emutel™|Duo

BRI and PRI NETWORK SIMULATOR

arcatech

Unit 402 LEC

Ballinderry Road

Lisburn

BT28 2SA

T: +44 (0) 28 9267 7204

F: +44 (0) 28 9260 5353

E: info@arca-technologies.com

W: www.arca-technologies.com

arca technologies

 Technology Development Center

545 Boylston St., 8th Floor

Boston, MA 02116

T: 001 800 375 9925

F: 001 617 262 9484

TABLE OF CONTENTS

INTRODUCTION

emutel™|Duo is an invaluable tool which is useful when multiple basic rate ISDN and primary rate ISDN terminals must be tested or demonstrated

emutel™|Duo provides three basic rate interfaces (BRI) and two primary rate interfaces (PRI) into which ISDN terminal equipment (e.g. terminal adapters, ISDN telephones, PABXs, video conferencing systems) can be plugged. The BRIs may be either S_0 interfaces (i.e. I.430 compatible) or U interfaces (i.e. ANSI T1.601 compatible). The PRIs may be either S_{2m} (i.e. E1 G.703 compatible) or T1 interfaces. In each case the interfaces need not be the same type.

A call on any bearer channel on any interface can be connected to any other bearer channel on any other interface. Virtually any type of call can be connected. **emutel™|Duo** can also provide a 40V, 1W power supply on each of the BRIs operating in both normal and restricted modes if they are S_0 interfaces and 88V 4W normal and sealing (20mA current limit) on U interface. Internal tones (A law and μ law) are provided for voice/3.1 kHz terminals.

The unit also supports X.25 packet calls on the D channel of BRI1 and BRI2.

Also available as a software option is a protocol analyser. When activated it will report what is happening at each of the BRI and PRI interface ports. Decoding can be enabled or disabled at:

- Layer 1 (physical layer)
- Layer 2 (data link layer)
- Layer 3 (call control layer)
- X.25

If layer 1 decoding is enabled the analyser will report the state of the physical connection.

At layer 2 you can select one of four possible modes of operation:

- No reporting
- Display message contents as hex bytes
- Display message contents in brief text messages
- Display message contents in detail, decoding all the information

INTRODUCTION

At layer 3 you there are six different levels of decoding for you to choose from:

- No reporting
- Display message contents as hex bytes
- Display message type only
- Display message type and the identifiers for the information elements in the message
- Display message type and show the meaning of the values within each information element
- Display message contents in detail, decoding all bits send and displaying their meaning

The originator, the interface number and the time are clearly identified in each message.

Finally, **emutel™|Duo** ISDN signalling can be disabled and permanent B channel connections established between each interface, allowing leased line equipment to function.

The focus of this manual is on the set up of **emutel™|Duo** and how the terminal equipment is connected in simulator mode. An easy to use windows application, emutel Config, has been developed to configure the **emutel™|Duo**. An overview of this application is provided in the Windows Application Chapter, however, it is strongly recommended that you refer to the online Help file for more details. Help can be accessed within the windows application by pressing F1 or by clicking the emutel ISDN Manager option from Start, Programs. Emutel ISDN Application Suite.

QUICK REFERENCE GUIDE

Introduction   This section allows you to set up and use your **emutel™|Duo** with minimum effort. If you follow this guide and the terminal equipment still does not function then please read the complete manual. The steps are as follows:

Unpack emutel™|Duo   Unpack **emutel™|Duo**. There should be a Terminal Cable (DB9-DB9), three ISDN Cables (RJ45-RJ45) and a Mains Power Cable.

If you have ordered the internal modem then a modem cable with BT adapter should be included.
If you have ordered any Network Personality Modules they should also be included.

Plug in the power cable   Plug the power cable into the rear of the unit and switch on (**emutel™|Duo** will work on 110V or 240V mains supply without adjustment).

Plug terminals into correct interface   Plug terminals into correct BRI or PRI interface (power up screen will tell you what interfaces are installed on **emutel™|Duo**).

Make a call   Make a call from one terminal to the other. (The default telephone numbers and other parameters are shown in Table 1.)

If the call did not work   For BRI calls where no LEDs became lit on the front panel then the terminals probably require power feeding. If not already switched on turn it on by following the instructions in the Software Setup chapter/Hardware Setup Screen.

For PRI calls where no LEDs became lit on the front panel then the framing format probably requires changing. Follow the instructions in the Software Setup chapter/Hardware Setup Screen.

Also check that the interface being used is the correct type for the terminal (i.e. U interface terminals will not work on an S interface and T1 terminals will not work on an E1 interface). See the chapter on Software Setup/Hardware Setup Screen to reconfigure a port.

Parameter	Default Setting
Baud Rate	19,200
Parity	None
Stop Bits	2
Data Bits	8
Port Power	On
100 μ Terminators	100 BRI
B channels/PRI	30
Use SPIDS	Optional
Numbering Option	Multiple Subscriber Numbering
CLIP	On
BRI 1	384010/11
BRI 2	384020/21
BRI 3	384030/31
PRI 1	384100-384129
PRI 2	384200-384229

Table 1 **emutel™|Duo** Default Settings

ISDN Connections
Network Simulator Mode

emutel™|Duo provides three ISDN S_0 or U BRI ports and two ISDN E1 (S_{2m}) or T1 PRI ports operating in NT mode. The BRI interfaces can optionally provide supply to power terminal equipment.

Parallel Monitoring

A Basic Rate S interface and an E1 or T1 PRI interface can be monitored.
For BRI S a terminal is connected to emutel™|Duo S BRI 2 interface and connected to the network.

For PRI a terminal is connected to emutel™|Duo PRI 1 interface and connected to the network.

In both cases network messages are then monitored by emutel™|Duo and displayed using the ISDN Analyser.

Permanent B Channel Connections

Normal ISDN Signalling is suspended and permanent connections made between the PRI and BRI interfaces.

LED Indicators

In operation, LEDs indicate the operating level of each port. The LEDs operate as follows:

- Physical layer activated
- Data link layer activated
- B1/B2 channel connected on the BRI interfaces or a single B LED to indicate that at least one B channel is active on the PRI interface
- S Interface on BRI
- U Interface on BRI
- E1 Interface on PRI
- T1 Interface on PRI
- Alarm condition has occurred
- Power is on

Data Ports

Two X.21 compatible data ports are available at the rear of emutel™|Duo. These provide access to the B channels on each interface for external test equipment.

Terminal Port

A V.24 port is provided at the rear of the unit allowing the connection of an ANSI compatible terminal or PC for setting up

the unit and to provide protocol analysis.

Auxiliary Port

The auxiliary port receives or transmits clock and frame information which allows two **emutel™|Duo** units to be locked to a single reference clock.

Network Personality Module

emutel™|Duo can be made to simulate country specific networks (e.g. 1TR6, BT, Euro ISDN etc.) by plugging a pre-programmed Network Personality Module into the slot on the front of the unit.

Protocol Analyser

A protocol analyser (emutel Analyser) can be used to decode all messages being transmitted or received by the **emutel™|Duo** through any of its BRI or PRI ports. It can be installed on Windows 95, Windows 98 or Windows NT4 and requires that the PC is connected to the **emutel™|Duo** via either the **emutel™|Duo**'s Terminal, Modem or LAN port.

emutel Application Suite

The emutel Application Suite consists of the following programs:

- emutel ISDN Manager is used to manage connections and launch the various applications such as emutel Config or emutel Analyser (protocol analyser)
- emutel Config is a graphical user interface that can be used to configure the **emutel™|Duo**
- emutel Analyser is the protocol analyser
- emutel Terminal is a terminal emulator that is used for reprogramming during software upgrades.
-

The emutel Application Suite can be installed on Windows 95, Windows 98 or Windows NT4 and requires that the PC is connected to the **emutel™|Duo** via either the **emutel™|Duo**'s Terminal, Modem or LAN port.
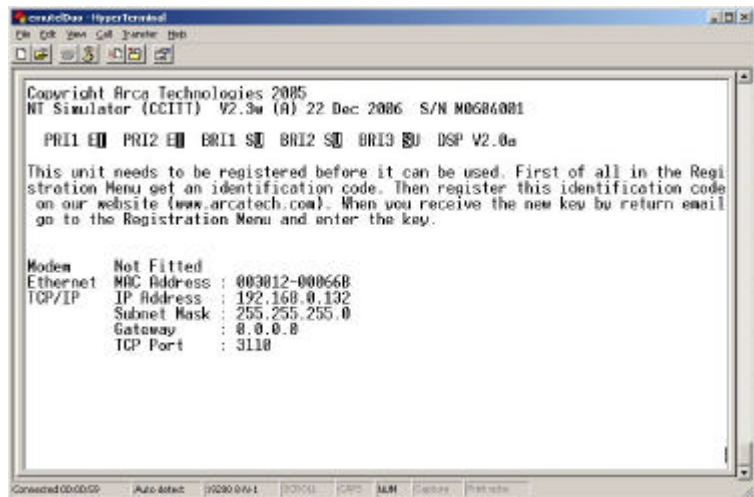
Unit Registration   When a new unit is purchased all ports are deactivated and require the
unit to be registered to activate these.

Registration of the **emutel™|Duo** is a two part process, with user
intervention required at both stages.

Firstly an Identification Code is obtained from the unit and sent to
arcatech ltd. This Identification Code is used by **arcatech** to produce a
Registration Key which is unique to the unit and Identification Code.

Identification Code   To obtain the unit's Identification Code you will need to connect to the
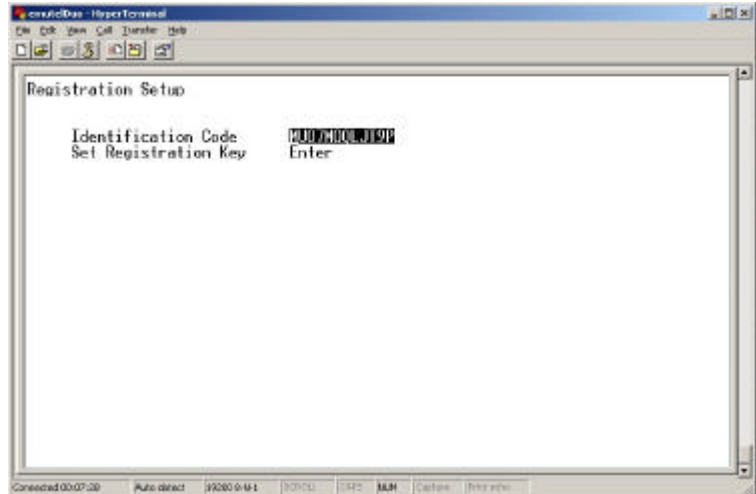unit using the RS-232 terminal port and a terminal package such as
HyperTerminal.

The unit's Copyright screen will appear when the unit is powered up.
If you press <Enter> to go to the main Menu screen and then select the
Registration Menu

A twelve digit Identification Code will be displayed on this screen.
This number should be copied and forwarded to **arcatech** along with
the unit serial number and also your contact details. Care should be
taken not to confuse the letter O with the digit 0, I with 1 and U with V.
Once **arcatech** have received the Identification Code, a Registration
Key will be issued.
This Registration Key should be entered under "Set Registration Key"
which will unlock the unit ready for use.
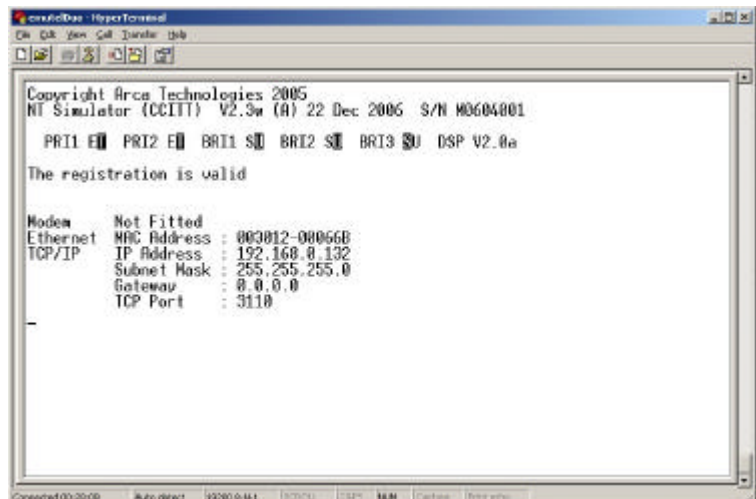
Installing the Software   Insert the CD into the drive. The CD should auto-run however if this fails to occur, run the setup.exe. Follow the on screen instructions to install the application suite. The suite consists of:

- emutel ISDN Manager - manages connections and is used to launch tools such as emutel Config and emutel Analyser
- emutel Config - configures the emutel unit
- emutel Analyser - protocol analyser
- help files

Note that a software upgrade from a lower version to a higher version of the application suite will result in the older software being removed first. When this is complete, run the setup.exe again to complete the software upgrade.

When installation is complete, run the emutel ISDN Manager first. This program can be launched from the Start, Programs, emutel ISDN Application Suite menu. The emutel ISDN Manager allows the connections to be configured and saved.

Please read the sections that follow on the emutel ISDN Manager, which describe how to manage connections and launch the emutel Config. Further information can also be obtained by referring to the comprehensive emutel Manager help file.

Unpack emutel™|Duo First unpack **emutel™|Duo** and check for signs of damage in transit. If the unit or packaging is damaged this should be reported immediately to your supplier.

Check Options Supplied To check which options have been installed inside the main unit check the option label on the bottom of the unit or the power up screen on the TERMINAL:

- **emutel™|Duo** Network Simulator
- Cables for ISDN - RJ45-RJ45 (3 off)
- Mains Cable
- Terminal Cable DB9-DB9 (1 off)
- **emutel™|Duo** Protocol Analyser
- **emutel™|Duo** Network Personality Modules (Options)
- Modem cable and BT adapter (With Modem option)
- Manual
- Emutel Application Suite on CD
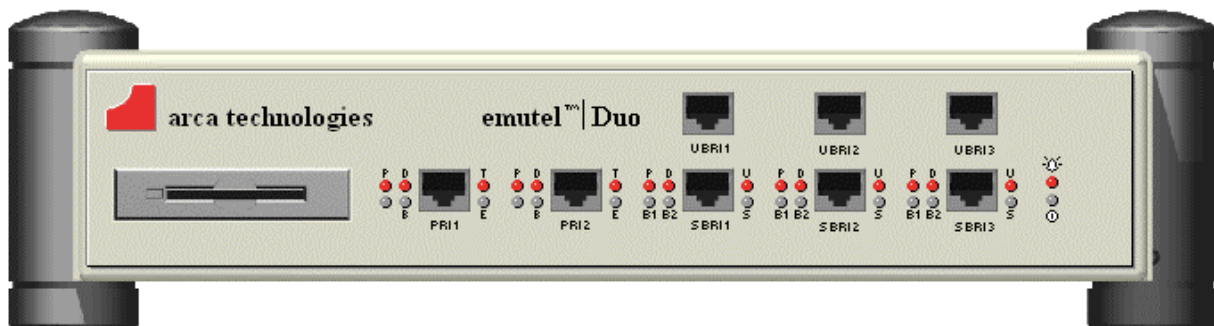
Figure 1 **emutel™|Duo** Front Panel

The BRI1, BRI2 and BRI3 RJ45 connectors provide the BRI interfaces into the unit. There are two BRI connectors per port. The top connector is for U interface equipment. The bottom connector is for S interface equipment. Only one piece of equipment (S or U) can operate at any time per BRI port. The PRI1 and PRI2 connectors provide the PRI connections into the unit.

Start Up Sequence When the unit is first switched on all the LEDs will illuminate. During this period the terminal port will default to 19200 baud, no parity, 8 data bits and 2 stop bits and will search for a <ctrl-c>

being transmitted to **emutel™|Duo**. If this occurs **emutel™|Duo** will restore the factory defaults. This is useful if a setting has been changed and **emutel™|Duo** ceases to operate as a result. Powering up **emutel™|Duo** and immediately typing <ctrl-c> will restore a factory default configuration to **emutel™|Duo**.

Interface Pinout

The S_0 interface is a 4 wire interface and the U interface is 2 wire. Figure 2 shows the signals provided at the BRI RJ45 connector.

S Interface Pinout (NT Mode)

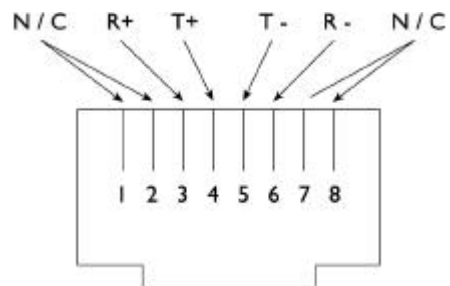Figure 2a RJ45 Signals (S Interface NT Mode)

U Interface Pinout
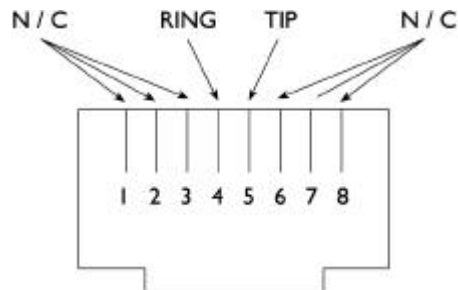
Figure 2b RJ45 Signals (U Interface)

PRI Interface Pinout T1 and E1 (NT Mode)

The S_{2m} (E1) and T1 interfaces are 4 wire interfaces. The pinout is shown in Figure 3.

T- T+ N/C R- R+ N/C N/C

1 2 3 4 5 6 7 8
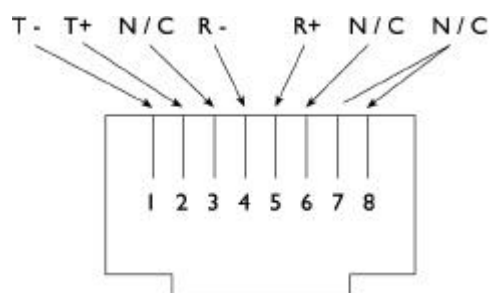
Figure 3a RJ45 Signals (E1/T1 NT Mode)

**PRI Interface Pinout T1and E1
(TE Mode)**

R- R+ N/C T- T+ N/C N/C

1 2 3 4 5 6 7 8
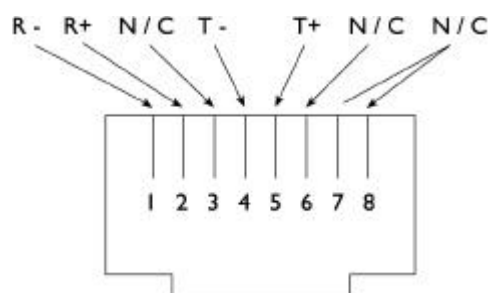
Figure 3b RJ45 Signals (E1/T1 TE Mode)

Use of PRI Connectors

The RJ45 connectors PRI1 and PRI2 provide 120Ω balanced twisted pair connections (see Figure 3) for the PRI interfaces.

Note that RJ45 cables require a 120Ω termination.

WARNING!

Plugging S-type Terminal Equipment (TE) into a U-type interface will short-circuit the interface. **This may cause damage to the TE, the interface or both.**

If using North American equipment on a U-type interface, only use equipment in "Sealing".

Parallel Monitoring

Please refer to Appendix 2 for a diagram of the connection setup for parallel monitoring.

LED Indicators

Beside each ISDN interface port is a group of LEDs. These LEDs indicate the state of the ISDN interface beside them. The P LED lights whenever the ISDN line has activated. The D LED lights whenever the Data Link layer for that port is active (i.e. Multi-Frame Established). The corresponding B channel LED on the BRI

interfaces (B1/B2) lights whenever that bearer channel is connected.

On the PRI interface one B LED is provided which lights whenever there is an active B channel. On the BRI, an S LED lights when the port is configured for S interface connection and a U LED lights when the port is configured for U interface connection. On the PRI, an E LED lights when the port is configured for E1 interface connection and a T LED lights when the port is configured for T1 interface connection.

The Alarm LED lights when an alarm condition has occurred within **emutel™|Duo**.

In addition the Power LED lights whenever 5V power is present in the unit.

When the unit is first switched on all the LEDs will illuminate. All but the Power LED will then extinguish and the BRI3 LEDs will indicate, for about 1 second, the configuration being used. **emutel™|Duo** will then switch to the mode defined by the internal configuration (usually NT mode).

Table 2 on the following page lists the configuration indicated by the LEDs on power up.

P LED	Name	Description
P	ON	NT Mode
D	ON	BRI Power Active
	OFF	BRI Power Inactive
B1	ON	BRI Terminators In
	OFF	BRI Terminators Out
B2	ON	Local Clock
	OFF	Remote Clock

Table 2 Power Up Configuration

Network Personality Module   Beside the two PRI interfaces is the slot for the Network Personality Module. **emutel™|Duo** can be made to simulate specific networks (e.g. 1TR6) by plugging the relevant Network Personality Module into this slot.

Figure 4 **emutel™|Duo** Back Panel

Terminal Port   **emutel™|Duo** has one V.24 compatible terminal port in which a PC or VT100 compatible terminal or a PC emulating an ANSI terminal (e.g. running Procomm, Windows, Terminal, Hyper Terminal etc.) can be connected. The pinout of the port is shown in Figure 5. Table 3 lists the operation of each pin.
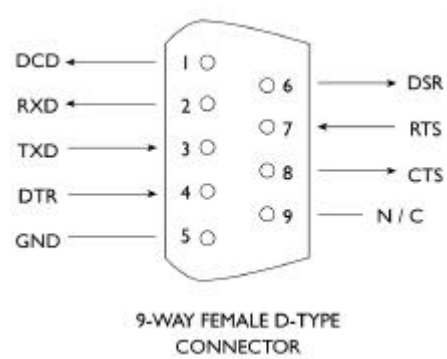
Figure 5 V.24 Terminal Port

Pin	Function	Description
1	DCD	Data Carrier Detect (always active)
2	RXD	Received Data (output)
3	TXD	Transmitted Data (input)
4	DTR	Data Terminal Ready (input - ignored)
5	GND	Ground
6	DSR	Data Set Ready (always active)
7	RTS	Request to Send (input - ignored)
8	CTS	Clear to Send
		(output- active when **emutel** can receive Data)

Table 3 Terminal Port Pin Description

X.21 Data Ports   **emutel™|Duo** has two X.21 data ports on the back panel. Figure 6
shows the pinout of each X.21 connector. Table 4 lists the X.21
signals and describes each one.
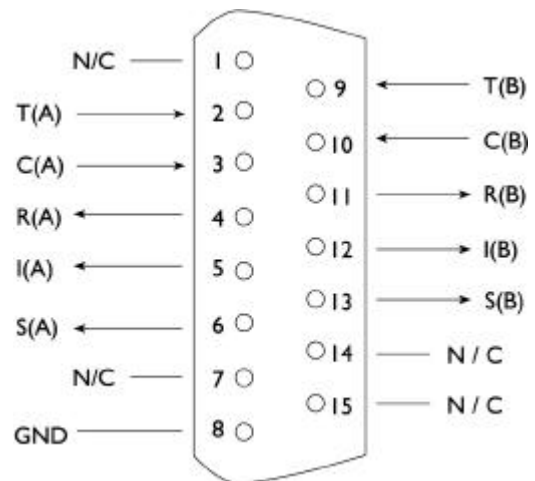
Figure 6 X.21 Data Port

Pin	Function	Description
4,11	RXD	Received Data (input)
2,9	TXD	Transmitted Data (output)
3,10	CON	Control (input) indicates that input data is valid
5,12	IND	Indicate (output) indicates that transmit data is valid
6,13	CLK	Data Clock (output) -frequency depends on number of B channels connected to X.21 interface
8	GND	Signal Ground

Table 4 X.21Data Port Signals

Auxiliary Port   The auxiliary port is currently used only to allow **emutel™|Duo** to receive network clock and frame synchronisation from another **emutel™|Duo**. This forces the two **emutel™|Duo**s to align the ISDN data to each other allowing a terminal requiring more than 2 PRI or 3 BRI interfaces to be connected to multiple **emutel™|Duo**s. The pinout of this port is shown in Figure 7. Table 5 defines the signals supplied on the auxiliary port.
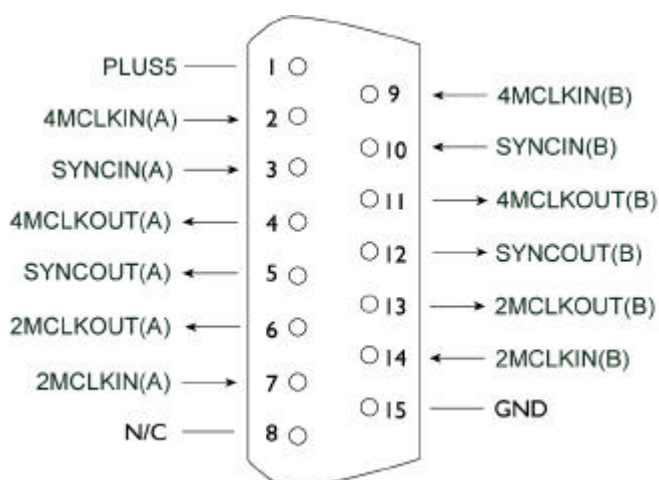
Figure 7 Auxiliary Port Pinout
(**NB** Signals on pins 9-14 are all inverted.)

Pin	Function	Description
1	PLUS5	+5 Volts DC
2	4MCLKIN	Differential input 4.096MHz clock signal from
9	/4MCLKIN	another **emutel™|Duo** to lock clock
		frequencies
3	SYNCIN	Differential input 8kHz frame pulse signal from
10	/SYNCIN	another **emutel™|Duo** to lock frame alignment
4	4MCLKOUT	Differential 4.096MHz clock signal to enable
11	/4MCLKOUT	**emutel™|Duo** to lock clock frequencies
5	SYNCOUT	Differential 8kHz frame pulse signal to enable
12	/SYNCOUT	**emutel™|Duo** to lock frame alignment
6	2MCLKOUT	Differential 2.048MHz clock signal to enable
13	/2MCLKOUT	**emutel™|Duo** to lock clock frequencies
7	2MCLKIN	Differential input 2.048MHz clock signal from
14	/2MCLKIN	another **emutel™|Duo** to lock clock
		frequencies
15	GND	Signal Ground

Table 5 Auxiliary Port Signal Definitions

Start-up Sequence   The information that follows refers to the use of terminal emulation software, however the emutel Config windows application provides a user-friendly interface for configuring the unit. The emutel Config is installed as part of the emutel Application Suite. Please refer to the Windows Application chapter for more information on how to install, run and use the Application Suite programs.

When **emutel™|Duo** is powered up it transmits an opening message, referred to later in the "Copyright Screen" (see Software Setup chapter). Once **emutel™|Duo** has been set up properly then it is not necessary to connect a terminal. To set up **emutel™|Duo** press any key on the terminal or PC keyboard and the screen is presented. The Hardware Setup chapter covers setting up **emutel™|Duo**.

The factory default settings for **emutel™|Duo** are 19200 baud, 8 data bits, 2 stop bits, no parity, although you can change these settings. If **emutel™|Duo** settings in memory become corrupt it may not be possible to operate the terminal, as the baud rate may be wrong. **emutel™|Duo** will always power up with the terminal port operating at 19200 baud, 8 data bits, 2 stop bit, no parity and will maintain this setting during the time when the power up LEDs are on. Typing <ctrl-c> during this time will reload the factory defaults and the terminal should start to function normally again.

Power   **emutel™|Duo** power connector will accept an IEC mains lead (supplied). **emutel™|Duo** has a universal input suitable for 110-240 V ac, 1.7A, 50-60 Hz. Connection to any other source may result in the unit failing to comply with safety requirements.

NOTE: The socket outlet should be installed near the equipment and should be easily accessible

Warning! - Earth emutel™|Duo   **The power supply must have a protective ground (Earth) connection. If not, the mains filter will force the metal case to a voltage equal to half the mains supply voltage.**

There are no user serviceable parts inside **emutel™|Duo**. The unit should only be opened by approved maintenance staff (i.e. service

personnel only) otherwise the warranty will be invalidated.

Once the terminal has been connected to the control port, power can be applied. All the LEDs will light and then extinguish once the power on self-test is completed (the Power LED will stay on). The terminal should now display the copyright screen and can be set up as described in the Software Setup chapter.

Introduction The emutel Config windows application is used to configure the **emutel^{TM}|Duo**. The easy to use interface reflects the appearance of the emutel unit, with its ports and LEDs. Additional features, such as BRI interface power levels and X25, are visually represented and the current network is immediately apparent.

emutel ISDN Manager Overview The emutel ISDN Manager allows multiple connections to be made via the serial port, modem or Ethernet. For example, an **emutel^{TM}|Duo** unit can be connected via one Com Port and the emutel Analyser connected via a second Com Port. The ISDN Manager can support up to 5 connections. When the emutel ISDN Manager is launched, the following window is displayed.
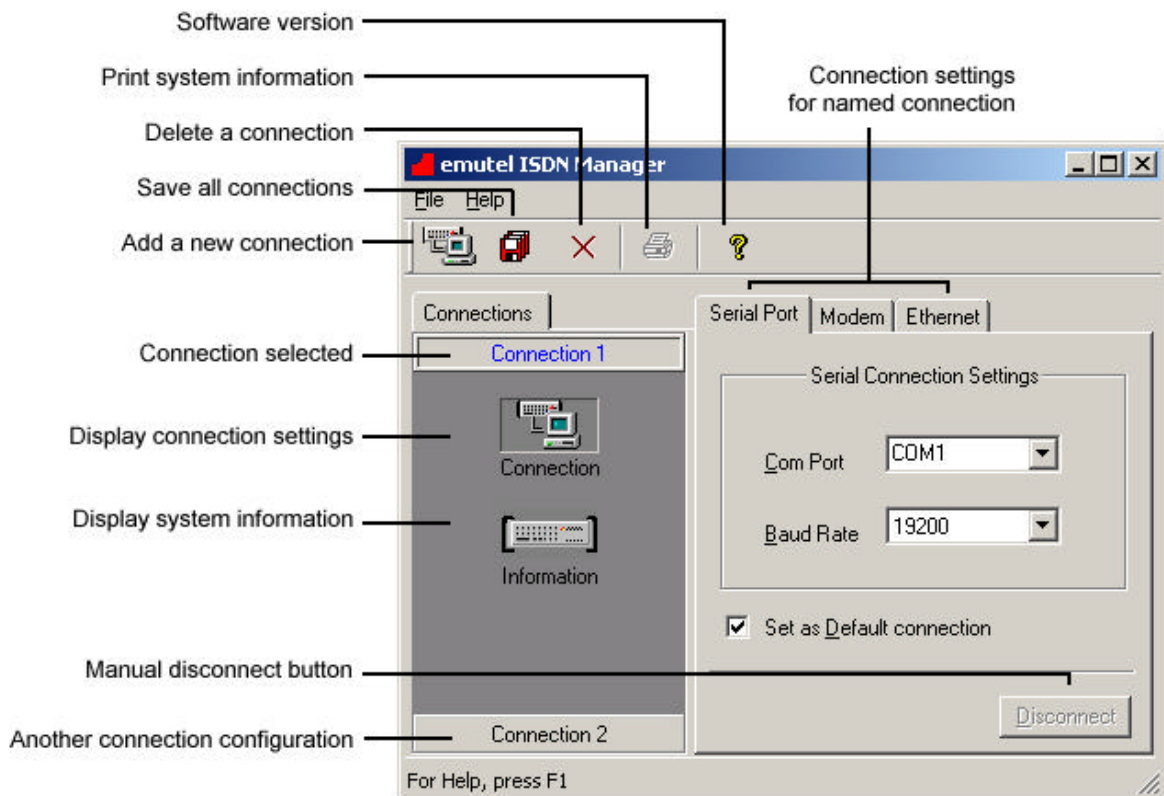

Figure 8 emutel ISDN Manager window

Connections Tab The Connections tab displays the connections that have been configured. Below each connection are icons for Connection and Information. Clicking the Connection icon, displays the connection settings in the right-hand pane. In the example displayed in Figure 8, Connection 1 is selected and the connection settings are displayed in

the right hand pane. A second connection has also been added, connection 2. The Disconnect button at the bottom of the window can be used to manually disconnect the Com Ports.

Clicking the Information icon, displays the system information such as software version, unit type, cards fitted and licensing status.

Configuring and Saving Connections Select a connection from the left hand pane of the window. Click on the Connection icon to display the Serial Port, Modem and Ethernet connection settings. Change the settings to those required as follows:

For the serial port, set the baud rate and Com Port.
For the modem connection, select the Com Port and enter the required telephone number. The modem connection option will only work if a modem module (optional) is installed in the **emutel^{TM}|Duo**.

For Ethernet connection, enter the IP address of the **emutel^{TM}|Duo** and the port number (3110). Note that the IP address of the unit can be modified via the windows application when connected via the serial port. From the windows application, click on the LAN port and change the settings.

Select either the serial, modem or ethernet as the default connection by clicking the Set as Default connection option on the appropriate tab. Click the Save Connection icon. This saves the connection settings.

To add another connection, click the New Connection icon on the toolbar and type in a name. Change the settings to those required as detailed above. Save the changes by clicking the Save Connection icon on the toolbar.

The connection configurations have now been set and saved and can now be used by tools to establish a connection to the unit.

Tools Tab The Tools tab is used to select tools or applications to launch and to check the connection status of tools. The tools available are:

- emutel Config – windows application to configure emutel

hardware
- emutel Analyser – protocol analyser
- emutel Terminal – terminal emulation software used for reprogramming during software upgrades

Clicking on a tool icon selects the tool and displays the connection status in the right-hand pane of the window. This includes the connection settings such as baud rate and Com Port, the number of bytes received and sent and the status e.g. OK.

How to Run a Tool   Select the Tools tab from the emutel ISDN Manager window and then left-click on the tool icon. This selects the tool. Right-click on the tool icon to display a pop-up menu for the tool. Click the Run Tool option to launch the tool. The Select Connection window is displayed (Figure 9).
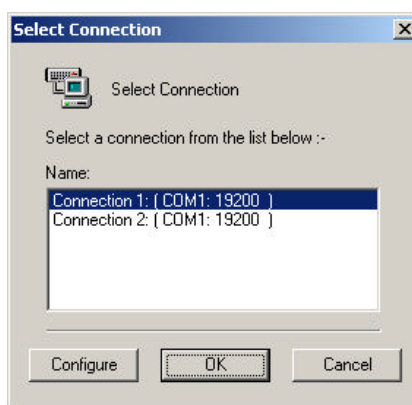
Figure 9 Select Connection window

From the list of available connections, select a connection. In this example, Connection 1, configured as Com Port 1, baud rate 19200 is selected. The other serial port settings are set automatically and cannot be altered. These are Parity (None), Stop bits (2) and Data bits (8). Click OK. Make sure that for serial port connections, a serial cable has been connected from the terminal connection to the correct Com Port on the PC.

Click OK. The tool is run and the connection established using the connection settings selected.

Running the emutel Config
Configure and save at least one connection setting.

Run the tool as described in the How to Run a Tool section.

Select the connection from the Select Connection window. The main window appears (Refer to Figure 10).

Running the emutel Analyser
Configure and save at least one connection setting.

Run the tool as described in the How to Run a Tool section. The main Analyser window is displayed.

Select Open Connection from the Analyse menu. The Select Connection window is displayed. Select the connection from the Select Connection window.

Running the emutel Terminal
Configure and save at least one connection setting.

Run the tool. The emutel Analyser window is displayed. Left-click on the ′connect-none′ text in the status bar. This is located at the bottom of the window. Select the required com port. The default baud rate is 19200. This can be changed by left-clicking on the ′19200′ text. Select a new baud rate from the pop-up window. The selected port is opened. Press the ESC key to display the main copyright screen. When the main copyright screen is displayed, press Enter to display the main menu options.

Reprogramming using the emutel Terminal
Software upgrades to the unit can be achieved by reprogramming i.e. uploading a new file to the unit. The Flash, PCMCIA card and DSP Module can be reprogrammed via the serial port.

When the main copyright screen of the emutel Terminal is displayed, press Enter to display the main menu options.

Use the arrow keys to scroll down to the Other Features option. Press Enter. The Reprogramming Menu will be highlighted. Press Enter.

From the reprogramming options presented, select the required component being upgraded e.g. Flash. Confirm the choice made by entering Y. For Flash reprogramming, the display shows Clearing Ram, Ready for S-Record.

From the File menu on the emutel Terminal window, select the Send File option. Locate the S-Record file. This file holds details of the

software changes and is obtained from Arca Technologies Ltd.

When the file is located, click Open. The file will be uploaded to the unit. If the file is valid, the display shows in sequence, S-Record download complete and Flash program complete. If the file is not valid an error message is displayed. The existing Flash will not have been changed.

Restart the unit to complete the upgrade.

Troubleshooting Connection Problems
The common connection problems and their resolution are described below:

- The unit may not be turned on. Check the power lead and ensure the unit is switched on.
- The unit may not be correctly connected. Check that all cable connections are secure.
- Other software such as a terminal emulation program may be connected to the Com Port being used to connect to the unit. Close the terminal emulation software and relaunch the emutel Config.
- Ethernet connection failure. Make sure the IP address, in the connection being used, matches that on the unit. A serial port connection can be made using the emutel Config application and the IP address changed by clicking on the LAN port.
- Modem connection failure. No modem is fitted. The modem is an optional extra. Contact your distributor for an upgrade.
- If a tool such as the emutel Config is launched successfully but fails to respond for some reason, the tool can be released. Open the emutel ISDN Manager window and select the Tools tab. Click on the tool icon and click the Release button at the bottom of the window. Run the tool again.

Note: Selecting the Reset Unit or Load Unit Configuration options from the emutel Config will result in the user interface being temporarily disabled. Normal functionality will resume after a few a few seconds when the operations have been completed.
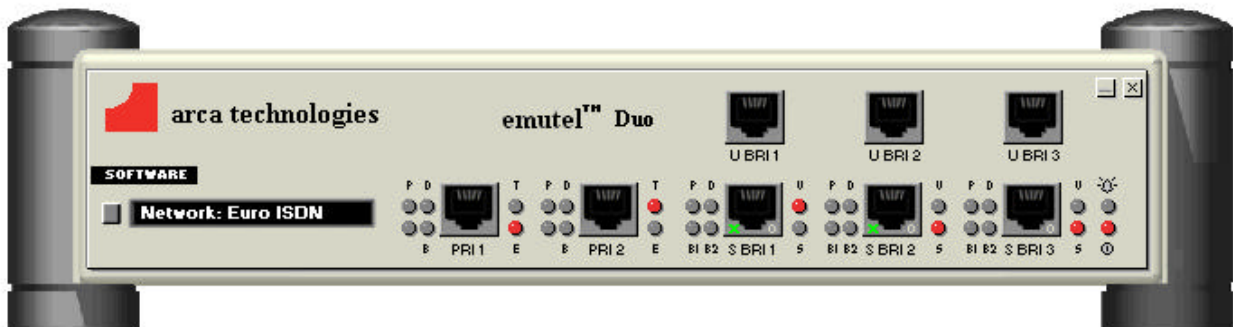
Figure 10 emutel Config windows application graphical user interface

emutel Config User Interface Overview The user interface (Figure 10) displays each of the cards in the unit. This includes the controller card and any additional expansion cards fitted.

Take a few minutes to move the mouse pointer over the application and note how the display changes. For example, when the mouse moves over an object such as a port, the port icon is highlighted. A left-click on the port displays a pop-up window with settings that can be viewed or modified.

Other items on the user interface provide access to additional features or menus. These include the software button, PCMCIA slot, system button and "arca technologies" text. A right-click near the **emutel^{TM}|Duo** text provides access to additional options such as communication settings, configuration files and a unit reset.

It is strongly recommended that the emutel Manager help file be consulted for detailed explanations on the operation of the emutel Config application as the following information is only a brief overview.

How to View and Change Settings Left-click on the appropriate icon on the interface e.g. port or system button. A pop-up window is displayed (Figure 11). Change the required settings and click OK or Apply. A message is sent to the

unit that responds with the updated settings. Communication between the application and the **emutel^{TM}|Duo** is depicted in a small window at the bottom right of the screen (Figure 12).

An alphabetical listing of all available settings and where they are located on the interface is listed in the emutel Manager help file under the topic Setting Locator.

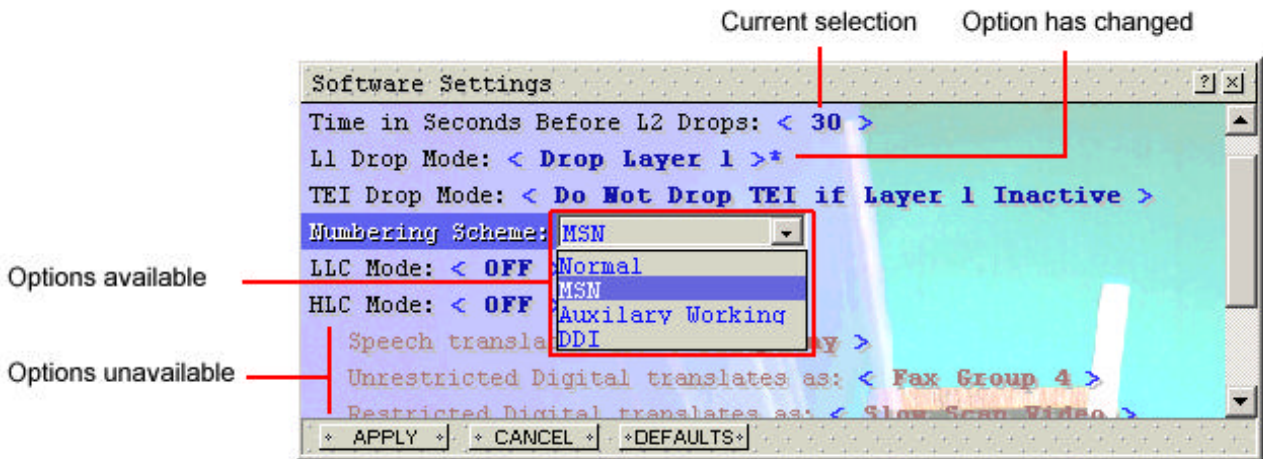Figure 11 Pop-up window settings example

Figure 12 Communication between the unit and the PC

Display Features

Ports Each port on the unit is represented graphically on the user interface. Left-click on a port to access settings.

E1/T1 interface The interface is depicted by the LED which is located to the right of the port. For Permanent B operation, both ports must be set to E1 or T1.

Figure 13 E1/T1 representation on user interface

S/U Selection interface The U BRI ports are for display purposes only and cannot be used to access U BRI port settings directly. Instead, click on the S BRI port immediately below.

For example, to change U BRI 1 port settings, click on the S BRI 1 port. Clicking on this port displays a window in which it is possible to switch between the S or U interfaces and change settings. The LED to the right of the S BRI port also indicates if the S or U interface is selected (Figure).

Note that changing the interface from S to U or vice versa results in the user interface being temporarily disabled while the changes are effected on the unit.

Figure14 S/U representation on user interface

Power Levels The power settings are displayed for any BRI ports on the unit. The current power setting is displayed in the bottom right-hand of the port. The display represents the following:
O = power off, N = normal, R = restricted, S = sealing

X25 BRI 1 and BRI 2 on the unit have X25 capability and are depicted on the interface with a small 'X' in the port icon. X25 must be enabled on the unit before X25 port level settings become available. To enable X25, click on the Software button and change the X25 mode to On.

Figure 15 X25 representation on user interface

System Button   The system button (Figure 16) is located to the top left of the unit. Left-click on it to access the system settings which include system telephone numbers and DSP settings. The DSP settings are read only in the pop-up window but can be changed by clicking the DSP button at the bottom of the window.

Figure 16 System button example

Website Access   Click on the 'arca technologies' text on the user interface. The company website is displayed with up to date information on products and technical support.

Software Button   The Software button (Figure 17) is located to the left of the unit below the Arca symbol. Left-click to access settings such as simulation mode and numbering scheme.

Figure 17 Software button example on a BRI U expansion card

PCMCIA Slot   The PCMCIA slot (Figure 18) is used to display the current network and to provide access to network settings.

Figure 18 PCMCIA slot example

System Menu A right-click on the unit near the **emutel™|Duo** text, displays a pop-up menu (Figure 19).
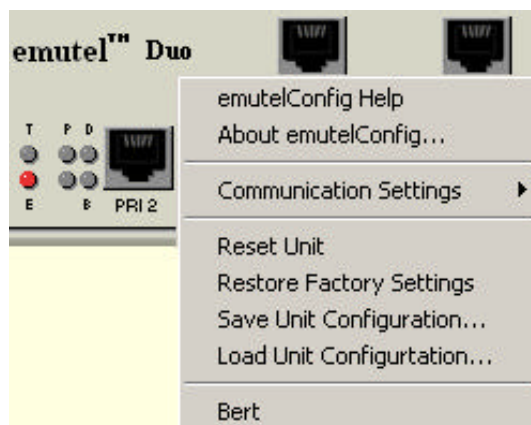
Figure 19 Right-click menu example

emutel Config Help Launches comprehensive Help for the application.

Communication Settings The LAN and Terminal port settings can be changed here. For the Terminal port, only the baud rate can be altered. The parity is set at none, stop bits at 2 and data bits at 8. For LAN settings, IP Address, IP Submask and IP Gateway can only be altered when the IP Mode is fixed. The Telnet Port is preset at 3110 and cannot be altered.

About emutel Config Copyright information and software version is displayed in a window.

Reset Unit Power cycles the unit without restoring factory default settings. The user interface is temporarily disabled while this operation is completed.

Restore Factory Defaults The Restore Factory Defaults option allows all of the unit settings to be restored to their defaults. The only exceptions to this are the communication settings for either the serial or Ethernet ports. This ensures that communication between the PC and the unit is not compromised. If the serial port is being used for the connection between the windows application and the unit, the Ethernet settings are returned to their default values and vice versa.

Saving and Loading Unit Configurations   This option is provided to save the current emutel unit configuration. This file can be saved and uploaded to another unit or different unit configurations can be stored for testing purposes. Should problems occur during the operation of the unit, the configuration file may be forwarded to Technical Support to aid troubleshooting. Note that the configuration files, which hold the unit information, should not be edited or they will become corrupted.

Save Unit Configuration   Right-click near the **emutel™|Duo** text to display a pop-up menu. From the menu displayed, click on Save Unit Configuration. The Save As window is displayed. Enter the folder location and filename. ISDN configuration files have a preset sdn file extension. Click Save. The unit settings are saved to the specified location.

Load Unit Configuration   The units must be identical in terms of number of ports and their interfaces e.g. if the saved unit configuration file was based on a unit with a PRI module fitted, running Euro ISDN network, the unit the file is being uploaded to must also have the same configuration and network. If this is not the case, the unit configurations will conflict and an error will be reported.

Right-click near the **emutel™|Duo** text to display a pop-up menu. From the menu displayed, click on Load Unit Configuration. The Open ISDN Configuration File window is displayed. Locate the saved configuration file.

When a configuration file is selected, the panel in the lower half of the window displays configuration file information such as the unit type e.g. cards, modules fitted, network etc. At this stage an initial crosscheck should be made with the unit to which the file is being uploaded.

Click Send Config. The configuration file information is uploaded to the unit. If there is a discrepancy in the unit types or configurations, an error message is displayed.

Note that during the upload period, the user interface is temporarily disabled.

Bert   The Bert statistics are available for viewing when the BERT number is

called. The Bert number is set via the System Settings button.

Accessing Help   The Help file provides an extensive range of topics on how to use the emutel ISDN Manager and the emutel Config interface including where to find specific settings (Setting Locator topic). Help can be accessed in the following ways:

- Press F1 to access the online Help.
- Right-click anywhere on the unit, other than on a card and select emutel Config Help
- View Help without launching the windows application via the Start, Programs, emutel ISDN Application Suite menu.

Introduction
This chapter outlines the user interface of **emutel™|Duo** and how the various functions of **emutel™|Duo** are set up and used using a terminal.

Assuming that the hardware has been set up as described in the Hardware Setup chapter, when power is applied the following message should be displayed on your terminal or PC.

Copyright Screen
```
©Copyright Arca Technologies Ltd 2000
ISDN Simulator (XXX) Vx.xx dd mmm yyyy  S/N xxxxxxxx

PRI1 xx PRI2 xx BRI1 xx BRI2 xx BRI3 xx

X.25 version Vx.xx

Modem      XXXX
Ethernet   MAC Address: xxxxxx-xxxxxx
TCP/IP     IP Address : xxx.xxx.xxx.xxx:xx
           Subnet Mask: xxx.xxx.xxx.xxx
           Gateway    : xxx.xxx.xxx.xxx
           TCP Port   : xxxx
```

Figure 20 Copyright Screen

The default data format is 19200 baud, 8 data bits, 2 stop bits, and no parity. If no message appears then there is probably something wrong with the control cable. If some characters are displayed but the format is strange then the terminal parameters are probably incorrect. Try adjusting the terminal parameters so that they match **emutel™|Duo**.

Nothing further will happen until you press a key. Note that once the unit has been set up it is not necessary to set it up each time it is powered on, and consequently the terminal need not be connected thereafter.

emutel™|**Duo** now displays the main set up screen, shown in Figure 21.

```
Hardware Setup
Software Setup
Telephone Number Setup
Ethernet Setup
Other Features
```

Figure 21 Main System Menu

Changing Parameters   The set up of emutel™|**Duo** is structured rather like a tree with the menu of Figure 21 at the top. You move to a more detailed lower function by using the <up-arrow> and <down-arrow> keys to select the desired function and press <enter> on the keyboard. To move to the next higher function, press the <esc> key on the keyboard. Note that <u> and <d> perform the same function as <up-arrow> and <down-arrow>.

Once you have located the item you wish to change use <space> to cycle through the various options permitted.

Some information must be entered by typing it in, rather than using <space> (e.g. telephone numbers). Move to the item to be changed and press <enter>. A prompt will appear at the bottom of the screen requesting the information.

The options listed in Figure 21 are as follows:

Hardware Setup   This function allows you to set up the communications ports, and various other hardware functions of emutel™|**Duo**.

Software Setup   This function allows you to change the operation of emutel™|**Duo** by switching on and off information elements in the call control messages or by changing the way in which the layer 2 and layer 3 software operates. This function can be used to enable facilities such as Multiple Subscriber Numbering and Subaddressing.

Telephone Number Setup   This function allows you to change the default telephone numbers for each B channel and the special purpose telephone numbers.

Ethernet Setup   This function allows you to change the ethernet options.

Hardware Setup Screen   On selecting this option you are presented with the screen of Figure 22.

```
Hardware Setup

Coms Port Baud Rate            xxxx

Simulator Mode                 xxxx
Permanent Mode                 xxxx

NT Mode Clock                  xxxx

DSP Settings Menu              xxxx
BRI Settings Menu              xxxx
PRI Settings Menu              xxxx

System Time                    xx/xx/xx xx:xx:xx
```

Figure 22 Hardware Setup Menu

All of the fields in Figure 22 are changed by highlighting the required field and cycling through the options using the <space>, unless stated otherwise. The fields are listed below:

Coms Port Baud Rate   This is the baud rate for the control terminal. Note that changing this parameter will mean that you will have to change the terminal setup also.

Simulator Mode   This field selects between ISDN Network Terminator Mode (NT). Parallel Monitoring Mode and Permanent B Channel Connections.

In NT mode **emutel™|Duo** will simulate an ISDN network, allowing PRI and BRI terminals to be plugged in and to call each other.
In Parallel Monitoring Mode the **emutel™|Duo** will monitor the

messages running on another piece of BRI S equipment or PRI equipment, allowing messages to be displayed without having to break the physical link in the network being monitored.

Permanent B Channel Connection disables normal ISDN signalling and allows for the creation of permanent connections between B channels. The BRI D channels are not connected.

If the Permanent B Channel Connection is selected you can configure the B Channels by typing <enter>. The screen of Figure 23 is displayed.

Permanent B Channel Menu

```
BRI1 to BRI2 / PRI1 to PRI2 (B1-B23)        xxxx

BRI1 to PRI1 and BRI2 to PRI2 (B1 & B2)     xxxx
PRI1 to PRI2 (B3 – B23)
```

Figure 23 Permanent B Channel Menu

Select one of the two options, shown above by typing <Enter>. Confirmation of your selection will appear at the bottom of the above screen and also beside Permanent Mode in the main Hardware Settings Menu.

NT Mode Clock   This field allows the clocks used to generate the timing for the interfaces in NT(LT) mode to be driven from another **emutel™|Duo**.   Both **emutel™|Duo** interfaces are then synchronised at the same speed. This field must be set to LOCAL if only one **emutel™|Duo** is being used and REMOTE to receive clocking signals from another **emutel™|Duo**.

DSP Settings Menu   This field is selected with the <Enter> key. The menu of Figure 24 will be displayed on your screen.

```
DSP Module Setup


Tone Mode              xxxx
Tone Law               xxxx
Selected Tone          xxxx
Sine Frequency         xxxx
Sine Power             xxxx
Custom dial tone setup   xxxx
Custom ring tone setup   xxxx
Custom busy tone setup   xxxx
Custom error tone setup xxxx
```

Figure 24 DSP Settings Menu

emutel™|Duo can generate a tone on a B channel whenever a terminal dials a particular telephone number (see Software Setup chapter/Telephone Number Setup Screen). This menu is used to select the tone frequency and power level. It is also possible to select dial tone, ring tone, error tone (reorder tone) and busy tone using these menu options.

BRI Settings Menu   This field is selected with the <Enter> key. The menu of Figure 25, below, will be displayed on your screen.

```
BRI Settings Menu


BRI1 Mode              xxxx
BRI2 Mode              xxxx
BRI3 Mode              xxxx
BRI Power Mode         xxxx


S Power Type           xxxx
U Power Type           xxxx
```

Figure 25 BRI Settings Menu

This menu is used for setting up the Basic Rate interfaces.

Setting BRI Power Mode to ON forces **emutel™|Duo** to provide a nominal 40V 1W dc supply to the ISDN S_0 interface or 88V 4W dc supply to the U interface if any terminal adapters or ISDN telephones require it.

This should normally be turned ON in NT(LT) mode (see note for U interface operation under Power Operation).

The Power Type field allows you to switch the power from normal mode to restricted mode power on an ISDN BRI S_0 interface and from sealing to full line power on an ISDN BRI U interface. This field should be set to normal/sealing operation unless you wish to test the terminal adapter operation in restricted power mode or an NT1 with line power.

Note that the U interface module in sealing mode is fitted with a current limiter circuit that restricts the total current to 20 mA. Switching to restricted/non-sealing mode power will increase the current limit to 50mA and the U interface will be supplied with the full 88V 4W power available. This will be necessary for testing NT1s and other line powered devices but will damage any equipment designed to operate with sealing current.

PRI Settings Menu

This field is selected with the <Enter> key. The menu of Figure 26 will be displayed on your screen.

```
PRI Settings Menu

PRI1 Mode                 xxxx
PRI2 Mode                 xxxx

PRI E1 I/F Config         xxxx
PRI T1 I/F Config         xxxx
```

Figure 26 PRI Settings Menu

This menu is used for setting up the Primary Rate interfaces.

The PRI E1 I/F Config field switches between AMI and HDB3 encoding on the E1 interface and sets the S bit to 1 or to reflect the status of the FEBE bit in the S2m interface, and to switch CRC4 multi-framing on or off.

The PRI T1 I/F Config field switches between AMI and B8ZS encoding on the T1 interface and sets the framing to SLC96, SF, T1DM or ESF.

System Time   The system date and time can be set or amended by typing <enter> while highlighted.

Software Setup Screen   On selecting this option the screen of Figure 27 is displayed.

```
Software Setup

Network Type                          xxxx
Drop Layer 2 if No Call Active     xxxx
Drop Layer 1 if Layer 2 Inactive   xxxx
Drop TEI if Layer 1 Inactive       xxxx
Number of Channels per PRI           xxxx
Service Profile IDs (SPIDs)          xxxx
Allow Overlap Sending/Receiving      xxxx
Numbering System Option            xxxx
Called Party Number                xxxx
Calling Party Number               xxxx
Called Party Sub-addressing        xxxx
Calling Party Sub-addressing       xxxx
Higher Level Compatibility         xxxx
Lower Level Compatibility          xxxx
D-Channel X25 Setup                  xxxx
Supplementary Services             xxxx
Point-to-Point/Multipoint Setup    xxxx
```

Figure 27 Software Setup Menu

These features are only available when in ISDN simulation mode and are enabled or disabled by selecting the relevant field and pressing <space>.

Network Type   Can be changed on NAT/AT&T/DMS and BT Network Personality Modules only.

Drop Layer 2 if No Call Active   If activated **emutel™|Duo** will disconnect layer 2 on a BRI interface after a predetermined time if there are no active calls. This time can be set up by pressing <enter> on this field if it is activated. The screen of Figure 28 is presented.

```
L2 Drop Timeout Setup


Timeout until L2 Dropped (secs) nn
```

Figure 28 Drop Timeout Menu

Pressing <esc> will leave the value unchanged while <enter> will allow you to change the default value.

Drop Layer 1 if Layer 2 Inactive   If enabled **emutel™|Duo** will deactivate layer 1 immediately layer 2 becomes inactive.

Drop TEI if Layer 1 Inactive   **emutel™|Duo** will remove its TEI value(s) once the layer 1 is deactivated. The terminals will then have to send an ID Request once they become active again.

Number of B channels per PRI   On selecting this option the screen of Figure 29 is displayed.

```
B channels per PRI Settings Menu


PRI1 T1 channels : xx    PRI1 E1 channels : xx
PRI2 T1 channels : xx    PRI2 E1 channels : xx
```

Figure 29 B Channels per PRI Settings Menu

You can select the number of b channels you require for each PRI interface type (T1 and E1) and for each of the PRI ports.

Service Profile IDs (SPIDs)   This field allows **emutel™|Duo** to accept a Service Profile Identifier from the terminal and assign a Terminal Endpoint to it. While using the NAT/AT&T/DMS network personality card this field can be set to (a) Optional - SPIDs may be used but if SPIDs are not used calls can still be made (b) Mandatory - SPID initialisation must be completed successfully before calls can be made (c) AutoSPID - same as (b) but the AutoSPID feature of National ISDN 1997 i.e. enabled. If using any other network support card (or none) this field is fixed at Optional. If this field is activated you can press <enter> to set up the SPIDs and the screen of Figure 30

is presented.

```
SPID Number Setup for Basic Rate Ports


PORT 1    Telephone No. 384010    SPID NO. xxxxxxxxxx
PORT 2    Telephone No. 384020    SPID NO. xxxxxxxxxx
PORT 3    Telephone No. 384030    SPID NO. xxxxxxxxxx
```

Figure 30 Service Profile ID Setup Menu (main board)

Allow Overlap Sending/Receiving If activated **emutel™|Duo** will allow Overlap Receiving on certain enbloc dialled calls. If deactivated Overlap Receiving is not allowed. For a further explanation of how Overlap Receiving works read the information in the chapter on Fault Finding entitled Overlap Receiving Will Not Work.

The remaining options affect the contents of the SETUP message sent from **emutel™|Duo** to the called terminal as follows:

Numbering System Option The **Normal** numbering system uses the numbers assigned to each B channel in the Telephone Number Setup Menu. **Multiple Subscriber Numbering** (MSN) is also available. If this feature is enabled and a number is called the last digit (last two digits on a PRI) is treated as a wildcard, i.e. dialling 384001 will connect to the channel whose number is set up as 384000. In addition to this the dialled number is provided to the destination terminal in the Called Party Number information element, assuming that the Called Party Number information element is enabled. (Note that in BT and 1TR6 Network Personality Modules only the last digit dialled is provided regardless of whether the Called Party Number information element is enabled or not.)

The third option is **Auxiliary Working**. Enabling this feature sets all B channels on an interface to the same telephone number. Lastly **Direct Dialling In** (DDI) is provided. This works in basically the same way as MSN. Overlap receiving works independently of the numbering option.

North American software only   The numbering option in the Software setup has been re-worded.

2 DN/2 SPID (Fixed B)   Each BRI port has 1 Directory Number (DN) and 1 SPID number for each B channel (as in Normal operation).

1 DN/1 SPID/MSN   Each BRI port has 1 Directory Number (DN) and 1 SPID number. MSN also operates in this mode (MSN).

This option leaves the last digit as a wild card on BRIs (N.B. last 2 digits for PRIs). So dialling 340020 from BRI Port 1 is like dialling 34002*. Therefore, any number dialled between 340020 and 340029 will have the same affect and dial B1 channel on Port 2. In addition to this the dialled number is presented at the destination port.

1 DN/1 SPID (x2)   Each BRI port has 1 Directory Number (DN) and 1 SPID number only (Auxiliary working).

This option assigns the same number to each of the B channels per interface. For example, for Port 1 on **emutel™|Duo** both B1 & B2 have the same number (384010). No wild card operates, unlike that described above.

N.B. There is no Direct Dial In operation in North American software.

Called Party Number   If activated a Called Party Number information element is included in the SETUP message sent to the destination terminal. This is the network generated directory number if the calling terminal did not send a Called Party Number information element to **emutel™|Duo** in its transmitted SETUP message or simply a copy of the terminal supplied number if it did include a Called Party Number information element in its transmitted SETUP message to **emutel™|Duo**.

Note that a Called Party Number is sometimes included in the SETUP message from emutel™|Duo to the called terminal even if this field is set to No.

If switched to Yes pressing <enter> when on this field displays the

screen of Figure 31.

```
Called Party Number Setup


Type                    tttttttt
Plan                    ppppppppp
```

Figure 31 Called Party Number IE Setup

This screen allows you to reconfigure the Called Party Number information element before it is sent to the called party. If Type or Plan are set to automatic then the Called Party Number will be passed through **emutel™|Duo** unaltered. The Type field can be forced to a different setting by pressing <space> while on the type field.

Available settings are:

- ▪ Unknown
- ▪ International
- ▪ National
- ▪ Network
- ▪ Subscriber
- ▪ Abbreviated

Similarly, the plan field can be forced to a fixed value.

Available plans are:

- ▪ Unknown
- ▪ ISDN / Telephony
- ▪ Data
- ▪ Telex
- ▪ National
- ▪ Private

Calling Party Number   If this feature is activated a Calling Party Number information element is included in the SETUP message sent from **emutel™|Duo** to the destination terminal.   This is the network generated

directory number if the calling terminal did not send a Calling Party Number information element in its transmitted SETUP message to **emutel**[TM]**|Duo** or simply a copy of the terminal supplied number it did include a Calling Party Number information element in its transmitted SETUP message to **emutel**[TM]**|Duo**.

If switched to Yes pressing <enter> when on this field displays the screen of Figure 32.

```
Calling Party Number Setup


Type                     tttttttt
Plan                     ppppppppp
Screening                sssssssss
Presentation             ppppppppppp
```

Figure 32 Calling Party Number IE Setup

This screen allows you to reconfigure the Calling Party Number information element before it is sent to the called party. If Type, Plan, Screening or Presentation are set to automatic then the Called Party Number will be passed through **emutel**[TM]**|Duo** unaltered.

The Type field can be forced to a different setting by pressing <space> while on the Type field. Available settings are:

- Unknown
- International
- National
- Network
- Subscriber
- Abbreviated

Similarly the Plan field can be forced to a fixed value. Available plans are:

- Unknown
- ISDN / Telephony

- Data
- Telex
- National
- Private

The Screening field can be forced to a fixed value. Available screening indicators are:

- User Provided Not Screened
- User Provided Verified and Passed
- User Provided Verified and Failed
- Network Provided

The Presentation field can be forced to a fixed value. Available presentation indicators are:

- Presentation Allowed
- Presentation Restricted
- Number Not Available

Note that if Presentation Restricted is chosen no number digits will be included in the Calling Party Number information element.

Called Party Subaddress   If this feature is enabled a Called Party Subaddress information element is included in the SETUP message sent to the destination terminal, but only if the calling terminal sent a Called Party Subaddress information element in its transmitted SETUP message to **emutel™|Duo**. The CCITT and Euro ISDN Network Personality Modules allow the generation of a Called Party Subaddress by dialling an enbloc number and the Called Party Subaddress separated by a # (e.g. dial 384000#123 to generate a subaddress of 123).

Higher Level Compatibility   If this feature is activated a Higher Level Compatibility information element is included in the SETUP message sent to the destination terminal. If this option is set to Yes, then **emutel™|Duo** always generates a HLC on outgoing calls. If it set to modify then it will modify outgoing HLC' according to the HLC setup.

If activated pressing <enter> when on this field allows you to map the "information transfer capability" field of the Bearer Capability information element to the "high layer characteristics identification" of the High Layer Compatibility information element (see Q.931). To set up this mapping the screen of Figure 33 is displayed.

The table is edited in the normal fashion - move to the field to be changed and use <space> to cycle through the available options until the desired option is selected.

The available options are:

- Telephone
- Fax Group 2 / 3
- Slow Scan Video
- Fax Group 4
- Teletex - basic mixed and fax
- Teletex - basic and processible
- International Videotex
- Telex
- Message Handling
- OSI Application
- Maintenance
- Management

One of these options is then chosen for each of the displayed fields to define the mapping required. For example, 'Speech' in the Bearer Compatibility information element might be mapped to 'Telephony' in the High Layer compatibility information element.

```
Higher Layer Compatibility Setup


Speech translates as                    xxxxxxxxxx

Unrestricted Digital translates as      xxxxxxxxxx

Restricted Digital translates as        xxxxxxxxxx

3.1 kHz Audio translates as             xxxxxxxxxx

7 kHz Audio translates as               xxxxxxxxxx

Video translates as                     xxxxxxxxxx
```

Figure 33 Translation from Bearer Capabilities to HLC

Lower Level Compatibility   If this feature is activated a Lower Level Compatibility information element is included in the SETUP message sent to the destination terminal. If this information element is supplied by the calling terminal then a copy is simply passed to the destination terminal, otherwise **emutel™|Duo** generates this information element from the Bearer Capability information element.

D-Channel X.25 Setup   If this feature is activated then it is possible to send D channel packet data between BRI1 and BRI2.

When activated typing <enter> when on this field allows you to configure the parameters of each interface. The screen of Figure 34 is displayed.

```
X.25 Setup

X.25 Setup BRI 1 & BRI 2     xxxx
RESTART on L2 establish       xxxx
```

Figure 34 X.25 Setup Screen

Selecting X.25 Setup BRI1 & BRI2 allows you to configure the parameters of each interface. The screen of Figure 35 is displayed.

```
X.25 Setup

BRI1 PVC LLC                    xxxxxxxxxx
BRI1 PVC HLC                    xxxxxxxxxx
BRI1 L0C                        xxxxxxxxxx
BRI1 HOC                        xxxxxxxxxx
BRI1 LTC                        xxxxxxxxxx
BRI1 HTC                        xxxxxxxxxx
BRI1 LTC                        xxxxxxxxxx
BRI1 HIC                        xxxxxxxxxx
BRI1 TEI Value                  xxxxxxxxxx

BRI2 PVC LLC                    xxxxxxxxxx
BRI2 PVC HLC                    xxxxxxxxxx
BRI2 L0C                        xxxxxxxxxx
BRI2 HOC                        xxxxxxxxxx
BRI2 LTC                        xxxxxxxxxx
BRI2 HTC                        xxxxxxxxxx
BRI2 LTC                        xxxxxxxxxx
BRI2 HIC                        xxxxxxxxxx
BRI2 TEI Value                  xxxxxxxxxx
```

Figure 35 X.25 BRI Setup Screen

X.25 restart You can enter a logical channel number for PVC connections, Incoming Calls, Bothway Calls, Outgoing Calls and a TEI value to be used on the particular channel.

```
RESTART on L2 establish    xx
```

Force simulator to issue a RESTART message when L2 establishes. For more information on X.25, see Appendix 1.

Supplementary Services Refer to the corresponding Network Personality Module chapter.

Point-to-Point/Multipoint Setup You can change the point-to-point options for the Basic Rate Interfaces. To set each PRI or BRI interface as being point-point or point-multipoint operation press <enter> and the screen of Figure 36 will be displayed.

```
Point to Point/Multipoint Setup

Configure all ports as port 1      xxxx

    Port 1 Configuration           xxxx
    Port 2 Configuration           xxxx
    Port 3 Configuration           xxxx
```

Figure 36 Point-Point/Point-Multipoint Setup

Each interface can be set to point-point mode (i.e. no broadcast TEI in use for SETUP messages) or in point-multipoint mode (i.e. broadcast TEI 127 used).

Telephone Number Setup Screen On selecting this option the screen of Figure 37 is displayed.

```
Telephone Number Setup

BRI Number Setup                        xxxx
PRI Number Setup                        xxxx

Busy Number                xxxx
Unallocated Number         xxxx
```

```
No User Responded Number              xxxx
Call Rejected Number        xxxx
Out of Order Number         xxxx
Temporary Failure Number    xxxx
No Answer Number                      xxxx
Test Tone Number                      xxxx
Loopback Number                       xxxx
BERT Number                           xxxx
X21 Port 1 Number           xxxx
X21 Port 2 Number           xxxx
```

Figure 37 Telephone Number Setup Menu

The fields of Figure 37 are modified by selecting the relevant telephone number using the <up-arrow> and <down-arrow> keys and pressing <enter>. Pressing <enter> for the BRI or PRI Number Setup will display the screens of Figure 38a and 38b. If the Numbering System Option is set to Normal, pressing <enter> on either of the PRI numbers, shown in Figure 38b, will display a further screen as shown in Figure 39 overleaf. This is used to set up a telephone number for each B channel on the PRI interface.

```
BRI Telephone Number Setup


Port 1 Number             384010
Port 2 Number             384020
Port 3 Number             384030
```

Figure 38a BRI Telephone Number Setup Menu

```
PRI Telephone Number Setup


Port 1 Base Number                      384100
Port 2 Base Number          384200
```

Figure 38b PRI Telephone Number Setup Menu

Primary Rate Interface Telephone Number Setup

```
B1  Number      xxxx        B16 Number      xxxx

B2  Number      xxxx        B17 Number      xxxx

B3  Number      xxxx        B18 Number      xxxx

B4  Number      xxxx        B19 Number      xxxx

B5  Number      xxxx        B20 Number      xxxx

B6  Number      xxxx        B21 Number      xxxx

B7  Number      xxxx        B22 Number      xxxx

B8  Number      xxxx        B23 Number      xxxx

B9  Number      xxxx        B24 Number      xxxx

B10 Number      xxxx        B25 Number      xxxx

B11 Number      xxxx        B26 Number      xxxx

B12 Number      xxxx        B27 Number      xxxx

B13 Number      xxxx        B28 Number      xxxx

B14 Number      xxxx        B29 Number      xxxx

B15 Number      xxxx        B30 Number      xxxx
```

Figure 39 PRI Telephone Number Setup Menu

To make a call simply dial the telephone number of the relevant port and B channel. Whenever Multiple Subscriber Numbering (MSN) is enabled (see Software Setup Menu/Numbering System Option) the last digit (last two digits for a PRI) in the telephone number is (are) treated as a wildcard, i.e. if Port 1 B1 Number is set to 384010 and you dial 384016 a connection will be made to Port 1 B1. If Auxiliary Working is enabled all B channels on an interface use the same telephone number but only one number is allowed. Direct Dialling In (DDI) works in exactly the same way as MSN.

A series of failure numbers are also defined. If you dial any of these numbers the call is rejected with a cause value defined by the failure mode, i.e. calling the User Busy number will cause the call to be rejected with cause value 17.

A number is defined for test tones. Dialling this number will force **emutel™|Duo** to send a PCM tone (A law or μ law) on the B channel. The tone frequency and power level are adjusted in the Hardware Setup Menu. Note that silence, dial tone, busy tone, and error tone can also be sent.

Ethernet Setup Screen   On selecting this option the screen of Figure 40 is displayed.

```
IP Address                    xxx.xxx.xxx.xxx
Control App TCP Port                 xxxx
Sub mask                       xxx.xxx.xxx.xxx
Gateway                       xxx.xxx.xxx.xxx
IP Mode                        xxxx
```

Figure 40 Ethernet Setup Menu

The IP Address is the unique identifier given to the **emutel™|Duo**, if desired.

The Subnet Mask is a 32-bit pattern used to differentiate the network portion of the IP address from the host portion of the IP address.

The Default Gateway is the IP address of the gateway out to the 'real' world, e.g. the IP address of a router.

Other Features Menu   On selecting this option the screen of Figure 41 is displayed.

```
Other Features Menu

   Reprogramming Menu        : Enter
   BERT Test                 : Enter
   Activate Basic Rate Ports  : Enter
   Licensing Status          : Enter
   Reset Unit                : Enter
   Restore Factory Settings   : Enter
```

Figure 41 Other Features Menu

Reprogramming Menu   On selecting this option the screen of Figure 42 is displayed.

```
Reprogramming Menu

   Reprogramming Flash          : Enter
   Reprogramming PCMCIA Card    : Enter
   Reprogramming DSP Module   : Enter
```

Figure 42 Reprogramming Menu

This menu is used for software upgrades to the **emutel™|Duo**.

BERT Test   On selecting this option the screen of Figure 43 is displayed.

```
BERT Test
Bert Number  : xxxxxx


Call         : xxxxxxxxxxxxx
Synchronised : xxx
Bit Count    : xx
Error Count   : xx
Elapsed Time : xx seconds


E – insert errors, ESC – exit
```

Figure 43 BERT Test Menu

This menu is used for running a BERT test. The display is updated every two seconds. <E> or <e> will insert errors into the error count and <ESC> will end the test and return to the Other Features Menu.

Activate Basic Rate Ports   Selecting this option will re-activate all the basic rate ports. Press any key to continue.

Licensing Status   On selecting this option the screen of Figure 44 is displayed.

```
Licensing Status

  Magic number is xxxxxxx


  ITU-T/CCITT        :xx
  BT                 :xx
  VN3                :xx
  1TR6               :xx
  Euro ISDN          :xx
```

```
NAT 1            :xx

5ESS             :xx

DMS100           :xx

NTT              :xx

BT ETSI          :xx


Analyser          :xx


Press any key to continue
```

Figure 44 Licensing Status Display

This screen shows which networks the **emutel™|Duo** is licensed to.

Reset Unit   This option will reset the **emutel™|Duo.**

Restore Factory Defaults   This option will reset the **emutel™|Duo** and return the settings to their factory defaults.

ANALYSER OPERATION

Introduction

Before the analyser can be used it has to be installed on a PC with Windows 95, Windows 98, Windows NT4 or Windows 2000. The protocol analyser is on the same CD as the windows application and is installed at the same time. Refer to the section Installing the Software in the Windows Application chapter for further details.

Protocol Analyser Overview

The protocol analyser for the unit consists of a single window display with a toolbar, status bar and a menu bar. All decoding of messages is displayed in the scrolling windows and toolbar and menu bar can be used for setting the different options within the analyser.

The analyser can operate in two modes:

- On-Line Monitoring
- Off-Line Analysis

In on-line monitoring mode the protocol analyser has to be connected to the terminal port on the unit, messages passed between the unit and terminal equipment can now be monitored. In off-line mode a trace currently in the viewer can be manipulated or a file can be loaded with information regarding a previously recorded trace.

The protocol analyser also contains a comprehensive Help file. It is strongly recommended that you consult the Help file for a detailed explanation of the operations that can be carried out in the analyser. A brief overview of the features and operation of the tool now follows.

Connecting to the Unit

The steps to connect the protocol analyser to the unit are described below.

The first step is to make sure the protocol analyser is installed correctly and can be launched. The analyser is on the emutel Application Suite CD. Consult the "Installing the Software" in the Windows Application chapter for further details on how to complete the installation.

Once installed, the protocol analyser can be launched in two ways.

From the Start, Programs menu select the emutel Application Suite and click on the emutel analyser. Alternatively, if the emutel ISDN Manager is running, click the Tools tab and run the emutel Analyser tool. For information on how to run the emutel ISDN Manager refer to the emutel ISDN Manager section in the Windows Application chapter.

Once you can view the protocol analyser window you are ready for step two. Connect a serial cable from the terminal connection on the back of the unit to a Com Port on the PC.

From the Analyse menu, select the Open Connection option. This displays the Select Connection window from which a connection can be selected. Refer to the emutel ISDN Manager section in the Windows Application chapter for more information on how to change and troubleshoot connection settings.

When the connection has been established between the protocol analyser and the unit, all of the messages will be loaded in the protocol analyser buffer and the viewer window.

For more information on the viewer, buffers, reloading and other options please consult the Help provided.

Configuring the Protocol Analyser   The "Options Menu" provides for all configuration of the protocol analyser. It consists of five options:

- Specification
- Display Modes
- Filtering
- Triggers
- Colour Settings

Each of these options is described briefly below. For a more in-depth explanation of the features consult the Help provided.

Setting the Network Specification

For most network personality modules, the analyser auto-detects the network however for the USA, BT and VN 2/3-network personality cards more than one option is available. The Specification option allows you to choose which network protocol is set in the unit. If the correct protocol is not selected the messages may not be decoded accurately.

Setting the Display Modes

Layer 3 provides the greatest flexibility with six different options. If "Hex" is selected the bytes representing the layer 3 part of a message are displayed in hexadecimal form. "Short" mode provides the protocol discriminator, call reference value and the message type. "Identified + Hex" mode gives the same general information as "Short" mode along with the identifiers for each information element and the hexadecimal values of its contents. "Identified + Values" goes one step further by giving the values of the attributes within each information element. The final mode is "Complete" which gives an unsurpassed level of decoding with each byte of the message shown with all its 'bits' and their relevance shown.

The last two modes above provide a substantial amount of checking of the messages and information elements. Any errors found will be result in a line flagging the error being shown at the top of the information element.

The timestamp for the analyser messages can be set from this window. The timestamp can either be synchronised with the operating system time or manually set by the user.

Setting the Filters

The "Filtering" option allows you to select which messages to decode and display according to a filtering system. Messages can be filtered on four main levels.

The first of these is the source of the message. This allows you to specify not only which physical port to decode messages but also in which direction.

The next level allows filtering to be carried out on Layer 1 events so that only specified events are displayed.

Layer 2 filtering is also provided with only specified frame type being decoded.

The final level is on Layer 3 messages, which can be filtered according to message type. However, it is worth noting that if Layer 2 INFO messages are suppressed all Layer 3 messages will also be suppressed.

The number of messages displayed after filtering against the total number of messages is displayed in the status bar.

Setting a Trigger

The "Triggers" option allows the analyser to start recording or displaying a trace when a particular event happens or a certain message is received. Triggers can be set on three levels to carry out three different actions.

The first level allows a Layer 1 event to start the action. This can be specified even further only apply to a particular port. The second level allows a Layer 2 frame type to be specified to carry out an action. Stating a particular direction for the message can specify this further. Level 3 allows a Layer 3 message type to be specified and again the direction of the message can be specified.

The action to be carried out when the trigger has been activated can be to either to start displaying the messages, to record the messages to a file or to filter the messages and then record them to a file.

One more option is available when setting up a trigger and that is

to record a certain number of messages before the event and then a set number after. This is used when the recording action is specified.

Setting the Viewer Colours   This option allows you to set the text colour for each layer of a message and the background colour to be used for the direction of the message.

Viewing a Trace   Once a message is decoded it is displayed and shown in the viewer window. Every message has some header information which always takes the same form:

- The Timestamp
- The Sequence number
- The Direction of the message
- The Port number
- The Layer

The timestamp is set according to the time set in the hardware settings on the **emutel™|Duo**. It is displayed in the form HH::MM::SS.mmmm.

The sequence number is generated by the **emutel™|Duo** and is initialised to zero on power-up. If a sequence number is missed a message is displayed on the screen showing how many have been lost.

The direction can be one of two values either T->N or N->T specifying if the message is being transmitted from the **emutel™|Duo** to the terminal equipment or by the terminal equipment to the **emutel™|Duo**. This also affects the background colour in which the message is displayed which allows easy understanding of the send/receive interaction. These colours can be set as described above using the options menu.

The port number corresponds to the port numbering on the front of your **emutel™|Duo** and also gives information on whether the port is BRI or PRI.

The last piece of generic information is the Layer identifier, which

uses L1 for Layer 1, L2 for Layer 2 and L3 for Layer 3. This controls the text colour of the information with a different colour for each layer, which can be set using the options menu.

Navigating a Trace

Whenever a trace is being viewed a number of options on the toolbar and the search menu become active. These allow you to easily navigate through the displayed messages.

The first of these are the four search options.

- Beginning - which scrolls to the beginning of the trace
- Previous - which scrolls back one message
- Next - which scrolls to the beginning of the next message
- End - which scrolls to the end of the trace

Another two options are also active if the protocol analyser is in on-line monitoring mode. These are:

- Pause - which stops any more messages from being added to the displayed trace
- Autoscroll - which automatically scrolls to the bottom of the window when a new message is decoded. This option is sensitive to user responses and clicking in the trace window, scrolling or using the search options will cause it to turn itself off.

For more information on the viewer and it options please consult the Help files provided.

Saving and Opening Trace Files

The "File" menu allows you to save a trace to a file, open a trace saved at an earlier time or export a trace to a text file. Each of these options is explained below.

When a trace is being viewed it is automatically logged to a file. When you exit a trace or start a new trace you are automatically prompted whether you wish to save the trace to a different file name. If you do not then it is automatically overwritten by the new trace as it is logged to the same file. If you save a trace while it is active all messages appended to that trace afterwards are automatically logged to the save file specified.

All the messages are saved in a capture file including those filtered out or not displayed as this allows you to change display modes and filtering options when the trace is re-loaded. The network specification is saved in the capture file, as this needs to be set when the file is re-loaded in-order for the trace to be decoded accurately.

A trace can also be opened from the view menu for off-line analysis. The network specification is set automatically and the trace is displayed. You can now change the display and filtering options as they please to analyse the trace. It is not possible to add to a trace opened from a file, and it can only be opened when no connection is present.

For more information on saving and opening files consult the Help files.

Exporting and Printing Trace files

Apart from opening and saving two other options are also available under the "File" menu. The first of these is to export to a text file. This allows a trace to be viewed without the analyser being installed. If no text is selected when this option is selected then the entire trace is exported to a text file, however, if text is selected then the only these lines are exported.

The print option results in the entire trace being printed. Print Setup and print preview work in the same way as other windows applications.

For more information on these options and their toolbar buttons please consult the Help files.

Help

There is an extensive Help file supplied with the protocol analyser that gives in-depth information on all its operations and options. However, it is necessary for IE4 to be installed in-order to view the help files.

To launch the Help file click "DUO Analyser Help" from the help menu.

Introduction

This section seeks to provide some guidance on solving common problems encountered in using **emutel™|Duo**.

Changing a parameter on emutel™|Duo forced it to stop operating

Changing parameters on **emutel™|Duo** may cause the unit to change operating modes and appear to stop functioning. In particular switching NT Clock from LOCAL to REMOTE will cause **emutel™|Duo** to stop running unless an external clock is provided.

To recover from this condition reload the factory defaults. When **emutel™|Duo** powers up the configuration LEDs will light for about 1 second. During this period if **emutel™|Duo** receives a <ctrl-c> character it will reload the defaults. **emutel™|Duo** defaults to 19200 baud, 2 stop bits, 8 data bits and no parity during this period.

Terminal will not activate at layer 1 (i.e. P LED does not illuminate)

If the P LED does not illuminate then the physical connection between the terminal and **emutel™|Duo** is not functioning. Check first that the terminal is connected to the correct interface type. If **emutel™|Duo** is being used in NT mode make sure that **emutel™|Duo** is switched to the correct mode in the Hardware Setup Menu. Now check the other settings in the Hardware Setup Menu. Switch on the power supply. If this does not help switch power operation between normal and restricted if the terminal is connected to an S_0 BRI.

For US originating products with U interfaces then the 88V power should be set to Normal/Sealing (i.e. 20mA current limit). To power NT-1s the U interface power should be set to Restricted/Non-Sealing. Be careful when switching the U interface to Restricted/Non-Sealing power as products intended to be connected to a current limited U interface (sealing current) may be damaged by non current limited power.

Terminal will not answer a call

Firstly check that the call is actually being routed to the called terminal as expected. To do this dial the number of the called terminal and check that one of the B channel LEDs illuminate. If the terminal responds by activating the ISDN line (P LED illuminates) and by starting up layer 2 (D LED illuminates) then the terminal has received the call and is not answering for a specific

reason (e.g. incompatible Bearer Capability, wrong Calling Party Number, wrong Called Party Number etc).

If neither P nor D LED illuminates then the terminal may be faulty or else refer to the guidance notes for section entitled Terminal will not activate at layer 1.

If the protocol analyser option is available set it to display the layer 3 messages. The called terminal may send DISCONNECT, RELEASE or RELEASE COMPLETE with a cause value indicating the problem.

A potential problem may be that called terminal and calling terminal do not support the same bearer capability in which case the called terminal will send RELEASE COMPLETE with a cause "Incompatible Destination". Another possibility is that the called terminal is expecting a Called Party Number or Calling Party Number information element in the SETUP message. Turn on these options in the Software Setup Menu and ensure that the called terminal is programmed accordingly. Conversely the terminal may be refusing the call because a called party number has been supplied but it is programmed for a different number.

It is also necessary that both terminals are running the same protocols. Most protocols (not 1TR6) will work with the basic CCITT network supplied on **emutel™|Duo** but may have reduced functionality.

Another possibility is that the terminal requires a Subaddress. Switch on Called Party Subaddress and Calling Party Subaddress in the Software Setup Menu.

For terminals based on NAT/AT&T/DMS protocols the correct endpoint ID at layer 3 must be used. If this is the source of the problem it may be necessary to restart both **emutel™|Duo** and terminal to ensure SPID initialisation is successfully completed.

Another problem may be the number of digits used in the Called Party Number information element Terminals from North America

usually have a 7 digit called party number and the terminals may not accept a 6 digit number which is the default on **emutel™|Duo**. To get around this problem change the numbering scheme of **emutel™|Duo**.

Other NAT/AT&T/DMS voice band terminals may require a Call Appearance information element to be sent in the Setup message to the terminal. Set this up as defined in section NAT/AT&T/DMS network personality module.

Terminal can dial only one number to set up two calls

If the calling terminal can be programmed with one telephone number to dial two calls then **emutel™|Duo** Numbering System option must be switched from Normal to Auxiliary Working, MSN or DDI. In Normal operation each B channel has a separate telephone number. To call B1 on BRI2 dial 384020 and to dial B2 on BRI2 dial 384021 (if using the normal numbering system).

The other possibilities are:

Auxiliary Working

One number is assigned per interface. Dialling this number can route a call to B1 on the called interface. Dialling this number again will route a call to B2 on the called interface, and so on. No other numbers will be accepted.

Multiple Subscriber Numbering (MSN)

A base number is assigned to an interface. An interface can be called by dialling any of ten numbers referenced to the base by changing the last digit (two digits for PRI interface). For example, using MSN and the default numbering system interface B1 will respond to all numbers in the range 384010-384019. The Called Party Number information element is always included in the SETUP message sent to the terminal.

Direct Dialling In (DDI)

This works in exactly the same way as MSN except that the called

party number is sent to the called terminal if the Called Party Number option is enabled in the Software Setup Menu.

Windows Terminal Emulation will not move up and down menus

If using the Windows terminal emulation program in its default configuration the <up> and <down> arrow keys will not function with the menus. This is because Windows uses these keys and does not pass any characters to **emutel™|Duo**. In most cases <up> can be replaced with the 'u' or 'U' key and <down> by the 'd' or 'D' key.

Alternatively change the operation of Windows by clicking on the Settings and Terminal Preferences options and then disable the "Use Function, Arrow and Ctrl Keys for Windows" option.

No communication with terminal port

Communication failure can occur for several reasons. Firstly check that **emutel™|Duo** is powering up properly. The power LED should illuminate and the correct power up sequence should be observed (see Hardware Setup chapter). In particular the internal relays should switch on power up and this should be audible.

Next check the cable. **emutel™|Duo** provides a DCE connection so a cable with a 9 way D male to 9 way D female (supplied with the unit) will connect **emutel™|Duo** to a PC.

If the cable is correct then check the communication parameters. The default is 19200 baud, no parity, 2 stop bits and 8 data bits. If the parameters have changed then during the power up sequence type <ctrl-c> at the keyboard of the terminal (terminal set for default communications parameters) and all the factory defaults should be restored (see Hardware Setup chapter). Another possibility is that **emutel™|Duo** is not powering up properly because the network personality module installed in **emutel™|Duo** will not start up and the LEDs on the front panel may flash. In this case see section entitled Network Personality Module will not work.

Parameters are lost when Network Personality Module is changed

If more than one type of software is being used, e.g. CCITT ROM, Euro ISDN Network Personality Module, North American Network Personality Module, the parameter table may be of a different

length. Hence when a different type is used the settings may be considered invalid and reset to that software's default.

The solution is to upgrade all the software types to the same version number.

Overlap receiving will not work

Overlap Sending/Receiving is available on **emutel™|Duo** and operates as follows.

(a) Overlap Sending used to dial the call

Here the calling terminal sends a SETUP message to **emutel™|Duo** without any Called Party Number information element. **emutel™|Duo** will respond with SETUP ACK and the calling terminal can now dial the call by sending the Called Party Number as digits in INFO messages. Once **emutel™|Duo** has received enough digits to route the call **emutel™|Duo** will send SETUP to the called terminal but will not include the Sending Complete information element. If the called terminal responds with CALL PROCEEDING, ALERTING or CONNECT then **emutel™|Duo** will send CALL PROCEEDING to the calling terminal followed by ALERTING or CONNECT as appropriate. The called terminal does not support overlap receiving in this case. However, if the called terminal sends SETUP ACK then **emutel™|Duo** will continue to accept digits in INFO messages from the calling terminal and will pass these to the called terminal. Once the called terminal has received enough digits to route the call internally it will send CALL PROCEEDING, ALERTING or CONNECT to **emutel™|Duo** and **emutel™|Duo** will send CALL PROCEEDING to the calling terminal followed by ALERTING or CONNECT as appropriate.

(b) Enbloc dialling used to dial the call

Here the calling terminal sends a SETUP containing the Called Party Number information required to route the call. If the Called Party Number option is enabled in the Software Setup Menu then all of the enbloc digits are forwarded to the called terminal. Otherwise only the overlap extension digits (i.e. the full dialled number less the digits used to route the call e.g. 384000 for BRI 1)

are sent in the Called Party Number information element.

(c) Enbloc Dialling used to dial the call with an incomplete number

This is a combination of (a) and (b). The SETUP message contains some of the Called Party Number information to **emutel™|Duo**. If the Called Party Number option is enabled in the Software Setup Menu then all of the enbloc digits are forwarded. If not only the overlap extension digits are forwarded. The terminal responds with SETUP ACK. The calling terminal supplies the remaining digits in INFO messages until enough digits are sent to start routing. Operation at the called terminal is the same as before.

However dialling a Called Party Number (i.e. base number plus overlap extension digits) ending in '0' will disable overlap receiving at the called terminal and the SETUP message sent by **emutel™|Duo** to the called terminal will include a Sending Complete information element. The called terminal must respond with CALL PROCEEDING, ALERTING or CONNECT without waiting for more digits from **emutel™|Duo**.

If overlap receiving does not work check the called party number does not end in '0'. To change this reprogram the base number using the Telephone Number Setup Menu or enable DDI / MSN which will provide a range of 10 numbers with the last digit being 'don't care'.

It is also possible to completely disable Overlap Receiving for all numbers by setting the Enable Overlap Sending / Receiving option in the Software Setup Menu to No. All SETUP messages sent to the called terminal will now have the Sending Complete information element included.

It is worth checking if the terminal (say PABX) requires point-point operation at **emutel™|Duo** to function in overlap receiving. If so the interface into which the terminal has been plugged requires setting to point-point mode (see Software Setup/Software Setup Screen).

Network Personality Module will not work

The most likely cause of the Network Personality Module not functioning is that the serial number programmed into the module does not match **emutel™|Duo** serial number on which it is running.

Note that the network support Network Personality Modules will run only on emutel™|Duo for which they were purchased.

If the Network Personality Module has just been reprogrammed then it is possible that it was not reprogrammed correctly. Try programming the Network Personality Module again.

Garbage appears on screen everytime I power on

The most likely reason for this is - the simulator and Software Communications Package (e.g.. Hyperterminal) are at two different Baud Rates. To rectify this, you can either go through the various baud rates on the Communications Package until correct one is found or do a Factory Reset, ensuring using Baud Rate of 19200 on the Comms package when typing <ctrl-c>.

Windows Application Connection Failure

Refer to the section on Troubleshooting Connection Problems in the Windows Application chapter.

Introduction   This section outlines the differences in operation of **emutel™|Duo** between the CCITT emulation provided on the standard **emutel™|Duo** and the Euro ISDN Network Personality Module.

Figure 45 shows the Software Setup Menu when simulating an Euro ISDN network.

```
Software Setup

Network Type                        Euro ISDN
Drop Layer 2 if No Call Active      xxxx
Drop Layer 1 if Layer 2 Inactive    xxxx
Drop TEI if Layer 1 Inactive        xxxx
Number of B Channels per PRI        xxxx


Allow Overlap Sending/Receiving     xxxx
Numbering System Option             xxxx
Called Party Number (DDI/MSN)       xxxx
Calling Party Number (CLIP)         xxxx
Called Party Subaddressing (SUB)    xxxx
Calling Party Subaddressing (SUB)   xxxx
Higher Level Compatibility          xxxx
Lower Level Compatibility           xxxx
Supplementary Services            xxxx
```

Figure 45 Euro ISDN Software Setup Menu

Supplementary Services have been added to the menu. To access the supplementary services menu move to the Supplementary Services field and type <enter>.

Figure 46 shows the Euro ISDN Supplementary Services Setup Menu.

```
Euro ISDN Supplementary Services Setup


Connected Party Number (COLP)          xxxx

Advice of Charge (AOC)                 xxxx

Call Waiting (CW)                      xxxx

Call Hold (HOLD)                       xxxx

Explicit Call Transfer (ECT)           xxxx

Call Diversion (CFU/CFB/CFNR/CD)       xxxx

Malicious Call Identification          xxxx

Three-Party Calling (3PTY)             xxxx
```

Figure 46 Euro ISDN Supplementary Service Setup Menu

The services offered are as follows:

Connected Party Number   The Connected Party Number information element is sent to the calling terminal as part of the CONNECT message. If the called terminal supplies a Connected Party Number this is sent to the calling party otherwise **emutel™|Duo** will generate one.

Advice of Charge   **emutel™|Duo** sends Advice of Charge information to the calling terminal. Various options are available:

- CEPT Total - each AOC message shows total charge

- CEPT Incremental – each AOC message adds a number of units to the total bill (above options can be chosen using codeset 5 or codeset 6)

- Euro ISDN AOC-D - AOC messages show cost of call during the call using AOC-D messages

- Euro ISDN AOC-E - AOC messages show cost of call at the end of the call using AOC-E messages

- Currency or Units - AOC information can be sent as currency or units

- Currency Identifier – Three letters which will be sent with

the AOC message when using currency

If you press <enter> when on this field the menu of Figure 47 is displayed.

```
Billing Parameters Setup

    Time between billing messages (secs)   5
    Amount to be added each time           1


    CEPT Total          (Codeset 5)        No
    CEPT Incremental   (Codeset 5)         No
    CEPT Total          (Codeset 6)        No
    CEPT Incremental   (Codeset 6)         No
    CEPT AOC Style                         Italtel
(Italy)


    Euro ISDN AOC-D ASN1                   No
    Euro ISDN AOC-E ASN1                   No
    Currency or Units                      Units
    Currency Identifier                    EUR
```

Figure 47 Advice of Charge Setup Menu

The amount to be added each time is the number of units or currency amount to be added when each AOC message is sent. The time between messages defines the number of seconds between each AOC message. The AOC style refers to CEPT messages only and selects the format used by various telephone companies.

Call Waiting   Call is offered to the BRI interface even if both B channels are busy. If disabled the calling user is returned busy immediately.

Call Hold   Call can be put on hold in **emutel™|Duo** using Euro ISDN call hold (HOLD) protocol.

Explicit Call Transfer   Calling terminal sets up a call and puts it on hold. Calling terminal sets up a second call. On activating Explicit Call Transfer the calling terminal is disconnected from both calls and these calls are

Call Diversion

connected together.

Terminal sets may send messages to **emutel™|Duo** to cause it to forward an incoming call to another number under certain conditions. Supported facilities include CFU (call forward unconditional), CFB (call forward busy), CFNR (call forward no response) and CD (call deflection).

If you press <enter> when on this field the menu of Figure 48 is displayed.

```
Euro ISDN Call Forwarding Setup


   Served User Notified of Diversion            xx

   Calling User Notified of Diversion           xx

   Served User Notified if Active               xx

   Diverting No. Released to Diverted-to-User   xx


   Call Forwarding No Reply Timeout (Seconds)   xx


   Call Forwarding Unconditional       (CFU)    xx

   Call Forwarding User Busy           (CFB)    xx

   Call Forwarding No Reply            (CFNR)   xx

   Call Diversion                      (CD)     xx
```

Figure 48 Euro ISDN Call Forwarding Setup Menu

This allows you to set up the call diversion parameters according to the information provided in ETS 300 207-1 Page 12.

Malicious Call Identification

If enabled allows terminals to send a message to **emutel™|Duo** requesting that the calling party number of the last call be recorded.

Three-Party Calling

The calling terminal sets up a call and puts it on hold. The calling terminal sets up a second call. On activating Three-Party Calling all three terminals are connected together.

Main Differences Between CCITT and Euro ISDN

The main differences between CCITT and Euro ISDN are:

- The CONNECT message includes the CEPT Advice of

Charge information element (if enabled) and the Date/Time information element

- Advice of Charge (Euro ISDN or CEPT option) is supplied in INFO or FACILITY messages during the call

- Date/Time information element does not include seconds

A subset of the CCITT Bearer Capability information element is allowed in the SETUP message sent to the network. The most notable restrictions are:

- µ law encoding is not a valid layer 1 protocol in the Bearer Capability information element

- V.120 rate adaptation is not a valid layer 1 protocol in the Bearer Capability information element

- Keypad information element is not supported for sending the Called Party Number

- Supplementary services available only for Euro ISDN network

Introduction   This section outlines the differences in operation of **emutel™|Duo** between the CCITT emulation provided on the standard **emutel™|Duo** and the BT Network Personality Module.

Figure 49 shows the Software Setup Menu when simulating a BT network.

```
Software Setup

Network Type                          BTNR191
Drop Layer 2 if No Call Active        xxxx
Drop Layer 1 if Layer 2 Inactive      xxxx
Drop TEI if Layer 1 Inactive          xxxx
Number of B Channels per PRI          xxxx


Allow Overlap Sending/Receiving       xxxx
Numbering System Option               xxxx
Called Party Number                   xxxx
Calling Party Number                  xxxx
Called Party Subaddressing            xxxx
Voice is End-to-End ISDN              xxxx
D-Channel X25 Setup                   xxxx
Point-to-Point/Multipoint Setup       xxxx
```

Figure 49 BT Software Setup Menu

The network type can be changed from BTNR191 (original BT ISDN Network) and BT-ETSI (new ISDN Network).

The BTNR191 network support defines a new parameter in the menu. Switching "Voice is End-to-End ISDN" to "On" changes some of the display messages used by **emutel™|Duo**.

Network Type   The network type can be changed between *BTNR191* (original BT ISDN Network) and *BT-ETSI* (new ISDN Network).

Voice is End-to-End   The BTNR191 network support defines a new parameter in the menu. Switching "Voice is End-to-End ISDN" to "On" changes some of the display messages used by the **emutel™|Symphony**.

Main Differences Between CCITT and BT

The main differences between CCITT and BT are:

- In the RELEASE COMPLETE message a cause value of 21 has priority over other cause values whereas in CCITT a cause of 18 has priority.

There are many display messages on the BT network not found in the CCITT specification. The most common are:

- *03*1#
  *86*number string#
  *AA*NUMBER UNOBTAINABLE# or *EC*00#
  *AA*CLEARED# or *EC*30#
  *AA*NETWORK BUSY# or *EC*07#
  *AA*NUMBER BUSY# or *EC*08#
  *AA*INCOMPATIBLE TERMINAL# or *EC*13#
  *AA*ERROR# or *EC*15#
  *AA*NO REPLY# or *EC*1f#
  *AA*NOT SUITABLE FOR DATA#

- A CALL PROCEEDING message in response to an outgoing SETUP message causes ALERTING to be sent to the calling party

- SETUP ACKNOWLEDGE is sent by the network in response to a SETUP message even if the SETUP message contained the complete called party number

- A subset of the CCITT Bearer Capability information element is allowed (see Euro ISDN support card for more details)

- The Calling Party Number information element has a maximum length of 15 digits

- Progress Indicator information element location field is always "network beyond interworking type"

- Calling Party Number and Called Party Number information element type and plan field are always "unknown"

- In MSN operation only the last digit of the Called Party Number is sent to the called terminal in the SETUP message

Generation of a Subaddress by concatenating the Called Party Number digits is supported in BT (e.g. dial enbloc 384000#123 generates a Called Party Subaddress of '123')

NETWORK PERSONALITY MODULE: VN2/3

Introduction   This section outlines the differences in operation of **emutel™|Duo** between the CCITT emulation provided on the standard **emutel™|Duo** and the VN2/3 Networking Personality Module.

The Software Setup Menu shown when simulating a VN3 network is displayed below.

```
Software Setup

Network Type                     VN3
Drop Layer 2 if No Call Active   xxxx
Drop Layer 1 if Layer 2 Inactive xxxx
Drop TEI if Layer 1 Inactive     xxxx
Number of B Channels per PRI     n

Allow Overlap Sending/Receiving  xxxx
Numbering System Option          xxxx
Called Party Number              xxxx
Calling Party Number             xxxx
Called Party Subaddressing       xxxx
Calling Party Subaddressing      xxxx
High Layer Compatibility         xxxx
Low Layer Compatibility          xxxx
D-Channel X25 Setup              xxxx
Point to Point/Multipoint Setup  Enter
```

Main Differences Between CCITT and VN2/3   The main differences are:

- VN2/3 adds a new information element to the SETUP message "Mode de fonctionnement d'usager" in codeset 6. This is mandatory in the SETUP message in both user→network and network→user directions.

- In the user→network SETUP message the Higher Layer Compatibility information element is mandatory.

- The Sending Complete information element is not supported in VN3.

CHAPTER 8   **79**

A subset of the CCITT Bearer Capability information element is allowed in the SETUP message sent to the network. The most notable restrictions are:-

- Coding Standard is fixed at CCITT.

- Information Transfer Capability is Speech, 3.1 kHz Audio or Unrestricted Digital.

- Information Transfer Rate is 64k only.

- Layer 1 protocol is G.711 A law or H.221/H.242 (G.722/G.725).

- A new optional information element "Facility d'usager a usager" in codeset 6 is defined. **emutel**[TM]**|Duo** analyser decodes this although **emutel**[TM]**|Duo** does not generate it.

- Octet 3a (Recommendation) is not supported in the Cause information element.

- Keypad information element is not supported.

Introduction   This section outlines the differences in operation of **emutel™|Duo** between the CCITT emulation provided on the standard **emutel™|Duo** and the 1TR6 Network Personality Module.

Figure 50 shows the Software Setup Menu when simulating a 1TR6 network.

```
Software Setup

Network Type                        1TR6
Drop Layer 2 if No Call Active      xxxx
Drop Layer 1 if Layer 2 Inactive    xxxx
Drop TEI if Layer 1 Inactive        xxxx
Number of B Channels per PRI        xxxx


Allow Overlap Sending/Receiving     xxxx
Numbering System Option             xxxx
Called Party Number                 xxxx
Calling Party Number                xxxx
Call Waiting                        xxxx
Billing                             xxxx
Additional Transmission Attributes  xxxx
Called User Status                  xxxx
Date/Time                           xxxx
D-Channel X25 Setup                 xxxx
```

Figure 50 1TR6 Software Setup Menu

Call Waiting   Call is offered to the BRI interface even if both B channels are busy. If disabled the calling user is returned busy immediately.

Billing   When enabled, includes the additional information element. The time between billing messages (valid range 1-30s) and amount to be added (valid range 1-255s) each time can be set.

Additional Transmission Attributes   When enabled, includes the additional information element. The element indicates whether one or more satellite links are involved in the transmission path of incoming calls.

Called User Status   When enabled, includes the additional information element. The

status can be either no information or subscriber line ringing.

Date/Time   When enabled, includes the additional information element. The
element includes the day, month, year, hour, minute and second.

Main Differences Between CCITT and 1TR6   The German 1TR6 network is very different to Q.931 based
networks such as Euro ISDN. To understand all of the differences
refer to the 1TR6 specification. **emutel™|Duo** does not support all
of the differences provided by 1TR6 but the following notes
outline the main differences between the standard network and
1TR6.

1TR6 does not use the normal Q.931 protocol discriminator (i.e. =
8) but defines two new ones N0 (=1) and N1 (=65). Some
messages are valid only with N0 and some only with N1.

The following Q.931 messages are not supported:

- PROGRESS
- RESTART
- RESTART ACKNOWLEDGE

The following N0 messages are additional to Q.931:

- REGISTER INDICATION
- CANCEL INDICATION
- FACILITY STATUS
- STATUS ACKNOWLEDGE
- STATUS REJECT
- FACILITY INFORMATION
- INFORMATION ACKNOWLEDGE
- INFORMATION REJECT
- CLOSE
- CLOSE ACKNOWLEDGE

None of these messages are supported by **emutel™|Duo**.

The following N1 messages are additional to Q.931:

- DETACH

- CANCEL ACKNOWLEDGE
- CANCEL REJECT
- FACILITY ACKNOWLEDGE
- FACILITY CANCEL
- FACILITY REGISTER
- FACILITY REJECT
- REGISTER ACKNOWLEDGE
- REGISTER REJECT

None of these messages are supported by **emutel™|Duo**.

The following messages (supported by **emutel™|Duo**) are common to 1TR6 and Q.931 but their numeric value is different.

- INFORMATION (1TR6 = 0 x 6d)
- STATUS (1TR6 = 0 x 63)

1TR6 also defines additional information elements not found in Q.931. These are mostly found in codeset 6:

- Service Indicator
- Charging Information
- Date
- Facility Select
- Status of Facilities
- Status of Called User
- Additional Transmission Attributes

The only non-Q.931 message in codeset 0 is Connected Address.

The following Q.931 information elements are not supported in 1TR6:

- Segmented Message
- Bearer Capability
- Call State
- Facility
- Progress Indicator
- Notification Indicator
- Date / Time

- Signal
- Switchhook
- Feature Activation
- Feature Indication
- Calling Party Sub-address
- Called Party Sub-address
- Transit Network Selection
- Restart Indicator
- Low Layer Compatibility
- High Layer Compatibility

Where information elements are supported by both Q.931 and 1TR6 they may have a different structure e.g. the Cause information element supports different cause values in 1TR6 and Q.931.

Because the Bearer Capability information element is not supported 1TR6 uses the Service Indicator information element in its place.

The 1TR6 Date information element is mandatory in the CONNECT, CONNECT ACKNOWLEDGE, DISCONNECT, and RELEASE messages from **emutel™|Duo**.

The 1TR6 Called User Status information element is mandatory in the ALERT message from **emutel™|Duo**.

The following information elements are used by **emutel™|Duo** and can be enabled in the Software Setup menu as shown in Figure 38.

- Charging Information
- Additional Transmission Attributes
- Called User Status
- Date

emutel™|Duo also allows the generation of a call waiting SETUP message.

NETWORK PERSONALITY MODULE: NTT

Introduction

This section outlines the differences in operation of **emutel™|Duo**. between the CCITT emulation provided on the standard **emutel™|Duo** and the NTT Network Personality Module.

The main Software Setup Menu is identical to the CCITT Menu but the Supplementary Service Setup Menu is shown in Figure 51.

```
NTT Supplementary Service Setup

Advice of Charge                 xx
```

Figure 51 NTT Supplementary Service Setup Menu

Advice of Charge

When enabled, includes the additional information element. The time between billing messages (valid range 1-30s) and amount to be added (valid range 1-255s) each time can be set.

Main Differences Between CCITT and NTT

NTT protocol is based on Q.931. The main differences between the two protocols are as follows:

- Overlap Sending and Overlap Receiving states are not supported

- SUSPEND and RESUME messages are supported only in point-point interfaces

- NTT supports only μ law voice/3.1kHz audio, unrestricted digital and V.110 data (64K/56K)

The following Q.931 messages are not supported in NTT:

- SETUP ACKNOWLEDGE
- USER INFORMATION
- CONGESTION CONTROL
- FACILITY

The following Q.931 information elements are not supported in NTT:

- More Data

- Sending Complete
- Congestion Level
- Repeat Indicator
- Segmented Message
- Network Specific Facilities
- Date/Time
- Transit Network Selection

The following Q.931 information elements have restrictions not imposed in Q.931:

- Bearer Capability
- Called Party Number
- Calling Party Number
- Signal

The NTT Called User Status information element is mandatory in the ALERT message from **emutel™|Duo**.

The following information elements which are not supported in Q.931 are available in NTT using codeset 6:

- Advice of Charge
- Blocking Channel ID

NETWORK PERSONALITY MODULE: N AMERICAN

Introduction   This section outlines the differences in operation of **emutel™|Duo** between the CCITT emulation provided on the standard **emutel™|Duo** and the NAT/AT&T/DMS Network Personality Module.

The NAT/AT&T/DMS Network Personality Module covers three switch variants found in North America i.e. Bellcore NAT-1, Nortel DMS100 and AT&T 5ESS.

The Software Setup Menu shown when simulating a NAT 1 network is displayed below.

```
Network Type                      NAT-1
Drop Layer 2 if No Call Active    xxxx
Drop Layer 1 if Layer 2 Inactive  xxxx
Drop TEI if Layer 1 Inactive      xxxx
Number of B Channels per PRI      n
Service Profile Ids (SPIDS)       xxxx
Allow Overlap Sending/Receiving   xxxx
Numbering System Option           xxxx
Called Party Number               xxxx
Calling Party Number              xxxx
Called Party Subaddressing        xxxx
Calling Party Subaddressing       xxxx
High Layer Compatibility          xxxx
Low Layer Compatibility           xxxx
D-Channel X25 Setup               xxxx
Supplementary Services            Enter
Point to Point/Multipoint Setup   Enter
Permanent B Channel Setup            Enter
```

Network Mode   The NAT/AT&T/DMS Network Personality Module covers three switch variants found in North America i.e. Bellcore *NAT-1*, Nortel *DMS100* and *AT&T 5ESS*.

Flexible Call Offering   When enabled, instructs the network (NT) to alert the Terminal Equipment (TE) of a call, even if that B channel (or Port) is already

in use. Instead of a "User Busy" from the NT, a SETUP message is sent to the destination. Calls are offered to the user equipment using different Call Appearance's. Once notified the user may free up a B channel, accept, ignore or reject the call.

Hold Conference Drop Transfer (HCDT)

When enabled allows the following services:

Hold   Places an active voice call on HOLD & re-uses the same B channel.

Conference   Allows more than one voice call to be connected together. Note that although the   protocol will appear as if a conference had   taken place, the voice path will only appear   between 2 of the active B channels.

Drop   Releases a user from a conference call.

Transfer   Used to pass an active voice call on to another user.

EKTS (Electronic Key Telephone Service) Call Appearance Call Handling

When enabled, includes the Call Appearance information element in the SETUP message. The call appearance identifier is the number coded in the call appearance identifier field included in the Call Appearance information element. The CACH EKTS terminal maps calls into the call appearances using the call appearance identifier.

Directory Number (DN) Sharing

When enabled, allows multiple pieces of Terminal Equipment (TE), connected to the same port, to share the same Call Appearances. One piece of TE can see which call appearances are already in use by another piece of TE on the same port. It is also associated to the Call Privacy feature.

Call Privacy

Allows another user to "listen-in/interrupt" an active call. It assumes that multiple pieces of Terminal Equipment (TE) are connected to an interface & that DN Sharing is switched on. In that scenario, one piece of TE can see if another call is in use on another piece of TE, by looking at the Call Appearance LED's and can therefore listen in on the conversation. The TE that will be the victim of the interruption must tell the NT that it will allow another piece TE to enter in on his calls. There are two options:

Manual - The TE will send a message to allow it to be interrupted. It can also send a message to deactivate this feature and prevent further interruption.

Automatic - The NT will automatically deactivate the ability for interruption at the end of each call. Activation is done on a call-by-call basis.

Main Differences Between CCITT and Bellcore National ISDN-1

National ISDN-1 (NAT-1) defines four new ISDN messages not found in Q.931. These are network specific messages (i.e. two octet) and are:

- KEY HOLD
- KEY RELEASE
- KEY SETUP
- ACKNOWLEDGE

These are not used in **emutel™|Duo**.

NAT-1 does not include the following Q.931 messages:

- USER INFORMATION
- RESTART
- RESTART ACKNOWLEDGE
- SEGMENT
- CONGESTION CONTROL
- FACILITY

NAT-1 defines new information elements in codeset 0. These are:

- Information Request
- Service Profile Identification
- Endpoint Identifier
- Information Rate
- End to End Transit Delay
- Transit Delay Selection and Identification
- Packet Layer Binary Parameters
- Packet Layer Window Size
- Packet Size

- Closed User Group
- Reverse Charging Information
- Redirection Number

emutel™|Duo supports Service Profile Identification and Endpoint Identifier information elements.

NAT-1 does not support the following Q.931 information elements:

- Segmented Message
- Call Identity
- Facility
- Network Specific Facilities
- Display
- Date / Time
- Switchhook
- Restart Indicator
- Sending Complete

NAT-1 offers the following information elements in codeset 5:

- Operator System Access
- Display Text

NAT-1 offers the following information elements in codeset 6:

- Redirection Sub-address
- Redirection Number
- Call Appearance

In NAT-1 the signal information element is mandatory in the following network→user messages:

- ALERTING
- RELEASE
- CONNECT ACKNOWLEDGE
- RELEASE
- RELEASE COMPLETE
- CALL PROCEEDING

- SETUP ACKNOWLEDGE
- DISCONNECT
- SETUP
- CONNECT

A subset of the CCITT Bearer Capability information element is allowed in the SETUP message sent to the network. The most notable restrictions are:

- Information transfer capability is speech, unrestricted, 3.1kHz audio only
- Transfer mode and rate is 64k, Packet mode
- Layer 1 protocol is rate adapted, μ law
- Rate is 56k
- Layer 2 protocol is LAPD, LAPB
- Layer 3 protocol is X.25
-

Main Differences Between CCITT and Nortel DMS100

DMS-100 defines new ISDN messages not found in Q.931. These are network specific messages (i.e. two octet) and are:-

- KEY HOLD
- KEY RELEASE
- KEY SETUP
- KEY SETUP ACKNOWLEDGE
- RETRIEVE
- RETRIEVE ACKNOWLEDGE
- RETRIEVE REJECT
- HOLD
- HOLD ACKNOWLEDGE
- HOLD REJECT

These are not used in the **emutel™|Duo**.

DMS100 defines new information elements in codeset 0 which are:-
- Connected Number
- Redirecting Number
- Redirection Number

DMS100 defines new information elements in codeset 6 which are:-
- Protocol Version Control

- Closed User Group
- Reverse Charging Indication
- Redirecting Subaddress
- Call Appearance

A subset of the CCITT Bearer Capability information element is allowed in the SETUP message sent to the network. The most notable restrictions are:-

- Information transfer capability is speech, unrestricted, 3.1kHz audio only.
- Transfer mode and rate is 64k, Packet mode.
- Layer 1 protocol is rate adapted, ? law.
- Rate is 56k.
- Layer 2 protocol is LAPD, LAPB.
- Layer 3 protocol is X.25.

The following differences are also noted:-

The Signal information element has additional values not defined in Q.931.

User to User signalling is not supported in DMS100.

The Sending Complete information element is not supported in Q.931.

Purpose The aim of this section is to give you a guide to the setup involved when using the X.25 option on **emutel** series. The X.25 implementation was developed to aid customers demonstrating user X.25 TE equipment. The X.25 functionality on **emutel™|Duo** is limited and may not be suitable for the development of customer equipment.

Example Setup For the purpose of this example, an X.25 call will be placed from DTE 1 to DTE 2.

DTE 1 calls DCE 1
Call is routed through the ISDN cloud
DCE 2 call DTE 2
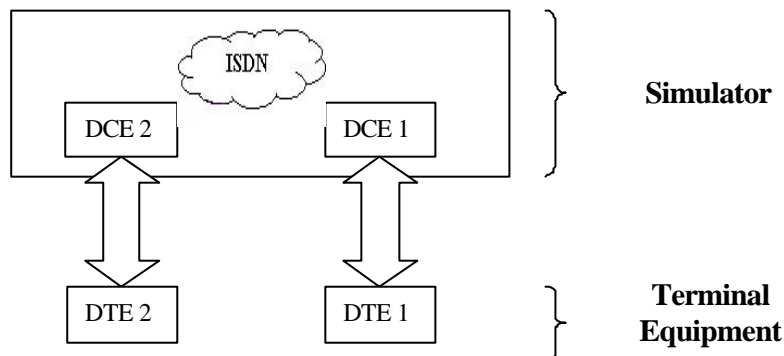
X-25 Setup Menu on the emutel Setup Permanent Virtual Circuits (PVCs) – this is like a leased line connection, where a permanent connection is established between the two DTEs.

Switched Virtual Circuits (SVCs) – in this case the connection between the two DTEs is on a Temporary basis, and is only maintained for the duration of the call.

Parameters Below is a list of the default values associated with the setup of the simulator (i.e. the DCE).

BRI1 PVC LLC	0 -	Lowest Logical Channel (PVC)
BRI1 PVC HLC	0 -	Highest Logical Channel (PVC)
BRI1 LOC	1 -	Lowest Outgoing Channel (SVC)

BRI1 HOC	2	-	Highest Outgoing Channel (SVC)
BRI1 LTC	3	-	Lowest Two-way Channel (SVC)
BRI1 HTC	4	-	Highest Two-way Channel (SVC)
BRI1 LIC	5	-	Lowest Incoming Channel (SVC)
BRI1 HIC	6	-	Highest Incoming Channel (SVC)
BRI1 TEI	1	-	TEI Value to be used (Default 1)
BRI2 PVC LLC	0	-	Lowest Logical Channel (PVC)
BRI2 PVC HLC	0	-	Highest Logical Channel (PVC)
BRI2 LOC	1	-	Lowest Outgoing Channel (SVC)
BRI2 HOC	2	-	Highest Outgoing Channel (SVC)
BRI2 LTC	3	-	Lowest Two-way Channel (SVC)
BRI2 HTC	4	-	Highest Two-way Channel (SVC)
BRI2 LIC	5	-	Lowest Incoming Channel (SVC)
BRI2 HIC	6	-	Highest Incoming Channel (SVC)
BRI2 TEI	1	-	TEI Value to be used (Default 1)

There should be similar options on the DTE, and it is important that the above settings within the simulator (i.e. DCE) match those of the DTEs. It is also worth noting that what is deemed as outgoing at one side is deemed as incoming at the other.

To expand on this:

When placing a call from DTE 1 to DTE 2 the following happens.

3. Call passed through simulator.

4. DCE 2 passes the call out to DTE 2 "outgoing".

2. DCE 1 sees the call from DTE 1 as "incoming".

DCE 2   DCE 1

5. DTE 2 sees the call arrive as "incoming".

1. DTE sends an "outgoing" call.

DTE 2   DTE 1
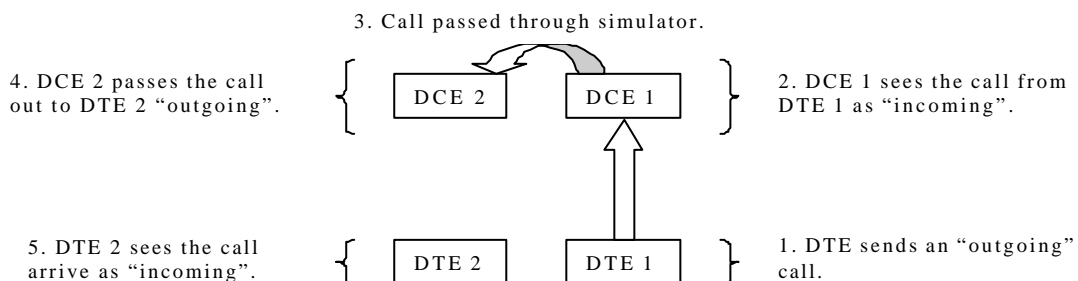
The process is reversed for a call in the opposite direction (i.e. DTE 2 to DTE 1).

Logical channel Setup Assuming that the simulator settings are not changed (highlighted in italics below), then the DTE settings will be as follows.

DTE **Channel**

Outgoing 5 & 6
Two-way 3 & 4
Incoming 1 & 2

DCE **Channel**

Incoming *5 & 6*
Two-way *3 & 4*
Outgoing *1 & 2*

The Two-way channels are used as reserve logical channels, and as they are bi-directional they support both Incoming and Outgoing.

TEI Value Pressing <Enter> can change the Terminal Endpoint Identifier. As default this value is set to "1".

Called Party Number When using SVCs it is necessary to send the called party number, as the call is still using the ISDN network. However, depending upon the Terminal Equipment being used, this may be called one of the following.

1. Called Party Number
2. Telephone number
3. Address
Etc.

Restarts Whenever an X25 call is being set up, a RESTART message must be sent. Normally the DTE will do this, however, due to a generalisation in the specification, some DTEs do not have this capability. For this reason an option has been implemented for the simulator to send a RESTART on Layer 2 establishment.

PARALLEL MONITORING SETUP

Parallel Monitoring Setup

The diagram below shows an example of how to connect the **emutel™|Duo** in parallel monitoring mode to BRI S equipment.
NB all the **emutel™|Duo** BRI ports should be set to S interface.
For PRI equipment the **emutel™|Duo connection** is to PRI 1.
NB both **emutel™|Duo** PRI ports should be set to E1 or T1 as appropriate.

The Telephone (TE) is connected to the equipment that is to be monitored (NT) via an RJ45 Splitter. This RJ45 Splitter allows the **emutel™|Duo** to be connected in parallel, from S BRI Port 2. The call between the TE and NT can now be monitored by the **emutel™|Duo.** All messages are displayed on the terminal connected to the **emutel™|Duo,** on the Emutel Protocol Analyser.

PLEASE NOTE

U interface cannot be monitored.
Configure emutel™|Duo before connecting ISDN equipment.
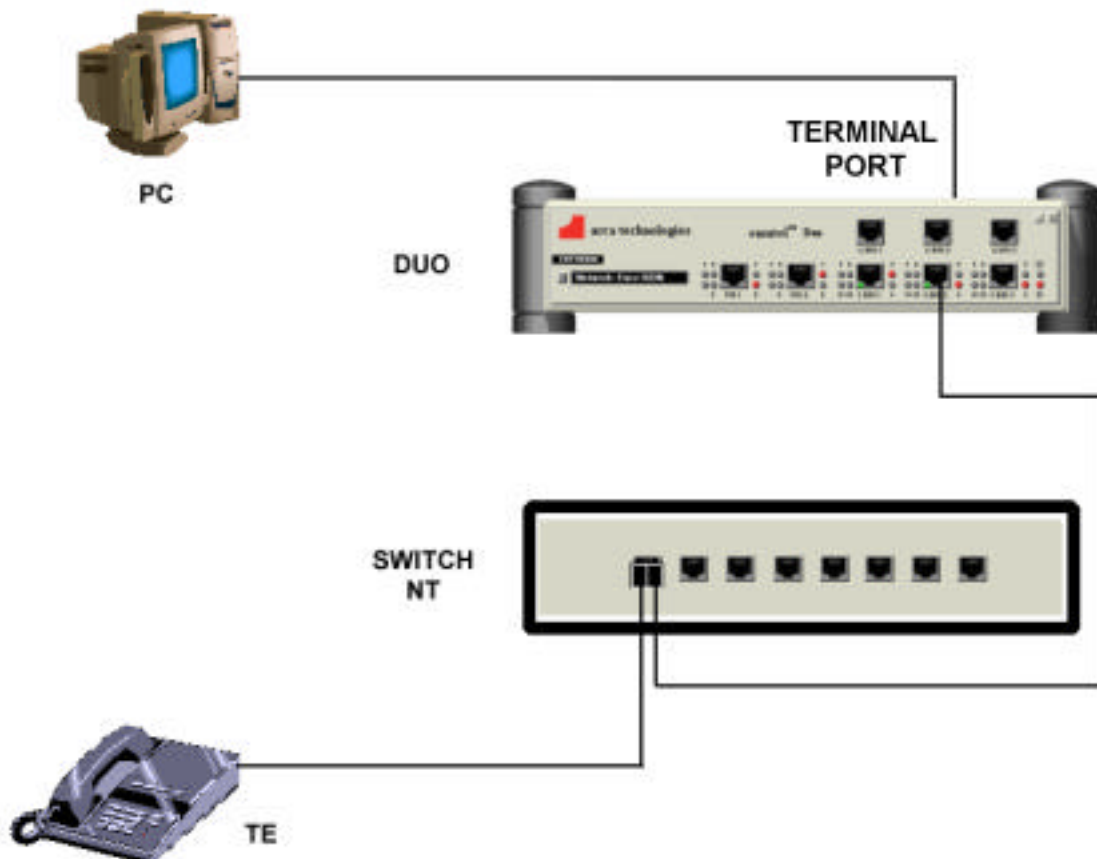
Technical Support Process   If you have any problems/queries when using the **emutel** Series, the first point of contact is the User Manual associated with the unit. Revised versions can be obtained from the Web site: (http://www.arca-technologies.com). These manuals contain useful notes on the various functions of the unit and also a Technical Help guide showing the most common problems/questions.

If, after having consulted the Manual and Help files, you still need help, please contact the distributor you purchased your unit from.

arca technologies prides itself in providing a high quality after-sales service. You may also access our Technical Support Engineers via the World Wide Web, fax or phone.

T: +44 (0)28 9084 5700
F: +44 (0)28 9084 5701
E: tech@arca-technologies.com
W: www.arca-technologies.com

INDEX

INDEX

INDEX

INDEX