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CoBox

Universal Thin Server

Installation Guide

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WARRANTY AND DECLARATIONS

1 Introduction

The CoBox Universal Thin Server (UTS) is designed to connect peripherals with a serial interface to an Ethernet or Token Ring network using the TCP/IP protocol family (TCP for transparent stream- and UDP for datagram applications). Various peripherals can be interfaced, for example:

- **terminals**
- **time/attendance and data collection devices**
- **CNC controllers**
- **industrial robots**
- **data display units**
- **instruments**
- **printers**
- **modems**

Depending on the model used, UTS's have different network interfaces to connect peripherals.

The UTS connects peripherals through a transparent TCP data channel or a Telnet connection to computers or another UTS. Datagrams (protocol blocks) can be sent by UDP. The network interface speed is 10-Mbit for Ethernet models and 4- or 16-Mbit for Token Ring versions.

2 UTS Interfaces

Depending on the model, the UTS supports different peripheral device interface connections with different network topologies:

2.1 Serial Interface

2.1.1 UTS, Ethernet and Token Ring:

1 x RS-232/RS-422 DB25 female (channel 1), software selectable, including RS-485 2 and 4-wire support, up to 115kBaud. 1 x RS 232 interface DB9 male (channel 2), up to 115k Baud.

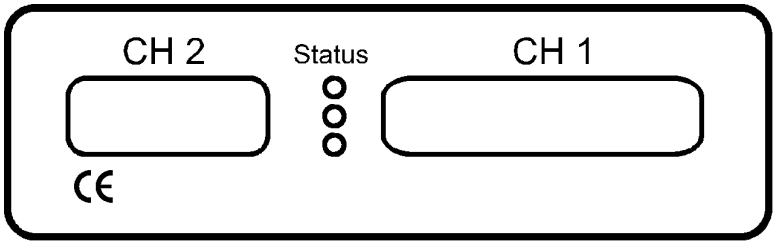


Figure 2-1

2.2 Network Interface

Ethernet models support 10Mbit; Token Ring models support 4 and 16Mbit network speed, switch or jumper selectable. Token Ring Source Bridge routing and administered address is fully supported.

2.3 Hardware Address

2.3.1 Network Hardware Address

The hardware address of the UTS can be calculated from the serial number and type:

First three bytes are fixed, and read 00-20-4A
Fourth byte is the type of the unit:

- 02 for UTS Ethernet
- 08 for all Token Ring models

Fifth and sixth bytes are the serial number in hex notation.

Depending on the model, UTS supports different physical network interfaces. The following list gives model-specific information:

2.3.2 UTS Ethernet

10BaseT (RJ-45 Connector) and
AUI (SubD15 Connector) for external transceiver connections.

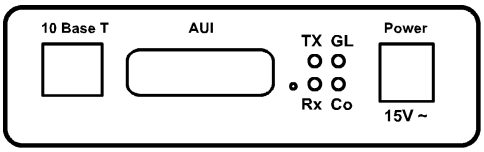


Figure 2-2

2.3.3 UTS Token Ring

STP and UTP interfaces (SubD9 and RJ-45)
Ring speed (4/16Mbit) switch selectable from outside of UTS.

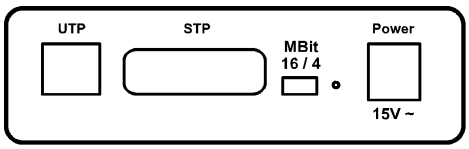


Figure 2-3

2.4 Power Supply

Depending on the model, the UTS has different power supply needs. In Europe (230VAC) and USA (110VAC), the UTS external models are shipped with an AC power adapter. Power consumption varies with connected transceivers, phantom current, etc. Typically, the Ethernet version consumes around 250mA with the 10BaseT interface activated, while the Token Ring version needs approximately 400mA at 15V (including the phantom drive).

3 Network Protocols

The UTS family uses TCP/IP protocols for network communication. The supported standards are: ARP, UDP, TCP, ICMP, Telnet, TFTP and SNMP. For transparent connections, TCP/IP (binary stream) or Telnet protocols are used. Firmware updates can be done with the TFTP protocol.

The IP protocol defines addressing, routing and data block handling over the network. The TCP (transmission control protocol) assures that no data is lost or duplicated, and that everything sent into the connection on one side arrives at the target exactly as it was sent.

For typical datagram applications where devices interact with others without maintaining a point to point connection, UDP is used (customer specific versions and “Datagram” mode).

3.1 Packing Algorithm

The two available packet algorithms (which define how and when packets are sent to the network) are software selectable on a per-channel base. The standard algorithm is optimized for applications where UTS is used in a local environment, allowing for very small delays for single characters while trying to keep the packet count low. The alternate packing algorithm minimizes the packet count on the network, and is especially useful for applications in routed Wide Area Networks. Various parameters can be set in this mode to economize the serial data stream.

3.2 Channel Identification

The UTS has one IP Address. The port number selects the specific channel, which must be unique.

3.3 IP Address

Every device connected to the TCP/IP network must have a unique IP address. This IP address is used to reference the specific device, for example to build a connection to a serial port. See Appendix B for a complete description of IP Addressing.

3.4 Port Number

Every TCP connection and every UDP datagram is defined by the two peer IP addresses, which are source and destination port number. These port numbers are necessary to address different applications or channels on a network host. The port number can be compared to an extension on a PBX system.

A Telnet application (login to a host with an ASCII terminal) is commonly assigned TCP port number 23. More than one Telnet connection can be established to one host to the Telnet port; however, the other peer IP address/port number combination must be different.

In the UTS, a different port number for each channel must be configured. The UTS uses this port number as the source port in outgoing messages and receives connections or UDP datagrams, which are addressed to this number. Port 9999 (decimal) is used for remote configuration.

4 Configuration

The UTS can be configured by various remote or local methods. Either use an ASCII terminal or terminal emulation to locally access the first serial port or use a Telnet connection to configure the unit over the network.

The UTS configuration is stored in nonvolatile memory and is retained without AC power. The configuration can be changed any time. The UTS performs a reset after the configuration has been changed and stored.

4.1 Network Configuration

To configure over the network, a Telnet connection to port 9999 must be established.

4.2 Factory IP Address

The UTS serial servers are shipped with the following default IP addresses:

Factory IP Address	UTS Type
194.039.078.254	Ethernet External Version
194.039.079.254	Token Ring External Version
194.039.078.253	Ethernet Mini Version
194.039.079.253	Token Ring Mini Version

Figure 4-1

4.3 Initial IP Address Setting

If the IP Address of the UTS is unknown or undefined, the following sets a temporary IP address:

a) Set a static ARP with the desired IP address using the hardware address of the UTS, which is printed on the product label. This address can also be calculated from the serial number (see Hardware Address). Below is the command example for WinNT/Win95, using the DOS prompt, when the hardware address of the UTS is 00-20-4A-02-64-0B.

NOTE: *In order for the ARP command to work in Windows, the ARP table on the PC must have at least one IP address defined other than its own. Type "ARP –A" at the DOS command prompt to verify that there is at least one entry in the ARP table. If there is no other entry beside the local machine, ping another IP machine on your network to build the ARP table. This has to be a host other than the machine on which you are working. Once there is at least one entry in the ARP table, use the following commands to ARP an IP address to the UTS.*

arp -s 191.12.3.77 00-20-4A-02-64-0B

The command example for most **Unix** systems is:

arp -s 191.12.3.77 00:20:4A:02:64:0B

b) Open a Telnet connection to port number 1. This connection will fail, but the UTS will change its IP address to the desired one designated in that step.

telnet 191.12.3.77 1

c) Open a Telnet connection to port 9999 and set all required parameters.

telnet 191.12.3.77 9999

NOTE: *The temporary IP address is reverted after every power reset of the UTS. Be sure to log into UTS and store the parameters to make the changes permanent.*

4.4 Serial Configuration

An ASCII terminal or PC with a terminal emulation is connected to the first serial port of the UTS. The terminal (or PC) should be configured for 9600 Baud, no parity, 8-bit, and 1 or 2 stop bits.

To enter configuration mode, the power on the UTS must be cycled (powered off and back on). After power-up, the self-test begins. About a half second later the red LED starts blinking. Now three lowercase 'x' characters must be sent to the UTS. These characters must all be sent within approximately one second to start configuration mode.

NOTE: *The easiest way to enter the configuration is to hold down the 'x' key at the terminal (emulation) and then powering the UTS. This will ensure that the x characters will arrive in time.*

4.5 Configuration Parameters

After configuration mode is entered (confirm with <CR>), the parameters can be changed; default values can be confirmed with the enter key. The parameters must be stored, and the UTS performs a reset.

4.6 Basic Parameters

To change the basic parameters, press '0'. The following values can be set/changed:

4.6.1 Ethernet Interface

This parameter is used to select the network port on the External Ethernet Model (10BaseT or AUI)

4.6.2 IP Address

The IP address must be set to a unique value in your network. Please refer to the literature mentioned in Appendix B if you are not familiar with IP addresses. If the UTS is set to an address already in use, it will display an error code with the LEDs and it will not connect to the network.

4.6.3 Gateway IP Address

The router/gateway address is needed to communicate to other LAN segments. The default gateway must be set to address the router that connects these segments. This address must be within the local network. If in doubt, consult the network administrator.

4.6.4 Netmask

A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section (reminder: Standard class A 8/24 (net/host), class B 16/16, class C 24/8 bits). If set to 0, the standard appropriate netmask for the actual IP address is used. Appendix B covers the calculation of the right value in detail.

The UTS prompts for the number of host bits, and then calculates the netmask. It is shown in standard format "255.255.xxx.xxx" when parameters are displayed.

4.6.5 Telnet Config Password

The telnet configuration password can be set to disable unauthorized access to the setup menu through a telnet connection to the setup port (9999).
For the setup through the serial port, it is not necessary to enter the password.

4.7 Channel Specific Parameters

The baud rate can be set within the defined limits (model dependent, most models 300 to 19200 or 115k Baud).

NOTE: *115 kBaud is entered as "150"*

4.7.1 Interface Mode

The line interface (I/F) mode is a bit-coded byte with the following meaning. It is entered in hexadecimal notation

Function	7	6	5	4	3	2	1	0
RS-232C							**0**	**0**
RS-422/485							**0**	**1**
RS-485 2-wire							**1**	**1**
7 Bit					**1**	**0**		
8 Bit					**1**	**1**		
No Parity			**0**	**0**				
Even Parity			**1**	**1**				
Odd Parity			**0**	**1**				
1 Stop bit	**0**	**1**						
2 Stop bit	**1**	**1**						

Figure 4-2

Common settings:
RS-232C, 8-bit, No Parity, 1 stop = 0x4C
RS-232C, 7-bit, Even Parity, 1 stop = 0x78
RS-485 2-Wire, 8-bit, No Parity, 1 stop = 0x4F
RS-422, 8-bit, Odd Parity, 2 stop = 0xDD

The bit combination can be easily converted to hexadecimal notation for input. See Appendix C for conversion tables.

4.7.2 Flow Control

This parameter sets the local handshake method for stopping output. Generally, Flow control is not required if the connection is used to pass a blocked protocol with block sizes <1k (ACK/NAK protocols and the like)

-	No flow control:	00
-	XON/XOFF flow control in both directions:	01
-	Hardware handshake with RTS/CTS lines:	02
	XON/XOFF, pass characters to host:	05

4.7.3 Port Number

This setting is the source port number in TCP connections, and is the number used to identify the channel for remote initiated connections. The port number must be unique for every channel, and may not be set to 0 or 9999 (Range: 1-65535). In general the port numbers 0..1023 are reserved in UNIX systems for specific applications. It is advisable to use numbers in the range 2000-30000 to avoid potential conflicts (although these are unlikely).

If the **UDP Datagram mode** is selected, the port number is used as the UDP source port number for outgoing datagrams; datagrams sent to the UTS with this port number are received to this channel.

4.7.4 Remote IP Address

If automatic connection mode is selected, a connection is made to this IP address and the set remote port number. In manual connection mode, the parts of the IP address that are not given are taken from this value.

4.7.5 Remote TCP Port

The remote TCP port number must be set to use automatic connections, and can be set to give a default for manual connect mode. This parameter defines the port number on the target host to which a connection is attempted.

NOTE: *To connect an ASCII terminal to a host using a UTS for login purposes, use the remote port number 23 (This is the Internet standard port number for Telnet services).*

This port number is also used as the UDP destination port number for transmitted datagrams, provided the UTS is used in UDP mode.

4.7.6 Connect Mode

This parameter defines how the UTS makes a connection and how it reacts to incoming connections over the network

Function	7	6	5	4	3	2	1	0
Connection acceptance								
never accept incoming	**0**	**0**	**0**					
Accept incoming with active DTR only	**0**	**1**	**0**					
Accept unconditional (if not busy)	**1**	**1**	**0**					
Response on serial to connect								
Nothing (quiet)				**0**				
Character response: (C=conn., D=disc., N=not available/unreachable)				**1**				
Active connection startup								
no active connection startup					**0**	**0**	**0**	**0**
start connection with any character on serial line					**0**	**0**	**0**	**1**
start connection with active-going DTR line					**0**	**0**	**1**	**0**
start connection with CR (0x0d) only					**0**	**0**	**1**	**1**
Manual connection startup ('C' + address)					**0**	**1**	**0**	**0**
Datagram Mode (separate doc)					**1**	**1**	**0**	**0**

Figure 4-3

Please refer to Appendix C on converting values to hexadecimal format.

4.7.7 Automatic Connection Address

For each serial port, an automatic TCP connection can be programmed—these are the remote IP address and the TCP port number.

If automatic connection is selected, all parameters must be supplied.

If manual connection startup is configured (with "C" + address/port), only the part not supplied in the command string is used. In manual mode, the last byte of the address must be supplied.

Example: *The configured remote IP address within the UTS is 129.1.2.3 and the TCP port number is 1234 :*

C121.2.4.5/1<CR>
complete override - connection is started with host 121.2.4.5, port 1.

C5<CR>
This means connect to 129.1.2.5, port 1234.

C28.10/12<CR>
This means connect to 129.1.28.10, port 12.

4.7.8 Disconnect Mode

In disconnect mode, DTR drop can be activated or ignored to end a connection:

- Disconnect with DTR drop: 80
- Ignore DTR: 00

4.7.9 Force Telnet Mode

With another bit in the disconnect mode, UTS can be forced into Telnet (terminal) mode and the setup for the terminal name can be enabled:

- activate Telnet mode and terminal type setup: 40

4.7.10 Buffer Flushing

With this parameter it is possible to control line handling and network buffers with connection startup and disconnect. Also, selection between two different packing algorithms is possible.

Function	7	6	5	4	3	2	1	0
clear input buffer (line to network)								
- with active connection:				**1**				
- with passive connection:			**1**					
- at time of disconnect:		**1**						
clear output buffer (network to line)								
- with active connection:								**1**
- with passive connection:							**1**	
- at time of disconnect:						**1**		
alternate packing algorithm	**1**							

Figure 4-4

4.7.11 Inactivity Timeout

With these parameters an inactivity time can be set. If the set time expires without an activity on the serial line, the connection is dropped.

4.7.12 Pack Control

(Version 2.80 and above) Alternative pack algorithm settings are controlled here. Set this value to 00 if specific functions are not needed.
The functions of these bits are defined in the following table:

Function	7	6	5	4	3	2	1	0
Idle time to force transmit: 12ms (avg.)							0	0
Idle time to force transmit: 52ms (avg.)							0	1
Idle time to force transmit: 250ms (avg.)							1	0
Idle time to force transmit: 5 secs (!)							1	1
No trailing chars after sendchar(s)					0	0		
One trailing char after sendchar(s)					0	1		
Two trailing chars after sendchar(s)					1	0		
Sendchars define 2-Byte sequence				1				
Send immediate after Sendchar			1					

Figure 4-5

"Idle time to force transmit" defines the time period after which all accumulated characters are sent, regardless of the recognition of send characters.
In some applications, CRC, Checksum or other trailers follow the end_of_sequence character. In these cases, this option helps to adapt frame transmission to the frame boundary.

If Bit 4 is set, UTS interprets the Sendchars as a 2-byte sequence, if reset, they will be interpreted independently.

If Bit 5 is not set, any other characters already in the serial buffer will be included in the transmission after a "transmit" condition is found. If the bit is set, the UTS will immediately send after recognizing the transmit condition (sendchar or timeout)

NOTE: *A transmission might occur if status information has to be exchanged or an acknowledgement has to be sent.*

4.7.13 Send Characters

Up to two characters can be entered in hexadecimal representation in the parameters "sendchar." If a character received on the serial line matches one of these characters, it is immediately sent, together with any waiting characters to

the TCP connection. This is especially useful to minimize the response time for specific protocol characters on the serial line (i.e. ETX, EOT etc.). Setting the first Sendchar to “00” disabled the recognition of the characters.

Alternatively, the two characters can be interpreted as a sequence (see Pack control, above).

4.7.14 Telnet Terminal Type

This parameter appears only if terminal type option is enabled by setting Bit 6 in the disconnect mode. If set, the terminal name used for the Telnet terminal type exchange option can be set here. Only one name can be entered.

If Terminal type option is enabled, UTS also reacts to the EOR (end of record) and binary options, which can be used for applications like terminal emulation to IBM hosts (contact Lantronix for details).

4.7.15 Exit Configuration Mode

To leave the configuration program and save all changes, press ‘9’. All values will be stored in nonvolatile (E^2PROM) memory, and UTS will reset.

5 Monitor Mode and Firmware Upgrade

To enter monitor mode, the same principal as setting the parameters is used (see 4.4 Serial Configuration). Instead of entering three “x ” keys, key in “xx1”. The UTS will respond with a special prompt**.** A UTS Token Ring needs a working network connection to enter monitor mode. Because Network functions are needed for some diagnostics commands, it may take up to 20 seconds until the network part of the UTS is initialized and the prompt is displayed. This is especially true if an empty Token Ring (or a ring simulator) is used. For a simple ring simulator, see Appendix B. To start the monitor mode without network functions, enter “xx2” (new function with Version 2.05 and later).

5.1 Monitor Commands

The following commands are available in the monitor mode. Many commands have an IP address as an optional parameter (x.x.x.x). If it is given, the command is applied to another UTS with that IP address. If no IP address is given, the command is executed locally.

All commands must be given in capital letters; only blanks (spaces) are accepted between parameters.

DL	Firmware download to the UTS
SF x.x.x.x	Send irmware to UTS with IP x.x.x.x
VS x.x.x.x	Query software header record (16-byte).
GC x.x.x.x	Get configuration as HEX records
SC x.x.x.x	Set configuration from HEX records
PI x.x.x.x	Check with Ping if x.x.x.x is alive and reachable.
QU	Quit - exit diagnostics mode

Command result codes:

0	OK, no error
1	No answer from remote device
2	Cannot reach remote device or does not answer
8	Wrong parameter(s)
9	Invalid command

5.2 Firmware Download Using Serial Port

Downloading is done in Monitor mode. Once in Monitor mode, the "DL" command is given, the node then waits for the firmware image in Intel HEX format. This must be sent completely through the serial interface. When the end record is received, the UTS checks the integrity of the firmware image and then programs the new firmware in the flash ROM. **Do not switch off the power supply at this time.** A loss of power while reprogramming will result in a corrupt program image and a nonfunctional UTS. The following figure displays a typical screen while programming new firmware.

After a complete reprogramming, the UTS restarts.

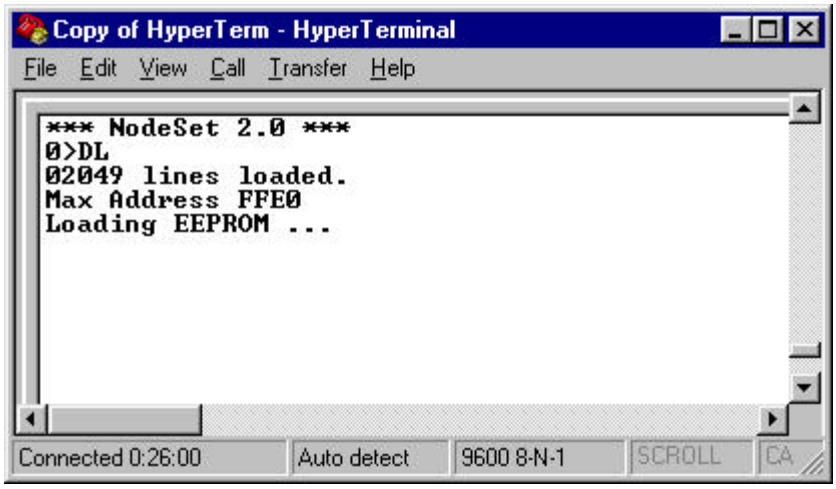


Figure 5-1

5.3 Distribute Firmware

To distribute the firmware of one UTS to others, the "SF" command is used. After entering Monitor mode on the UTS, simply send the firmware with the "SF" command to the other devices. Be sure to confirm reprogramming in the other devices.

5.4 Firmware Download From Host

To download new firmware from a computer to a UTS, it is necessary to have a TFTP client send a binary file. The parameters to send the firmware are shown in figure 5-2.

NOTE: *The file to be downloaded must be the .ROM (binary) image and not the hex version! File size should be 32768 or 65536 bytes.*

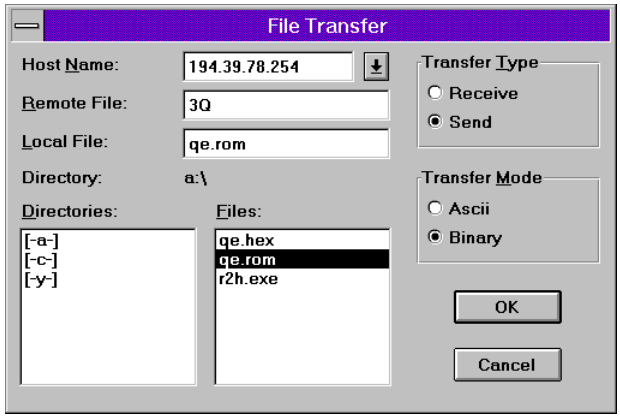


Figure 5-2

6 Serial Line Interfaces

6.1 Connector Pinout RS-232C, Channe1 1

This connector is available on the UTS External Models. Configuration is DCE (modem-like), 25pin female SubD.

Pin	Direction	Function
1		None
2	to UTS	TxD Transmitted data
3	from UTS	RxD Received data
4	to UTS	RTS Request to send
5	from UTS	CTS Clear to send
6	from UTS	DSR Data set ready
7		Ground
8	from UTS	DCD Data carrier detect
20	to UTS	DTR Data Terminal Ready

Figure 6-1

NOTE: *Please make sure that other pins are not connected, as there are other signals on the connector. Improper wiring of these pins might damage the UTS.*

6.2 Connector Pinout RS-232C Channel 2

This connector is available on the UTS External Models. Configuration is PC-like (9pin male DB), but the signals are different due to DCE function.

Pin	Direction	Function
1	to UTS	DTR
2	to UTS	TxD Transmitted data
3	from UTS	RxD Received data
4	from UTS	DCD
5		Ground
7	from UTS	CTS
8	to UTS	RTS

Figure 6-2

6.3 Connector Pinout RS-422/485

This connector is the same as the Channel 1 RS-232 connector for the External UTS Models.

Pin	Function
1	None
7	Ground
14	DOUT +
15	DOUT -
21	DIN+
22	DIN -

Figure 6-3

NOTE*: For RS-485 2-wire functionality, 14 and 21, as well as 15 and 22 must be connected together*.

6.4 Line Interface Description

6.4.1 First Channel, RS-232C

The following paragraph addresses the standard UTS. The serial interface of the UTS is designed to be used like a standard DCE (data communications equipment) modem.

UTS transmits data received from the network to RxD (pin 3) and sends data received on TxD (pin 2) to the network.

Hardware handshake is controlled by means of the signals RTS (pin 4) and CTS (pin 5, UTS-driven). The DSR line (pin 6) is active hardwired.

If a connection to/from the channel is active to a peer on the network, the DCD line (pin 8) is set active.

Connection establishment and disconnect can be controlled with DTR (pin 20).

6.4.2 Secondary RS-232C Interface

The secondary interface (used for channel 2) works exactly the same way as defined for channel 1.

6.4.3 RS-422/485 Interface

The RS-422/485 interface is designed for two- or four-wire applications (selectable by one bit in the IF-Mode, interface mode). Only TxD and RxD signals are available.

When two-wire operation mode is selected, the UTS automatically switches the transmitter off after the last data byte and suppresses the echo from the line. UTS RS-485 input and output must be connected together externally

7 Application Examples

7.1 ASCII Terminal to Host for Login

To connect a DTE (Data Terminal Equipment), a standard non-crossed cable can be used for port 1.

Channel one is configured for speed, interface mode (typically 4C, N,8,1) and flow control (hardware or XON/XOFF).

TCP port number is a user-selected arbitrary number (10000 is fine). Connect Mode 01 (connect with any character--never accept network initiated connections), remote IP Address set to the host, and the remote port number to 23 (telnet service).

Flush mode can be set to 80 to select the block-saving packing algorithm, and no buffers are cleared.

A disconnect timeout can be set, whereas the DTR disconnect feature is disabled (00)

7.2 RS-485 2-wire Prolongation Over Network

Two UTSes are used for this application: one at the “local” site and one at the “remote” site. Only Channel 1 can be used because Channel 2 supports only RS-232.

Assuming that one device initiates the dialog, the following shows a sample setting.

Interface mode can be set based on RS-485 on 4-wire or 2-wire applications. See Figure 4-2.

Flow control is usually not used in these applications (set to 00). The port number can be any number; it is recommended to use the same value for both units at the local and remote sites. (i.e. 10000)

Flush mode should be set to 80 to minimize packet count, unless both UTSes are connected to a local LAN and minimal transmission delay is important. Send Characters can be programmed to Block trailing Characters (like <CR>) to speed up transmission.

Disconnect Mode should be set to 00.

The Connect mode can be configured similarly on both UTSes, although it is advisable to declare one side as “master” to activate the connection.

On the master side, the remote IP address and port number MUST be set. Connect mode is typically set to 01 (autoconnect with any character, never accept incoming connections), whereas the slave connect mode is set to C0, indicating it will not build up a connection and accept on the network.
It is not necessary to set the remote IP address and ports for the slave. If a you want a symmetric setup, both connect mode entries should be C1; the remote IP address and port have to be set on both units.

7.3 Telnet Server for Device Management

Management of workstations, routers and other equipment through Telnet sessions is accomplished by defining the UTS as a Telnet server. The UTS accepts connections over the network and so “connects” directly to the serial port.

It is necessary to either set the port number to 23 (the Telnet” service standard) or to explicitly enable the Telnet functionality by setting bit6 (hex 40) in the disconnect mode.
Recommended settings:

Connect Mode: C0 (or 40 if inactive DTR signals that the device is not available)
Disconnect Mode: 40 (to enable telnet server)
Flush Mode: 80
Sendchars: 0A 0A (line feed)

The interface mode will usually be 4C (N81, RS.232)
Example: PC or ASCII Terminal to UTS

7.4 Printer Connection

The UTS does not support LPD/LPR spooling systems. In order to use the UTS as a serial print server, your operating system/application must support TCP socket connections.

A serial printer is usually wired like a DTE device. Different printers have different pin configurations, so be sure to check your printer manual for the correct pinouts.

The signal goes low if the printer is unable to accept more data (e.g. the printer buffer is full). It must be connected to the UTS’ RTS input. Depending on the model, the flow control signals are:

RTS (standard)

DTR (widespread, named ”Busy” most times)
TXD

7.4.1 Software Handshake

If a device uses a software handshake, it is unnecessary to connect the RTS and CTS wires. It may be advisable to jumper the inputs to “always active”.

7.4.2 Printer Ready Signal

If a DTE (printer) has a “ready”- signal (paper installed etc.), it can be used to deny the connection if not ready. In this case, this signal must be connected to the UTS DTR signal, and the connection setup should be set to “accept only with active DTR”.

8 LED Status Display

Depending on the model, three different LEDs display the status of the UTS. Most models also have some network diagnostic LEDs (such as Good Link (GL), Receive (RX), Transmit (TX), Collision (CL). They are labeled on the front.

8.1 Yellow and Green LED

The green LED displays the status of Channel 1; the yellow LED displays the status of Channel 2 (the red LED will be off while in normal operation).

Stable color:
Channel idle, no connection

Blinking, 1 sec cycle:
Connected over the network

8.2 Red LED

If the red LED is on or blinking, the green LED will give a diagnostics code. There is a fatal error, and the UTS is not working.

Red LED stable on, green LED blinking:

1x:	EPROM-checksum error
2x:	RAM-error
3x	Network controller error (Token Ring)
4x:	E²PROM checksum error or bad
5x:	IP address already used on network

Red LED blinking, green LED blinking:

4x:	The network connection is faulty. This code should only appear after power up. Even though the UTS is going into operation mode, the problem will potentially persist.
5x:	No DHCP response was received.

9 Technical Data

Some values are for the standard external models only!

9.1 CPU, Memory Controllers:

V.40 CPU, 10MHz clock
Z85C30 SCC Serial Communications Controller
National Semiconductor DP839xx Ethernet Controller or TMS340 chipset for Token Ring Version
128kByte RAM, 128 or 256kByte Flash PROM
256 Byte E²PROM for parameter storage

9.2 Serial Interface

25-pin D-shell female connector (DCE pinout)
Speed software selectable 300 to 115k baud
Software selectable RS-232C or RS-422/485
Second channel RS-232C interface

9.3 Network Interface

15-pin AUI interface (External Ethernet only) for transceiver connection to:
- Thick Wire Ethernet
- Thinner Ethernet
- fiber optics

Integrated 10-BaseT port (RJ-45 connector)

9.4 Power Supply

Power Plug (supplied), or 15-30 Volt DC, max. 800mA

9.5 Power Consumption

max. 9 Watt

9.6 LEDs

Three LEDs for channel status display
Four LEDs for network interface status (Ethernet)

9.7 Case

Aluminum case, with removable mounting brackets

9.8 Dimensions

180 x 155 x 40 mm (7.1 x 6.1 x 1.6 in)

9.9 Weight

approx. 500g without AC power adapter

A- Token Ring Specific

A.1 Additional Information for Token Ring Versions

The following information describes differences for Token Ring versions.

A.1.1 Token Ring Insertion Process Needs Time

When the NTS attempts to enter the ring, extensive tests of the ring physical interface are done before opening the loop. These tests take a few seconds. After opening the ring, the NTS waits for a token from a ring master. If there is no other device in the ring, it may take up to 30 seconds until the ring insertion process is completed (and the red LED stops blinking).

A.2 Network Interface

The Token Ring version of UTS has a standard D-Shell 9pin female connector (STP) to be connected to standard Token Ring drop cables and an RJ-45 connector (UTP) to be connected to an UTP Token Ring MAU. The used connector will be automatically detected. The ring interface speed is configured by a jumper to prevent accidental configuration. The jumper can be set through a hole in the back of the case. The factory setting of this jumper is 16Mbit.

A.3 Token Ring Simulator

The following schematic defines a simple Token Ring simulator that can be used to test the NTS Network interface without a MAU.

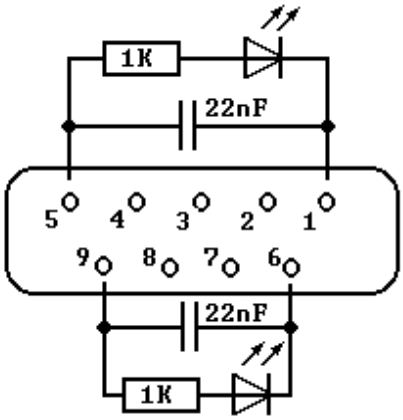


Figure A-1

B- IP Addresses, Netmask etc.

B.1 IP Addressing

An IP address is a 32-bit value, divided into four octets of eight bits each. The standard representation is four decimal numbers (in the range of 0..255), divided by dots.
Example: 192.2.1.123

This is called decimal-dot notation.

The IP address is divided in two parts: network and host. To support different needs, three ”network classes” have been defined. Depending on the network class, the last one, two or three bytes define the host, while the remaining part defines the network. In the following, ‘x’ stands for the host part of the IP address:

B.2 Class A Network

IP address 1.x.x.x to 127.x.x.x

Only 127 different networks of this class exist. These have a very large number of potential connected devices (up to 16,777,216)
Example: 10.0.0.1, (network 10, host 0.0.1)

B.3 Class B Network

IP address 128.0.x.x to 191.255.xxx.xxx

These networks are used for large company networks. Every network can consist of up to 65,534 devices.

Example: 172.1.3.2 (network 172.1, host 3.2)

B.4 Class C Network

IP address 192.0.0.xxx to 223.255.255.xxx

These network addresses are most common and are often used in small companies. These networks can consist of a maximum number of 254 hosts.
Example: 192.7.1.9 (network 192.7.1, host 9)

The remaining addresses 224.x.x.x - 239.x.x.x are defined as ”class D” and are used as a multicast addresses.

The addresses 240.x.x.x. - 254.x.x.x are defined as "class E" and are reserved addresses.

B.5 Network Address

The host address with all host bits set to "0" is used to address the network as a whole (in routing entries, for example).

B.6 Broadcast Address

The address with the host part bits set to ‘1” is the broadcast address, meaning “for every station”.

Network and Broadcast addresses must not be used as a host address (e.g. 192.168.0.0 identifies the entire network, 192.168.0.255 identifies the broadcast address).

B.7 IP Netmask

The netmask is used to divide the IP address differently from the standard defined by the classes A, B, C. A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section.

B.7.1 Standard IP Network Netmask:

	Network Bits	Host Bits	Netmask
Class A	8	24	255.0.0.0
Class B	16	16	255.255.0.0
Class C	24	8	255.255.255.0

Figure B-1

The number of host bits is entered; the NTS then calculates the netmask. The netmask is displayed in standard decimal-dot notation.

B.7.2 Netmask Examples

Netmask	Host bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
.	.
.	.
255.128.0.0	23
255.0.0.0	24

Figure B-2

B.7.3 Private IP Networks and the Internet

If your network is not connected to the Internet and there are no plans to make such a connection you may use any IP address you wish.

If you are not connected to the Internet and have plans to connect, or you are connected to the Internet and want to operate your NTSes on an Intranet you should use one of the sub-networks below. These network numbers have been reserved for such networks. If you have any questions about IP assignment consult your Network Administrator.

Class A	10.x.x.x
Class B	172.16.x.x
Class C	192.168.0.x

B.7.4 Network RFC's

For more information regarding IP addressing see the following documents. These can be located on the World Wide Web using one of the directories or indices:

RFC 950	Internet Standard Subnetting Procedure
RFC 1700	Assigned Numbers
RFC 1117	Internet Numbers
RFC 1597	Address Allocation for Private Internets

C- Binary to HEX Conversion

Hexadecimal digits have values from 0..15, represented as 0...9, A (for 10), B (for 11) ... F (for 15). The following table can serve as a conversion chart bin - dec. - hex:

C.1 Bin/DEC/Hex Table

Decimal	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Figure C-1

To convert a binary value to a hexadecimal representation, the upper and lower four bits are treated separately, resulting in a two-digit hexadecimal number.

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Declaration of Conformity

(according to ISO/IEC Guide 22 and BS 7514)

Manufacturer's Name & Address: Lantronix
15353 Barranca Parkway, Irvine, CA 92618 USA

Declares that the product:

Product Names: Network Time Server
Device Server

Model Name/Number: NTP-01/02/03
CoBox-E2-01/02/03

Conforms to the following standards or other normative documents:

Safety: EN60950:1988+A1, A2

Electromagnetic Emissions: EN55022: 1998 (CISPR 22, Class A: 1993, A1: 1995, A2: 1996)
IEC 1000-3-2/A14: 2000
IEC 1000-3-3: 1994

Electromagetic Immunity: EN55024: 1998 Information Technology Equipment-Immunity Characteristics
IEC 6100-4-2: 1995 Electro-Static Discharge Test
IEC 6100-4-3: 1996 Radiated Immunity Field Test
IEC 6100-4-4: 1995 Electrical Fast Transient Test
IEC 6100-4-5: 1995 Power Supply Surge Test
IEC 6100-4-6: 1996 Conducted Immunity Test
IEC 6100-4-8: 1993 Magnetic Field Test
IEC 6100-4-11: 1994 Voltage Dips & Interrupts Test

(L.V.D. Directive 73/23/EEC)

Supplementary Information: *The product complies with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.*

This product has been verified as being compliant within the class B limits of the FCC Radio Frequency Devices Rules (FCC Part 15, Subpart B), revised as of October 1993.

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