Teldat Router

ASTM Interface

Doc. *DM721-I* Rev. *10.00*
March, 2003

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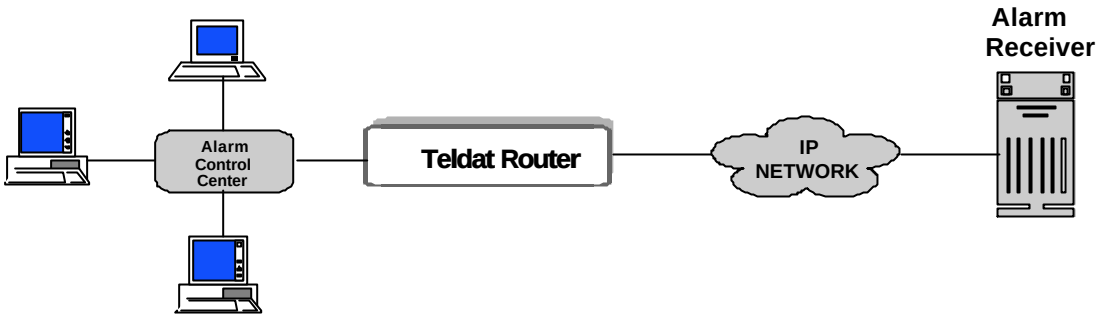
Chapter 1
Introduction

1. ASTM Interface



In a work scenario as shown by the above figure where messages generated by the security and surveillance devices (alarm centers) are sent through a data network based in IP protocol. In order to carry this out, two facilities need to be implemented. Firstly you need to define the method to transport the messages through the network, and secondly specify a method to convert data from the format delivered by the surveillance device (alarm center) to the format specified in the previously defined method for transport purposes.

The first objective is to implement a transport protocol to send general data via IP (Internet Protocol) based networks.

The method used is called Trivial Message Transfer Protocol (known as TRMTP). In this, each message is dealt with separately from the rest.

This protocol has been designed in such a way that implementation is simple, excessive amounts of resources are not used and the tasks required of the devices using this are not overwhelming. A further use is the sending of alarm messages between devices.

So that the loading and resource consumption is kept low, this is implemented over the UDP (User Datagram Protocol) service, available in the IP protocol.

Some of the TRMTP protocol characteristics are:

- Ensures that all information messages arrive at the other end (CONFIRMATION MODE).
- Ensures the detection of duplicated messages at reception so they can be discarded (CONFIRMATION MODE).
- Ensures that the order the messages arrive in is correct (CONFIRMATION MODE).
- There is a datagram sending service that while it cannot totally ensure delivery, is quicker (DATAGRAM MODE).
- It is not orientated to a connection.
- It is bi-directional; the device can both send and receive messages.

The second objective is to discover a conversion method to send data received by an asynchronous series interface via the previously defined TRMTP protocol.

The converter will be defined as ASYN-TRMTP and the interface supporting this conversion is called ASTM (ASynchronous Transport Message).

1.1. Functionality

The defined converter function is PAD or PDA (Packet Assembler/Dissembler). Basically these systems packet data received from the asynchronous interface according to the rules established in order to send them in frames or messages via the interface orientated to packets. It also carries out the inverse process for data received from the interface orientated to packets.

1.2. TRMTP -> ASYNCHRONOUS Conversion

Below the norms the converter follows to send encapsulated received data in TRMTP messages to the asynchronous interface are defined.

As the nature of the data traffic basically consists of messages sent between devices and not a continuous stream of data, a software flow control system is not defined. The devices are considered to have sufficient memory to receive the complete messages and leave flow and error control to the superior protocols between devices using the transport system.

In order to maintain a simple design and a rapid recuperation of recourses in the device, the system discards received messages when it becomes congested both globally in the devices as well as in the outgoing queues to the interface. In order to avoid these congested situations as much as possible, you need to define enough memory to deal with these.

a) Congestion in the device

The device is considered to be in a congested state when it does not have enough memory to save the received TRMTP messages pending forwarding to an asynchronous serial port either due to lack of buffers to store them or because the outgoing queues to the serial interface are full.

- In the TRMTP DATAGRAM service. The received DGM messages are discarded and not forwarded to the interface.
- In the TRMTP WITH CONFIRMATION service. The received INF messages are discarded and not confirmed. NAK can be used to respond or not for this.

b) TRMTP Service Down

In this case, messages are not received from the TRMTP service.

c) Asynchronous Interface Down

The interface is considered down or out of order when the physical signals indicated that the device connected to the interface is not operative.

- In the TRMTP DATAGRAM service. The received DGM messages are discarded and not forwarded to the interface.
- In the TRMTP WITH CONFIRMATION service. The received INF messages are discarded and not confirmed. NAK can be used to respond or not for this.

d) Both Asynchronous Interface and TRMTP Service Operative

The interface is considered operative when the physical signals indicate that the device connected to the interface is operative.

Distinct priorities are not defined between INF and DGM messages. The data therefore must respect the chronological order of arrival when forwarding to the serial interface.

- In the TRMTP DATAGRAM service. The received DGM messages are sent to the outgoing asynchronous interface queues.
- In the TRMTP WITH CONFIRMATION service. The data received in INF or DGM messages is sent to the outgoing asynchronous interface queues.

1.3. ASYNCHRONOUS -> TRMTP Conversion

Below the norms the converter follows to generate TRMTP messages with received data by the asynchronous interface are defined.

As the nature of the data traffic basically consists of messages sent between devices and not a continuous stream of data, a software flow control system is not defined. The devices are considered to have sufficient memory to receive the complete messages and leave flow and error control to the superior protocols between devices using the transport system.

In order to maintain a simple design and a rapid recuperation of recourses in the device, the system discards received data if it cannot generate messages when it becomes congested. In order to avoid these congested situations as much as possible, you need to define enough memory to deal with these.

a) Congestion in the device

The device is considered to be in a congested state when it does not have enough memory to create TRMTP messages from the received data by the asynchronous serial interface. In the case where the incoming asynchronous interface queues become full, characters are lost. The queues therefore need to be made large enough in order to avoid loss of information.

b) TRMTP Service Down

In this case, the messages generated in the conversion are discarded by the TRMTP service and are lost.

c) Asynchronous Interface Down

The interface is considered down or out of order when the physical signals indicated that the device connected to the interface is not operative. In this case, data from the asynchronous serial interface is not received.

d) Both Asynchronous Interface and TRMTP Service Operative

The characters received from the asynchronous serial port are queued in a buffer and a TRMTP message is generated with the content from the buffer when one of the following conditions is met.

- If the buffer is full. This is defined by the value in the TRMTP service N1 parameter.
- The character received provokes the buffer to send according to the CHRSND parameter defined for the conversion.

- The buffer contains characters and the TMRSND send timer expires. The TMRSND process starts once the last character is received.

Once the buffer is ready to send, it requests the generation of a TRMTP message.

- In the TRMTP DATAGRAM service. A DGM message send is requested.
- In the TRMTP WITH CONFIRMATION service. An INF message send is requested.

1.4. Asynchronous Interface Parameters

The configurable parameters for the asynchronous interface operation are as follows:

- SPEED: Asynchronous serial Interface speed. This is configurable and the values are between 300 and 64000 bps. The default value is 9600.

- DATA BITS (BDATA): Number of data bits per character. As this system intends sending octets, the default value is 8. The possible values are 5, 6, 7 or 8.

- STOP BITS (BSTOP): Number of STOP bits per character. The default value is 1. The possible values are 1 or 2.

- PARITY: Type of parity used. By default this is NOT used. The possible values are EVEN, ODD, MARK, SPACE or NONE.

1.5. Conversion Parameters

The configurable parameters for the ASYN-TRMTP converter's operation are as follows:

- CHRSND: Character which provokes data transmission. This is configurable and in reality is based on the X.3 norm number 3 parameter. This parameter contains a value between 0 and 255 (0xFF) where each bit set to 1 indicates which characters can provoke data transmission. By default this is 0 meaning that no character provokes data sending. The meaning of each bit is described below:

    - 0x00 No character provokes data transmission.
    - 0x01 (A - Z, a - z, 0 - 9) provoke data transmission.
    - 0x02 CR provokes data transmission.
    - 0x04 ESC, BEL, ENQ, ACK provoke data transmission.
    - 0x08 DEL, CAN, DC2 provoke data transmission.
    - 0x10 ETX, EOT provoke data transmission.
    - 0x20 HT, LF, VT, FF provoke data transmission.
    - 0x40 Other characters (0x00 - 0x1F) not previously defined.
    - 0x80 Other characters (0x20 - 0x7F) not previously defined.

- TMRSND: Inactivity timer which provokes data transmission. This process begins once a character is received from the asynchronous interface. This is configurable and in reality is based on the X.4 norm number 4 parameter. The value is between 0 and 65535. The unit for this timer is 1/20 second. By default the value is 0 i.e. the timer is deactivated although in reality this does not happen as if there is no send character defined either, it uses a timer of 60 seconds of inactivity to send the buffer.

Chapter 2
Configuration

1. ASTM Configuration Commands

To enter in the configuration procedure, follow the steps explained below:

1. At the (*) prompt, enter **PROCESS 4** or just **P 4**. This will take you to the configuration prompt *Config>*.

```
*P 4
Config>
```

If the *Config>* prompt does not immediately appear, press *enter* again.

2. Then, enter the **NETWORK** command, followed by the name of the ASTM interface previously configured. This is generically known as <*ifc*>.

```
Config>NETWORK <ifc>

-- ASTM Interface Configuration --
ASTM-ifc Cfg>
```

If for example the interface was serial0/0, it would look like this:

```
Config>NETWORK serial0/0

-- ASTM Interface Configuration --
ASTM-serial0/0 Cfg>
```

In this chapter, the ASTM configuration commands are numbered and described. All the ASTM configuration commands must be entered at the ASTM prompt (ASTM-*ifc* Cfg>).

Command	Function
? (HELP)	Lists the configuration commands or within a command lists any associated parameters.
DELETE	Deletes the interface configuration.
LIST	Displays configured information on the ASTM interface.
RESTORE	Restores the default configuration used in the ASTM interfaces.
SET	Configures specific interface parameters.
EXIT	Returns to the Config> prompt.

1.1. ? (HELP)

The **?** (HELP) command serves to list all the available commands included at the normal prompt level. In the same way, entering **?** after a specific command name you can obtain all the options for that command.

Syntax:

```
ASTM-serial0/0 Cfg>?
```

Example:

```
ASTM-serial0/0 Cfg>?
DELETE
LIST
RESTORE
SET
EXIT
ASTM-serial0/0 Cfg>
```

1.2. DELETE

Use the **DELETE** command in the ASTM configuration procedure to delete specific ASTM interface information.

Syntax:

```
ASTM-serial0/0 Cfg>DELETE
```

Example:

```
ASTM-serial0/0 Cfg>DELETE
Confirm interface configuration delete (Yes/No)(Y)? Y
ASTM-serial0/0 Cfg>
```

1.3. LIST

Use the **LIST** command in the ASTM configuration procedure to view the ASTM interface configuration information.

Syntax:

```
ASTM-serial0/0 Cfg>LIST ?
ALL
CHARACTER-SEND
DATA-BITS
LOCAL-PORT
MODE
N1
N2
PARITY
REMOTE-IP
REMOTE-PORT
SPEED
STOP-BITS
T1
T2
T3
T4
TIMER-SEND
ASTM-serial0/0 Cfg>
```

a) LIST ALL

This command displays all the interface configuration.

Example:

```
ASTM-serial0/0 Cfg>LIST ALL
Link speed                          :  9600 (bit/sec)
Data bits                           : 8
Stop bits                           : 1
Parity                              : NONE
Character Send                      :     0
Timer Send                          :     0 (1/20 secs)
Transfer Mode                       : DATAGRAM
```

```
Remote IP Address                   : 0.0.0.0
Remote UDP Port                     : 20000
Local UDP Port                      : 20000
Max. length of messages        (N1) :  1400 (bytes)
Max. num of retransmissions    (N2) :     3
Answer timer                   (T1) :    30 (secs)
Tx error recuperation timer    (T2) :   300 (secs)
Tx inactivity timer            (T3) :     0 (secs)
Rx inactivity timer            (T4) :   300 (secs)

ASTM-serial0/0 Cfg>
```

b) LIST CHARACTER-SEND

This command displays the value configured for the send message character.

Example:

```
ASTM-serial0/0 Cfg>LIST CHARACTER-SEND
Character Send                      :     0
ASTM-serial0/0 Cfg>
```

c) LIST DATA-BITS

This command displays the Data bits configured value by character.

Example:

```
ASTM-serial0/0 Cfg>LIST DATA-BITS
Data bits                           : 8
ASTM-serial0/0 Cfg>
```

d) LIST LOCAL-PORT

This command displays the value configured for the local UDP port.

Example:

```
ASTM-serial0/0 Cfg>LIST LOCAL-PORT
Local UDP Port                      : 20000
ASTM-serial0/0 Cfg>
```

e) LIST MODE

This command displays the mode or type of service used by the interface to send TRMTP messages.

Example:

```
ASTM-serial0/0 Cfg>LIST MODE
Transfer Mode                       : DATAGRAM
ASTM-serial0/0 Cfg>
```

f) LIST N1

This command displays the value configured for the N1 counter.

Example:

```
ASTM-serial0/0 Cfg>LIST N1
Max. length of messages        (N1) :  1400 (bytes)
ASTM-serial0/0 Cfg>
```

g) LIST N2

This command displays the value configured for the N2 counter.

Example:

```
ASTM-serial0/0 Cfg>LIST N2
Max. num of retransmissions    (N2) :     3
ASTM-serial0/0 Cfg>
```

h) LIST PARITY

This command displays the used parity configured value by character.

Example:

```
ASTM-serial0/0 Cfg>LIST PARITY
Parity                          : NONE
ASTM-serial0/0 Cfg>
```

i) LIST REMOTE-IP

This command displays the value configured for the remote IP address.

Example:

```
ASTM-serial0/0 Cfg>LIST REMOTE-IP
Remote IP Address                : 0.0.0.0
ASTM-serial0/0 Cfg>
```

j) LIST REMOTE-PORT

This command displays the value configured for the remote UDP port.

Example:

```
ASTM-serial0/0 Cfg>LIST REMOTE-PORT
Remote UDP Port                  : 20000
ASTM-serial0/0 Cfg>
```

k) LIST SPEED

This command displays the speed for interface reception and transmission.

Example:

```
ASTM-serial0/0 Cfg>LIST SPEED
Link speed                       :  9600 (bit/sec)
ASTM-serial0/0 Cfg>
```

l) LIST STOP-BITS

This command displays the Stop bits configured value by character.

Example:

```
ASTM-serial0/0 Cfg>LIST STOP-BITS
Stop Bits                        : 1
ASTM-serial0/0 Cfg>
```

m) LIST T1

This command displays the value configured for the T1 timer.

Example:

```
ASTM-serial0/0 Cfg>LIST T1
Answer timer                (T1) :    30 (secs)
ASTM-serial0/0 Cfg>
```

n) LIST T2

This command displays the value configured for the T2 timer.

Example:

```
ASTM-serial0/0 Cfg>LIST T2
Tx error recuperation timer    (T2) :   300 (secs)
ASTM-serial0/0 Cfg>
```

o) LIST T3

This command displays the value configured for the T3 timer.

Example:

```
ASTM-serial0/0 Cfg>LIST T3
Tx inactivity timer            (T3) :     0 (secs)
ASTM-serial0/0 Cfg>
```

p) LIST T4

This command displays the value configured for the T4 timer.

Example:

```
ASTM-serial0/0 Cfg>LIST T4
Rx inactivity timer            (T4) :   300 (secs)
ASTM-serial0/0 Cfg>
```

q) LIST TIMER-SEND

This command displays the value configured for the send messages timer.

Example:

```
ASTM-serial0/0 Cfg>LIST TIMER-SEND
Timer Send                          :     0 (1/20 secs)
ASTM-serial0/0 Cfg>
```

1.4. RESTORE

Use the **RESTORE** command to load the configuration with the default values for the interface.

Syntax:

```
ASTM-serial0/0 Cfg>RESTORE
```

Example:

```
ASTM-serial0/0 Cfg>RESTORE
ASTM-serial0/0 Cfg>
```

1.5. SET

Syntax:

```
ASTM-serial0/0 Cfg>SET ?
CHARACTER-SEND
DATA-BITS
LOCAL-PORT
MODE
N1
N2
PARITY
REMOTE-IP
REMOTE-PORT
SPEED
STOP-BITS
T1
T2
T3
T4
TIMER-SEND
ASTM-serial0/0 Cfg>
```

a) SET CHARACTER-SEND

Configures the character that on reception provokes message send. This parameter indicates the ASTM-TRMTP converter which sends the message with the received date including the send character when the latter is received. The range of admitted values is 0 - 255. A 0 value indicates that there is no character provoking a message send and these will only be sent if the send timer expires or if the N1 value for received data waiting to be sent is exceeded. The value is a bits mask where each bit indicates the permitted characters to carry out sending. The default value is 0.

0x00	(0)	No character provokes data transmission.
0x01	(1)	(A - Z, a - z, 0 - 9) provoke data transmission.
0x02	(2)	CR provokes data transmission.
0x04	(4)	ESC, BEL, ENQ, ACK provoke data transmission.
0x08	(8)	DEL, CAN, DC2 provoke data transmission.
0x10	(16)	ETX, EOT provoke data transmission.
0x20	(32)	HT, LF, VT, FF provoke data transmission.
0x40	(64)	Other characters (0x00 - 0x1F) not previously defined.
0x80	(128)	Other characters (0x20 - 0x7F) not previously defined.

Example:

```
ASTM-serial0/0 Cfg>SET CHARACTER-SEND
Enter character send value (0 - 255) [0] ? 2
ASTM-serial0/0 Cfg>
```

b) SET DATA-BITS

Configures the number of Data bits forming a character in the asynchronous port. The permitted values are 5, 6, 7 or 8 Data bits per character. The default value is 8.

Example:

```
ASTM-serial0/0 Cfg>SET DATA-BITS 8
ASTM-serial0/0 Cfg>
```

c) SET LOCAL-PORT

This parameter permits you to configure the local UDP port where the TRMTP messages destined for this interface are received. Each interface has a different local port. The range of valid values is from 0 to 65535. The default port is 20000.

Example:

```
ASTM-serial0/0 Cfg>SET LOCAL-PORT
Enter local UDP port value (0 - 65535) [20000] ?
ASTM-serial0/0 Cfg>
```

d) SET MODE

Configures the mode or type of service used by the ASTM-TRMTP converter to send messages. The DATAGRAM mode does not ensure that they reach their destination. CONFIRMED mode waits for confirmation from the destination before sending a new message. The default mode is datagram.

Syntax:

```
ASTM-serial0/0 Cfg>SET MODE ?
CONFIRMED
DATAGRAM
```

SET MODE CONFIRMED

Example:

```
ASTM-serial0/0 Cfg>SET MODE CONFIRMED
ASTM-serial0/0 Cfg>
```

SET MODE DATAGRAM

Example:

```
ASTM-serial0/0 Cfg>SET MODE DATAGRAM
ASTM-serial0/0 Cfg>
```

e) SET N1

Configures the N1 parameter or the maximum data field size for the messages that can be transmitted or received by TRMTP. The permitted values are from 1 to 1400 octets. The default value is 1400.

Example:

```
ASTM-serial0/0 Cfg>SET N1
Enter max. length of messages (1 - 1400) [1400] ?
ASTM-serial0/0 Cfg>
```

f) SET N2

Configures the N2 parameter or maximum number of permitted retransmissions to send a TRMTP message. The permitted values are between 0 and 65335. Values 0 and 1 values indicate retransmission is not carried out. The default value is 3.

Example:

```
ASTM-serial0/0 Cfg>SET N2
Enter max. number of retransmissions (0 - 65535) [3]?
ASTM-serial0/0 Cfg>
```

g) SET PARITY

Configures the parity used in a character in the asynchronous port. The permitted values are EVEN, ODD, MARK, SPACE or NONE. The default value is NONE.

Syntax:

```
ASTM-serial0/0 Cfg>SET PARITY ?
EVEN
MARK
NONE
ODD
SPACE
ASTM-serial0/0 Cfg>
```

Example:

```
ASTM-serial0/0 Cfg>SET PARITY NONE
ASTM-serial0/0 Cfg>
```

h) SET REMOTE-IP

This parameter permits you to configure the remote device IP address where the messages generated by the TRMTP are sent, and the address where the messages are received.

Example:

```
ASTM-serial0/0 Cfg>SET REMOTE-IP
Enter remote IP address [0.0.0.0]? 192.168.0.1
ASTM-serial0/0 Cfg>
```

i) SET REMOTE-PORT

This parameter permits you to configure the remote device UDP port where the messages generated by TRMTP are sent. The range of permitted values is from 0 to 65535. The default port is 20000.

Example:

```
ASTM-serial0/0 Cfg>SET REMOTE-PORT
Enter remote UDP port value (0 - 65535) [20000] ?
ASTM-serial0/0 Cfg>
```

j) SET SPEED

This command specifies the speed of the interface reception and transmission. The range of values is between 300 and 64000 bps.

Example:

```
ASTM-serial0/0 Cfg>SET SPEED
Enter link speed (300 - 64000) [9600]? 1200
ASTM-serial0/0 Cfg>
```

k) SET STOP-BITS

Configures the number of Stop bits traveling in a character in the asynchronous port. The permitted values are 1 o 2 Stop bits per character. The default value is 1.

Example:

```
ASTM-serial0/0 Cfg>SET STOP-BITS 1
ASTM-serial0/0 Cfg>
```

l) SET T1

Configures the T1 parameter or wait timer for a response to a TRMTP message, after this has expired the message is transmitted again. The permitted values are between 1 and 65335 seconds. The default value is 30 seconds.

Example:

```
ASTM-serial0/0 Cfg>SET T1
Enter T1 value (Ack Wait)(1 - 65535)(secs) [30] ?
ASTM-serial0/0 Cfg>
```

m) SET T2

Configures the T2 parameter or the TRMTP error recuperation timer. When a transmission error occurs, the TRMTP system for this interface becomes inactive, once the T2 has timed out, it becomes active once more and from here tries to synchronize with the receptor again when it is going to send a confirmation message. The permitted values are between 1 and 65335 seconds and should be greater than T1. The default value is 300 seconds.

Example:

```
ASTM-serial0/0 Cfg>SET T2
Enter T2 value (Tx Error)(1 - 65535)(secs) [300] ?
ASTM-serial0/0 Cfg>
```

n) SET T3

Configures the T3 parameter or the inactivity timer between transmitted TRMTP confirmed messages. This timer sets the inactivity time between sent messages. This starts up each time a confirmed TRMTP message is transmitted. When it expires, the TRMTP transmitter sends an EOT order to the remote end indicating that the next confirmed message will be preceded by a synchronization phrase. The permitted values are between 0 and 65335 seconds and should be greater than T2. A 0 value

indicates that an EOT is always sent after each confirmed TRMTP message. The default value is 0 seconds.

Example:

```
ASTM-serial0/0 Cfg>SET T3
Enter T3 value (Tx inac.)(1 - 65535)(secs) [0] ?
ASTM-serial0/0 Cfg>
```

o) SET T4

Configures the T4 parameter or the inactivity timer between received TRMTP confirmed messages. This timer sets the inactivity time between received messages. It starts up each time a confirmed TRMTP message is received. When it expires, the TRMTP receiver enters into idle and the next confirmed message to be received must be preceded by a synchronization phase. The permitted values are between 1 and 65335 seconds. It is advisable although not necessary that this value should be adjusted to the T3 value. The default value is 300 seconds.

Example:

```
ASTM-serial0/0 Cfg>SET T4
Enter T4 value (Rx inac.)(1 - 65535)(secs) [300]?
ASTM-serial0/0 Cfg>
```

p) SET TIMER-SEND

Configures the message timer-send. This parameter indicates the ASTM-TRMTP converter which sends the message with the received data if the configured inactive timer has expired since it received the last data from the interface. The range of admitted values is 0 - 65535 expressed in units of 1/20 of a second. A 0 value indicated that a 60 second default value is used. The default value is 0.

Example:

```
ASTM-serial0/0 Cfg>SET TIMER-SEND
Enter timer send value (0 - 65535 (1/20 secs)) [0]  ? 1
ASTM-serial0/0 Cfg>
```

1.6. EXIT

Use the **EXIT** command to return to the previous prompt.

Syntax:

```
ASTM-serial0/0 Cfg>EXIT
```

Example:

```
ASTM-serial0/0 Cfg>EXIT
Config>
```

Chapter 3
Monitoring

1. ASTM Monitoring Commands

To enter in the ASTM monitoring procedure, follow the steps explained below:

1. At the (*) prompt, enter **PROCESS 3** or just **P 3**. This will take you to the monitoring prompt +.

```
*P 3
+
```

2. At the (+) prompt, enter the **NETWORK** command, followed by the name identifying the associated ASTM interface previously configured with the device. This is generically known as <*ifc*>.

```
+NETWORK <ifc>
ASTM Console
ASTM-ifc>
```

If the interface were serial0/0 for example, it would look like this:

```
+NETWORK serial0/0
ASTM Console
ASTM-serial0/0>
```

In this chapter, the ASTM monitoring commands are numbered and described. All the ASTM monitoring commands must be entered at the ASTM prompt (ASTM-ifc >).

Command	Functions
? (HELP)	Lists the available commands or their options.
CLEAR	Clears the link counters.
LIST	Displays the link counter information.
EXIT	Exits the ASTM monitoring environment.

1.1. ? (HELP)

The **?** (HELP) command serves to list all the available commands included at the normal prompt level. In the same way, entering **?** after a specific command name you can obtain all the options for that command.

Example:

```
ASTM-serial0/0>?
CLEAR
LIST
EXIT
ASTM-serial0/0>
```

1.2. CLEAR

Use the **CLEAR** command to clear the link counters.

Example:

```
ASTM-serial0/0>CLEAR
ASTM-serial0/0>
```

1.3. LIST

Use the **LIST** command in the monitoring process to display specific statistics for the link data level.

Example:

```
ASTM-serial0/0>LIST

Bytes sent to interface          : 800
Bytes received from interface    : 971
Bytes sent over INF messages     : 971
Bytes received over INF messages : 800
Bytes sent over DGM messages     : 0
Bytes received over DGM messages : 0
INF messages sent                : 161
INF messages received            : 208
DGM messages sent                : 0
DGM message received             : 0
TST messages received            : 1
EOT messages received            : 1
ACK messages received            : 162
NAK messages received            : 0
T1 Timeouts detected             : 0
T2 Timeouts detected             : 0
T3 Timeouts detected             : 1
T4 Timeouts detected             : 0
N2 overflows detected            : 0
Error or congestion detected     : 0
ASTM-serial0/0>
```

The meaning of each field is:

Bytes sent to interface	Number of bytes sent to interface.
Bytes received from interface	Number of bytes received from the interface.
Bytes sent over INF messages	Number of bytes transmitted in INF messages or confirmed.
Bytes received over INF messages	Number of bytes received in INF messages or confirmed.
Bytes sent over DGM messages	Number of bytes transmitted in DGM messages or datagrams.
Bytes received over DGM messages	Number of bytes received in DGM messages or datagrams.
INF messages sent	INF messages or confirmed transmission.
INF messages received	INF messages or confirmed reception.
DGM messages sent	DGM messages or confirmed transmission.
DGM message received	INF messages or confirmed reception.
TST messages received	Synchronous TST messages received.
EOT messages received	EOT end of transmission messages received.
ACK messages received	ACK messages received.
NAK messages received	NAK messages received.
T1 Timeouts detected	T1 timeouts detected.
T2 Timeouts detected	T2 timeouts detected.
T3 Timeouts detected	T3 timeouts detected.

T4 Timeouts detected	T4 timeouts detected.
N2 overflows detected	Excessive retransmission detected.
Error or congestion detected	Error in transmissions or congestion detected.

1.4. EXIT

Use the exit command to return to the previous prompt.

Syntax:

```
ASTM-serial0/0>EXIT
```

Example:

```
ASTM-serial0/0>EXIT
+
```

2. Displaying the ASTM interface statistics

You can use the **DEVICE** command to view the statistics for the ASTM devices. To do this, enter the **DEVICE** command and the interface number at the (+) prompt as shown below:

Example:

```
+DEVICE serial0/0

                                    Auto-test   Auto-test     Maintenance
Interface            CSR    Vect      valids    failures       failures
serial0/0       fa200a00      5E           0           0              0
 Interface DCE
   V.24 circuits:105 106 107 108 109 125 141
   Nicknames:    RTS CTS DSR DTR DCD RI  LL
   State:         ON ON  ON  OFF ON  --- ---

Speed   (bps)             =       1200
Throughput (bps)          =       1575
Last throughput (bps)     =       2160
Bits per character        =          8
Stop bits                 =          1
Parity selected           =       NONE
Parity errors             =          0
Data errors               =          0
Overrun errors            =          0
Last reset                = 2 hours 54 minutes 41 seconds
+
```

Interface	Interface assigned by the software during the initial configuration.
CSR	Location of the status control register memory for the ASTM interface.
Vec	Interrupt vector.
Auto-test valids	Number of times the ASTM interface has passed the auto-test.
Auto-test failures	Number of times the ASTM interface has not passed the auto-test.
Maintenance failures	Number of maintenance failures.
Interface	Indicates the interface behavior (DTE or DCE).
Circuit	Circuits in use in the V.24 circuit.
Nickname	Physical signals name.
State	State of the V.24 circuits, signals and pin assignment (ON or OFF).
Speed	Normal speed for the line configured for the ASTM interface.
Throughput	Interface throughput expressed in bits per seconds.
Last throughput	Interface's last measured throughput expressed in bits per seconds.
Bits per character	Number of Data bits per character configured.
Stop bits	Number of Stop bits configured.
Parity selected	Parity per character configured.
Parity errors	Parity errors detected.
Data errors	Framing or synchronization errors detected.
Overrun errors	Overrun errors detected.
Last reset	How long since the last port reset.