User’s Manual:

NETmate

NM-9021

Synchronous-serial to Asynchronous-serial

Synchronous-serial to TCP/IP Network

Communication Interface

Software Revision 1.010

Copyright ©2004, ADD-Engineering B.V.

Copyright ©2004, ADD-Engineering B.V.
Online version copyright © 2004
All rights reserved.

Printed in the Netherlands

This document is protected by Copyright Protection Laws. The online version of this document may be freely printed and distributed internally, but cannot be modified, in whole or in part, or included in any other work without prior written consent from ADD-Engineering B.V.

Limitation of Liability

ADD-Engineering B.V. makes NO WARRANTY, EXPRESSED or IMPLIED, with respect to this user-manual, and any related items, its quality, performance, merchantability, or fitness for any particular use. It is solely the purchaser's responsibility to determine its suitability for any particular use. Information contained in this document is subject to change without notice.

Trademark credits

The following are trademarks of ADD-Engineering B.V.

NETmate
SyncMate
ClockMate

Contents

Chapter 1
Introduction

Congratulations on purchasing your NETmate (NM-9021) from ADD-Engineering. The NETmate combines dedicated communication hardware with on-board data processing software to provide an efficient means of interfacing asynchronous Data Terminal Equipment and networked equipment to synchronous Data Communication Equipment.

By doing this the NETmate off-load communications overhead from your Data Terminal Equipment's CPU for optimum system performance.

Functional Description

The NETmate is a device that establishes the interface from standard asynchronous serial ports with an RS-232 electrical interface (the ones which are usually standard on computer systems) to standard as well as "non-standard" synchronous systems with an RS-232 electrical interface (non-standard in terms of Commercially Of The Shelf equipment).

The NETmate can interface a single synchronous system to a single asynchronous system or interface two synchronous systems to a system equipped with TCP/IP ethernet. Apart from the configurable "Universal-mode", the NETmate also provides a Link-1, a Link-11B and a transparent interface mode.

To provide flexibility and create a wide adaptation level within these different modes, the NETmate has a number of parameters that can be altered to be able to interface to specific military and commercial protocols. Synchronisation word, bit encoding and bit stripping are only a couple of these parameters.

Though the NETmate is designed from a total new concept, a lot of its functionality is comparable to that of the standard UCC, SyncMate and the ClockMate.

The NETmate provides more functionality, flexibility, stability, configurability, ease of installation and fault check mechanisms.

Above all that, the NETmate also provides a mechanism to remote monitor/configure the unit by means of a web-browser and a TCPI/IP based ethernet connection.

System configuration security (and access control) is guaranteed by a user-name and password combination.

Specification Overview

DCE / Asynchronous Interface	
Ports	1
Connector	RJ-45 (socket)
Electrical Interface	RS-232
Speed	1200, 2400, 4800, 9600, 19k2 , 38k4, 115k2 bps
Start/Stop bits	1
Data bits	8
Bit order	LSB-first, MSB-first
Flow control	CTS/RTS
Input buffer	128 bytes
Output buffer	32 bytes
Available signals	CTS, RTS, TxD, RxD

Table 1:Specification of DCE interface

DTE / Synchronous Interface	
Ports	1
Connector	RJ-45 (socket)
Electrical Interface	RS-232
Speed	600, 1200, 2400, 4800, 9600, 19k2, 56k, 64k bps
Clock mode	Internal, Dpll, External
Clock source	input: TxC, RxC
	output: ExC
Sync Length	5...16 bits

Table 2:Specification of DTE interface

DTE / Synchronous Interface	
Frame Length	1..254 bytes
BIt Encoding	NRZ, !NRZ, NRZI, !NRZI
Sync Stripping/Insertion	On/Off
Bit Stripping/ Insertion	On/Off
Checksum Generation	Off/Xor/Xnor
Idle State	1, 0, Alternating
Clock Inversion	On/Off
Available signals	TxD, RxD, TxC, RxC, ExC,RTS,CTS

Table 2:Specification of DTE interface

Control & Data Port / Ethernet	
Ports	1
Connector	RJ-45 (socket)
Electrical Interface	Ethernet 100Mb/10Mb
TCP/IP Protocols	UDP, TCP-client, TCP-server

Table 3:Specification of control port interface

Power Requirements	
DC Input	7.5V / 1000mA
	(through supplied 230V AC-adaptor)
Net Frequency	47 Hz - 63 Hz
Power Consumption	16 Watt

Table 4:Power requirements

Dimensions	
Enclosure	Metal painted light grey
Width	100 mm
Height	26 mm
Depth	79 mm

Table 5:Dimensions

Chapter 2
Front and back panel

The NETmate is controlled and configured through a web-browser interface. Through the use of this concept there is no requirement for a front panel keyboard or configuration switches. Only the power supply connector and indication LEDs are placed at the front panel of the unit.

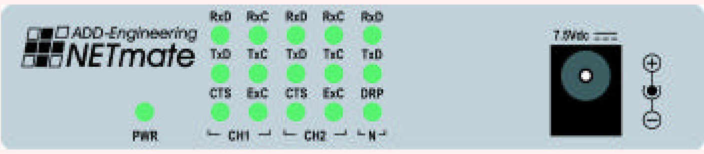

Figure 1:NETmate front panel

Front panel

The front panel of the NETmate contains a large number of status LEDs (see Figure 1:“NETmate front panel.”), each providing information on the unit’s status or an RS-232 signal. The large number of LEDs facilitates easy troubleshooting of a configuration or connection.

PWR-LED

The PWR-LED indicates that power is supplied to the NETmate. If the PWR-LED is on, power is supplied through the power supply connector, if the PWR-LED is off, power is not supplied. When using another power-supply adapter than the one included, please make sure that the polarity is correct.

CH1-group

The CH1-group provides information on the synchronous interface side of the NETmate.

RxD

The RxD-LED indicates that reception of a frame is in progress.

TxD

The TxD-LED indicates that a transmission of a frame is in progress.

CTS

The CTS-LED indicates the state of the Clear To Send signal. In case the CTS-LED is off, the NETmate will not transmit frames through the synchronous interface. When the CTS state is inactive and the system connected to the asynchronous side of the NETmate continues to provide frames, the Clear To Send signal on the asynchronous side will change to inactive (after the buffer is filled).

RxC

The RxC-LED indicates the state of the Receive Clock signal. The RxC-LED is tied "directly" to the clock-signal on pin 17. A normal clock signal alternates, the RxC-LED blinks at the same frequency as the clock signal.

TxC

The TxC-LED indicates the state of the Transmit Clock signal. The TxC-LED is tied "directly" to the clock-signal on pin 15. A normal clock signal alternates, the TxC-LED blinks at the same frequency as the clock signal.

ExC

The ExC-LED indicates the state of the External Clock signal. The ExC-LED is tied directly to the clock-signal on pin 24. A normal clock signal alternates, the ExC-LED blinks at the same frequency as the clock signal.

CH2-group async mode

The CH2-group in asynchronous mode provides information on the asynchronous interface side of the NETmate.

RxD

The RxD-LED indicates the reception of data from the asynchronous interface side of the NETmate is in progress.

TxD

The TxD-LED indicates that the transmission of a frame just received (or in progress) at the synchronous interface side, is in progress.

CTS

The CTS-LED indicates that the Clear To Send signal on the asynchronous interface side is active, thus the system connected to the asynchronous interface side is allowed to submit data.

RxC

The RxC-LED is not used in the asynchronous mode.

TxC

The TxC-LED is not used in the asynchronous mode.

ExC

The ExC-LED is not used in the asynchronous mode.

CH2-group sync mode

The CH2-group in synchronous mode provides information on the synchronous interface side of the NETmate.

RxD

The RxD-LED indicates that reception of a frame is in progress.

TxD

The TxD-LED indicates that a transmission of a frame is in progress.

CTS

The CTS-LED indicates the state of the Clear To Send signal. In case the CTS-LED is off, the NETmate will not transmit frames through the synchronous interface. When the CTS state is inactive and the system connected to the asynchronous side of the NETmate continues to provide frames, the Clear To Send signal on the asynchronous side will change to inactive (after the buffer is filled).

RxC

The RxC-LED indicates the state of the Receive Clock signal. The RxC-LED is tied "directly" to the clock-signal on pin 17. A normal clock signal alternates, the RxC-LED blinks at the same frequency as the clock signal.

TxC

The TxC-LED indicates the state of the Transmit Clock signal. The TxC-LED is tied "directly" to the clock-signal on pin 15. A normal clock signal alternates, the TxC-LED blinks at the same frequency as the clock signal.

ExC

The ExC-LED indicates the state of the External Clock signal. The ExC-LED is tied directly to the clock-signal on pin 24. A normal clock signal alternates, the ExC-LED blinks at the same frequency as the clock signal.

N-group

The N-group provides information on the network interface side of the NETmate.

RxD

The RxD-LED indicates that the NETmate is sending a packet onto the ethernet TCP/IP network.

TxD

The TxD-LED indicates that the NETmate is receiving a packet from the ethernet TCP/IP network.

DRP

The DRP-LED indicates that the NETmate is receiving a packet from the ethernet TCP/IP network but ignoring (dropping) it because of a buffer overflow or because of an incorrect encapsulation method.

Back panel

The back panel of the NETmate (see Figure 2:“NETmate back panel.”) contains 6 space saving RJ-45 connectors. Through the use of the supplied RJ-45 to DB25 adapter cables, the unit can be connected to systems using a DB25 physical interface.

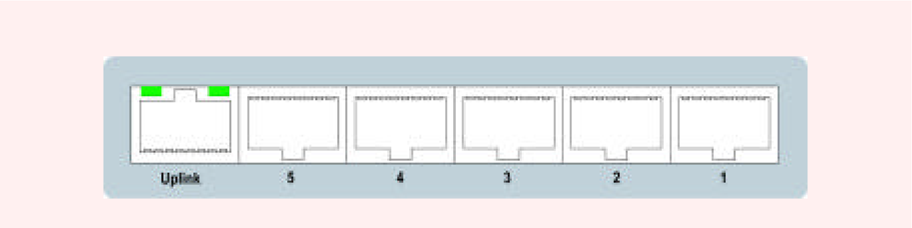

Figure 2:NETmate back panel

Uplink

The Uplink-port is used to connect the NETmate to the 10/100Mb ethernet.

Led indicators

Left LED Color	Right LED Color	Meaning
Off	Off	No Link
Off	Solid Amber	100BASE-T Half Duplex Link
Off	Blinking Amber	100BASE-T Half Duplex Activity
Off	Solid Green	100BASE-T Full Duplex Link
Off	Blinking Green	100BASE-T Full Duplex Activity
Solid Amber	Off	10BASE-T Half Duplex Link
Blinking Amber	Off	10BASE-T Half Duplex Activity
Solid Green	Off	10BASE-T Full Duplex Link
Blinking Green	Off	10BASE-T Full Duplex Activity

Table 6:Network status LED indicators

1

Port number 1 is not used on the NETmate model NM-9021.

2

Port number 2 is not used on the NETmate model NM-9021.

3

Port number 3 is not used on the NETmate model NM-9021.

4

Port number 4 is the synchronous/asynchronous interface of the NETmate named channel-2. Use the cable with the **blue** RJ-45 connector (and with the DB25-female connector) supplied with the NETmate to connect to this port in the asynchronous mode.

Use the cable with the **red** RJ-45 connector (and with the DB25-male connector) supplied with the NETmate to connect to this port in the synchronous mode.

5

Port number 5 is the synchronous interface of the NETmate named channel-1. Use the cable with the **red** RJ-45 connector (and with the DB25-male connector) supplied with the NETmate to connect to this port.

Chapter 3
User Interface

The NETmate is equipped with an HTML-based user interface through an embedded HTTP-server. Through the use of a standard HTTP-client (web-browser) the unit can be configured in just a few minutes.

Network

The NETmate has the default settings as specified in Table 7:“Network default settings.”.

Parameter name	Value
IP-address	192.168.1.1
Network mask	255.255.255.0
Default gateway	192.168.1.254

Table 7:Network default settings

To be able to configure the unit please make sure that the IP-address of the system that is used to configure the NETmate, is within the network address range of the NETmate. In other words, the configuring system should have an address in the range 192.168.1.2 - 192.168.1.254.

Authentication

The first dialog that appears when trying to establish a conenction with the NETmate is an authentication dialog see Figure 3:“Authentication dialog.”. By entering the correct User Name and Password combination, access to the NETmate is granted. The NETmate has the default settings for authentication as specified in Table 8:“Authentication default settings.”

Parameter name	Value
User Name	root
Password	manager

Table 8:Authentication default settings

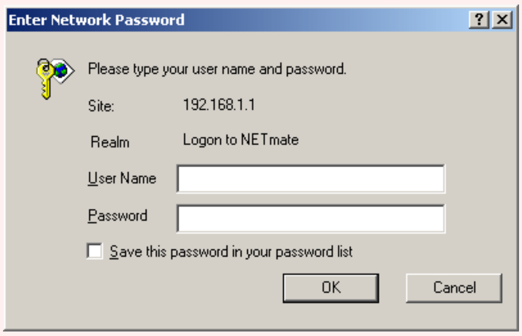

Figure 3:Authentication dialog

In case multiple attempt to logon fail or in case the "Cancel" button is selected in the logon-dialog, the NETmate will generate a message "401 UNAUTHORIZED" that will be displayed in the web-browser as illustrated in Figure 4:“Multiple logon attempts failed.”.

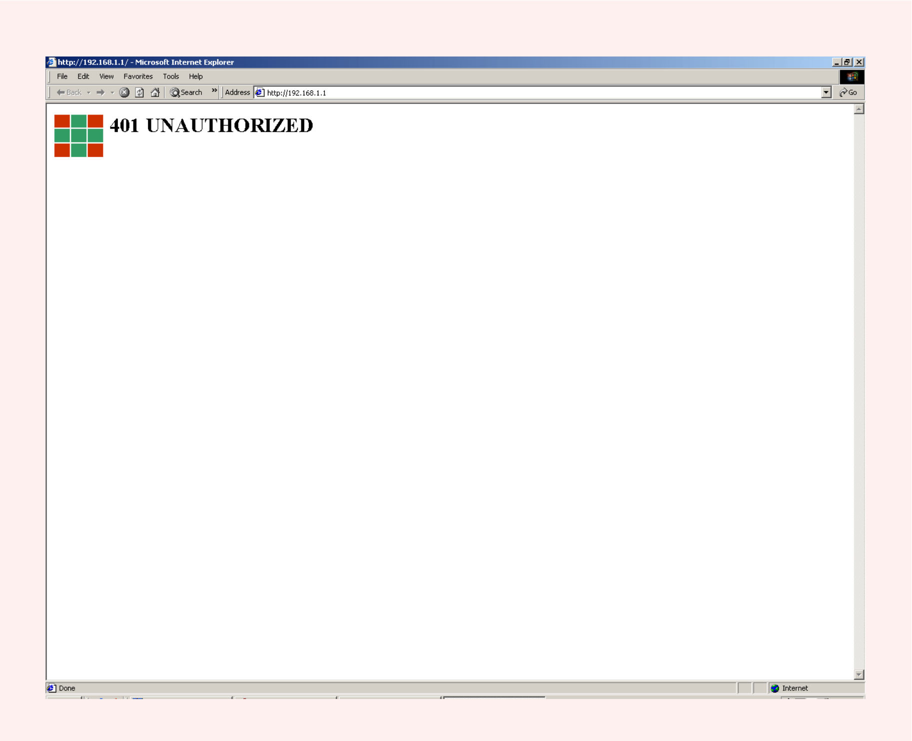

Figure 4:Multiple logon attempts failed

Main menu

Using the HTML-links (underlined texts) provided on the Main menu (see Figure 5:“Main menu.”), it is possible to navigate through the available management, configuration and statistics menu’s of the NETmate.

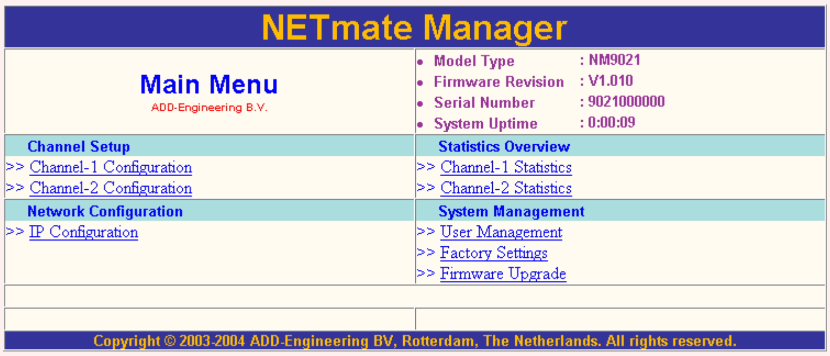

Figure 5:Main menu

Please note the information in the top-right corner of the menu’s (in this case the main menu).

Model Type	The specific model of the NETmate
Firmware Revision	Revision of the software embedded in the NETmate
Serial Number	The factory assigned serial number
System Uptime	Elapsed time since the unit was powered on

Chapter 4
Channel Setup

The channel configuration menu can be selected by following the “Channel Configuration 1” or “Channel Configuration 2” link from the Main menu.

Channel Configuration 1

After selecting the link the menu as illustrated in Figure 6:“Channel 1 Configuration.” is displayed.

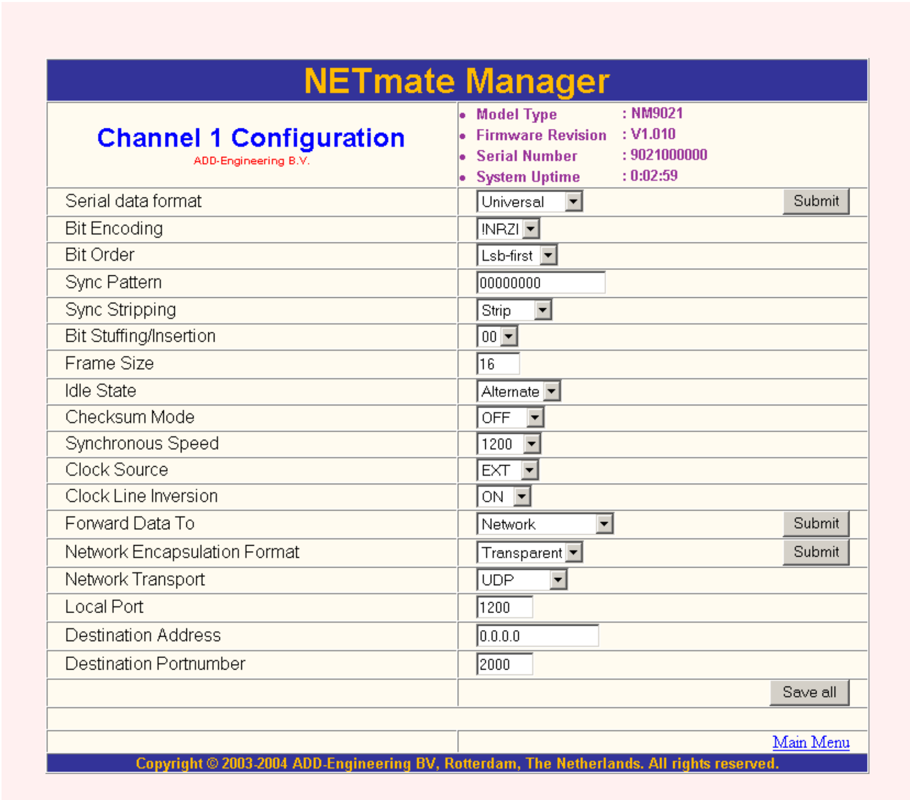

Figure 6:Channel 1 Configuration

Serial data format

Serial data format type selects the type of “protocol” for the specific channel. After selecting a specific serial data format the user should click on the "Submit" button, in this way the parameters that are of no use for the selected serial data format will be hidden. The NETmate provides 4 types of channels, Universal, Link-1, Link-11B and Transparant.

- Universal

  The standard operating mode used for processing different military protocols.

- Link-1

  The operating mode providing an interface to Link-1
- Link-11B

  The operating mode providing an interface to Link-11B
- Transparent

  The operating mode that provides a transparant interface from asynchronous to synchronous and vice versa.

Bit Encoding

Receiver

Bit-encoding for the receiver can be described as the way the line-state is decoded to a received bit. With the NETmate it is possible to specify 4 different bit-encoding methods, NRZ, !NRZ, !NRZI and NRZI.

- NRZ

  Generally known as Non Return to Zero, the line-state is directly decoded to form a bit. A '1' on the physical line is "decoded" to a bit with the value '1'. A '0' on the physical line is "decoded" to a bit with the value '0'.
- !NRZ

  Almost the same as NRZ but in this case all bits are simply inverted. A '1' on the physical line is "decoded" to a bit with the value '0' in memory. A '0' on the physical line is "decoded" to a bit with the value '1'.
- NRZI

  Generally known as Non Return to Zero Inverted. Although the name implies that it is just the inverted version of NRZ, there is a more significant difference between these two. To decode the line-state to a bit in NRZI requires knowledge of the previous line-state. If there is a difference between the previous line-state and the actual line-state then it is decoded to a bit with the value '0'. If there is no difference between the previous and the actual line-state then it is decoded to a bit with the value '1'. In short, transitions will be decoded to form a bit with the value '0' and steady states will be decoded to form a bit with the value '1'.

- !NRZI

  Almost the same as NRZI but in this case all bits are simply inverted. Transitions will be decoded to form a bit with the value ‘1’ and steady states will be decoded to form a bit with the value ‘0’.

Transmitter

Bit-encoding for the transmitter can be described as the way the bits which need to be transmitted are encoded to a line state.

- NRZ

  Generally known as Non Return to Zero, the bit is directly encoded to form a line-state. A bit with the value ‘1’ is encoded to the physical line-state 1. A bit with the value ‘0’ is encoded to the physical line-state ‘0’.

- !NRZ

  Almost the same as NRZ but in this case all bits are simply inverted first. A bit with the value ‘1’ is encoded to the physical line-state ‘0’. A bit with the value ‘0’ is encoded to the physical line-state ‘1’.

- NRZI

  To encode the bit to transmit to a line-state in NRZI requires knowledge of the previous line-state. If a bit with the value ‘0’ needs to be encoded then the line-state should alter, so the actual line-state should be the inverted version of the previous line-state. If a bit with the value ‘1’ needs to be encoded the actual line-state should be the same as the previous line-state. In short, bits with the value ‘0’ will be encoded as transitions and bits with the value ‘1’ will be encoded as steady-states.

- !NRZI

  Almost the same as NRZI but in this case all bits are simply inverted first. In short, bits with the value ‘1’ will be encoded as transitions and bits with the value ‘0’ will be encoded as steady-states.

Bit Order

Receiver

For the receiver the bit-order can best be described as the order in which the synchronously received bits are submitted to the asynchronous receiver. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST
  The bit which is received first at the synchronous line will be placed at the LSB-position of the byte which will be submitted to the asynchronous receiver. No bit-reversal is taking place.

- MSB-FIRST
  The bit which is received first at the synchronous line will be placed at the MSB-position of the byte which will be submitted to the asynchronous receiver. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Transmitter

For the transmitter the bit-order can best be described as the order in which the asynchronously received bytes are transmitted by the synchronous transmitter. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST
  The bit at the LSB-position of the byte received at the asynchronous input will be transmitted first by the synchronous transmitter. No bit-reversal is taking place.

- MSB-FIRST
  The bit at the MSB-position of the byte received at the asynchronous input will be transmitted first by the synchronous transmitter. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Sync Pattern

Receiver

The Sync-Pattern specifies the sync-word (a pattern of ones and zeros) on which the receiver will synchronise. The length of the sync-pattern is a minimum of 5 bits and a maximum of 16 bits. The sync-pattern is compared after bit-decoding takes place. When the Sync-Pattern has been received the device is considered to be in-sync. Bytes will now be submitted to the user asynchronously.

Transmitter

The Sync-Pattern denotes the start of a frame. The pattern will be transmitted if there are bytes in the internal buffer. If there are less bytes in the buffer than the specified frame-length, the NETmate will transmit the bytes in the buffer and fill up the remaining bytes (which were not submitted) with idle bits. The Sync-Pattern is fully user definable.

Sync Stripping

To provide the user with the possibility to strip or not strip the sync-word from the synchronously received data or to insert or not insert the sync-word into the synchronously transmitted data, this option is implemented in the NETmate.

Receiver

- NOSTRIP

  The synchronously received sync-word is submitted to the user via the asynchronous output. In case the bit-order is reversed the sync-word will also be reversed.

- STRIP

  The number of synchronisation bits are stripped from the synchronously received data. In other words the sync-word is stripped from the data.

Transmitter

- NOSTRIP

  Nostrip in this context actually means no-insertion. No insertion of a sync-word takes place at the synchronous transmitter side. The user has to submit the sync-word via the asynchronous input port.

- STRIP

  Strip means that the sync-word is inserted by the NETmate in case a new frame needs to be transmitted. The sync-word that is inserted is specified by the pattern "Sync-Pattern". The pattern should be read from right to left with the right bit (LSB) transmitted first.

Bit Stuffing/Insertion

Specific bits are stripped from the data at the receiver's side and inserted at the transmitter's side.

Receiver

At the receiver's side (synchronous) the specified bit will be stripped from the data. The insert parameter in this menu is of no significance for the receiver's side. The bitposition parameter specifies which bit will be stripped after reception of the Sync-Word. Assuming the Sync-Word is found and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit after the Sync-Word is stripped from the data (in case Sync-Stripping is also enabled), then the next 8 bits are forwarded to the asynchronous port and the next "first" bit is stripped from the data. This continues until all the bytes of the frame are received.

Transmitter

At the transmitter's side (synchronous) the specified bit will be inserted in the data. The insert parameter in this menu specifies if a ‘0’ or a ‘1’ will be inserted. Assuming the Sync-Word has already been transmitted (and sync-stripping is also enabled) and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit transmitted after the sync-word will be a ‘0’. After that a byte which is submitted via the asynchronous port will be forwarded to the synchronous port and then another ‘0’ will be inserted. This continues until all the bytes of the frame are transmitted.

Frame-Size

The frame-size is selectable in the range of [1..254]. In general the Frame-Size is the number of bytes the user will submit or can expect asynchronously. The latter with some exceptions which can be read hereunder.

Receiver

With the Fame-Length parameter the number of bytes which the user expects is specified. The number of bytes are submitted to the asynchronous side. All the bytes which are received are included in the Frame-Size. So, in case the sync-word is not stripped the Sync-Word will count as part of the total Frame-Length.

Transmitter

With the Frame-Length parameter the number of bytes which the user will submit is specified. In case the Sync-Word is not stripped, the Sync-Word should be submitted by the user via the asynchronous port and thus will count as part of the Frame-Size. However, if a checksum-mode is selected, one byte less should be submitted while the NETmate is generating its own checksum to be forwarded with the data.

Idle-State

The idle-state is used to specify the behaviour of the transmitter in the case that there are no bytes to transmit. The idle-state is directly related to the line-state and thus no bit-encoding will take place. There are three possible idle-states, ‘0’, ‘1’ and ALT.

Receiver

This parameter is of no significance for the receiver.

Transmitter

- ‘0’
  Idle in zero's, invalid for NRZI and !NRZI bit encoding methods.
- ‘1’
  Idle in one's, invalid for NRZI and !NRZI bit encoding methods.
- ALT
  Idle in alternating states, normally this is used to keep receivers with DPLL in sync.

Checksum-Mode

Checksums can be generated by the NETmate, it means that the user does not have to calculate checksums over the data submitted to the NETmate. The checksum is transmitted as the last byte of a frame. The checksum-mode has three options, OFF, XOR and XNOR.

Receiver

The checksum-mode parameter is of no significance in the receiver.

Transmitter

The checksum calculated using the method defined above is attached to the frame as a last byte.

- OFF
  No checksum is attached to the frame
- XOR
  An XOR (exclusive or) will be performed over all the bytes in the frame (except the sync-word).
- XNOR
  An XNOR (inverted exclusive or) will be performed over all the bytes in the frame (except the sync-word).

Synchronous Speed

The Synchronous-Speed parameter of the NETmate has only significance if INT (internal) or DPLL (digital phase locked loop) is enabled. In other cases the transmit/receive clock submitted will dictate the synchronous speed. Thus, when using external clock, the user is not limited by the selection of synchronous-speeds down here. However, there is an upper-limit to the external supplied synchronous clock which is 64k.

- 600
  Data is clocked in and out at 600 bps.
- 1200
  Data is clocked in and out at 1200 bps.
- 2400
  Data is clocked in and out at 2400 bps.

- 4800
  Data is clocked in and out at 4800 bps.
- 9600
  Data is clocked in and out at 9600 bps.
- 19200
  Data is clocked in and out at 19200 bps.
- 56K
  Data is clocked in and out at 56kbps.
- 64K
  Data is clocked in and out at 64 kbps.

Receiver

Data is clocked in at the selected speed.

Transmitter

Data is clocked out at the selected speed.

Clock-source

With the NETmate it is possible to select three different clock-sources. The first most commonly used is the external (EXT) clock-mode, the second is the internal (INT) clock-mode and the third and last is the digital pll (DPLL) clock-mode.

- INT

  The internal clock-mode is used when the NETmate should generate the clocking signals required. The synchronous clock-speed can be selected from the Sync-Speed menu. The clock which is generated internally is placed on pin 24 of the DB25M connector.

- DPLL

  The digital pll clock-mode is used when synchronous data is coming in at a known synchronous bit-rate but not accompanied by a clock signal. The synchronous clock-speed can be selected from the Synchronous-Speed menu. The clock which is generated internally is placed on pin 24 of the DB25M connector. The internally generated clock is synchronised continuously with the received data, or better with the transitions in this data.

- EXT

  With the external clock-mode clock-signals should be connected to the NETmate at pin 17 (RCLK) and pin 15 (TCLK). The RCLK is timebase related to the data on pins 3 (RxD) and the TCLK is timebase related to the data on pin 2 (TxD). The TCLK and RCLK need not to be related, however usually they are.

Receiver

Data is clocked in at the rate specified by the clock-signal.

Transmitter

Data is clocked out at the rate specified by the clock-signal.

Clock Line Inversion

The NETmate has the capability to invert the clock signals when required by the specific type of modem connected to the NETmate. The term "inverted" means the opposite of the standard clock signal used for commercial equipment. Clock Line Inversion OFF thus means that the NETmate is adapted for commercial synchronous equipment.

- ON
  The clock signals (incoming and outgoing, TxC, RxC, ExC) of the NETmate are inverted.
- OFF
  The clock signals (incoming and outgoing, TxC, RxC, ExC) of the NETmate are **not** inverted.

Receiver

Data is clocked in at the inverted or non-inverted clock-signal.

Transmitter

Data is clocked out at the inverted or non-inverted clock-signal.

Forward Data To

The NETmate model NM-9021 can forward data to the asynchronous channel 2 (Async-Channel-2) or to the network.

- Network
  Data received/transmitted on channel-1 is exchanged through the network
- Async-Channel-2
  Data received/transmitted on channel-1 is exchanged through the asynchronous interface channel-2 (SyncMate emulation).

Receiver

Data is received from the synchronous interface (channel-1) and forwarded to either the network or the asynchronous interface (channel-2).

Transmitter

Data received from either the network or the asynchronous interface is forwarded to the synchronous interface (channel-1).

Network Encapsulation Format

The NETmate model NM-9021 can exchange data on the network in a number of network-encapsulation-formats. A network encapsulation format specifies how the synchronously exchanged data is represented on the network. Through network encapsulation it is possible to "pack" more than a single message-frame into one network packet. Also through encapsulation it is possible to distinguish the exchanged data from other data exchanged on the network. The NETmate can encapsulate data in three different formats.

- NIRAS
  An ASTERIX-like protocol capable of encapsulating multiple frames into a single NIRAS packet.
- ASEP
  A legacy format used in a large number of application to exchange track-data. ASEP has the capability of encapsultaing multiple frames into a single NIRAS packet.
- Transparent
  Data exchanged from the synchronous interface (channel-1) is forwarded after a complete frame has been received.

Receiver

Data is received from the synchronous interface (channel-1) and forwarded to the network encapsulating format. Depending on the configuration the data will be forwarded to the network.

Transmitter

Data received from the network is verified and unpacked by the network encapsulation format and forwarded (if correct) to the synchronous interface (channel-1).

Station Id

Station Identification is a 16 bit integer that is used in the NIRAS encapsulation format to be able to identify the origin of the NIRAS data stream.

Receiver

NIRAS data transmitted to the network has the station id set to the specified value.

Transmitter

Data received from the network is not checked against the configured station id. Please note that the station id is a means to identify the origin, not a means to address a specific unit.

Link Id

Link Identification is a 16-bit integer when used in conjunction with the NIRAS format and an 8-bit integer when used in conjunction with the ASEP format. Link Identification is used to be able to distinguish between multiple data links originating from the same station.

Receiver

ASEP or NIRAS data transmitted to the network has the link id set to the specified value.

Transmitter

Data received from the network is checked against the configured link id. If there is a match, the data is forwarded to the synchronous interface (channel-1). If there is no match, the data will be dropped.

Buffering Time Out

Buffering Time Out is used by the ASEP and NIRAS network formats.

Receiver

The data is transmitted to the network when:
- The maximum frame size has been reached (and thus the buffer is full)
- No data has been received through the synchronous interface during the specified buffering time out.

Transmitter

Buffering Time Out has no function for receiving data from the network.

Network Transport

Network Transport defines the TCP/IP protocol that will be used to exchange data through the network. The NETmate has three options, UDP, TCP/CLT and TCP/SRV.

- UDP
  User Datagram Protocol, a connectionless oriented protocol. There is no guarantee that the data transmitted is actually received by the destination.
- TCP/CLT
  Transfer Control Protocol, a connection oriented protocol. Delivery of data is guaranteed by the protocol. The CLT means CLIENT, the NETmate thus expects a TCP-server at the remote side. The NETmate will initiate the connection.
- TCP/SRV
  Transfer Control Protocol, a connection oriented protocol. Delivery of data is guaranteed by the protocol. The SRV means SERVER, the NETmate thus expects a TCP-client at the remote side. The remote-side need to initiate the connection, thus the NETmate waits until a remote unit connects.

Receiver

Data is transmitted to the network using the specified protocol.

Transmitter

Data is received from the network using the specified protocol.

Local Port

The local port is the network port that is used to send the network data from. The local port is also known as source port. In case TCP/SRV is used the local port specifies to which port clients can connect.

Receiver

Data transmitted to the network has a source port as specified.

Transmitter

Data will be received from the network through the specified source port. That means that other applications need to have their destination port set to the NETmate specified source port.

Destination Address

The destination address is used when exchanging data using the UDP and TCP/CLT protocols. When a UDP-broadcast is required, specify the correct network broadcast address in this field. When connecting to a TCP-server, specify the address of the TCP-server.

Receiver

Data transmitted to the network will be addressed to the specified network address. In case of a TCP/CLT, a connection will be set up to the specified server-address.

Transmitter

In case of a TCP/CLT, a connection will be set up to the specified server-address.

Destination Portnumber

The destination port number specifies to which port the network data will be transmitted. In case of a TCP/CLT it specifies to which port number the NETmate will connect.

Receiver

Data transmitted to the network will be addressed to the specified port number (and IP-address)

Transmitter

The destination port number has no function for the data received from the network.

Async-Speed

The speed selected in this menu is used to transmit and receive asynchronous data via the asynchronous ports. Make sure that the asynchronous baudrate is always higher than the synchronous speed.

- 1200
  Asynchronous bitrate is 1200, No Parity, 8 Bits, 1 Stop bit.
- 2400
  Asynchronous bitrate is 2400, No Parity, 8 Bits, 1 Stop bit.
- 4800
  Asynchronous bitrate is 4800, No Parity, 8 Bits, 1 Stop bit.
- 9600
  Asynchronous bitrate is 9600, No Parity, 8 Bits, 1 Stop bit.
- 19200
  Asynchronous bitrate is 19200, No Parity, 8 Bits, 1 Stop bit.
- 38400
  Asynchronous bitrate is 38400, No Parity, 8 Bits, 1 Stop bit.
- 115K2
  Asynchronous bitrate is 115200, No Parity, 8 Bits, 1 Stop bit.

Receiver

The asynchronous receive rate.

Transmitter

The asynchronous transmit rate.

Channel Configuration 2

After selecting the link the menu as illustrated in Figure 7:“Channel 2 Configuration.” is displayed

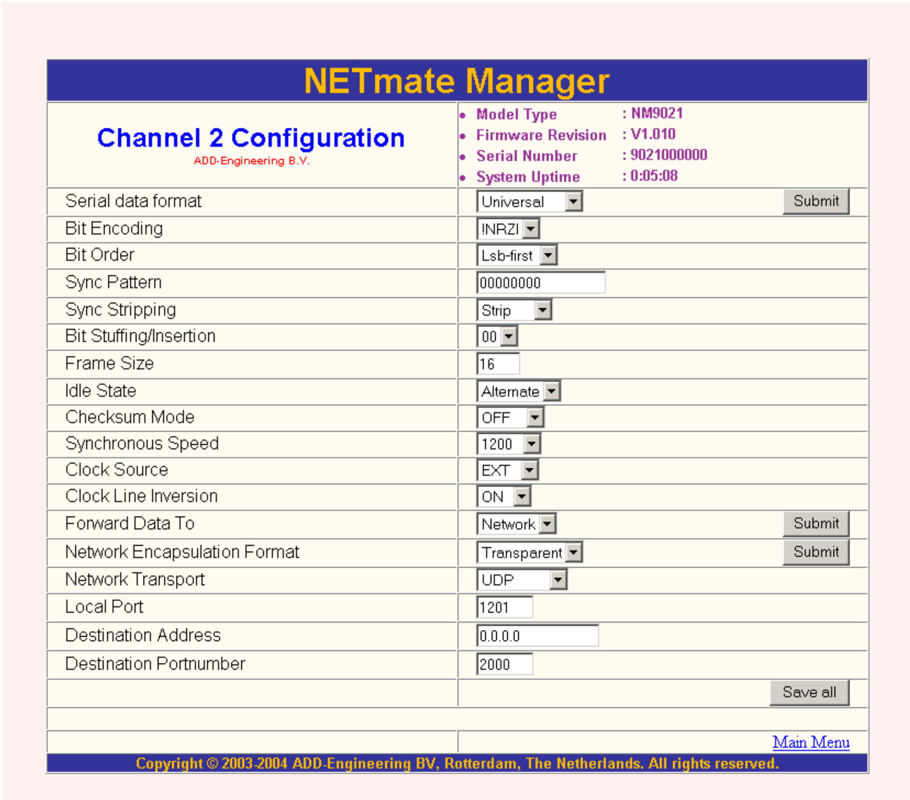

Figure 7:Channel 2 Configuration

Serial data format

Serial data format type selects the type of “protocol” for the specific channel. After selecting a specific serial data format the user should click on the "Submit" button, in this way the parameters that are of no use for the selected serial data format will be hidden. The NETmate provides 4 types of channels, Universal, Link-1, Link-11B and Transparant.

- Universal

The standard operating mode used for processing different military protocols.

- Link-1

  The operating mode providing an interface to Link-1

- Link-11B

  The operating mode providing an interface to Link-11B

- Transparent

  The operating mode that provides a transparant interface from asynchronous to synchronous and vice versa.

Bit Encoding

Receiver

Bit-encoding for the receiver can be described as the way the line-state is decoded to a received bit. With the NETmate it is possible to specify 4 different bit-encoding methods, NRZ, !NRZ, !NRZI and NRZI.

- NRZ

  Generally known as Non Return to Zero, the line-state is directly decoded to form a bit. A ‘1’ on the physical line is "decoded" to a bit with the value ‘1’. A ‘0’ on the physical line is "decoded" to a bit with the value ‘0’.

- !NRZ

  Almost the same as NRZ but in this case all bits are simply inverted. A ‘1’ on the physical line is "decoded" to a bit with the value ‘0’ in memory. A ‘0’ on the physical line is "decoded" to a bit with the value ‘1’.

- NRZI

  Generally known as Non Return to Zero Inverted. Although the name implies that it is just the inverted version of NRZ, there is a more significant difference between these two. To decode the line-state to a bit in NRZI requires knowledge of the previous line-state. If there is a difference between the previous line-state and the actual line-state then it is decoded to a bit with the value ‘0’. If there is no difference between the previous and the actual line-state then it is decoded to a bit with the value '1'. In short, transitions will be decoded to form a bit with the value '0' and steady states will be decoded to form a bit with the value '1'.

- !NRZI
  Almost the same as NRZI but in this case all bits are simply inverted. Transitions will be decoded to form a bit with the value '1' and steady states will be decoded to form a bit with the value '0'.

Transmitter

Bit-encoding for the transmitter can be described as the way the bits which need to be transmitted are encoded to a line state.

- NRZ
  Generally known as Non Return to Zero, the bit is directly encoded to form a line-state. A bit with the value '1' is encoded to the physical line-state 1. A bit with the value '0' is encoded to the physical line-state '0'.

- !NRZ
  Almost the same as NRZ but in this case all bits are simply inverted first. A bit with the value '1' is encoded to the physical line-state '0'. A bit with the value '0' is encoded to the physical line-state '1'.

- NRZI
  To encode the bit to transmit to a line-state in NRZI requires knowledge of the previous line-state. If a bit with the value '0' needs to be encoded then the line-state should alter, so the actual line-state should be the inverted version of the previous line-state. If a bit with the value '1' needs to be encoded the actual line-state should be the same as the previous line-state. In short, bits with the value '0' will be encoded as transitions and bits with the value '1' will be encoded as steady-states.

- !NRZI
  Almost the same as NRZI but in this case all bits are simply inverted first. In short, bits with the value '1' will be encoded as transitions and bits with the value '0' will be encoded as steady-states.

Bit Order

Receiver

For the receiver the bit-order can best be described as the order in which the synchronously received bits are submitted to the asynchronous receiver. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST

  The bit which is received first at the synchronous line will be placed at the LSB-position of the byte which will be submitted to the asynchronous receiver. No bit-reversal is taking place.

- MSB-FIRST

  The bit which is received first at the synchronous line will be placed at the MSB-position of the byte which will be submitted to the asynchronous receiver. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Transmitter

For the transmitter the bit-order can best be described as the order in which the asynchronously received bytes are transmitted by the synchronous transmitter. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST

  The bit at the LSB-position of the byte received at the asynchronous input will be transmitted first by the synchronous transmitter. No bit-reversal is taking place.

- MSB-FIRST

  The bit at the MSB-position of the byte received at the asynchronous input will be transmitted first by the synchronous transmitter. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Sync Pattern

Receiver

The Sync-Pattern specifies the sync-word (a pattern of ones and zeros) on which the receiver will synchronise. The length of the sync-pattern is a minimum of 5 bits and a maximum of 16 bits. The sync-pattern is compared after bit-decoding takes place. When the Sync-Pattern has been received the device is considered to be in-sync. Bytes will now be submitted to the user asynchronously.

Transmitter

The Sync-Pattern denotes the start of a frame. The pattern will be transmitted if there are bytes in the internal buffer. If there are less bytes in the buffer than the specified frame-length, the NETmate will transmit the bytes in the buffer and fill up the remaining bytes (which were not submitted) with idle bits. The Sync-Pattern is fully user definable.

Sync Stripping

To provide the user with the possibility to strip or not strip the sync-word from the synchronously received data or to insert or not insert the sync-word into the synchronously transmitted data, this option is implemented in the NETmate.

Receiver

- NOSTRIP

  The synchronously received sync-word is submitted to the user via the asynchronous output. In case the bit-order is reversed the sync-word will also be reversed.

- STRIP

  The number of synchronisation bits are stripped from the synchronously received data. In other words the sync-word is stripped from the data.

Transmitter

- NOSTRIP

  Nostrip in this context actually means no-insertion. No insertion of a sync-word takes place at the synchronous transmitter side. The user has to submit the sync-word via the asynchronous input port.

- STRIP

Strip means that the sync-word is inserted by the NETmate in case a new frame needs to be transmitted. The sync-word that is inserted is specified by the pattern "Sync-Pattern". The pattern should be read from right to left with the right bit (LSB) transmitted first.

Bit Stuffing/Insertion

Specific bits are stripped from the data at the receiver's side and inserted at the transmitter's side.

Receiver

At the receiver's side (synchronous) the specified bit will be stripped from the data. The insert parameter in this menu is of no significance for the receiver's side. The bitposition parameter specifies which bit will be stripped after reception of the Sync-Word. Assuming the Sync-Word is found and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit after the Sync-Word is stripped from the data (in case Sync-Stripping is also enabled), then the next 8 bits are forwarded to the asynchronous port and the next "first" bit is stripped from the data. This continues until all the bytes of the frame are received.

Transmitter

At the transmitter's side (synchronous) the specified bit will be inserted in the data. The insert parameter in this menu specifies if a ‘0’ or a ‘1’ will be inserted. Assuming the Sync-Word has already been transmitted (and sync-stripping is also enabled) and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit transmitted after the sync-word will be a ‘0’. After that a byte which is submitted via the asynchronous port will be forwarded to the synchronous port and then another ‘0’ will be inserted. This continues until all the bytes of the frame are transmitted.

Frame-Size

The frame-size is selectable in the range of [1..254]. In general the Frame-Size is the number of bytes the user will submit or can expect asynchronously. The latter with some exceptions which can be read hereunder.

Receiver

With the Fame-Length parameter the number of bytes which the user expects is specified. The number of bytes are submitted to the asynchronous side. All the bytes which are received are included in the Frame-Size. So, in case the sync-word is not stripped the Sync-Word will count as part of the total Frame-Length.

Transmitter

With the Frame-Length parameter the number of bytes which the user will submit is specified. In case the Sync-Word is not stripped, the Sync-Word should be submitted by the user via the asynchronous port and thus will count as part of the Frame-Size. However, if a checksum-mode is selected, one byte less should be submitted while the NETmate is generating its own checksum to be forwarded with the data.

Idle-State

The idle-state is used to specify the behaviour of the transmitter in the case that there are no bytes to transmit. The idle-state is directly related to the line-state and thus no bit-encoding will take place. There are three possible idle-states, ‘0’, ‘1’ and ALT.

Receiver

This parameter is of no significance for the receiver.

Transmitter

- ‘0’
  Idle in zero's, invalid for NRZI and !NRZI bit encoding methods.
- ‘1’
  Idle in one's, invalid for NRZI and !NRZI bit encoding methods.
- ALT
  Idle in alternating states, normally this is used to keep receivers with DPLL in sync.

Checksum-Mode

Checksums can be generated by the NETmate, it means that the user does not have to calculate checksums over the data submitted to the NETmate. The checksum is transmitted as the last byte of a frame. The checksum-mode has three options, OFF, XOR and XNOR.

Receiver

The checksum-mode parameter is of no significance in the receiver.

Transmitter

The checksum calculated using the method defined above is attached to the frame as a last byte.

- OFF
  No checksum is attached to the frame
- XOR
  An XOR (exclusive or) will be performed over all the bytes in the frame (except the sync-word).
- XNOR
  An XNOR (inverted exclusive or) will be performed over all the bytes in the frame (except the sync-word).

Synchronous Speed

The Synchronous-Speed parameter of the NETmate has only significance if INT (internal) or DPLL (digital phase locked loop) is enabled. In other cases the transmit/receive clock submitted will dictate the synchronous speed. Thus, when using external clock, the user is not limited by the selection of synchronous-speeds down here. However, there is an upper-limit to the external supplied synchronous clock which is 64k.

- 600
  Data is clocked in and out at 600 bps.
- 1200
  Data is clocked in and out at 1200 bps.
- 2400
  Data is clocked in and out at 2400 bps.

- 4800
  Data is clocked in and out at 4800 bps.
- 9600
  Data is clocked in and out at 9600 bps.
- 19200
  Data is clocked in and out at 19200 bps.
- 56K
  Data is clocked in and out at 56kbps.
- 64K
  Data is clocked in and out at 64 kbps.

Receiver

Data is clocked in at the selected speed.

Transmitter

Data is clocked out at the selected speed.

Clock-source

With the NETmate it is possible to select three different clock-sources. The first most commonly used is the external (EXT) clock-mode, the second is the internal (INT) clock-mode and the third and last is the digital pll (DPLL) clock-mode.

- INT

  The internal clock-mode is used when the NETmate should generate the clocking signals required. The synchronous clock-speed can be selected from the Sync-Speed menu. The clock which is generated internally is placed on pin 24 of the DB25M connector.

- DPLL

  The digital pll clock-mode is used when synchronous data is coming in at a known synchronous bit-rate but not accompanied by a clock signal. The synchronous clock-speed can be selected from the Synchronous-Speed menu. The clock which is generated internally is placed on pin 24 of the DB25M connector. The internally generated clock is synchronised continuously with the received data, or better with the transitions in this data.

- EXT

  With the external clock-mode clock-signals should be connected to the NETmate at pin 17 (RCLK) and pin 15 (TCLK). The RCLK is timebase related to the data on pins 3 (RxD) and the TCLK is timebase related to the data on pin 2 (TxD). The TCLK and RCLK need not to be related, however usually they are.

Receiver

Data is clocked in at the rate specified by the clock-signal.

Transmitter

Data is clocked out at the rate specified by the clock-signal.

Clock Line Inversion

The NETmate has the capability to invert the clock signals when required by the specific type of modem connected to the NETmate. The term "inverted" means the opposite of the standard clock signal used for commercial equipment. Clock Line Inversion OFF thus means that the NETmate is adapted for commercial synchronous equipment.

- ON
  The clock signals (incoming and outgoing, TxC, RxC, ExC) of the NETmate are inverted.
- OFF
  The clock signals (incoming and outgoing, TxC, RxC, ExC) of the NETmate are **not** inverted.

Receiver

Data is clocked in at the inverted or non-inverted clock-signal.

Transmitter

Data is clocked out at the inverted or non-inverted clock-signal.

Forward Data To

The NETmate model NM-9021 can forward channel-2 data only to the network.

- Network
  Data received/transmitted on channel-2 is exchanged through the network

Receiver

Data is received from the synchronous interface (channel-2) and forwarded to the network.

Transmitter

Data received from the network is forwarded to the synchronous interface (channel-2).

Network Encapsulation Format

The NETmate model NM-9021 can exchange data on the network in a number of network-encapsulation-formats. A network encapsulation format specifies how the synchronously exchanged data is represented on the network. Through network encapsulation it is possible to "pack" more than a single message-frame into one network packet. Also through encapsulation it is possible to distinguish the exchanged data from other data exchanged on the network. The NETmate can encapsulate data in three different formats.

- NIRAS
  An ASTERIX-like protocol capable of encapsulating multiple frames into a single NIRAS packet.
- ASEP
  A legacy format used in a large number of application to exchange track-data. ASEP has the capability of encapsultaing multiple frames into a single NIRAS packet.

- Transparent
  Data exchanged from the synchronous interface (channel-2) is forwarded after a complete frame has been received.

Receiver

Data is received from the synchronous interface (channel-2) and forwarded to the network encapsulating format. Depending on the configuration the data will be forwarded to the network.

Transmitter

Data received from the network is verified and unpacked by the network encapsulation format and forwarded (if correct) to the synchronous interface (channel-2).

Station Id

Station Identification is a 16-bit integer that is used in the NIRAS encapsulation format to be able to identify the origin of the NIRAS data stream.

Receiver

NIRAS data transmitted to the network has the station id set to the specified value.

Transmitter

Data received from the network is not checked against the configured station id. Please note that the station id is a means to identify the origin, not a means to address a specific unit.

Link Id

Link Identification is a 16-bit integer when used in conjunction with the NIRAS format and an 8-bit integer when used in conjunction with the ASEP format. Link Identification is used to be able to distinguish between multiple data links originating from the same station.

Receiver

ASEP or NIRAS data transmitted to the network has the link id set to the specified value.

Transmitter

Data received from the network is checked against the configured link id. If there is a match, the data is forwarded to the synchronous interface (channel-2). If there is no match, the data will be dropped.

Buffering Time Out

Buffering Time Out is used by the ASEP and NIRAS network formats.

Receiver

The data is transmitted to the network when:
- The maximum frame size has been reached (and thus the buffer is full)
- No data has been received through the synchronous interface during the specified buffering time out.

Transmitter

Buffering Time Out has no function for receiving data from the network.

Network Transport

Network Transport defines the TCP/IP protocol that will be used to exchange data through the network. The NETmate has three options, UDP, TCP/CLT and TCP/SRV.

- UDP
  User Datagram Protocol, a connectionless oriented protocol. There is no guarantee that the data transmitted is actually received by the destination.
- TCP/CLT
  Transfer Control Protocol, a connection oriented protocol. Delivery of data is guaranteed by the protocol. The CLT means CLIENT, the NETmate thus expects a TCP-server at the remote side. The NETmate will initiate the connection.
- TCP/SRV
  Transfer Control Protocol, a connection oriented protocol. Delivery of data is guaranteed by the protocol. The SRV means SERVER, the NETmate thus expects a TCP-client at the remote side. The remote-side need to initiate the connection, thus the NETmate waits until a remote unit connects.

Receiver

Data is transmitted to the network using the specified protocol.

Transmitter

Data is received from the network using the specified protocol.

Local Port

The local port is the network port that is used to send the network data from. The local port is also known as source port. In case TCP/SRV is used the local port specifies to which port clients can connect.

Receiver

Data transmitted to the network has a source port as specified.

Transmitter

Data will be received from the network through the specified source port. That means that other applications need to have their destination port set to the NETmate specified source port.

Destination Address

The destination address is used when exchanging data using the UDP and TCP/CLT protocols. When a UDP-broadcast is required, specify the correct network broadcast address in this field. When connecting to a TCP-server, specify the address of the TCP-server.

Receiver

Data transmitted to the network will be addressed to the specified network address. In case of a TCP/CLT, a connection will be set up to the specified server-address.

Transmitter

In case of a TCP/CLT, a connection will be set up to the specified server-address.

Destination Portnumber

The destination port number specifies to which port the network data will be transmitted. In case of a TCP/CLT it specifies to which port number the NETmate will connect.

Receiver

Data transmitted to the network will be addressed to the specified port number (and IP-address)

Transmitter

The destination port number has no function for the data received from the network.

Async-Speed

The speed selected in this menu is used to transmit and receive asynchronous data via the asynchronous ports. Make sure that the asynchronous baudrate is always higher than the synchronous speed.

- 1200

  Asynchronous bitrate is 1200, No Parity, 8 Bits, 1 Stop bit.

- 2400

  Asynchronous bitrate is 2400, No Parity, 8 Bits, 1 Stop bit.

- 4800
  Asynchronous bitrate is 4800, No Parity, 8 Bits, 1 Stop bit.
- 9600
  Asynchronous bitrate is 9600, No Parity, 8 Bits, 1 Stop bit.
- 19200
  Asynchronous bitrate is 19200, No Parity, 8 Bits, 1 Stop bit.
- 38400
  Asynchronous bitrate is 38400, No Parity, 8 Bits, 1 Stop bit.
- 115K2
  Asynchronous bitrate is 115200, No Parity, 8 Bits, 1 Stop bit.

Receiver

The asynchronous receive rate.

Transmitter

The asynchronous transmit rate.

In case channel-1 is configured in the "Async-Channel-2" forwarding mode, channel-2 can not be configured. See Figure 8:“Channel 2 configuration disabled.”.

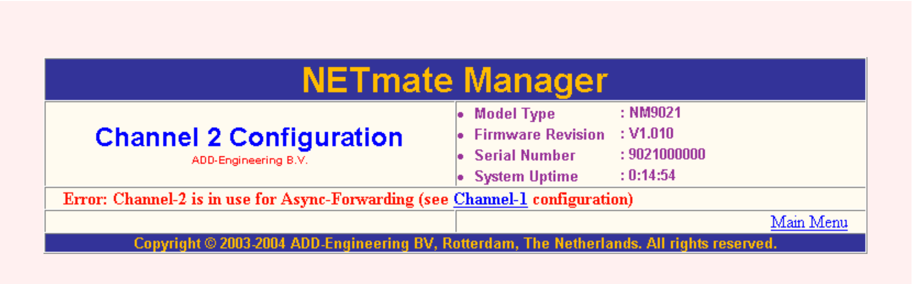

Figure 8:Channel 2 configuration disabled

Chapter 5
Network Configuration

The NETmate has a number of network parameters that can be configured to adapt the NETmate to your Local Area Network configuration. After selecting the IP-Configuration link, the following menu is displayed.

IP-Configuration

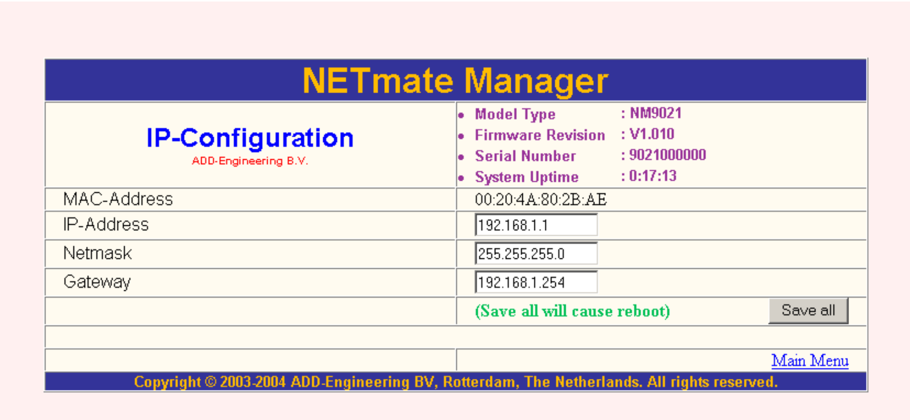

Figure 9:IP-Configuration menu

MAC-Address

The MAC-Address specifies the unique hardware address of the NETmate. The hardware address can not be altered and is only displayed in this menu for information.

IP-Address

The IP-address of the NETmate. The user should take care that a network unique IP-address is assigned to the NETmate.

Netmask

The network mask of the NETmate and in this way selects a class-A, class-B or a class-C network. Please see other documentation on TCP/IP for a detailed explanation on the netmask.

Gateway

The gateway to use when communicating with systems outside the Local Area Network.

Save all

After making the required changes, click on the "Save all" button to store the settings in the NETmate. After storing these settings, the NETmate will reboot. Please follow instructions as displayed in Figure 10:“IP-Configuration menu.”.

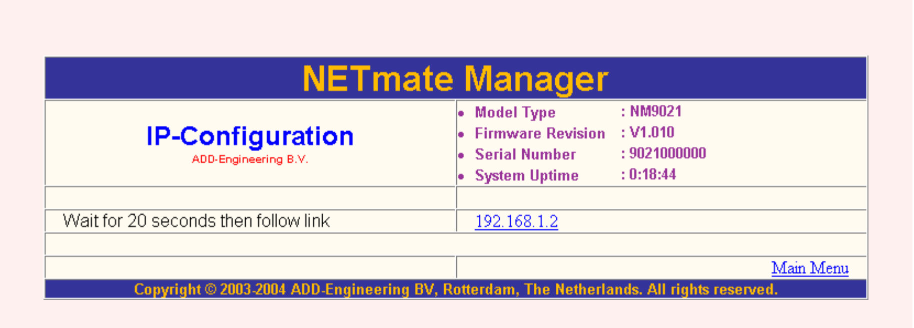

Figure 10: IP-Configuration menu

Chapter 6
Statistics Overview

The NETmate has a number of facilities to monitor the behaviour of the communication link and the unit. By selecting "Channel-1 Statistics" or "Channel-2 Statistics" information is provided on the selected synchronous channel.

Channel-1 Statistics

After selecting the "Channel-1 Statistics" link, the menu as illustrated in Figure 11:“Channel 1 Statistics menu.” is displayed.

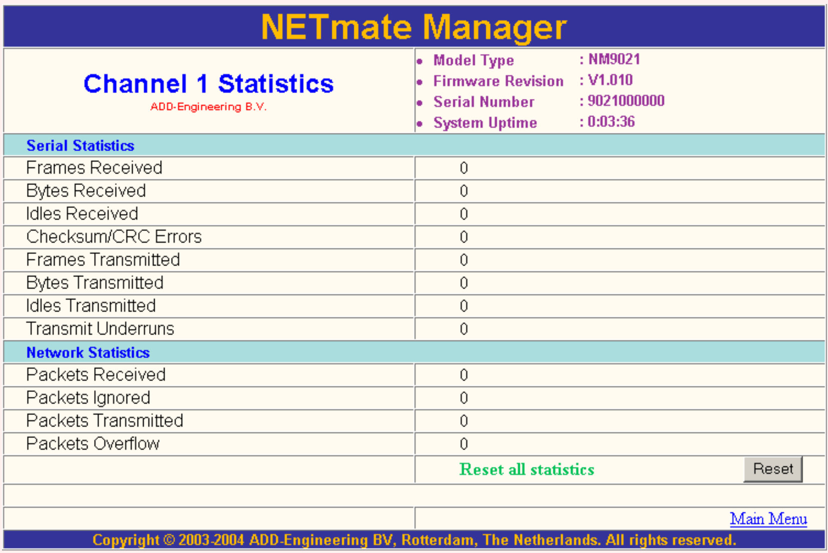

Figure 11: Channel 1 Statistics menu

Serial Statistics

Frames Received

The number of frames received through the synchronous interface side.

Bytes Received

The number of bytes received through the synchronous interface side.

Idles Received

The number of idles (idle-bytes) received through the synchronous interface side.

Checksum/CRC Errors

Only applicable to the Link-1 and Link-11B data format. Indicates the number of detected checksum errors for the specified data format.

Frames Transmitted

The number of frames transmitted through the synchronous interface side.

Bytes Transmitted

The number of bytes transmitted trhough the synchronous interface side.

Idles Transmitted

The number of idles (idle bytes) transmitted through the synchronous interface side.

Transmit Underruns

The number of transmitter underruns. An underrun occurs when the request for data is not handled successfully. Normally this should remain 0.

Network Statistics

The network statistics are applicable to the data packets (thus the frames received/transmitted through the synchronous interface) send/received through the network interface.

Packets Received

The number of packets received from the network.

Packets Ignored

The number of network packets dropped (thus not passed to the synchronous serial interface).

Packets Transmitted

The number of packets transmitted to the network.

Packets Overflow

The number of packets dropped because of a buffer overflow.

General

Reset

Sets all the statistics to the value of zero.

Channel-2 Statistics

After selecting the "Channel-2 Statistics" link the following menu is displayed.

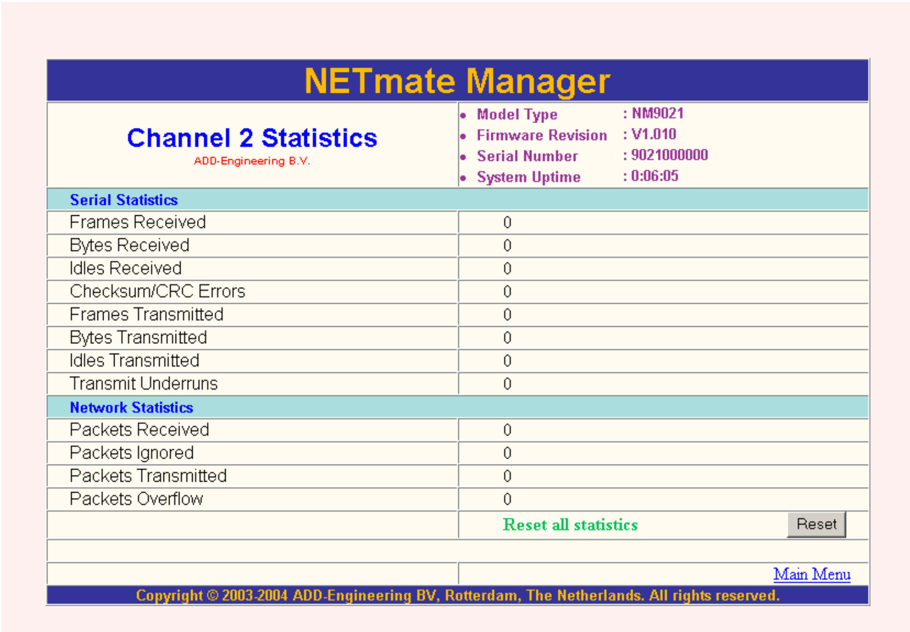

Figure 12: Channel 2 Statistics menu

Serial Statistics

Frames Received

The number of frames received through the synchronous interface side.

Bytes Received

The number of bytes received through the synchronous interface side.

Idles Received

The number of idles (idle-bytes) received through the synchronous interface side.

Checksum/CRC Errors

Only applicable to the Link-1 and Link-11B data format. Indicates the number of detected checksum errors for the specified data format.

Frames Transmitted

The number of frames transmitted through the synchronous interface side.

Bytes Transmitted

The number of bytes transmitted trhough the synchronous interface side.

Idles Transmitted

The number of idles (idle bytes) transmitted through the synchronous interface side.

Transmit Underruns

The number of transmitter underruns. An underrun occurs when the request for data is not handled successfully. Normally this should remain 0.

Network Statistics

The network statistics are applicable to the data packets (thus the frames received/transmitted through the synchronous interface) send/received through the network interface.

Packets Received

The number of packets received from the network.

Packets Ignored

The number of network packets dropped (thus not passed to the synchronous serial interface).

Packets Transmitted

The number of packets transmitted to the network.

Packets Overflow

The number of packets dropped because of a buffer overflow.

General

Reset

Sets all the statistics to the value of zero.

In case channel-1 is configured in the "Async-Channel-2" forwarding mode, channel-2 can not be configured. See Figure 13:“Channel 2 Statistics disabled.”

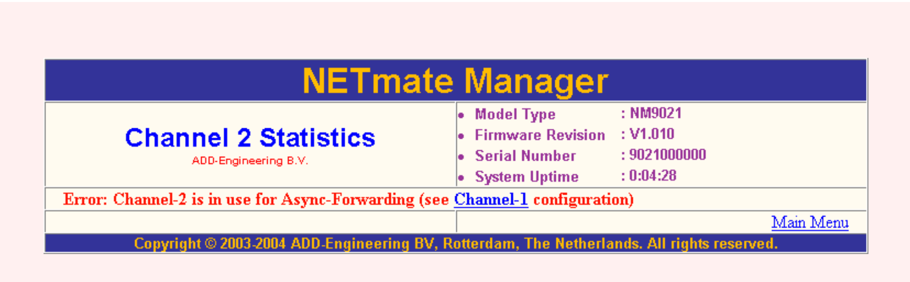

Figure 13: Channel 2 Statistics disabled

Chapter 7
System Management

Through system-management the firmware of the unit can be upgraded, the unit’s settings can be reset to factory defaults and the username and password combination can be changed.

User Management

When clicking on the link "User Management" the menu as illustrated in Figure 14:“User Management menu.” is displayed. Through this menu, the username and password can be changed. After changing username and password, the same menu is displayed. When selecting another menu, an authentication dialog (logon-dilalog) is displayed where the new username and password should be entered.

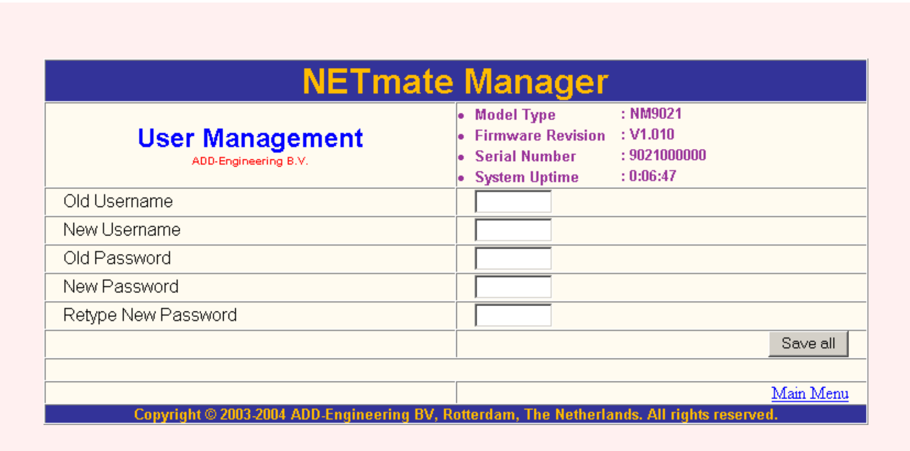

Figure 14:User Management menu

Old Username

The current username

New Username

The new username (minimum of 5 characters)

Old Password

The current password

New Password

The new password

Retype New Password

The new password (for verification).

Save all

Saves the settings.

Factory Settings

When clicking on the link "Factory Settings" the following menu is displayed. Through this menu, the factory defaults can be re-programmed into the NETmate again. Please use http://192.168.1.1 to reconnect to the NETmate after resetting to defaults.

Reset

Resets to default and reboots the unit.

Firmware Upgrade

When clicking on the link "Firmware Upgrade" the menu as illustrated in Figure 15:“Firmware upgrade menu.” is displayed. Through this menu, the firmware embbeded in the NETmate can be upgraded.

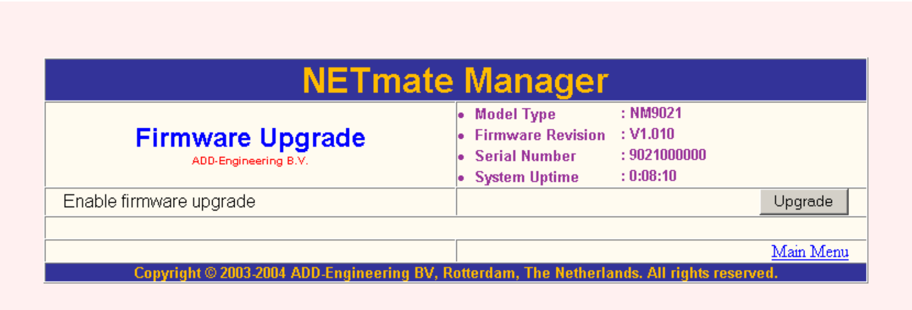

Figure 15: Firmware upgrade menu

Upgrade

Places the NETmate into "firmware upgrade mode". The unit is now ready for a new software version. Please use the appropiate software upgrade tool supplied by ADD-Engineering. Do not power off the unit when firmware upgrade is in progress (and thus the upgrade tool has been started). **The unit should never be powered off when the upgrade tool has been started and a firmware upgrade is in progress. The NETmate can be damaged permanently when not following the instructions above.**

Chapter 8
Factory Defaults

This chapter describes the settings of the NETmate model NM-9021 when shipped by ADD-Engineering. These settings can be restored using the "Factory Settings" option in the System Management group.

Network defaults

Parameter name	Value
IP-address	192.168.1.1
Network mask	255.255.255.0
Gateway	192.168.1.254
Network Transport	UDP
Local port	1200 (channel-1) / 1201 (channel-2)
Destination address	0.0.0.0
Destination portnumber	2000

Table 9:Network default settings

Serial defaults

Parameter name	Value
Data format	Link-1
Bit Encoding	!NRZI
Bit Order	LSB-First
Sync Pattern	00000000
Sync Stripping	ON
Bit Stuffing/Insertion	00
Frame Size	16
Idle State	Alternate
Checksum-Mode	OFF
Synchronous Speed	1200
Clock-source	EXT
Clock-inversion	ON
Forward Data To	Async-Channel-2
Async Speed	2400

Table 10:Serial port default settings

Authentication defaults

Parameter name	Value
Username	root
Password	manager

Table 11:Authentication default settings

Appendix A
Warranty and Maintenance

Warranty Information

Hardware

All ADD-Engineering B.V.'s hardware products are covered by a one year warranty from the original date of purchase. Warranty coverage includes:

Telephone support. Free phone support on any hardware product for one year after initial product purchase. ADD-Engineering's Customer Service and Support (CSS) hours are 9:00 am to 5:00 pm, Monday through Friday.

Rapid replacement. Upon CSS phone verification of hardware failure within the first 90 days after purchase, ADD-Engineering will issue a return material authorization (RMA) number for rapid replacement. If the failed unit is in stock, a replacement unit will be shipped within one business day. If the failed unit is not in stock, it will receive the highest priority for repair once ADD-Engineering receives the unit.

Extended maintenance option. Extends the standard warranty coverage, including rapid replacement, to three years when purchased within 90 days of initial product purchase.

Out of warranty repair service is available for a per-product flat fee. Typical turnaround for out-of-warranty repairs is four to six weeks from date of factory receipt.

Limited Hardware Warranty. ADD-Engineering warrants its hardware products to be free from defect in materials and workmanship. ADD-Engineering will repair or replace (at its option) all defective product returned freight pre-paid, in original packaging, to its factory in Rotterdam, The Netherlands within one (1) year. ADD-Engineering reserves the right to ship replacement units from our inventory of reconditioned units. All other warranties, expressed or implied, are limited to the restrictions of this warranty. Product abuse, alteration, or misuse invalidates all warranties. This warranty does not cover damages incurred by natural or electrical forces exceeding the stated product specifications. In no event will ADD-Engineering's warranty liability exceed the purchase price of the product. No liability is assumed for any consequential damages resulting from the use of any ADD-Engineering product.

This warranty is in lieu of all other warranties, including but not limited to the warranties of merchantability and fitness for a particular purpose. National, state and local laws may offer rights in addition to those stated above.

Product Information Worksheet

Please record the following information about your NETmate model NM-9021.

NETmate Serial number:

NETmate MAC address:

Purchase date:

Appendix B
Cables and Connectors

This appendix provides necessary background information for making connections to the serial and the network ports on the NETmate model NM-9021. It discusses modem and null modem connectors, the standard RS-232 pinouts, the RJ-45 pinouts, and describes some typical cables

Two terms used frequently throughout this appendix are

- Data Communication Equipment (DCE)
- Data Terminal Equipment (DTE)

DCE peripheral devices usually refer to modems
DTE devices include terminals, computers and printers.

Cabling Overview

To connect a peripheral device to the NETmate, you need an interface cable to run electrical signals from one of the RJ-45 connectors to the peripheral device.

ADD-Engineering includes the cables required to connect the NETmate to a standard asynchronous port and to a standard synchronous port. Cables required to connect the NETmate to the network are not included. You can purchase ready-made network cables at your local computer store or make them on your own

DCE and DTE devices send and receive signals through different pins. The NETmate has the capability to be configured as a DCE device with an RS-232 electrical interface and on the other side (synchronous) to be a DTE device with an RS-232 electrical interface.

Serial Connector Pinouts

All of the NETmate's synchronous communication ports are equipped with an RJ-45 connector (port 4 and 5). The electrical interface for these ports is RS-232. The port behaves like a DTE (with respect to the clocking signals).

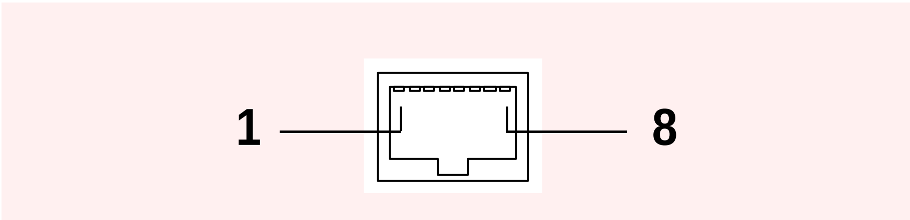

Figure 16: Serial connector pin diagram (DTE RJ-45)

Pin Number	RS-232 Signal	V.24 Signal	Direction
1	RxC	115	Input
2	TxC	114	Input
3	ExC	113	Output
4	Signal GND		None
5	RxD	104	Input
6	TxD	103	Output
7	CTS	106	Input
8	RTS	105	Output

Table 12:Pinout of synchronous serial interface

All of the NETmate's asynchronous ports (port 4) are equipped with an RJ-45 connector. The electrical interface for these ports is RS-232. The port can behave like a DCE (with respect to the handshaking signals) when configured to do so.

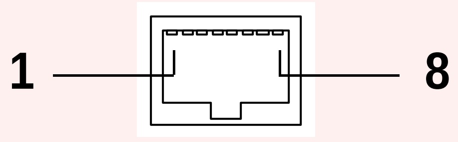

Figure 17: Serial connector pin diagram (DCE RJ-45)

Pin Number	RS-232 Signal	V.24 Signal	Direction
1			
2			
3			
4	Signal GND		None
5	RxD	103	Input
6	TxD	104	Output
7	RTS	105	Input
8	CTS	106	Output

Table 13:Pinout of asynchronous serial interface

Signal	Description
TxD	Transmit Data. Sends data to peripheral device
RxD	Receive Data. Receives data from the peripheral
RxC	Receive Data Clock. Input for receiver signal element timing from a synchronous DCE-device.
TxC	Transmit Data Clock. Input for transmitter signal element timing from a synchronous DCE-device
TxC	Transmit Data Clock. Output for transmitter signal element timing generated on the NETmate
CTS	Clear To Send handshake signal
RTS	Request To Send handshake signal

Table 14:Signal descriptions

RJ-45 to DB25-male cable (RED)

RJ-45 Pin Number	RS-232 Signal	Direction	DB25-male Pin Number
1	RxC	<-	17
2	TxC	<-	15
3	ExC	->	24
4	Signal GND		7
5	RxD	<-	3
6	TxD	->	2
7	CTS	<-	5
8	RTS	->	4

Table 15:RJ-45 to DB25-male cable pinout

RJ-45 to DB25-female cable (BLUE)

RJ-45 Pin Number	RS-232 Signal	Direction	DB25-female Pin Number
1			
2			
3			
4	Signal GND		7
5	RxD	<-	2
6	TxD	->	3
7	RTS	<-	4
8	CTS	->	5

Table 16:RJ-45 to DB25-female cable pinout