ASTM Interface

bintec-Dm 721-I

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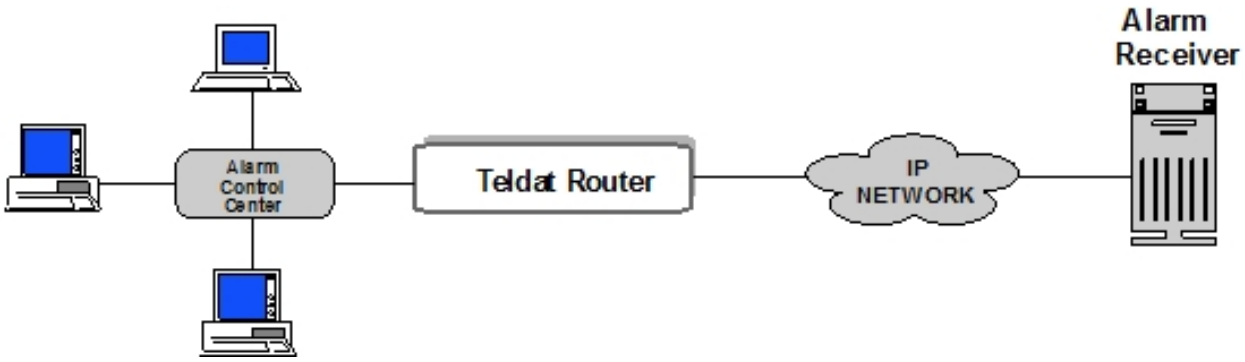
bintec-Dm 772-I Common Configuration for Interfaces

Chapter 1 Introduction

1.1 ASTM Interface



In a work scenario like the one above, the messages generated by the security and surveillance devices (alarm centers) must be sent over an IP-based data network. To be able to do this, two facilities will need to be implemented. First, you have to define a method for transporting messages over the network; and second, you have to specify a data conversion method that converts data from the format delivered by the surveillance device (alarm center) to the format specified in the method defined for transport.

The first objective is to implement a transport protocol for sending general data over IP (Internet Protocol) networks.

The method used for this is called Trivial Message Transfer Protocol (TRMTP). In this method, each message is treated separately from the other messages that are sent.

This protocol has been designed to be easy to implement, not to consume excessive resources and not to significantly increase the workload of the devices that will use it. Its most widespread use will be to send alarm messages between devices.

To keep load and resource consumption down, it is implemented over UDP (User Datagram Protocol) in IP.

Here are some of the TRMTP protocol's characteristics:

- It ensures that all information messages reach the other end (CONFIRMATION MODE).
- It ensures that duplicated messages are detected at reception and discarded (CONFIRMATION MODE).
- It ensures that messages arrive in the correct order (CONFIRMATION MODE).
- It includes a datagram sending service that, while not fully guaranteeing delivery, is faster (DATAGRAM MODE).
- It is non-connection-oriented.
- It is bi-directional (a device can both send and receive messages).

The second objective is to describe a conversion method to be able to send data received through an asynchronous serial interface using the TRMTP protocol defined previously.

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

1.1.1 Functionality

The defined converter will function as a PAD or PDA (Packet Assembler/Dissembler). These systems basically use set rules to package data received through the asynchronous interface and send them in frames or messages through the packet-oriented interface. They also perform the reverse process for data received from the packet-orientated interface.

1.1.2 TRMTP -> ASYNCHRONOUS Conversion

The following defines the rules that the converter will refer to in order to generate TRMTP messages with the data received through the asynchronous interface.

Since the nature of the data traffic basically consists of messages sent between devices and not a continuous flow of data, a software flow control system has not been defined. The devices are considered to have sufficient memory to allow them to receive the messages in full, and the functions of flow control and errors are handled by higher-level protocols between machines using the transport system.

To keep the design simple and recover device resources as quickly as possible, the system discards the received packets when it is congested, both globally in the device and in the output queues to the interface. To avoid these congestion situations as much as possible, it is important to define enough memory for these tasks.

1.1.2.1 Congestion in the device

The device is considered congested when it has insufficient memory to store the received TRMTP messages before their transmission to an asynchronous serial port, either because it has insufficient buffers to store them, or 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 respond.

1.1.2.2 TRMTP Service Down

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

1.1.2.3 Asynchronous Interface Down

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

- 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 respond.

1.1.2.4 Both Asynchronous Interface and TRMTP Service Operative

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

Different priority levels are not defined for INF and DGM messages. The data must therefore respect the chronological arrival order when forwarded 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.

1.1.3 ASYNCHRONOUS -> TRMTP Conversion

The following defines the rules that the converter will refer to in order to generate TRMTP messages with the data received through the asynchronous interface.

Since the nature of the data traffic basically consists of messages sent between devices and not a continuous flow of data, a software flow control system has not been defined. The devices are considered to have sufficient memory to receive the messages in full, and the functions of flow control and errors are handled by higher-level protocols between devices using the transport system.

To keep the design simple and recover device resources as quickly as possible, the system discards the received packets when it is congested, both globally in the device and in the output queues to the interface. To avoid these congestion situations as much as possible, it is important to define enough memory for these tasks.

1.1.3.1 Congestion in the device

The device is considered congested when it has insufficient memory to create TRMTP messages from the data received through the asynchronous serial interface. If the incoming asynchronous interface queues become full, characters are lost. It is therefore important to make the queues large enough to avoid losing information.

1.1.3.2 TRMTP Service Down

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

1.1.3.3 Asynchronous Interface Down

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

1.1.3.4 Both Asynchronous Interface and TRMTP Service Operative

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

- The buffer is filled with the value defined in the TRMTP service N1 parameter.
- The received character causes the buffer to send according to the CHRSND parameter you define for the conversion.
- There are characters in the buffer and the TMRSND send timer expires when the last character is received.

Once the buffer is ready to send, there is a request to generate the TRMTP message.

- In the TRMTP DATAGRAM service, there is a request to send a DGM message.
- In the TRMTP WITH CONFIRMATION service, there is a request to send an INF message.

1.1.4 Asynchronous Interface Parameters

The asynchronous interface has the following configurable parameters:

- SPEED: Speed of the asynchronous serial interface. You can set this to between 300 and 64000 bps. The default value is 9600.
- DATA BITS (BDATA): Number of data bits per character. Since this system tries to send 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 will NOT be used. The possible values are EVEN, ODD, MARK, SPACE or NONE.

1.1.5 Conversion Parameters

The following are the configurable parameters for the ASYN-TRMTP converter:

- CHRSND: Character that triggers the sending of data. This parameter is configurable and actually based on parameter 3 from the X.3 standard. Its value can be between 0 and 255 (0xFF); any bits set to 1 indicate the characters that can trigger data transmission. The default is 0, meaning that no character triggers data transmission. Here is an explanation of the meaning of each bit:
    - 0x00 No character triggers data transmission.
    - 0x01 (A - Z, a - z, 0 - 9) trigger data transmission.
    - 0x02 CR triggers data transmission.
    - 0x04 ESC, BEL, ENQ, ACK trigger data transmission.
    - 0x08 DEL, CAN, DC2 trigger data transmission.
    - 0x10 ETX, EOT trigger data transmission.
    - 0x20 HT, LF, VT, FF trigger data transmission.
    - 0x40 Other characters (0x00 - 0x1F) not previously defined.
    - 0x80 Other characters (0x20 - 0x7F) not previously defined.
- TMRSND: Inactivity timer that triggers the sending of data. It starts whenever a character is received through the asynchronous interface. This parameter is configurable and is actually based on parameter 4 from the X.3 standard. Its value can range from 0 to 65535. The units of the timer are 1/20 of a second. The default value is 0, which deactivates the timer; although this does not actually happen because if there is no send character defined either, a 60-second inactivity timer is used to send the buffer.

Chapter 2 Configuration

2.1 Assigning the ASTM Interface

The ASTM interface operates on a serial line. Therefore, in order to add an ASTM interface you need to assign one of the router's serial lines as ASTM through the S**ET DATA-LINK** command found in the general configuration menu. To do this, enter **PROCESS 4** or just **P 4** at the asterisk (*) prompt. This will take you to the *Config*> configuration prompt.

```
*p 4
Config>
```

Then you need to enter the SET DATA-LINK command.

```
Config>set data-link astm serial0/0
Config>
```

"SerialX/X" interfaces are compatible with the ASTM protocol.

If the router has only one WAN line, you will not be asked which interface you want to use (as shown in the following example):

```
Config>set data-link asdp
Config>
```

Once you have assigned the interface, you can configure it. However, for the changes to take effect and to be able to monitor said interface, you need to save the configuration and restart the device.

2.2 ASTM Configuration Commands

Follow the steps outlined here to access the configuration procedure:

(1) At the asterisk (*) 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 that you configured previously. 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>
```

Some commands are common to all the device's interfaces. These commands are described in the manual on configuring common interfaces (bintec-Dm 772-I Common Configurations for Interfaces).

This chapter lists and describes the ASTM configuraiton commands. All ASTM configuration commands must be entered from the ASTM prompt (ASTM-*ifc* Cfg>).

Command	Function
? (HELP)	Lists configuration commands or associated parameters within a command.
RESTORE	Restores the default configuration used in the ASTM interfaces.
SET	Configures specific interface parameters.
EXIT	Returns to the Config> prompt.

2.2.1 ? (HELP)

You can use the **?** (HELP) command to display a list of available commands at the normal prompt level. Likewise, by typing a question mark (**?**) after a specific command name, you can learn which options are available for that command.

Syntax:

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

Example:

```
ASTM-serial0/0 Cfg>?
  restore        Restore ASTM default configuration
  set            Configure ASTM parameters
  exit
ASTM-serial0/0 Cfg>
```

2.2.2 RESTORE

Use the **RESTORE** command to load the interface's default values to the configuration.

Syntax:

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

Example:

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

2.2.3 SET

This command is used to configure different interface-specific parameters.

Syntax:

```
ASTM-serial0/0 Cfg>set ?
  character-send    Configure the message send character
  data-bits         Set number of bits per character
  local-port        Configure local UDP port
  mode              Configure the type of service used
  n1                Configure TRMTP data field size
  n2                Configure maximum number of TRMTP retransmissions
  parity            Set character parity
  remote-ip         Configure the remote device IP address
  remote-port       Configure the remote device UDP port
  speed             Set speed
  stop-bits         Set number of stop bits per character
  t1                Wait time for a TRMTP message response
  t2                TRMTP error recuperation timer
  t3                TRMTP transmission inactivity timer
  t4                TRMTP reception inactivity timer
  timer-send        Configure the message timer-sendCHARACTER-SEND
ASTM-serial0/0 Cfg>
```

2.2.3.1 SET CHARACTER-SEND

Configures the character whose reception causes messages to be sent. This parameter tells the ASTM-TRMTP converter to send the message with the received data, including the send character when it is received. Allowed values range from 0 to 255. A 0 value means that there is no character to trigger sending messages. In this case, they are only sent if the sending timer expires or if the N1 value for received data waiting to be sent is exceeded. The value is a bit mask, where each bit indicates the characters allowed to trigger the sending. The default value is 0.

- 0x00 (0) No character triggers data transmission.
- 0x01 (1) (A - Z, a - z, 0 - 9) trigger data transmission.
- 0x02 (2) CR triggers data transmission.
- 0x04 (4) ESC, BEL, ENQ, ACK trigger data transmission.

- 0x08 (8) DEL, CAN, DC2 trigger data transmission.
- 0x10 (16) ETX, EOT trigger data transmission.
- 0x20 (32) HT, LF, VT, FF trigger 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 2
ASTM-serial0/0 Cfg>
```

2.2.3.2 SET DATA-BITS

Sets the number of data bits per character in the asynchronous port. Allowed values are 5, 6, 7 or 8 bits/character. The default value is 8.

Example:

```
ASTM-serial0/0 Cfg>set data-bits 8
ASTM-serial0/0 Cfg>
```

2.2.3.3 SET LOCAL-PORT

This parameter allows you to configure the local UDP port that will receive the TRMTP messages for this interface. Valid values range from 0 to 65535. The default port is 20000.

Example:

```
ASTM-serial0/0 Cfg>set local-port 20000
ASTM-serial0/0 Cfg>
```

2.2.3.4 SET MODE

Sets the mode or type of service that the ASTM-TRMTP converter will use to send messages. DATAGRAM mode does not ensure that they reach their destination. CONFIRMED mode awaits confirmation of the destination before sending a new message. The default mode is datagram.

Syntax:

```
ASTM-serial0/0 Cfg>set mode ?
  confirmed
  datagram
```

2.2.3.4.1 Set Mode Confirmed

Example:

```
ASTM-serial0/0 Cfg>set mode confirmed
ASTM-serial0/0 Cfg>
```

2.2.3.4.2 Set Mode Datagram

Example:

```
ASTM-serial0/0 Cfg>set mode datagram
ASTM-serial0/0 Cfg>
```

2.2.3.5 SET N1

Configures the N1 parameter or maximum data field size for messages that can be sent or received by TRMTP. Allowed values range from 1 to 1600 octets. The default value is 1500.

Example:

```
ASTM-serial0/0 Cfg>set n1 1600
ASTM-serial0/0 Cfg>
```

2.2.3.6 SET N2

Configures the N2 parameter or maximum number of retransmissions allowed per message in TRMTP. This parameter only makes sense in CONFIRMED mode. Allowed values range from 0 to 65335. Setting a 0 or 1 value indicates no retransmission. The default value is 3.

Example:

```
ASTM-serial0/0 Cfg>set n2 5
ASTM-serial0/0 Cfg>
```

2.2.3.7 SET PARITY

Sets the parity that is used in a character on the asynchronous port. Allowed 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>
```

2.2.3.8 SET REMOTE-IP

This parameter lets you configure the remote device's IP address to which the TRMTP protocol is going to send the messages.

Example:

```
ASTM-serial0/0 Cfg>set remote-ip 192.168.0.1
ASTM-serial0/0 Cfg>
```

2.2.3.9 SET REMOTE-PORT

This parameter allows you to configure the remote device UDP port to which the TRMTP protocol is going to send the messages to. Allowed values range from 0 to 65535. The default port is 20000.

Example:

```
ASTM-serial0/0 Cfg>set remote-port 20000
ASTM-serial0/0 Cfg>
```

2.2.3.10 SET SPEED

This command sets the interface's reception and transmission speed. Allowed values range from 300 to 64000 bps. The default is 9600 bps.

Example:

```
ASTM-serial0/0 Cfg>set speed 1200
ASTM-serial0/0 Cfg>
```

2.2.3.11 SET STOP-BITS

Configures the number of Stop bits per character on the asynchronous port. Allowed values are 1 or 2 Stop bits/character. The default value is 1.

Example:

```
ASTM-serial0/0 Cfg>set stop bits 1
ASTM-serial0/0 Cfg>
```

2.2.3.12 SET T1

Sets the TRMTP protocol T1 parameter, which indicates the wait timer value for a response to a TRMTP message. After this has expired, the message is transmitted again. Allowed values are from 1 second to 18 hours, 12 minutes and 15 seconds. The default value is 30 seconds.

Example:

```
ASTM-serial0/0 Cfg>set t1 3h12m3s
ASTM-serial0/0 Cfg>
```

2.2.3.13 SET T2

Sets the TRMTP protocol T2 parameter, which indicates the TRMTP error recuperation timer value. When a transmission error occurs, the TRMTP system for this interface becomes inactive. Once the T2 has timed out, the system becomes active once more and from here tries to synchronize with the receptor again when it is going to send a confirmation message. Allowed values range from 1 second to 18 hours, 12 minutes and 15 seconds and should be greater than T1. The default value is 300 seconds.

Example:

```
ASTM-serial0/0 Cfg>set t2 4h14m30s
ASTM-serial0/0 Cfg>
```

2.2.3.14 SET T3

Configures the TRMTP protocol T3 parameter. Indicates the inactivity timer value between sent TRMTP confirmed messages. This timer sets the inactivity time between sent messages. This starts up each time a confirmed TRMTP message is sent. 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. Allowed values are from 0 seconds to 18 hours, 12 minutes and 15 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 200
ASTM-serial0/0 Cfg>
```

2.2.3.15 SET T4

Configures the TRMTP protocol T4 parameter. Indicates the inactivity timer value 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 idle state and the next confirmed message to be received must be preceded by a synchronization phase. Allowed values range from 1 second to 18 hours, 12 minutes and 15 seconds. Setting a similar value to the T3 parameter is advisable, though not absolutely necessary. The default value is 300 seconds.

Example:

```
ASTM-serial0/0 Cfg>set t4 200
ASTM-serial0/0 Cfg>
```

2.2.3.16 SET TIMER-SEND

Sets the message sending timer. This parameter tells the ASTM-TRMTP converter to send the message with the received data if the configured inactivity time has expired since the last data was received through the interface. Admitted values range from 0 to 65535 expressed in units of 1/20 of a second. A 0 value indicates that a 60-second default value is used. The default value is 0.

Example:

```
ASTM-serial0/0 Cfg>set timer-send 1
ASTM-serial0/0 Cfg>
```

2.2.4 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

3.1 ASTM Monitoring Commands

Follow the steps outlined below to access the ASTM monitoring procedure:

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

```
*p 3
+
```

(2) At the plus (+) prompt, enter the **NETWORK** command followed by the name of the interface associated with the previously configured ASTM device, which we will generically call <*ifc*>.

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

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

```
+ network serial0/0
-- ASTM Console --
ASTM-serial0/0+
```

This chapter lists and describes the ASTM monitoring commands. All ASTM monitoring commands must be entered at the ASTM prompt (ASTM-ifc >).

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

3.1.1 ? (HELP)

You can use the **?** (HELP) command to display a list of available commands at the normal prompt level. Likewise, by typing a question mark (**?**) after a specific command name, you can learn which options are available for that command.

Syntax:

```
ASTM-ifc+?
```

Example:

```
ASTM-serial0/0+?
  clear    Initialize link counters
  list     Show statistics for link data level
  exit
ASTM-serial0/0+
```

3.1.2 CLEAR

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

Syntax:

```
ASTM-ifc+clear
```

Example:

```
ASTM-serial0/0+clear
ASTM-serial0/0+
```

3.1.3 LIST

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

Syntax:

```
ASTM-ifc+list
```

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	No. of bytes sent to the interface.
Bytes received from interface	No. of bytes received from the interface.
Bytes sent over INF messages	No. of bytes sent in INF messages or confirmed.
Bytes received over INF messages	No. of bytes received in INF messages or confirmed.
Bytes sent over DGM messages	No. of bytes transmitted in DGM messages or datagrams
Bytes received over DGM messages	No. of bytes received in DGM messages or datagrams.
INF messages sent	INF or confirmed messages sent.
INF messages received	INF or confirmed messages received.
DGM messages sent	DGM or confirmed messages sent.
DGM message received	INF or confirmed messages received.
TST messages received	Synchronized 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	Transmission error or congestion detected.

3.1.4 EXIT

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

Syntax:

```
ASTM-ifc+exit
```

Example:

```
ASTM-serial0/0+exit
```

```
+
```

3.2 Viewing ASTM interface statistics

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

Syntax:

```
+device <ifc>
```

Example:

```
+device serial0/0

                                  Auto-test   Auto-test     Maintenance
Interface            CSR    Vect      valids    failures       failures
serial0/0       FA200A00      5E           0           0              0
 Interface DTE
   Circuits:      105 106 107 108 109 125 141
   Nicknames:     RTS CTS DSR DTR DCD RI  LL
   State:         ON  OFF OFF ON  OFF --- OFF

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 software, during the initial configuration.
CSR	Location of the status control register memory for the ASTM interface.
Vect	Interrupt vector.
Auto-test valids	No. of times the ASTM interface passed the auto-test.
Auto-test failures	No. of times the ASTM interface failed the auto-test.
Maintenance failures	No. of maintenance failures.
Interface	Indicates interface behavior (DTE or DCE).
Circuit	Circuits in use.
Nickname	Physical signal name.
State	State of circuits, signals and pin assignment (ON or OFF).
Speed	Normal speed for the configured ASTM interface line.
Throughput	Interface throughput expressed in bits/seconds.
Last throughput	Interface's last measured throughput expressed in bits/seconds.
Bits per character	No. of Data bits per character configured.
Stop bits	No. 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	Time elapsed since the last port reset.