

Dynamix

Dynamix UM-SN/703

SHDSL NTU E1



**User Manual
V 2.01**

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Chapter 1 Introduction

The SHDSL NTU offers two different ways to connect customers to high-speed TDM services with two G.703 E1 interfaces (balance 120Ω RJ45 jack and unbalance 75Ω dual BNCs). The G.703 interface will carry 64kbps to 2.048Mbps.

The SHDSL NTU can be configured and managed via EOC, or menu-driven VT100 compatible Asynchronous Terminal Interface, either locally or remotely.

The SHDSL NTU is equipped with an auto rate capability that identifies the maximum line rate supported by the copper loop. This powerful automatic configuration capability makes installation and service provisioning simple and painless. Further flexibility is provided in the ability to manually set the maximum NTU speed at different levels for different customer-tailored service offerings.

Features

- Standard G.shdsl (ITU G.991.2) supports improved reach/speed and greater interoperability
- Fast and cost-effective provisioning of traditional frame relay (FR or T-HDLC) or TDM leased line services
- User existing copper loop infrastructures
- Can operate back to back connection
- Efficient single wire pair usage
- Up to 2.312Mbps symmetric service bit rate
- Auto rate installation maximizes data rate based on loop conditions
- Auto configuration wetting current to protect SHDSL line
- Local management interface with LCD display
- Remote line loopback
- SHDSL Line performance monitoring
- Raw and per time interval statistics
- Bandwidth guaranteed transmission equipment

Specification

Network Interface

- Line Rate: SHDSL per ITU G.991.2
- Coding: trellis coded pulse amplitude modulation
- Support: ANSI (Annex A) and ETSI (Annex B)
- Payload rates: 64kbps to 2.048Mbps (N x 64kbps N=1 to 32)
- Connection: RJ-11 jack (2-wire)

G.703 Interface

- Connection: RJ-45 for balanced 120Ω E1 cable
- Connection: BNC for unbalanced 75Ω E1 cable

Framing

- G.703/G.704

- CRC 4 enable/disable
- Framed
- Unframed

DSL Timing

- Network
- Internal
- DTE

Line Protection

- Auto configuration wetting current

Performance Monitoring

- ES, SES, UAS, Alarms, Errors for E1, SHDSL

Loopback Tests

- Local Loopback
- Digital Loopback
- Remote Loopback
- Far-end Loopback
- Build-in 2047 bit tester

Management

- Configuration with keypad and LCD display
- Console port
- Support firmware upgradeable

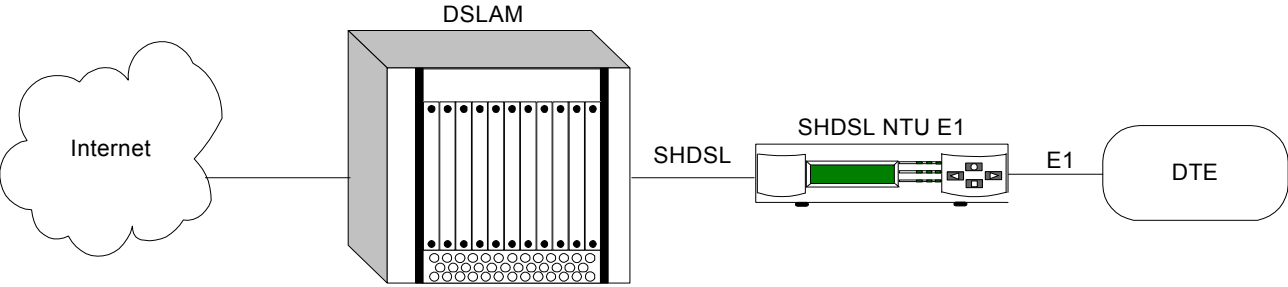
Physical/Electrical

- Dimensions: 19.5 x 4.8 x 16.8 cm
- Input: 90~240VAC with 50~60Hz
- Power Consumption: 10W Max
- Operation: 0 to 50°C
- Humidity: Up to 95% (non-condensing)

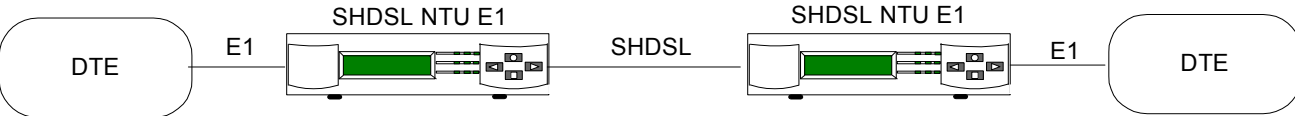


Warning! High voltage. Do not open

Applications



Internet Access Application



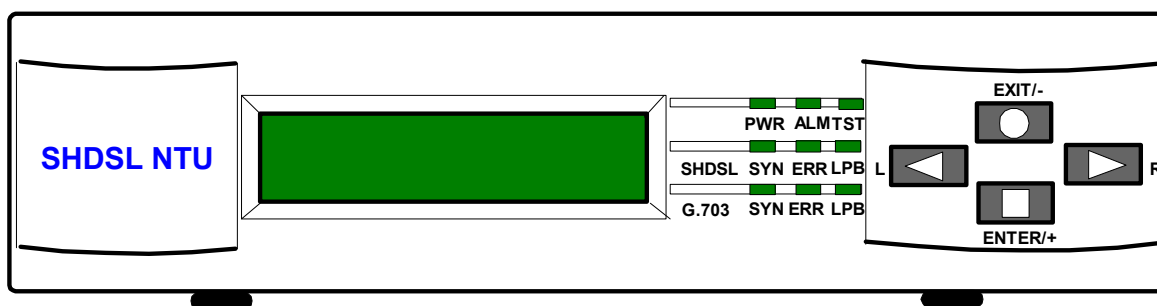
Point-to-Point Application

Chapter 2 Hardware Installation

This chapter shows the front panel and how to install the hardware.

2.1 Front Panel

Front panel can be separated into three parts: (1)LCD (2) keypads (3) LEDs.



1. The LCD can show the status and configuration of the product. The local management interface will be done by keypads with LCD display. For more detail, refer to chapter 3: Configuration.
2. The purpose of key pad is to configure the SHDSL NTU. Review the chapter 2 for detail configuration.

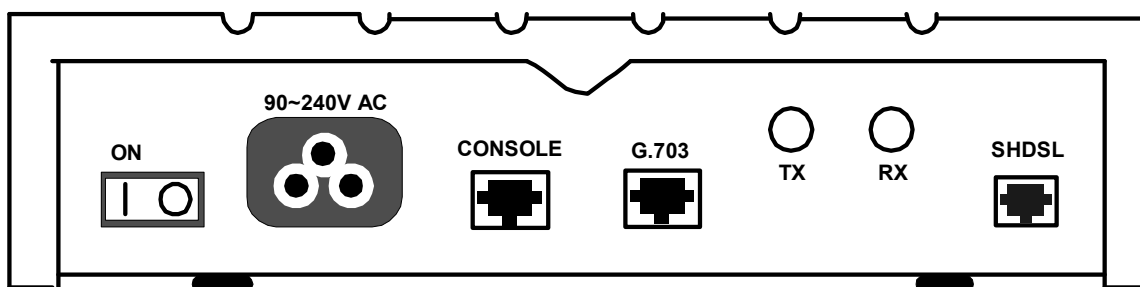
Key Pad	Description
Exit/-	● Return to previous configuration menu.
Enter/+	■ Skip to next configuration menu or configure the items.
L	◀ Select other parameter in the same level menu.
R	▶ Select other parameter in the same level menu.

3. The following table describes the LEDs' function of the product.

LED	Color	Action	Description
PWR	Green	On	Power is on.
		Off	Power is off.
ALM	Red	On	Major alarm occurs.
		Off	System is working normally.
TST	Yellow	On	System is testing for connection.
		Off	System is working normally.
SHDSL SYN	Green	On	SHDSL line is connected.
		Off	SHDSL line is dropped.
SHDSL ERR	Red	Blink	There are error seconds.
		Off	There is not only error second.
LPB	Yellow	On	Loopback is on.
		Off	Loopback is off.
SYN	Green	On	E1 line is connected.
		Off	E1 line is dropped.
G.703 ERR	Red	Blink	There are error seconds.
		Off	There is not any error second.
LPB	Yellow	On	Loopback is on.
		Off	Loopback is off.

2.2 Rear Panel

The rear panel of SHDSL NTU is including power switch, power socket, RJ-45 console, RJ-45 G.703, BNC jack for transmitting and receiving and RJ-45 for SHDSL from left to right.



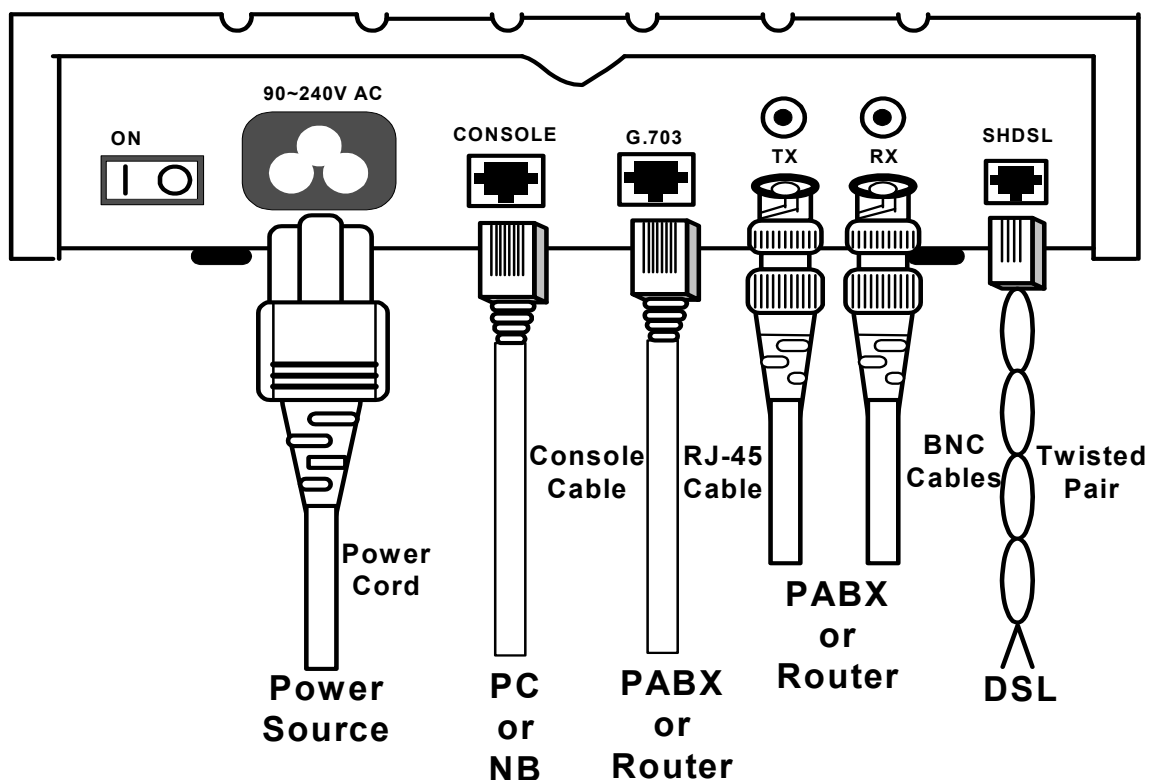
Connector Description

ON	Power switch. Press 1 for turn on and press 0 for off.
90~240V AC	Power socket. It has power adapting function from 90V to 240V.
CONSOLE	RJ-45 for system configuration and maintenance.
G.703	RJ-45 for 120Ω E1 connection with PABX (Private Automatic Branch Exchange) or Router
TX	BNC for 75Ω E1 transmitting
RX	BNC for 75Ω E1 receiving
SHDSL	RJ-45 for SHDSL connection

2.3 Hardware Installation

Note: To avoid possible damage to this router, do not turn on the product before hardware installation.

- I. Plug the power cord in the power socket.
- II. Plug the console port in console if you want to configure the NTU with VT100 program of NB or PC.
- III. Plug the E1 cable (Either 75Ω BNC cables or 120Ω cable)
- IV. Plug SHDSL cable
- V. Power on



Warning! High voltage. Do not open

Chapter 3 What's auto configuration?

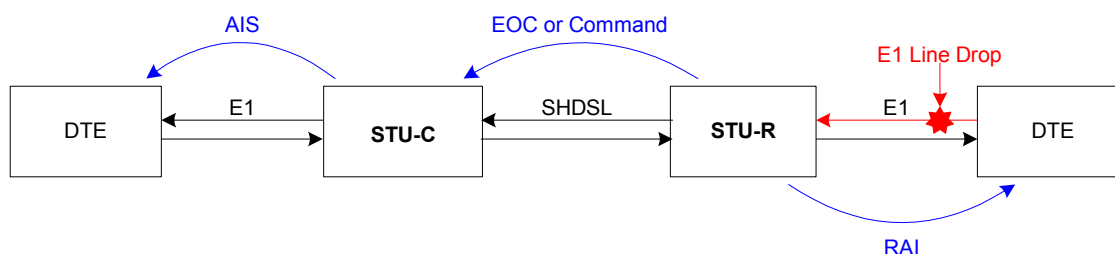
Some of the embedded functions do not have a separate command to setup but some of them are auto sense with some configurations and change itself configuration. Some of them are always enable function.

3.1 Wetting Current

Wetting current, also known as loop sealing current, is a low-level DC current applied to a loop for the specific purpose of maintaining cable splice integrity by preventing the build-up of oxidation. The "enable" applies a relatively -42 ± 2 V DC voltage to the cables and allows 20~3 mA of current to flow at all times as STU-C type, there has the ability to source wetting current. The product will automatically enable wetting current as STU-C type. As STU-R type, it always terminates the wetting current.

3.2 AIS (Alarm Indication Signal)

Automatically to the connected device when remote E1 line drop or SHDSL line drop. For example: When STU-R E1 RX line is drop, STU-R will send the status to STU-C via EOC or command. STU-C will send AIS (Alarm Indication Signal) to DTE while the AIS (Alarm Indication Signal) is enabled.



Chapter 4 Configuration with Keypad and LCD





4.1 Purpose

This chapter provides information about configuration your SHDSL NTU via front panel LCD display and keypads.

Note: After you have completed all necessary settings for your SHDSL NTU, make sure to write the new configuration to NVRAM by “write” command and reboot the system for taking effect of new configuration.

4.2 How to use key pads?

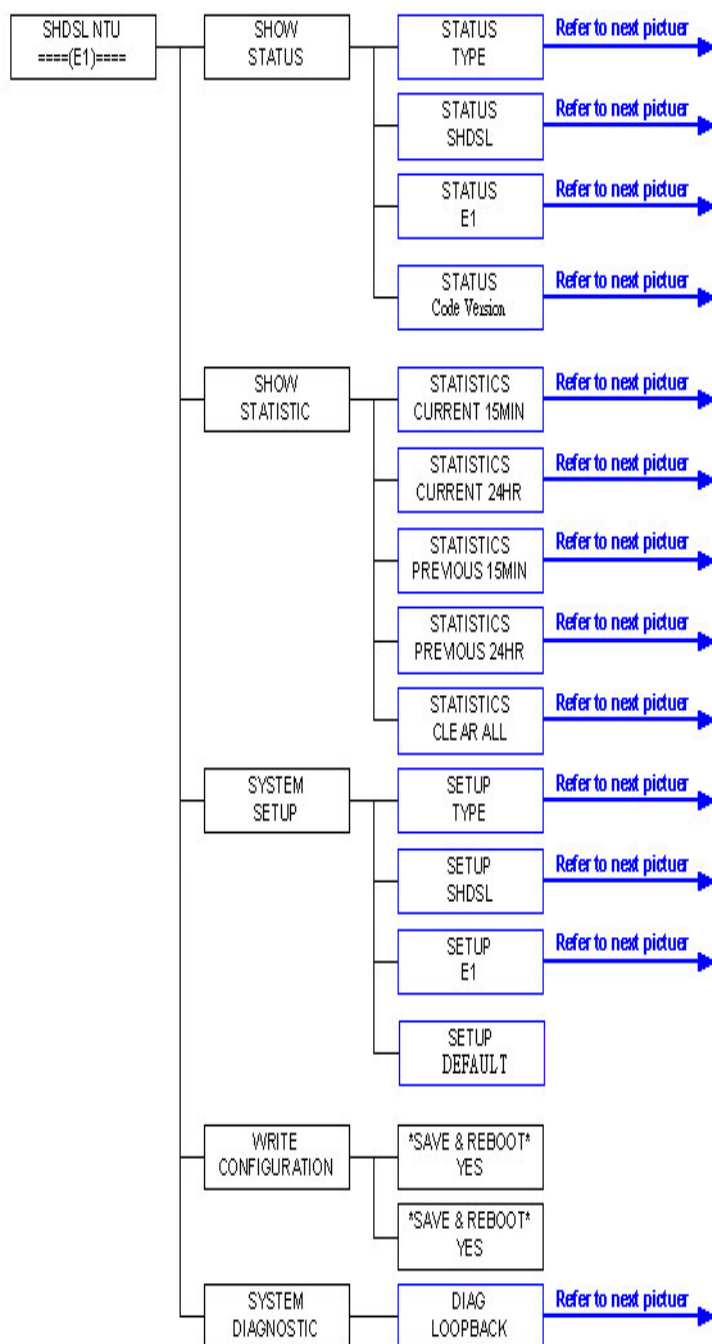
The product is designed for user-friendly configuration with keypads and LCD display without using PC or NB with VT100 terminal.

Key Pad	Description
Exit/-	 Return to previous configuration menu.
Enter/+	 Skip to next configuration menu or configure the item.
L	 Select other parameter in the same level menu.
R	 Select other parameter in the same level menu.

4.3 Menu Tree

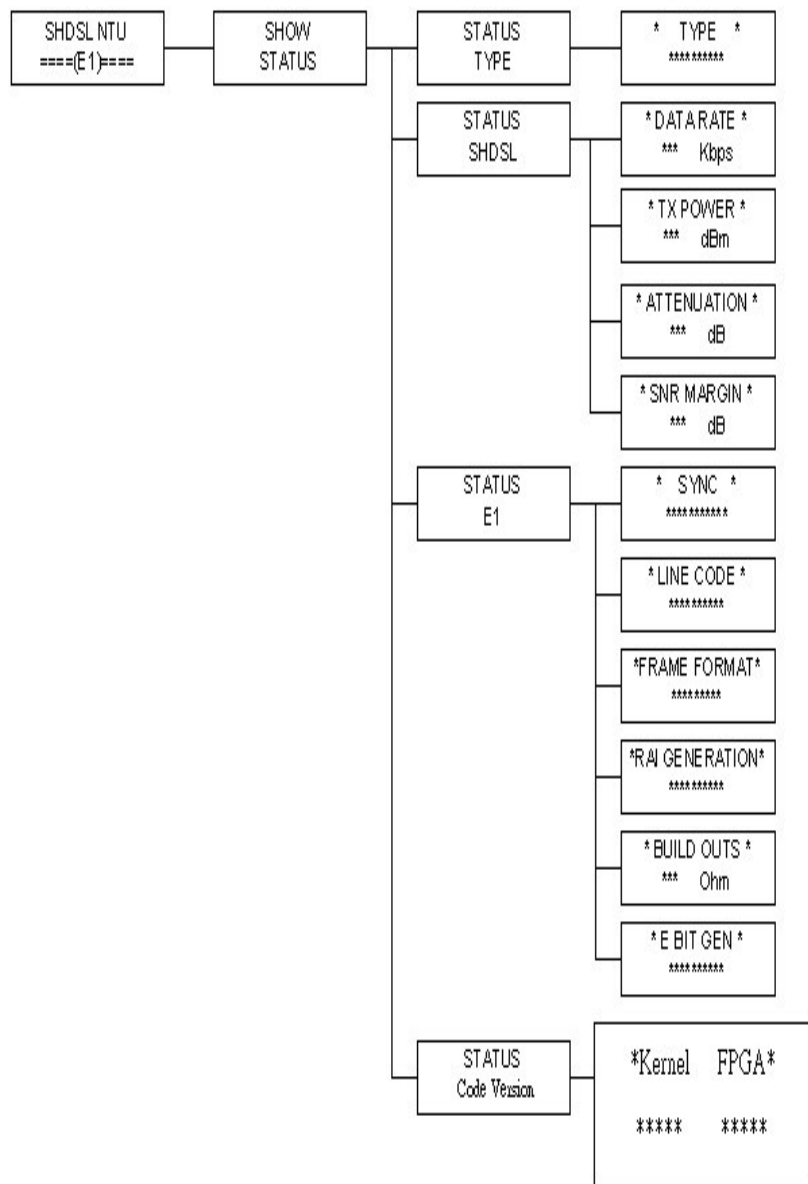
After turning on the product, LCD will prompt **SHDSL NTU (E1)**. Press **Enter** to enter. There are five main commands, show status, show statistics, system setup, write configuration and system diagnostic. For more detail, refer to each title.

Note: After you have completed all necessary settings for your SHDSL NTU, make sure to write the new configuration to NVRAM by “write” command and reboot the system for taking affect of new configuration.



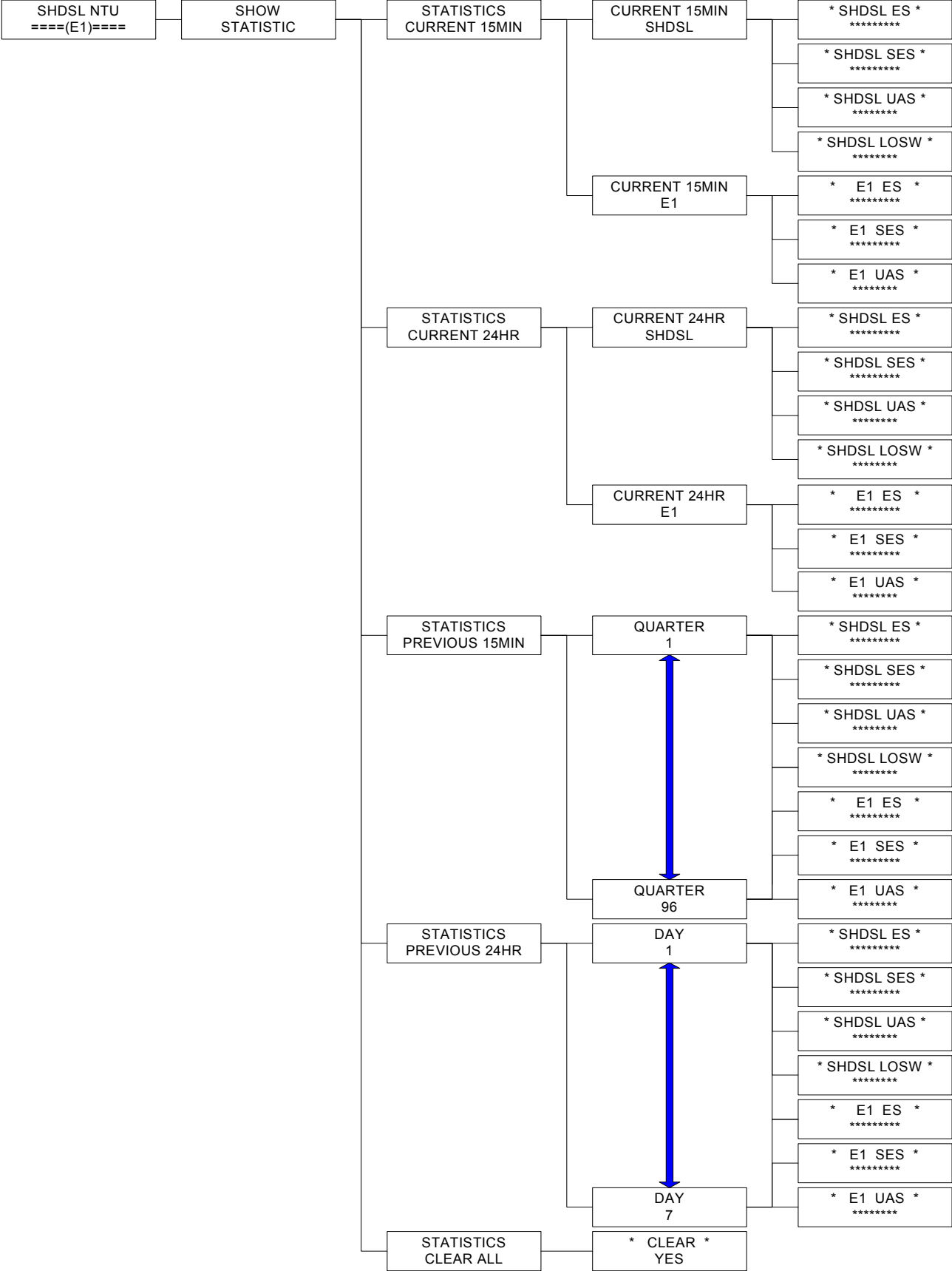
Menu tree for SHOW STATUS

You can check three kinds of status via LCD display: Type, SHDSL status and E1 status. The SHOW STATUS menu tree is as follow.



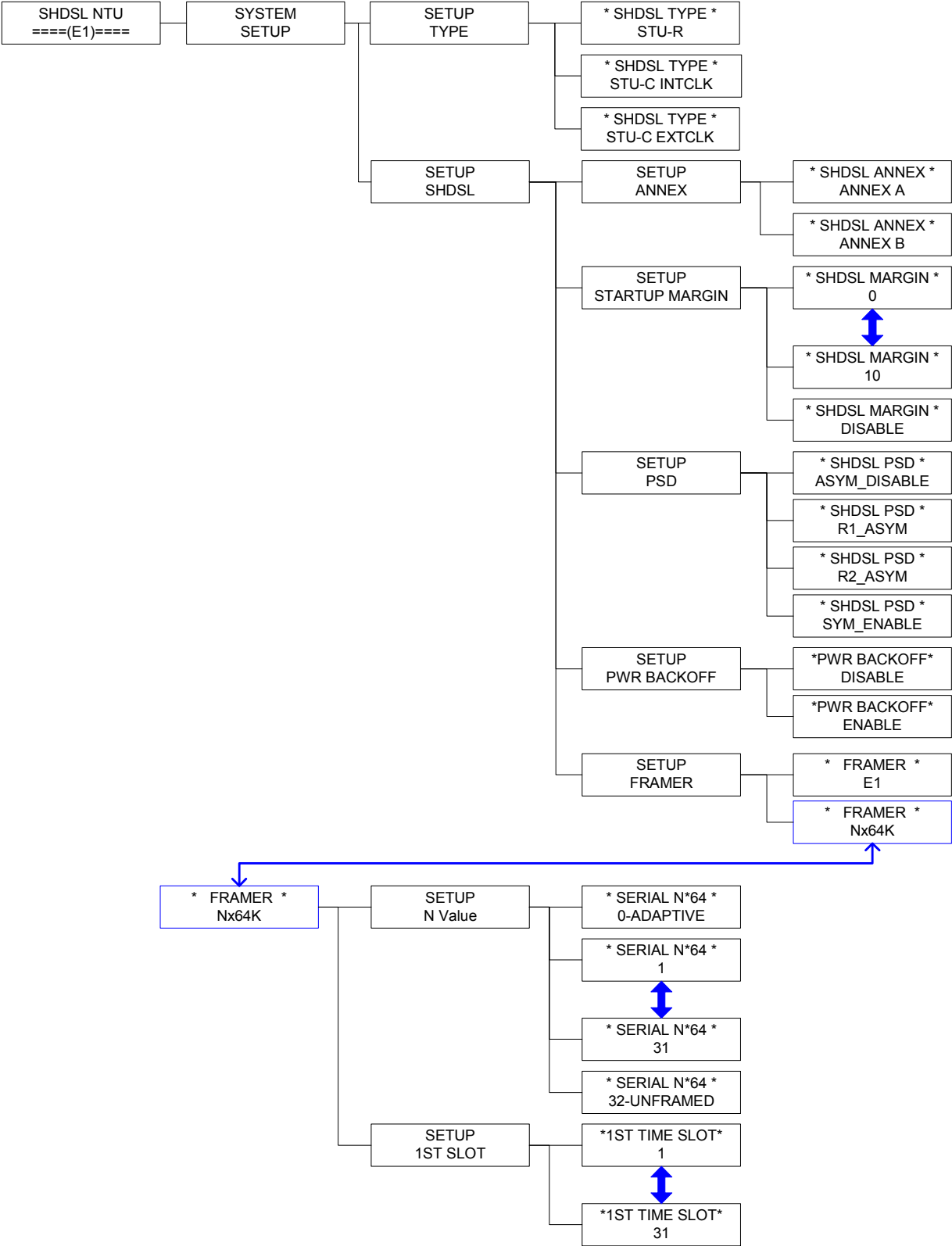
Menu tree for SHOW STATISTICS

The product can display two kinds of statistics data, the statistic data of SHDSL and E1 for current 15 minutes and current 24 hour. The menu tree is as follow.



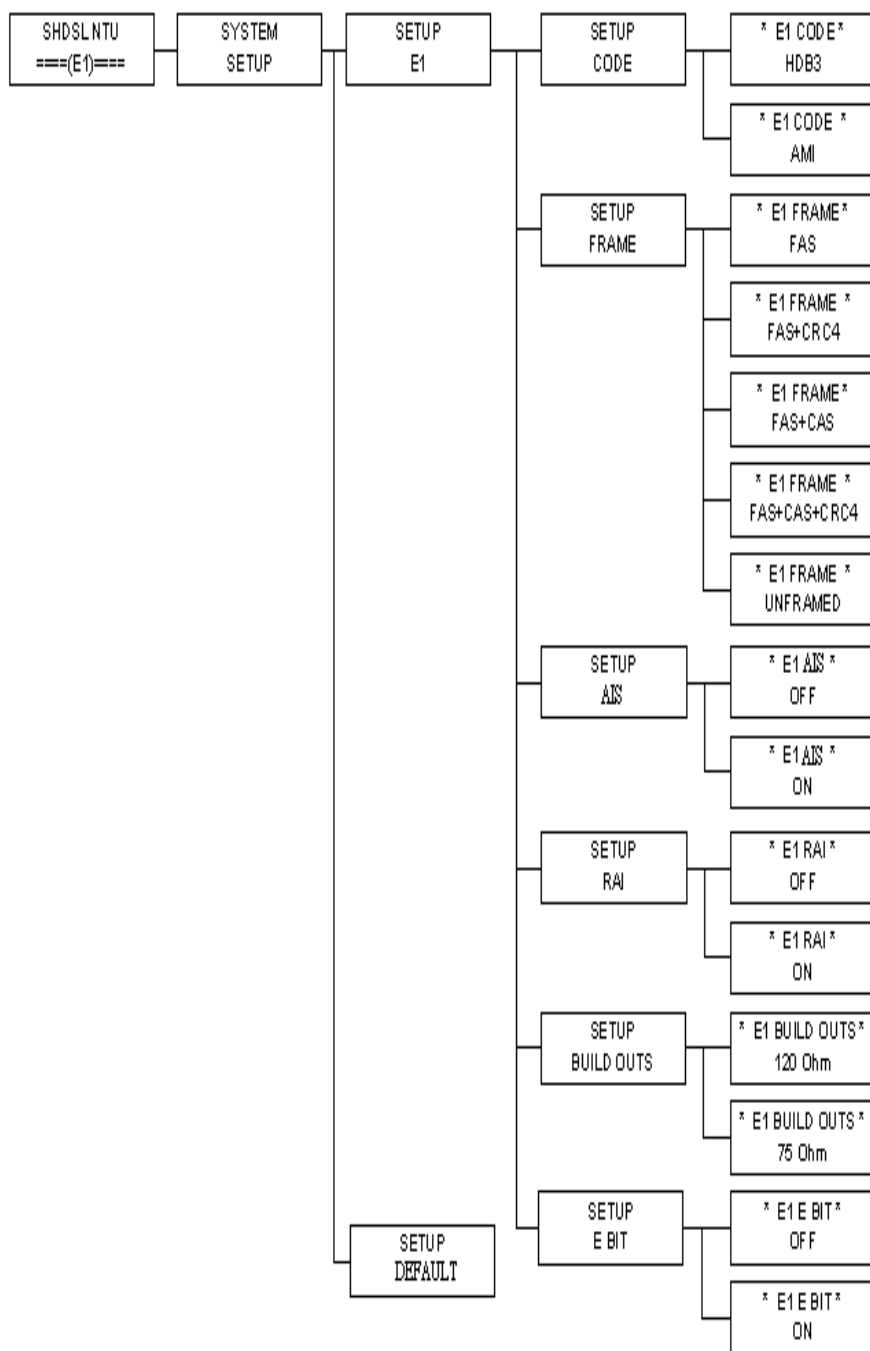
Menu tree for SETUP TYPE and SHDSL

The menu tree of setup type and SHDSL is as follow.



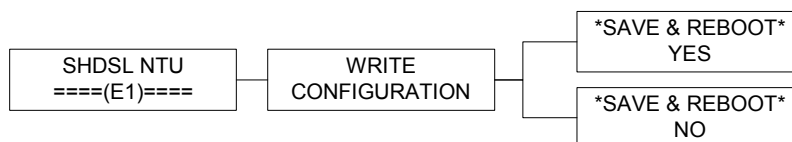
Menu tree for SETUP E1

The route of setup E1 is SHDSL NTU → SYSTEM SETUP → SETUP E1.



Menu tree for SAVE CONFIGURATION

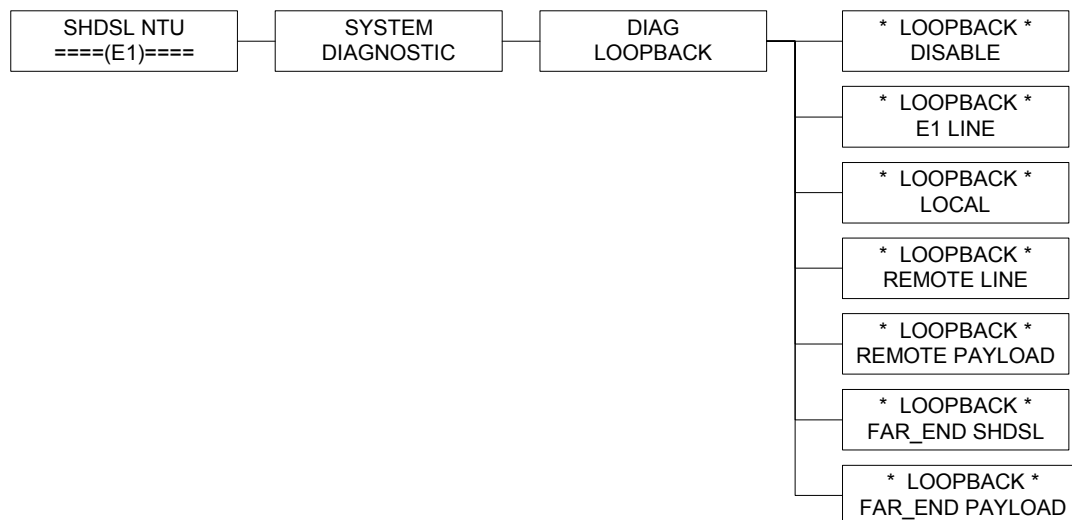
After configuration, the new parameters have to be saved in NVRAM by following the steps. Choose WRITE CONFIGURATION by using **L** or **R** key and press **Enter**.
Choose SAVE & REBOOT YES and then press **Enter**.



Congratulation! The configuration is complete.

Manu tree for DISGNOSTIC

The route for diagnostic is SHDSL NTU → SYSTEM DIAGNOSTIC → DIAG LOOPBACK.



Chapter 5 Configuration with Console Port

This chapter provides information about configuring the product via console port with VT100 terminal.

Note: After you have completed all necessary settings for your SHDSL NTU, make sure to write the new configuration to NVRAM by “write” command and reboot the system for taking effect of new configuration.

5.1 Login Procedure

Check the connectivity of the RS-232 cable from your computer to the console port of Product. Start your terminal access program with VT100 terminal emulation. Configure the serial link with baudrate of 9600, 8 data bits, no parity check, 1 stop bit, and no flow-control, and press the SPACE key until the login screen appears. When you see the login screen, you can logon to the product.

```
User : admin  
Password: *****
```

Note: If you have not set any user profile for the SHDSL NTU, enter the factory default user “admin”. When the system prompts you for a password, type “admin” to enter SHDSL NTU.



```
User: admin  
Password: *****_
```

After you type the password, the SMT displays the main menu.

```

-----
SHDSL NTU
-----
>> setup          Configure system
   status         Show running system status
   show           View system configuration
   write          Update flash configuration
   reboot         Reset and boot system
   diag           Diagnostic utility
   admin          Setup management features
   upgrade        Software upgrade
   exit           Quit system

-----

Command: setup <more...>_
Message:

-----

<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help
  
```

5.2 Window structure

From top to bottom, the window will be divided into four parts:

1. Product name
2. Menu field: Menu tree is prompted on this field. ">>" symbol indicates the cursor place.
3. Configuring field: You will configure the parameters in this field. < **parameters** > indicates the parameters you can choose and < **more...**> indicates that there have submenu in the title.
4. Operation command for help

5.3 System Management Terminal (SMT)

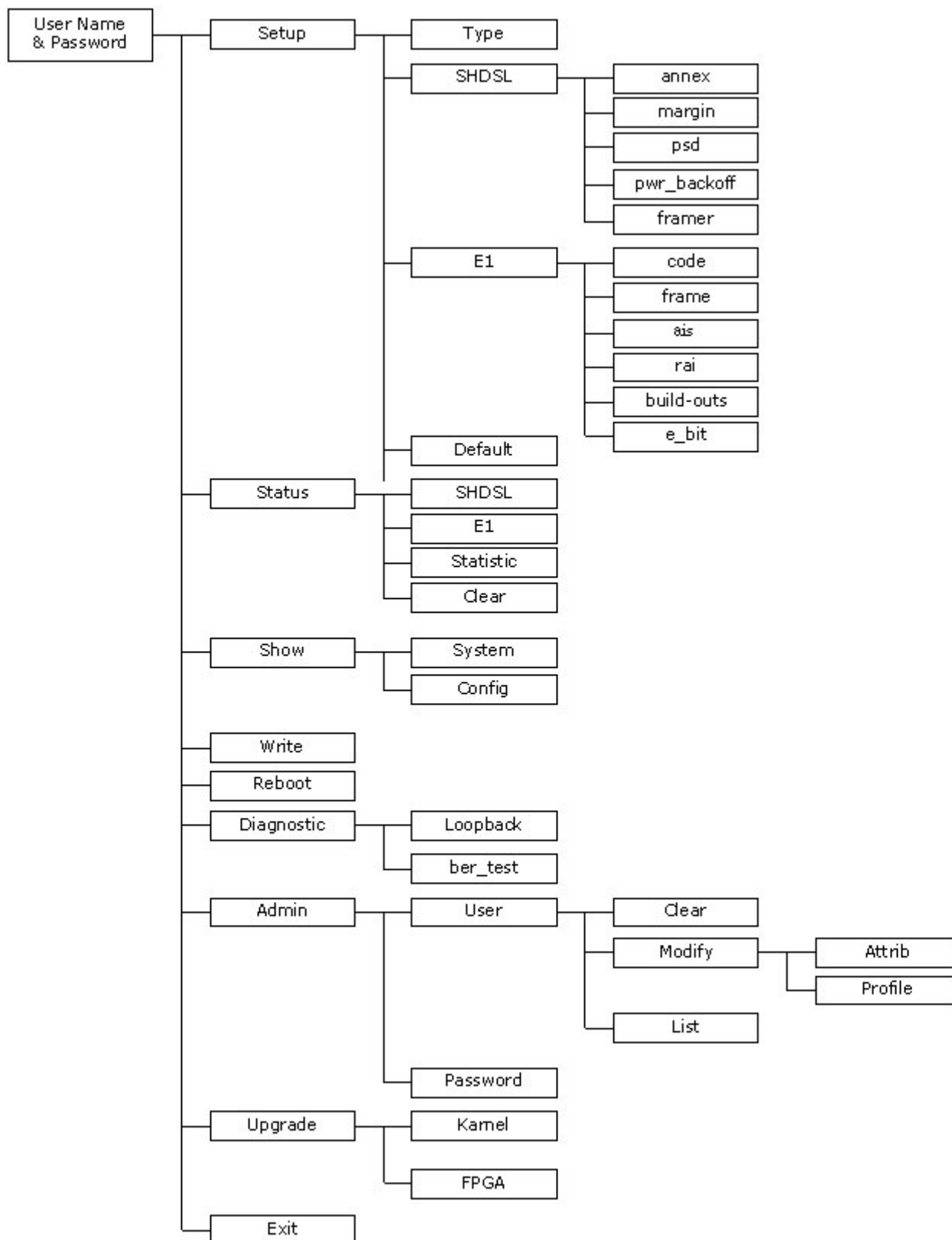
Menu Commands

Before changing the configuration, familiarize yourself with the operations list in the following table. The operation list will be shown on the window.

Keystroke	Description
[UP] or I	Move to above field in the same level menu.
[DOWN] or K	Move to below field in the same lever menu.
[LEFT] or J	Move back to previous menu.
[RIGHT] or L	Move forward to submenu.
[ENTER]	Move forward to submenu.
[TAB]	To choose another parameters.
Ctrl + C	To quit the configuring item.
Ctrl + Q	For help

Navigating the SMT interface

Use the SMT (System Management Terminal) interface to configure the NTU. The following figure is an overview of the menu tree.



5.4 Main Menu Summary

The main menu is prompt as follow.

Manu Title	Function
Setup	Use this menu to setup SHDSL type, SHDSL parameters and E1 parameters or restore factory default setting.
Status	Use this menu to show SHDSL status, E1 status and statistics or clear the statistics
Show	Use this menu to show general information, all configurations and all configurations in command script.
Write	Use this menu to save your configuration.
Reboot	Use this menu to reset and reboot the system
Diag	Use this menu to setup diagnostic utility
Admin	Use this menu to manage user profile and change user password
Upgrade	Use this menu to upgrade kernel and FPGA.
Exit	Use this menu to exit STM

5.5 Changing the password and user profile

The SHDSL NTU comes pre-configured with user profile 1 already established, that is, user “admin” and password “admin” with menu driven interface. The maximum number of user profile is limited to 5 users. You can add, delete and modify the users in Admin menu.

For system security, suggest to change the default user name and password by performing the following steps.

Step 1: Move the cursor to **admin** and press [ENTER] or [RIGHT].

```
-----
  setup      Configure system
  status     Show running system status
  show       View system configuration
  write      Update flash configuration
  reboot     Reset and boot the system
  diag       Diagnostic utility
>> admin    Setup management features
  upgrade    Software upgrade
  exit       Quick system
-----
```

Step 2: Choose **user** and press [ENTER] or [RIGHT].

```
-----
>> user     Manage user profile
  passwd    Change supervisor password
-----
```

Step 3: Move to **modify** and press [ENTER] or [RIGHT].

```
-----
  clear     Clear user profile
>> modify   Modify user profile
  list      List user profile
-----
```

Step 4: The default user name and password is pre-configured in user profile 1. For changing the default setting, type **1** to modify.

```
-----
Command: admin user modify <1~5> <more...>
Message: Please input the following information.
```

```
Legal access user profile number <1~5> : 1
-----
```


Step 5: Move the cursor to **profile** and press [ENTER] or [RIGHT]

```
-----  
  attrib      UI mode  
>> profile   User name and password  
-----
```

Step 6: Type the new user name, old password (admin), new password and retype the new password to confirm. The passwords are prompted as star symbol.

Note: After setting the user name and password, strongly suggest you to save them. In the next time when you login, you have to use the new user name and password.

```
-----  
Command: admin user modify 1 profile <name> <pass-conf>  
Message: Please input the following information.
```

```
Legal user name (Enter for default) <admin>: test  
Input the old Access password: *****  
Input the new Access password: *****  
Re-type Access password: *****  
-----
```

There are two UI modes, command mode and menu mode, used for setting the product. User can determine one kind for configuration the product in the **attrib** command.

```
-----  
>> attrib      UI mode  
  profile   User name and password  
-----
```

```
-----  
Command: admin user modify 1 attrib <Command|Menu>  
Message: Please input the following information.
```

```
User interface (Tab select) <Menu>: Menu  
-----
```

5.6 Configuration the SHDSL NTU

This section provides information about configuration the SHDSL NTU. Follow the procedures:

In main menu, select **setup** and press [ENTER] or [RIGHT]

```
-----  
>> setup      Configure system  
  status      Show running system status  
  show        View system configuration  
  write       Update flash configuration  
  reboot      Reset and boot the system  
  diag        Diagnostic utility  
  admin       Setup management features  
  upgrade     Software upgrade  
  exit        Quick system  
-----
```

The screen will prompt as follow

```
-----  
>> type       Configure shdsl type  
  shdsl       Configure shdsl parameters  
  e1          Setup e1 parameters  
  default     Restore factory default setting  
-----
```

Configure SHDSL type

This section will introduce the configuring of SHDSL type: STU-R, STU-C-INTCLK, STU-C-EXTCLK. The default operation type is STU-R.

Select **type** and press [ENTER] or [RIGHT] to setup SHDSL type. Press [TAB] to select the operating type and press enter to finish setting.

```
-----  
>> type      Configure shdsl type  
    shdsl    Configure shdsl parameters  
    serial   Setup serial parameters  
    default  Restore factory default setting
```

```
-----  
Command: setup type <STU-R, STU-C-INTCLK, STU-C-EXTCLK>  
Message: Please input the following information.
```

```
SHDSL operation type (TAB Select) <STU-R>: STU-C-INTCLK
```

```
-----
```

INTCLK: The device will generate the appropriate clock speed defined by the speed setting of the interface.

EXTCLK: The device will accept the clock from the interface and will use that clock to receive and transmit data across the interface.

Most applications use Internal Clock. If the DTE provides a clock with TX data, the clock can set to be External Clock.

Configure SHDSL parameters

This section provide to setup SHDSL parameters: Annex type, margin, psd, wetting current, power backoff and framer.

Select SHDSL and press [ENTER] or [RIGHT].

```
-----  
type          Configure shdsl type  
>> shdsl      Configure shdsl parameters  
e1            Setup e1 parameters  
default       Restore factory default setting  
-----
```

For setting the SHDSL Annex type, move the cursor to **annex** and press [ENTER].
Select the annex type by using [TAB] key.

```
-----  
>> annex          Configure shdsl annex  
margin            Configure shdsl margin  
psd               Configure shdsl psd  
pwr_backoff      Configure power backoff  
framer           Configure shdsl framer  
-----
```

```
-----  
Command: setup shdsl annex <Annex_A|Annex_B>  
Message: Please input the following information.
```

```
Annex Type (TAB Select) <Annex_A>: Annex_B  
-----
```

For setting SHDSL Margin, move the cursor to **margin** and press [ENTER]. Select the Stratup margin via [TAB] key and key in the Next margin.

```
-----  
>> annex          Configure shdsl annex  
margin            Configure shdsl margin  
psd               Configure shdsl psd  
pwr_backoff      Configure power backoff  
framer           Configure shdsl framer  
-----
```

```
-----  
Command: setup shdsl margin <0~10|Disable>  
Message: Please input the following information.
```

```
Set Startup Margin (TAB Select)<0~10>: Disable  
-----
```

SNR margin is an index of line connection. You can see the actual SNR margin in STATUS SHDSL. The larger SNR margin, the better line connection. If you set SNR margin in the field as 2, the SHDSL connection will drop and reconnect when the

SNR margin is lower than 2.

For configuring SHDSL PSD, move the cursor to **psd** and press [ENTER]. Select the parameter via [TAB] key.

```
-----
annex          Configure shdsl annex
margin         Configure shdsl margin
>> psd         Configure shdsl psd
pwr_backoff    Configure power backoff
framer         Configure shdsl framer
-----
```

```
Command: setup shdsl psd <r1_asym|r2_asym|sym_enable|asym_disable>
Message: Please input the following information.
```

```
SHDSL PSD (TAB Select) <r1_asym>: r2_asym
-----
```

The SHDSL PSD will enable the transceiver to use an asymmetric power spectral density, as specified in the G.991.2 standard.

Possible values for PSD are:

- r1_asym: 786kbps for Annex A, 2312kbps for Annex B
- r2_asym: 1552kbps for Annex A, 2056kbps for Annex B
- sym_enable: Symmetric and Asymmetric enable.
- asym_disable: Symmetric enable but asymmetric disable.

For configuring power backoff, move the cursor to **pwr_backoff** and press [ENTER]. Select enable or disable via [TAB] key.

```
-----
annex          Configure shdsl annex
margin         Configure shdsl margin
psd            Configure shdsl psd
>> pwr_backoff Configure power backoff
framer         Configure shdsl framer
-----
```

```
Command: setup shdsl pwr_backoff <enable|disable>
Message: Please input the following information.
```

```
SHDSL Power Backoff (TAB Select) <disable>: enable
-----
```

The power backoff of SHDSL is a transmit power negotiation mechanism applied between STU-C and STU-R to limit the power transmitted on the SHDSL line to the minimum necessary for a clear signal to be received at the STU-C.

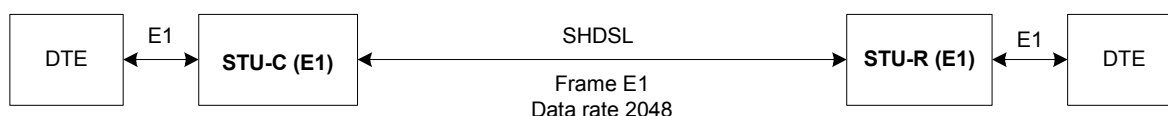
For configuring framer, move the cursor to **framer** and press [ENTER]. Select the parameters via [TAB] key.

```
-----
annex          Configure shdsl annex
margin         Configure shdsl margin
psd           Configure shdsl psd
pwr_backoff   Configure power backoff
>> framer     Configure shdsl framer
-----
```

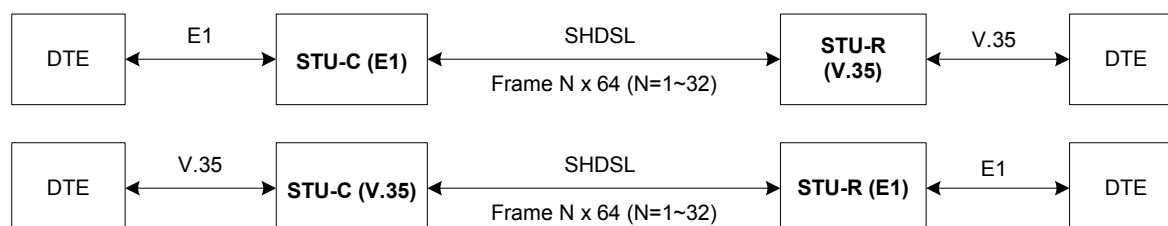
```
Command: setup shdsl framer <e1|Nx64k> <1~32> <1~31>
Message: Please input the following information.
```

```
SHDSL Framer (TAB Select) <E1>: Nx64k
Set Time Slot Number (Enter for default) <0>: 8
Set First Time Slot (Enter for default) <1>: 1
-----
```

Though ITU 991.2 (SHDSL) supports data rate of 2304kbps, G.703 (E1) only supports data rate of 2048kbps so the maximum data rate of SHDSL line, connected with E1 DCEs, depends on data rate of E1, 2048kbps. There are two types of frames on SHDSL line, E1 and N x 64k. E1 frame only use for connection with E1 DCEs.



If the connection is E1 vs V.35 or V.35 vs E1, the frame has to be used N x 64k. In this case, the data rate depends on value of N. Same as above case, SHDSL and V35 can support 2304kbps data rate (36 x 64k) but E1 supports maximum data rate of 2048kbps (32 x 64k).

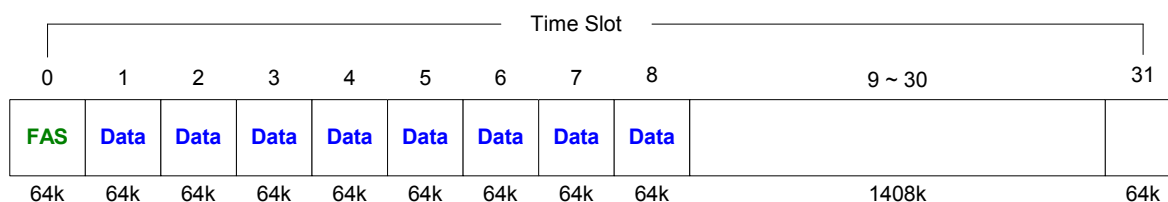


Time slot, N value, is place of data in the frame. Time Slot Number 1~31 (N=1~31) is Fractional E1 and Time Slot Number 32 (N=32) is unframed.

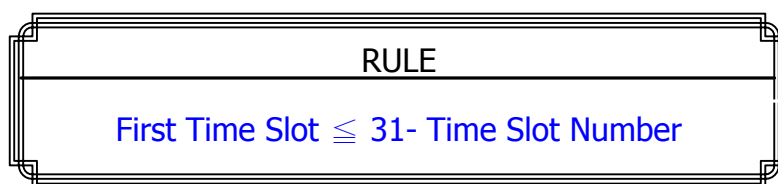
Fractional E1

For fractional E1, FE1, the data rate is from 64k, N=1, to 1984k, N=31, according to

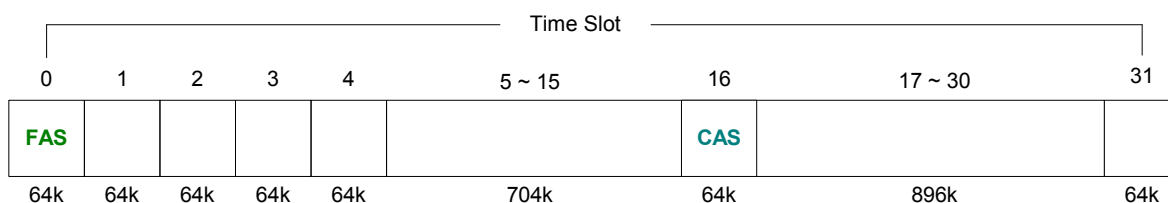
the E1 frame. If the E1 frame is FAS or FAS+CRC4, there are 1~31 available time slot for use data. If the data rate of SHDSL line set to be 512k, the time slot number is 8 and first time slot number is 1. The frame is shown as below.



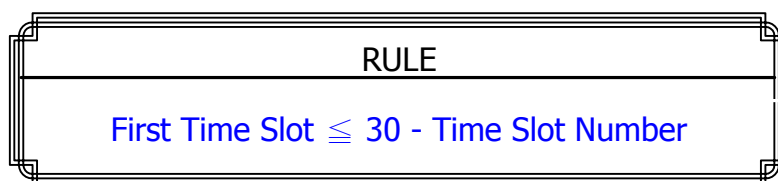
The First Time Slot setting of FAS and FAS+ CRC4 have to follow the rule:



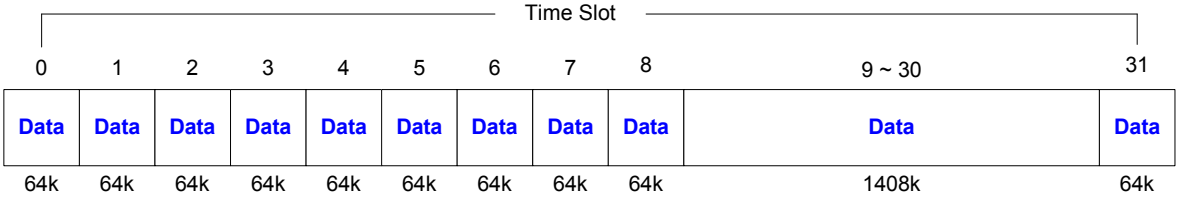
Using E1 frame of FAS+CAS or FAS+CAS+CRC4, the FAS will occupy Time Slot 0 and CAS Time Slot 16. There are only 30 Time Slot left for data. On the other hand, the data rate is 1920kbps.



The First Time Slot setting of FAS+CAS and FAS+CAS+CRC4 have to follow the rule:



Unframed E1



Configure E1 parameters

This section introduce the setting of E1 code, frame, rai, built out and e_bit. Select E1 and press [ENTER] or [RIGHT].

```
-----
type          Configure shdsl type
shdsl         Configure shdsl parameters
>> e1         Setup e1 parameters
default       Restore factory default setting
-----
```

```
-----
>> code       Configure e1 code
frame        Configure e1 frame
ais          Configure e1 ais
rai          Configure e1 rai
build_outs   Configure e1 build outs
e_bit        Configure e1 e_bit
-----
```

For configuring code, move the cursor to **code** and press [ENTER]. Select the parameter via [TAB] key.

```
-----
>> code       Configure e1 code
frame        Configure e1 frame
ais          Configure e1 ais
rai          Configure e1 rai
build_outs   Configure e1 build outs
e_bit        Configure e1 e_bit
-----
```

Command: setup e1 code <AMI|HDB3>

Message: Please input the following information.

SHDSL E1 code (TAB Select) <HDB3>: **HDB3**

HDB3 In this line coding, the transmitter substitutes a deliberate bipolar violation when excessive zeros in the data stream are detected. The receiver recognizes these special violations and decodes them as zeros. This method enables the network to minimum pulse density requirements. Unless AMI is required for your application, HDB3 should be used whenever possible.

AMI Alternate Mark Inversion defines a pulses as a “mark,” a binary one as, as opposed to a zero. In an E1 network connection, signals are transmitted as a sequence of one and zero. One is sent as pulse, and zero is sent as spaces, i.e. no pulse. Every other pulse is inverted from the previous pulse in polarity, so that the signal can be effectively transmitted. This means, however, that a long sequence of zero in data stream will cause problems, since the NTU receiving the signal relies on the signal to recover the 2048kbps clock.

For configuring frame, move the cursor to **frame** and press [ENTER]. Select the parameter via [TAB] key.

```
code          Configure e1 code
>> frame      Configure e1 frame
ais          Configure e1 ais
rai          Configure e1 rai
build_outs   Configure e1 build outs
e_bit        Configure e1 e_bit
-----
```

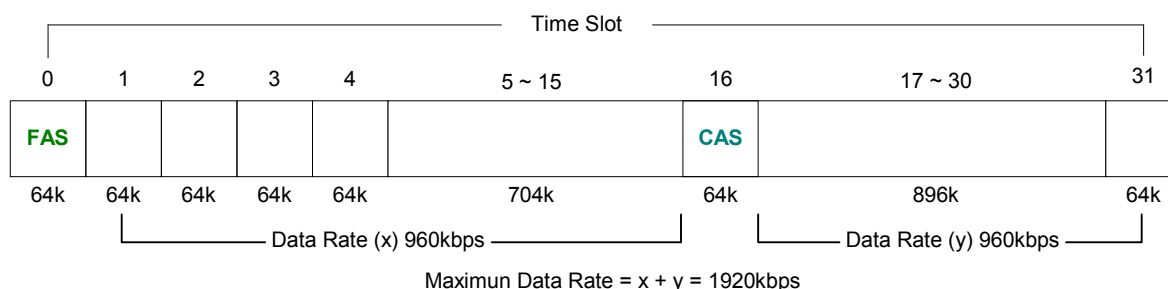
```
Command: setup e1 frame <FAS|FAS+CRC4|FAS+CAS|FAS+CRC4+CAS|UNFRAMED>
Message: Please input the following information.
```

```
SHDSL E1 frame (TAB Select) <fas+crc4+cas>: unframed
-----
```

FAS Frame Alignment Signal use 7-bit pattern to establish and maintain frame synchronization. The FAS word is located in timeslot 0 of frame. In FAS mode there are 1~31 timeslot available for use data.



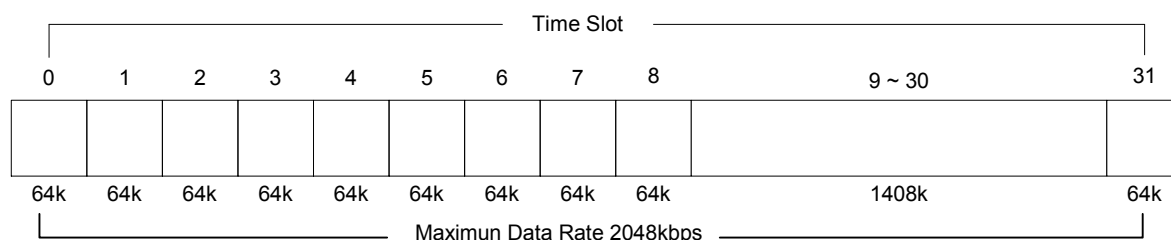
CAS Also known as time slot 16 multiframe. It requires a multiframe alignment signal to be present for frame sync. The Multiframe Alignment Signal (MFAS) is inserted into the 16th timeslot of frame 0 of the 16-frame multiframe. In CAS mode, there are 30 channels available for user data. If timeslot 16 is included in the unit's mapping, it will be disregarded.



CRC4 The CRC-4 checksum bits are transmitted in the outgoing E1 data stream. Also the received signal is checked for errors. CRC-4 checksum cannot be sent in unframed mode.

Unframed In this mode, user data is inserted into all 32 channels (64k x 32 =

2048k) of the E1 stream. The object of running without framing is to utilize the full bandwidth of the E1 line.



For configuring RAI, move the cursor to **rai** and press [ENTER]. Select the parameter via [TAB] key.

```

-----
code          Configure e1 code
frame        Configure e1 frame
>> ais       Configure e1 ais
rai          Configure e1 rai
build_outs   Configure e1 build outs
e_bit        Configure e1 e_bit
-----

```

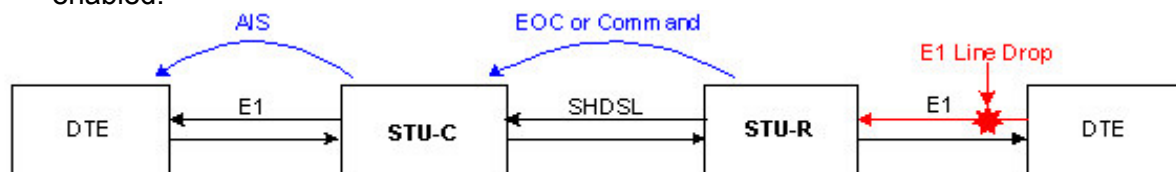
Command: setup e1 ais <enable|disable>

Message: Please input the following information.

SHDSL E1 ais (TAB Select) <disable>: **enable**

AIS (Alarm Indication Signal) is a signal which transmit automatically when E1 line drop.

- For example 1: When STU-R E1 RX line is drop, STU-R sends the status to STU-C via EOC or command, and then STU-C will send AIS (Alarm Indication Signal) to DTE while AIS function is enabled.



- For example 2: When SHDSL connection drops, STU-R and STU-C both send AIS (Alarm Indication Signal) to DTE in the same time while AIS function is enabled.

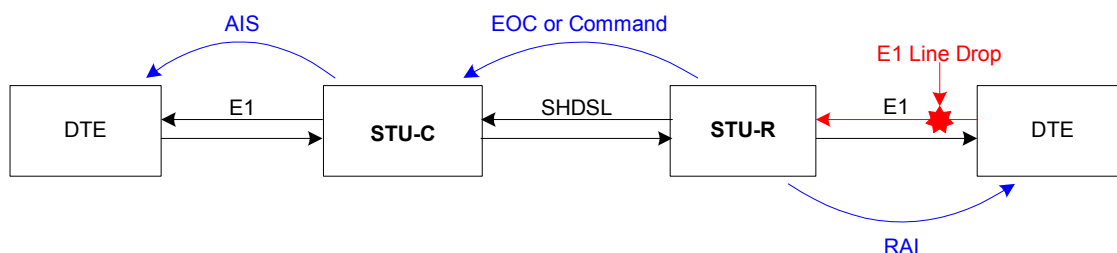


```
-----
code          Configure e1 code
frame         Configure e1 frame
ais           Configure e1 ais
>> rai        Configure e1 rai
build_outs    Configure e1 build outs
e_bit         Configure e1 e_bit
-----
```

Command: setup e1 rai <enable|disable>
Message: Please input the following information.

SHDSL E1 rai (TAB Select) <disable>: **enable**

Remote Alarm Indication (RAI) is a signal which transmit automatically when E1 line drops. For example: When STU-R E1 RX line is drop, STU-R will send the status to STU-C via EOC or command. In the same time it will send RAI to DTE. STU-C will send AIS (Alarm Indication Signal) to DTE if AIS function is enable.



For configuring build outs, move the cursor to **built_outs** and press [ENTER]. Select the parameter via [TAB] key.

```
-----
code          Configure e1 code
frame         Configure e1 frame
ais           Configure e1 ais
rai           Configure e1 rai
>> build_outs Configure e1 build outs
e_bit         Configure e1 e_bit
-----
```

Command: setup e1 built_outs <120_Ohm|75_Ohm>
Message: Please input the following information.

SHDSL E1 built_outs (TAB Select) <120_Ohm>: **75_Ohm**

For configuring e_bit, move the cursor to **e_bit** and press [ENTER]. Select the parameter via [TAB] key.

```
-----  
code          Configure e1 code  
frame         Configure e1 frame  
ais           Configure e1 ais  
rai           Configure e1 rai  
build_outs    Configure e1 build outs  
>> e_bit      Configure e1 e_bit  
-----
```

```
Command: setup e1 e_bit <enable|disable>  
Message: Please input the following information.
```

```
SHDSL E1 e_bit (TAB Select) <disable>: enable  
-----
```

Restore factory default

If you want to restore factory default setting in setup, select **default** and press [ENTER] or [RIGHT].

```
-----  
type      Configure shdsl type  
shdsl     Configure shdsl parameters  
e1        Setup e1 parameters  
>> default Restore factory default setting  
-----
```

```
-----  
Command: setup default
```

```
Message: Please input the following information.
```

```
Are you sure? (y/n): y  
-----
```

If you enter “y” the setup field will be automatically configured to factory default setting.

5.7 Write the setup parameters

After configuration, write the new configured parameters into NVRAM and reboot the SHDSL NTU to work with new parameters. Follow the procedure;

Step 1: In main menu, move the cursor to **write** and press [ENTER].

```
-----  
  setup      Configure system  
  status     Show running system status  
  show       View system configuration  
>> write     Update flash configuration  
  reboot     Reset and boot the system  
  diag       Diagnostic utility  
  admin      Setup management features  
  upgrade    Software upgrade  
  exit       Quick system  
-----
```

Step 2: Type “y” to write the new parameters

```
-----  
Command: write <CR>  
Message: Please input the following information.  
  
Are you sure? (y/n): y  
-----
```

5.8 Reboot the SHDSL NTU

To work the SHDSL NTU with new parameters, you have to reboot it after writing the parameters into NVRAM. Follow the procedure;

Step 1: In main menu, move the cursor to **reboot** and press [ENTER].

```
-----  
setup      Configure system  
status     Show running system status  
show       View system configuration  
write      Update flash configuration  
>> reboot  Reset and boot the system  
diag       Diagnostic utility  
admin      Setup management features  
upgrade    Software upgrade  
exit       Quick system  
-----
```

Step 2: Type "y" to reboot the SHDSL NTU.

```
-----  
Command: reboot <CR>  
Message: Please input the following information.  
  
Do you want to reboot? (y/n): y  
-----
```


5.9 View the system status

You can use the **status** command to view the status of SHDSL, E1 as well as statistic and clear the statistic log. Select **status** and press [ENTER].

```
-----  
  setup      Configure system  
>> status    Show running system status  
  show       View system configuration  
  write      Update flash configuration  
  reboot     Reset and boot the system  
  diag       Diagnostic utility  
  admin      Setup management features  
  upgrade    Software upgrade  
  exit       Quick system  
-----
```

Select **SHDSL** command to show the status of SHDSL.

```
-----  
>> shdsl     Show shdsl status  
  e1         Show e1 status  
  statistic  Show statistic  
  clear      Clear statistic  
-----
```

Select **e1** command to show the status of E1.

```
-----  
  shdsl     Show shdsl status  
>> e1       Show e1 status  
  statistic Show statistic  
  clear     Clear statistic  
-----
```

Select **statistic** command to show the statistic information in 15 minutes or 24 hour via [TAB] to choose.

```
-----  
  shdsl     Show shdsl status  
  e1        Show e1 status  
>> statistic Show statistic  
  clear     Clear statistic  
-----
```

```
-----  
Command: status statistic <15m|24h>  
Message: Please input the following information.
```

```
SHDSL Statistic (TAB Select): 15m  
-----
```

To clear the statistic log file, select **clear** and press [ENTER].

```
-----  
shdsl      Show shdsl status  
e1         Show e1 status  
statistic  Show statistic  
>> clear   Clear statistic  
-----
```

5.10 View System Configuration

By using show command, you can view the system configuring. Select **show** and press [ENTER] or [RIGHT].

```
setup      Configure system
status     Show running system status
>> show    View system configuration
write      Update flash configuration
reboot     Reset and boot the system
diag       Diagnostic utility
admin      Setup management features
upgrade    Software upgrade
exit       Quick system
```

To show system information, select **system** and press [ENTER] or [RIGHT]. The screen will prompt the system information.

```
>> system   Show general information
script      Show all configuration in command script
```

To show the system configuration, select **script** and press [ENTER] or [RIGHT]. The screen will prompt the configuration in script type.

```
system      Show general information
>> script    Show all configuration in command script
```

5.11 Upgrade the SHDSL NTU

This section will introduce how to upgrade the kernel and FPGA of SHDSL NTU. Select **upgrade** in main menu and press [ENTER] or [RIGHT].

```
-----  
setup      Configure system  
status     Show running system status  
show       View system configuration  
write      Update flash configuration  
reboot     Reset and boot the system  
diag       Diagnostic utility  
admin      Setup management features  
>> upgrade Software upgrade  
exit       Quick system  
-----
```

Before upgrading the NTU you must have the main software or FPGA code in your computer.

If you want to upgrade the kernel:

1. Select **kernel** and press [ENTER] or [RIGHT].

```
-----  
>> kernel  Upgrade main software  
   FPGA    Upgrade FPGA code  
-----
```

2. Confirm the process via pressing “y”

```
-----  
Command: upgrade kernel <CR>  
Message: Please input the following information.  
  
Are you sure (y/n)?: (Note: this will erase flash) y  
-----
```

3. After entering “y”, the SMT will show

```
-----  
Utility running window...  
Starting XModem download...CCC  
-----
```

4. Click Send file in terminal access program, hyper terminal, to send the file.
5. Select the source file in window and press OK.

6. After upgrading the product, press “y” to write in flash.

If you want to upgrade the FPGA code:

1. Select **FPGA** and press [ENTER] or [RIGHT].

```
-----  
kernel      Upgrade main software  
>> FPGA     Upgrade FPGA code  
-----
```

```
-----  
Command: upgrade FPGA <CR>
```

```
Message: Please input the following information.
```

```
Are you sure (y/n)?: (Note: this will erase flash) y  
-----
```

2. After entering “y”, the SMT will show

```
-----  
Utility running window...  
Starting XModem download...CCC  
-----
```

3. Click Send file in terminal access program, hyper terminal, to send the file.

4. Select the source file in window and press OK.

5. After upgrading the product, press “y” to write in flash.

5.12 Diagnostic

The diagnostic facility allows you to test the different aspects of your SHDSL NTU to determine if it is working properly. Select **diag** and press [ENTER] or [RIGHT].

```

-----
  setup      Configure system
  status     Show running system status
  show       View system configuration
  write      Update flash configuration
  reboot     Reset and boot the system
>> diag     Diagnostic utility
  admin      Setup management features
  upgrade    Software upgrade
  exit       Quick system
-----
  
```

Loopback can test whether the NTU is properly worked with the connection device. Press [ENTER] or [RIGHT] to setup the loopback.

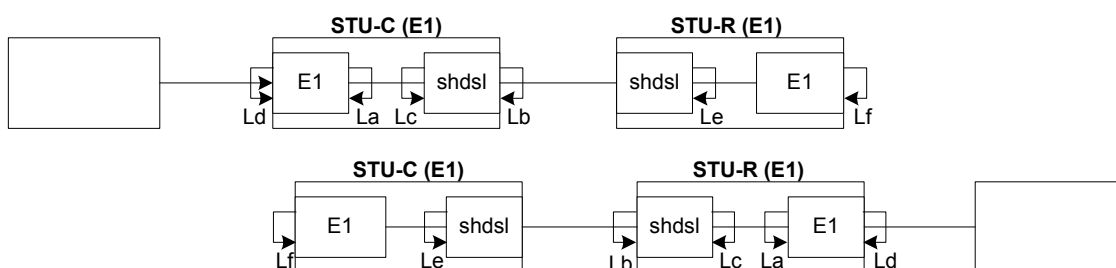
```

-----
>> loopback Loopback
   ber_test  Ber_test
-----
  
```

Command: loopback <...local|remote_line|remote_payload|Farend_line|Farend_payload>
 Message: Please input the following information.

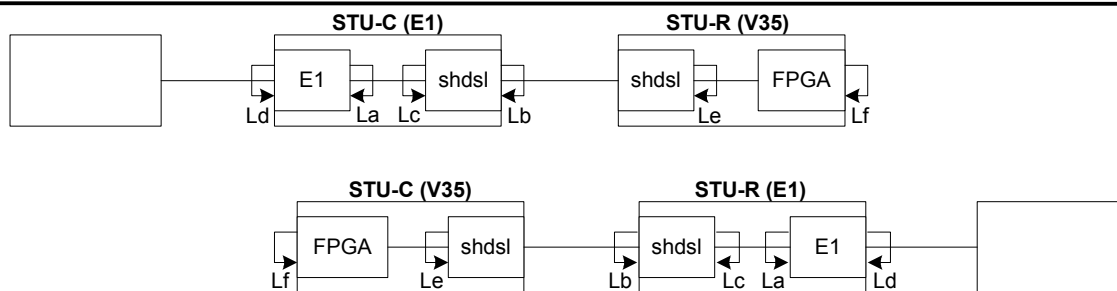
SHDSL Loopback Type (TAB Select) <disable>: **e1_line**

Loopback Define E1 vs E1



E1_Line	La
Local	Lb
Remote Line	Lc
Remote Payload	Ld
Far End Line	Le
Far End Payload	Lf

Loopback Define Fractional E1 vs V35



E1_Line	La
Local	Lb
Remote Line	Lc
Remote Payload	Ld
Far End Line	Le
Far End Payload	Lf

The product supports Bit Error Rate Testing (BERT). To configure the BERT, move the cursor to `ber_test` and press enter.

```
-----
loopback Loopback
>> ber_test Ber_test
-----
```

```
Command: diag ber_test <disable|2047|resync>
Message: Please input the following information.
```

```
SHDSL Ber_test Type (TAB Select) <disable>: 2047
-----
```

5.13 Exit SMT

For exiting SMT without saving any configuration, you can use **exit** command to exit the SMT. Select **exit** and press [ENTER] or [RIGHT].

```
-----  
setup      Configure system  
status     Show running system status  
show       View system configuration  
write      Update flash configuration  
reboot     Reset and boot the system  
diag       Diagnostic utility  
admin      Setup management features  
upgrade    Software upgrade  
>> exit    Quick system  
-----
```

```
-----  
Command: exit <CR>
```

```
Message: Please input the following information.
```

```
Do you want to disconnect? (y/n) : y  
-----
```

After press [ENTER], the SMT will be disconnected.

Appendix I

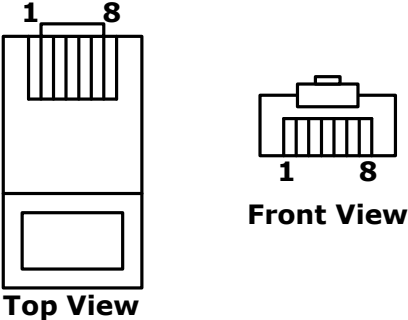
AMI	Alternate mark inversion
B8ZS	Bipolar 8 zero substitution
CAS	Also known as timeslot 16 multiframing, requires a multiframe alignment signal to represent for frame sync.
CRC4	Cyclic redundancy check 4 bit
E BIT GEN	Remote End Block Error Bit generation
EOC	Embedded operations channel
ES	Number of Error second (Errors/Second)
ESF	Extended super frame
FAS	Frame alignment signal
LINE BUILD OUTS	Cable used between NTU and Router or PABX
LOSW	Loss of synchronization word
PSD	Power spectral density
AIS	Alarm Indication Signal
RAI	Remote alarm indication
R1 ASYM	Symmetric speed, 784kbps for Annex A or 2312kbps for Annex B
R2 ASYM	Symmetric speed, 1552kbps for Annex A or 2056kbps for Annex B
SES	Number of Severely error seconds (more than 832 CRC errors / second. Approximately equivalent to a bit error rate of 1×10^{-3}).
SF	Super Frame
SNR MARGIN	Signal to noise ration margin
SYNC	Synchronization
TX POWER	Transmission power
UAS	Number of Unavailable second (10 or more consecutive seconds.)

Appendix II

Connector Architecture

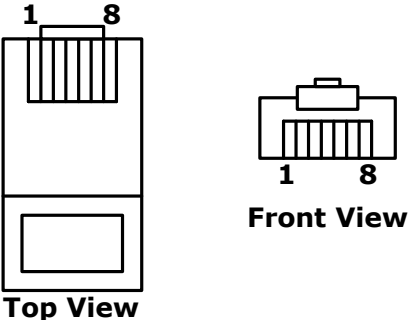
Console Connector (RJ-45)

The Console Port interface is a 8 position Modular Jack. The table below displays the pin out assignments.

Pin Number	Description	Figure
1	No connection	 <p style="text-align: center;">Top View</p> <p style="text-align: center;">Front View</p>
2	No connection	
3	No connection	
4	GND	
5	RC	
6	TD	
7	No connection	
8	No connection	

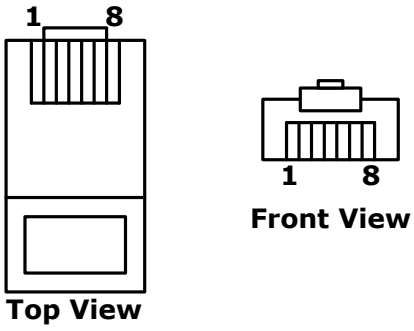
G.703 120Ω Connector (RJ-45)

The 120Ω E1 Port interface is a 8 position modular jack, the following table displays the pin out assignments.

Pin Number	Description	Figure
1	E1 interface receive pair-ring	 <p style="text-align: center;">Top View</p> <p style="text-align: center;">Front View</p>
2	E1 interface receive pair-tip	
3	No connection	
4	E1 interface transmit pair-ring	
5	E1 interface transmit pair-tip	
6	No connection	
7	No connection	
8	No connection	

SHDSL Interface Pin Assignments (RJ-45)

The SHDSL interface is standard eight-pin modular jack. The table below displays the pin out assignments.

Pin Number	Description	Figure
1	No connection	
2	No connection	
3	No connection	
4	ANALOG Input/Output	
5	ANALOG Input/Output	
6	No connection	
7	No connection	
8	No connection	

Appendix III

Cable Connection

DB9 vs. RJ45 Cable (Console)

