TransPort router out of direct mode, no response to this command will be sent, the terminal should wait for about 100ms to ensure that the command has been processed by the TransPort router.
AT<CR>		To test that the TransPort router is out of direct mode.
	OK<CR><LF>	The TransPort router confirms that it is no longer in direct mode by replying with an OK message.
tcpdial 146.82.184.75 2050 - ok<CR>		The terminal sends the tcpdial command to connect to a remote host.
	CONNECT<CR><LF>	The TransPort router replies with "CONNECT" when the TCP connection is established.
DATA		The terminal sends data
	DATA	The 146.82.184.75 host replies with data
+++		The terminal sends the escape sequence
<PAUSE>		The terminal should pause for longer than the escape delay configured on the TransPort router.
ATH<CR>		The terminal sends the ATH command to hang up
	NO CARRIER<CR><LF>	The TransPort router replies with "NO CARRIER" when the connection is terminated.
AT\DIR<CR>		The terminal sends AT\DIR to put the TransPort router back into direct mode
	OK<CR><LF>	The TransPort router confirms this by sending an OK response

The TransPort router is now ready for further direct mode transactions.

## 2.5 Checking that the TransPort router is there

If for any reason it is necessary for the terminal to check that the direct mode configured TransPort router is still present and connected. The terminal may send the <ENQ> ASCII char and expect to receive the <ACK> char back.

As in the following example:

```
Terminal sends ENQ char:
----- 7-6-2006 11:54:20.420 -----
ASY 0(TPAD 0) DTE to DCE:

05 .
-----
```



#### TransPort router replies with ACK char:

```
----- 7-6-2006 11:54:20.420 -----  
ASY 0(TPAD 0) DCE to DTE:  
  
06  
-----
```

## 2.6 Connecting to more than one host.

The above example assumes that the terminal only ever wishes to connect to one host. If there is a requirement to connect to different hosts for different card IINs (**I**ssuer **I**dentification **N**umber) then please contact Digi support. Different firmware can be made available that scans the IIN in the APACS message and ensure that the TransPort router connects to the correct host. The special TransPort router firmware that does this currently supports APACS 30 messages and may need updating if there is a requirement to do this for APACS 40 messages.