ASDP Interface

bintec Dm736-I

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Chapter 1 ASDP Interface Introduction

1.1 ASDP interface

ASDP is an acronym for *Asynchronous Serial Device Proxy* . As its name suggests, an ASDP interface aims to provide remote access to an asynchronous serial device. Its does this through a TCP connection.

The ASDP interface transparently sends all data received over a TCP connection to and from a device connected to a serial interface.

ASDP allows you to limit the maximum duration of TCP sessions. To do this, it incorporates two timers, one for maximum session length and one for time without data exchange.

The ASDP interface can be configured as MASTER or SLAVE. Once a MASTER receives data through the serial port, it establishes a TCP connection with a remote port and forwards the data over the established TCP connection. Furthermore, all data received over the connection will be forwarded through the serial port.

A SLAVE has a TCP listening port, which supports a single incoming connection. Data received through this port are forwarded to and from the serial port.

The ASDP interface has three modes of operation:

(1) Standard. Remote access to a serial port via a TCP connection. It also applies to a scenario where, at the request of the MASTER, MASTER and SLAVE connect their end-to-end serial ports via a TCP connection.

(2) Broadcast. A MASTER router establishes simultaneous TCP connections with a group of SLAVE routers. All data received through the MASTER serial port will be forwarded simultaneously over the TCP connections established with the SLAVE routers.

(3) Dial-up. The ASDP interface simulates an AT modem. It admits AT configuration commands and only the MASTER has the capacity to perform a dial-up connection.

The following figure shows a basic user scenario for an ASDP interface:

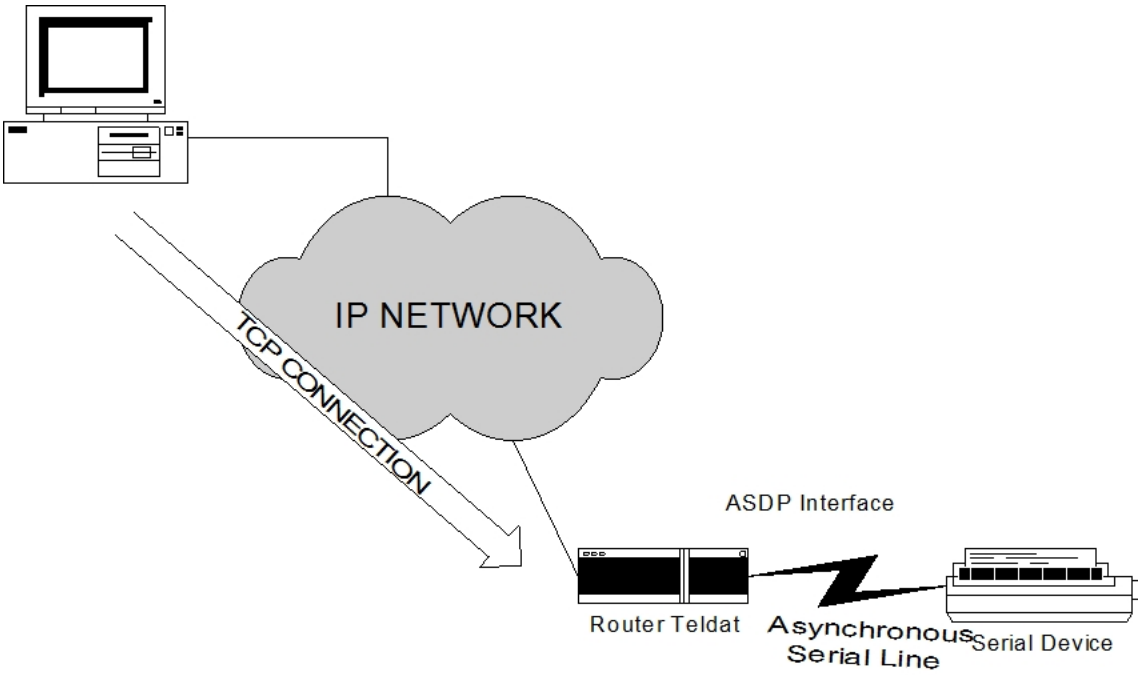

Fig. 1: ASDP interface user scenario

1.1.1 Operation scenario

ASDP can operate in two modes: MASTER and SLAVE (depending on the mode used). However, through a mixture of two devices combining these modes, various operating schemes can be presented.

1.1.1.1 Operating in STANDARD SLAVE mode

In SLAVE mode, ASDP is configured so it waits for a TCP connection request from a remote device (it never takes the initiative).

The general scheme of operation is as follows:

(1) A device wishing to send data to the serial device must set up a TCP connection with the router on a specific port. This connection will only be established if there is a device connected to the corresponding serial interface.

(2) If the connection has been successfully established, both the device connected to the serial port and the remote can send data to the other end.

(3) The session may end for various reasons:

- The remote device releases the TCP session.
- The maximum TCP session length is exceeded. (if this is configured).
- The maximum time without data exchange is exceeded. (if this is configured).
- The control signal is disabled by the device connected to the router's serial port.

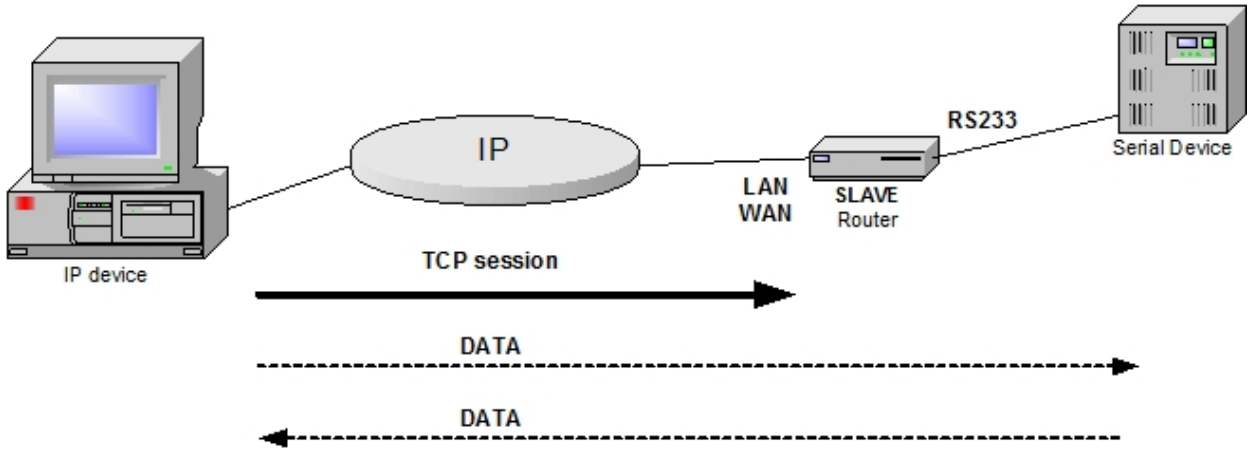

Fig. 2: SLAVE operating scheme

1.1.1.2 Operating in STANDARD MASTER mode

In MASTER mode, ASDP is able to initiate TCP sessions with a remote device when receiving data through the serial device interface connected to it. ASDP can also establish incoming TCP sessions in this mode.

The general scheme of operation for the MASTER mode, besides being able to perform the same operations as the SLAVE, is as follows:

(1) A device connected to the router's ASDP interface wishing to send data to a remote device, must enable the control signal and send data through the serial port. The router will establish a TCP session with the configured IP address and port.

(2) If the connection is successfully established, both the device connected to the serial port and the remote can send data to the other end.

(3) The session may end for several reasons:

- The remote device releases the TCP session.
- The maximum TCP session length is exceeded. (if this is configured).
- The maximum time without data exchange is exceeded. (if this is configured).
- The control signal is disabled by the device connected to the router's serial port.

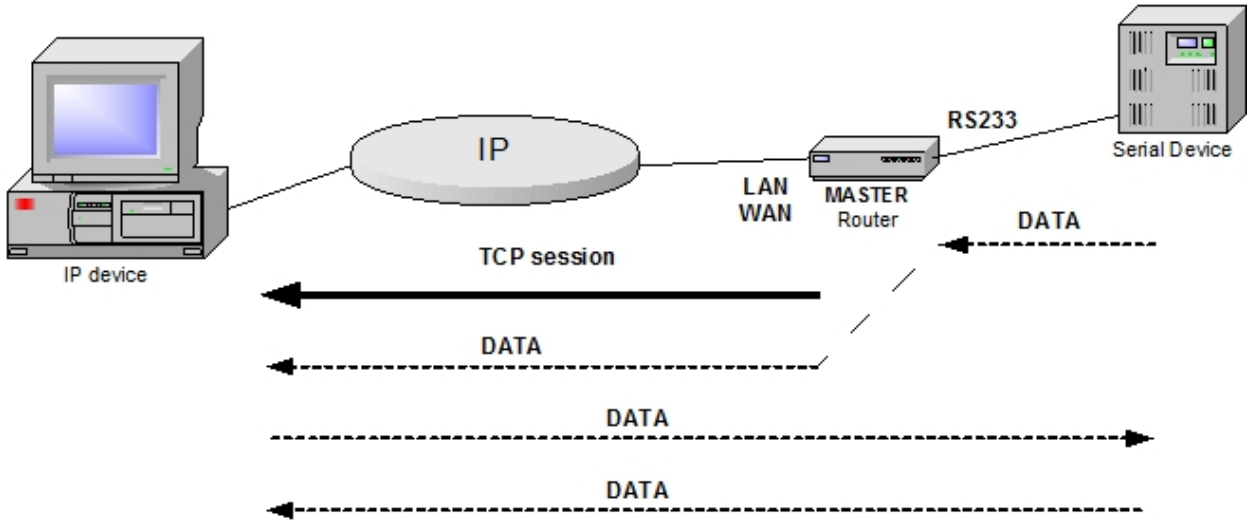

Fig. 3: MASTER operating scheme

1.1.1.3 Operating in STANDARD COMBINED mode

This mode allows you to connect two asynchronous serial devices via TCP through two routers configured in ASDP. At least one of the routers must be configured in MASTER mode, in order to perform the TCP connection attempt. Both routers can be in MASTER mode, thus, on receiving data from the serial devices connected to their serial ports, they will try to establish the TCP session. The two serial devices connected to the routers must have their control signal enabled when the session is established.

The general scheme of operation for COMBINED mode is as follows:

(1) A device connected to the router's ASDP interface set to MASTER mode, wishing to send data to a remote device, must enable its control signal and send data through the serial port. The router will establish a TCP session with the configured IP address and port.

(2) The remote router, which can be set to MASTER or SLAVE mode, should have the control signal enabled when receiving a request to establish a TCP session, so that the router accepts the session.

(3) If the connection is successfully established, both the device connected to the serial port and the remote, can send data to the other end.

(4) The session may end for several reasons:

- The remote device releases the TCP session.
- The maximum TCP session length is exceeded (if this is configured).
- The maximum time without data exchange is exceeded (if this is configured).
- The control signal is disabled by the device connected to the router's serial port.

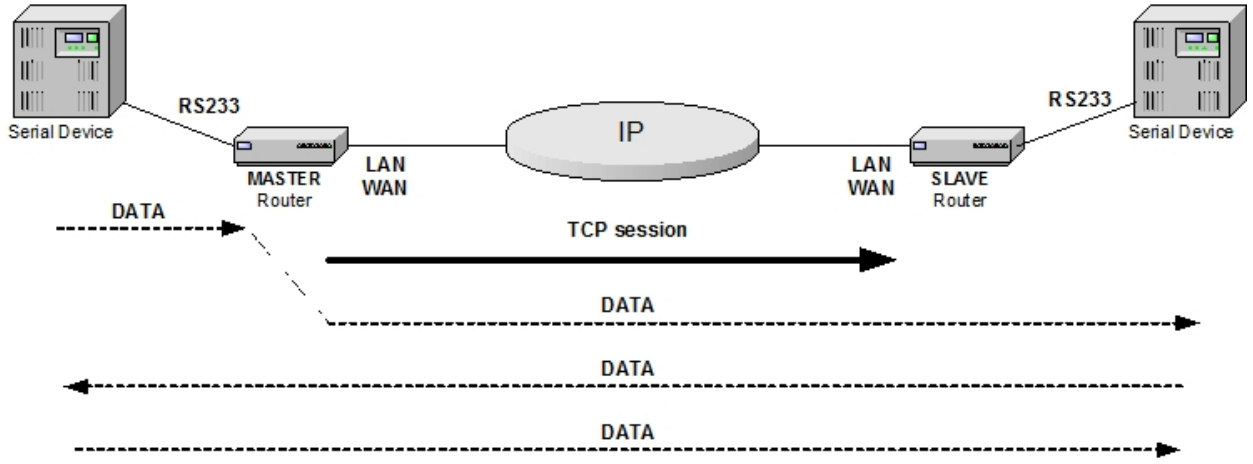

Fig. 4: COMBINED operating scheme

1.1.1.4 Operating in BROADCAST mode

This operating scheme applies to scenarios where:

(1) All asynchronous data traffic received through the serial port associated with an ASDP interface in MASTER mode is simultaneously sent to a group of up to 8 routers in SLAVE mode. The MASTER will establish up to 8

TCP connections with the SLAVEs to do this.

(2) Only one of the routers in SLAVE mode will transmit the response to the traffic received from the MASTER. That is to say, the MASTER polls the individual SLAVE devices.

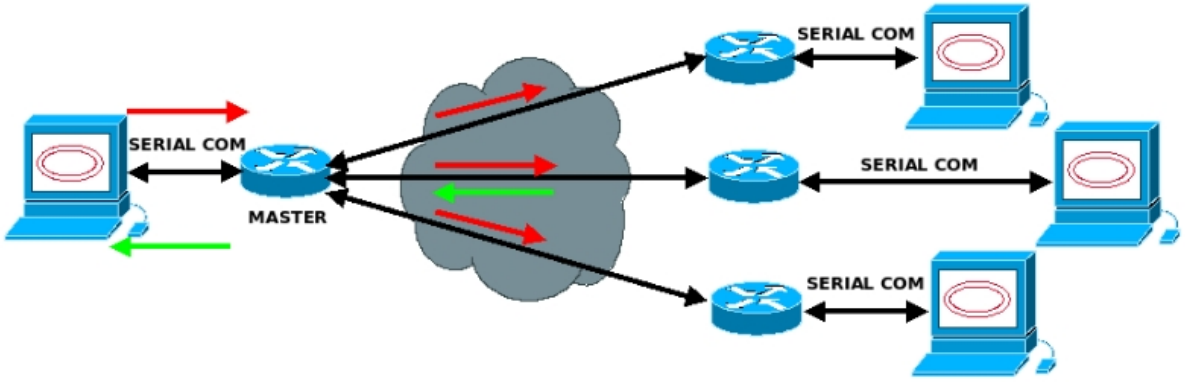

Fig. 5: BROADCAST operating scheme

1.1.1.5 Operating in DIAL-UP mode

This operating scheme applies where the ASDP interface simulates an AT modem. The objective is to replace a pair of real modems with two routers, one with an ASDP interface set to MASTER mode and the other with an ASDP interface in SLAVE mode.

Both the MASTER and the SLAVE router can process a range of AT configuration commands. Those commands that are not processed will respond with OK.

The router in MASTER mode processes the ATD dial command. The slave does not process the ATD command. Therefore, the communication is one-way, from MASTER to SLAVE.

The sequence of configuration, connection and disconnection are as follows:

(1) Sequence of AT initialization commands processed by both MASTER and SLAVE:

```
CLIENT'S SOFTWARE                          MODEM

    ATZ<cr>      --------->
                 <---------      ATZ<cr><cr><lf>OK<cr><lf>
    ATE<cr>      --------->
                 <---------      ATE<cr><cr><lf>OK<cr><lf>
  ATVS30=1<cr>   --------->
                 <---------      0<cr>
    ATX0<cr>     --------->
                 <---------      0<cr>
```

(2) The MASTER has the capacity to receive the ATDTXXXXX command. The number XXXXX is assigned a SLAVE IP address in the configuration table so that when the MASTER receives an ATD command it establishes a TCP connection with the SLAVE.

(3) The SLAVE will send ten RING (2<cr>) messages every three seconds indicating the incoming TCP connection. When the SLAVE receives the ATA command to pick up it will tell the MASTER that the connection is operational. THE MASTER and SLAVE will send the CONNECT (1<cr>) response through the serial port telling the applications that the point-to-point connection has been established. If the SLAVE does not receive the ATA command the MASTER will respond with NO ANSWER (8<cr>).

```
    APPLICATION   MASTER     IP-NET     SLAVE     APPLICATION

     ATDTXXXXX --->
                           ----------->  SYN
                  SYN-ACK <-----------
                           ----------->  ACK

                                              ----> 2<CR>(RING)
                                              ----> 2<CR>(RING)
                                                .
                                                .
                                              <---- ATA<cr>
                                              ----> 1<cr>(CONNECT)
                INDICATION <----------

1<cr>(CONNECT)<---
```

(4) Once the call is established it passes to data connection mode. The DCD signal remains active during the data phase.

(5) The transition from data mode to command mode is through the +++ escape sequence. A temporary gap between the escape sequence and the ATH command of at least a three packets duration is needed.

```
    APPLICATION   MASTER     IP-NET     SLAVE     APPLICATION

     +++        --->
     0<cr>(OK)  <---

     ATH<cr>    --->
                          ----------->  RST
                                             ----> 3<cr>(NO CARRIER)

     0<cr>(OK)  <---
```

1.1.2 Flow control

In many cases, the router is able to transmit data to the serial device faster than they are processed. Therefore, a mechanism to pace the data flow between the two devices is needed. Said mechanisms are called flow control mechanisms. There are several flow control mechanisms in serial devices, the most common of which are Hardware and XON/XOFF flow controls.

The first of these is based on the use of certain serial interface signals (RTS/CTS) to check when the device can receive data. In the second case, the device sends a special character to indicate when it wants the transmission to stop temporarily (XOFF) and another when its wants to resume the transmission (XON).

Similarly, there must be flow control between the router and the remote end of the connection. Otherwise the router would be flooded with data from the remote end as it would be unable to deliver the data (due to flow control with the device) at the same rate it receives them over the connection. In this case, flow control mechanisms are provided by the use of TCP, which already covers this situation.

Therefore, two possible flow controls are presented for the schema proposed above:

- Between the serial device and the router it is connected to (through signals or XON/XOFF).
- Between the router and the remote device (provided by TCP).

Note

Some of the serial interfaces on our routers DO NOT support Hardware Flow control. Flow control through RTS-CTS may or may not be supported depending on the device model.

1.2 Operation specifications

The ASDP interface is divided into two clearly different parts: a serial interface and a TCP application. The operations of each part are described below.

1.2.1 Serial interface

The ASDP interface is an asynchronous serial line with RS-232 or RS-485 physical layer. It has the following characteristics:

- Option to operate as a DTE or DCE.
- Speed: up to 115200 bits per second.
- Data bits: 5, 6, 7 or 8.
- Parity: none, even, odd, mark (parity bit is always at 1) or space (parity bit is always at 0).
- Stop bits: 1 or 2.
- Hardware Flow control (depending on the model) and/or XON/XOFF.

The serial interface manages the communication with the device connected to the line. This sends, according to the rate indicated by the established flow control, the data received from the application level to the line. Likewise, it also processes the data received via the serial line and forwards this towards the application level.

The physical interface on which the ASDP transmits and receives data can be either RS-232 or RS-485, depending on the router hardware.

1.2.2 TCP application

The ASDP application layer is responsible for communication with the remote end. It accepts a single incoming TCP connection and forwards all data received over the connection to the serial interface. It also sends all data received from the serial interface over the TCP connection, provided the connection is established.

The application has the following characteristics:

- In SLAVE mode, it only accepts requests on a TCP port (which is configurable).
- In MASTER mode it accepts requests on a TCP port but can also make requests to an IP address and TCP port when there is data in the serial port.
- It does not establish access controls (you can establish access controls on the IP protocol if desired).
- It does not process data in any way, it merely redirects to the TCP connection or interface accordingly.
- It allows you to set the maximum length of time of a TCP session.
- It allows you to set a length of time to wait before closing the TCP session due to idleness.

1.2.3 Interface – Application relationship

The serial interface and the application layer are two entities that operate independently, but cooperate to perform the work of ASDP. The interrelation between both modules is described below:

- The application layer only accepts/launches TCP connections when it detects a device connected to the serial interface.
- If there is a disconnection of the device connected to the serial interface, the application layer discards all the data it has to send and closes the TCP connection (if it is established).
- In SLAVE mode, the serial interface discards all packets received from the device connected to the line while there is no TCP connection established at the application layer.
- In MASTER mode, the serial interface, on receiving data from the device connected to the line, tries to establish a TCP session with the configured remote location (several remote locations if operating in broadcast mode).
- Time control between digits received from the serial port to send data messages. This time allows you to determine the time that must lapse between receipt of the last serial port character and sending the data stored in the serial port buffer. This can optimize the number of TCP data messages sent. If the buffer is full and the time has not expired, the data stored in said buffer is sent and the buffer starts to fill again.

Chapter 2 ASDP Interface Configuration

2.1 Assigning the ASDP interface

The ASDP interface operates over a serial line. Therefore, to add an ASDP interface, you need to assign one of the router's serial lines as ASDP through the **set data-link** command (general configuration menu). To carry this out enter:

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

Interfaces compatible with the ASDP protocol are serialX/X and uartX/X.

If the router only has one WAN line, it will not ask which interface is to be used (as seen in the following example):

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

Once the interface is assigned, you can configure it. For the changes to take effect and for the interface to be monitored, save the configuration and reboot the device.

2.2 ASDP interface configuration commands

In this section, the steps to configure the ASDP interface are explained.

To access the ASDP interface configuration environment, enter the **network <id_ifc>** command at the general configuration prompt, (*Config>*), where **<id_ifc>** is the identifier of the ASDP interface being configured.

Example:

```
*process 4
Config>network serial0/0

-- ASDP Interface Configuration --
ASDP-uart0/0 Cfg>
```

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

The following commands are available within the ASDP interface configuration environment:

Command	Function
? (HELP)	Lists the commands or the available options.
advanced-applications	Defines ASDP in standard, broadcast and dial-up modes.
application-block-size	Sets TCP application block size.
device-mode	Configures device mode (DCE, DTE, AUTO).
dial-up	Dial-up mode menu access.
dtr-signal-ignored	DTR signal ignored. ASDP is always up.
flow-control	Sets flow control mode.
idle-time	Sets max TCP idle time.
interdigit-delay	Sets interdigit delay time.
interface-buffer-size	Sets serial interface frame size.
list	Displays the ASDP interface configuration.
local-port	Sets local port number to listen.
mode	Configures the ASDP protocol operating mode.
no	Restores the interface default configuration.
remote-ip	Sets remote IP address.
remote-port	Sets remote TCP port number.
serial-broadcasting	Broadcast mode menu access.
serial-parameters	Sets serial parameters.

session-time	Sets max TCP session time.
exit	Exits the ASDP configuration prompt.

2.2.1 ? (HELP)

This command is used to list all valid commands at the level where the router is programmed. You can also use this command after a specific command in order to list the available options.

Syntax:

```
ASDP-X Cfg>?
```

Example:

```
ASDP-uart0/0 Cfg>?
  advanced-applications     Advanced ASDP applications mode
  application-block-size    Set TCP application block size
  description               Enter interface description
  device-mode               Set device mode (DCE, DTE, AUTO)
  dial-up                   Set peer to send serial data as modem
  dtr-signal-ignored        DTR signal ignored. ASDP will be always up
  flow-control              Set flow control mode
  idle-time                 Set max TCP idle time
  interdigit-delay          Set interdigit delay time(x10msg)
  interface-buffer-size     Set serial interface frame size
  list                      List configuration
  local-port                Set local port number for listen
  mode                      Set ASDP operation mode
  no                        Negates a command or sets its defaults
  remote-ip                 Set remote IP address
  remote-port               Set remote port number
  serial-broadcasting       Set peers to broadcast serial data
  serial-parameters         Set serial parameters
  session-time              Set max TCP session time
  shutdown                  Change state to administratively down
  update                    Update a level indicator
  exit
ASDP-uart0/0 Cfg>
```

2.2.2 ADVANCED-APPLICATIONS

Configures the operating mode of the interface:

(1) Standard.

(2) Broadcast.

(3) Dial-up.

Syntax:

```
ASDP-X Cfg>advanced-applications mode <mode>
  none                      No advanced applications
  serial-to-TCP-broadcast   serial to TCP-broadcast mode
  dialup-to-TCP             dial-up to TCP mode
```

Example:

```
ASDP-uart1/0 Cfg>advanced-applications mode serial-to-TCP-broadcast
```

The default is standard mode.

2.2.3 APPLICATION-BLOCK-SIZE

Configures the size (in bytes) of the buffer used in the TCP connection. Values are between 100 and 65535 bytes. Default is 8192 bytes.

Syntax:

```
ASDP-X Cfg> application-block-size <TCP buffer size>
```

Example:

```
ASDP-uart0/0 Cfg>application-block-size
ASDP-uart0/0 Cfg>
```

2.2.4 DEVICE-MODE

Configures the mode of the ASDP serial interface: DCE, DTE and AUTO. This command cannot be used on routers that do not have a configurable serial interface. The configurable modes are:

- DCE: Forces the interface to operate as a DCE. This is the default mode for serial interfaces on routers.
- DTE: Forces the interface to operate as a DTE. A DCE-DTE adaptor cable must be connected.
- AUTO: The serial port will operate as a DCE or DTE depending on whether a DCE-DTE adaptor cable is used.

Syntax:

```
ASDP-X Cfg>device-mode auto
ASDP-X Cfg>device-mode DCE-forced
ASDP-X Cfg>device-mode DTE-forced
```

Example:

```
ASDP-uart0/0 Cfg>device-mode DCE-forced
ASDP-uart0/0 Cfg>
```

2.2.5 DIAL-UP

Creates the configuration table in the MASTER router that links phone numbers to IP addresses/remote port. This table will be used for processing AT dial-up commands in dial-up mode.

Syntax:

```
ASDP-X Cfg>dial-up peer-phone <telephone-number> remote-ip-address <x.x.z.w>
ASDP-X Cfg>dial-up peer-phone <telephone-number> remote-tcp-port <port>
```

Example:

```
ASDP-uart1/0 Cfg>dial-up peer-phone 123456789 remote-ip-address 10.10.10.1
ASDP-uart1/0 Cfg>dial-up peer-phone 123456789 remote-tcp-port 4010
```

2.2.6 DTR-SIGNAL-IGNORED

Ignores the state of the DTR signal. By default the DTR signal state is taken into account to activate the ASDP interface. If this signal is active, this means there is a DTE terminal connected and the ASDP interface will activate. If, there is no DTR signal however, this generally means there is no DTE connected and the ASDP interface is deactivated.

However, there are scenarios where the DTE terminal only has TX/TX signals. In these cases, this command allows the ASDP interface to activate.

Syntax:

```
ASDP-X Cfg>dtr-signal-ignored
```

2.2.7 FLOW-CONTROL

Configures the type of flow control used in the serial communication with the device connected to the ASDP interface.

The flow control can be *HARDWARE*, *XON-XOFF*, *ALL* or *NONE*. Default is *NONE*. The *ALL* option enables both types of flow control simultaneously.

As uartX/X interfaces do not support HARDWARE flow control, neither this option nor the ALL option appears in these types of interfaces.

Syntax:

```
ASDP-X Cfg>flow-control <Type of flow control>
hardware
xon-xoff
```

```
all
none
```

Example:

```
ASDP-uart0/0 Cfg>flow-control xon-xoff
ASDP-uart0/0 Cfg>
```

2.2.8 IDLE-TIME

Configures the time the router must remain without receiving data from the device connected to the serial port, and the device connected through the TCP session, in order to close the session. A zero value prevents this function, i.e., the TCP session will not be released due to absence of data exchange.

Values are between 0 seconds and two days. Default is zero. The minimum units handled are seconds.

Syntax:

```
ASDP-X Cfg>idle-time <time>
```

Example:

```
ASDP-uart0/0 Cfg> idle-time 120
ASDP-uart0/0 Cfg>
```

2.2.9 INTERDIGIT-DELAY

Sets the maximum time between digits for sending data to the TCP device.

This parameter determines the time that must lapse after receiving the last character from the serial interface and sending data stored in the serial interface buffer. This can optimize the number of TCP data messages sent. In the event that the data buffer fills up before this time has expired, the data stored in the interface buffer is sent and the buffer begins to fill again.

A zero value inhibits this function i.e., there is no wait time after the last character before sending the stored data over TCP. When this parameter is set to zero, it does not mean that a TCP data message is sent for each character received by the serial interface, it depends on the data reception mode. It is possible to send bigger or smaller blocks.

Values are between 0 and 65535 seconds. Default is zero. The unit handled is 10 milliseconds (n x 10 milliseconds).

Syntax:

```
ASDP-X Cfg>interdigit-delay <time>
```

Example:

```
ASDP-uart0/0 Cfg>interdigit-delay  10
ASDP-uart0/0 Cfg>
```

2.2.10 INTERFACE-BUFFER-SIZE

Configures the size (in bytes) of the ASDP serial interface buffer. This represents the maximum block of data that can be received or transmitted in a single operation. Values are between 100 and 2048 bytes. Default is 2048 bytes. This parameter used together with the “interdigit-delay”, is used as a limit to determine the quantity of data to store in the interface buffer when data is being continuously received i.e., without time between digits.

Syntax:

```
ASDP-X Cfg>interface-buffer-size <Interface buffer size>
```

Example:

```
ASDP-uart0/0 Cfg>interface-buffer-size 1024
ASDP-uart0/0 Cfg>
```

2.2.11 LIST

The **list** command displays information on the ASDP interface configuration.

Syntax:

```
ASDP-X Cfg>list <Type of information to display>
  all                     List all configuration
  interface-parameters    List ASDP interface parameters
  serial-parameters       List serial communication parameters
  tcp-parameters          List TCP protocol parameters
```

2.2.11.1 LIST ALL

Displays ALL the ASDP interface configuration information.

Syntax:

```
ASDP-X Cfg>list all
```

Example:

```
ASDP-uart0/0 Cfg>list all

Serial parameters
-----------------
Interface  : RS485
Mode       : FULL DUPLEX
Term. Res. : DISABLED
Link speed.: 9600 (bit/sec)
Data bits..: 8
Stop bits..: 1
Parity.....: NONE

Interface parameters
--------------------
Flow control type.....: XON/XOFF
Interdigit delay......: 1 (x10msg)
Interface buffer size.: 2048 (bytes)

TCP parameters
--------------
ASDP operation mode.....: MASTER
Local TCP port number...: 35
Remote TCP port number..: 35
Remote IP address.......: 172.24.78.125
Max TCP session time....: 20s
Max TCP idle time.......: 0s
Maximum data block size.: 8192 (bytes)

ASDP-uart0/0 Cfg>
```

2.2.11.2 LIST INTERFACE-PARAMETERS

Displays the configuration parameters relative to the ASDP interface part.

Syntax:

```
ASDP-X Cfg>list interface-parameters
```

Example:

```
ASDP-uart0/0 Cfg>list interface-parameters

Interface parameters
--------------------
Flow control type.....: XON/XOFF
Interdigit delay......: 1 (x10msg)
Interface buffer size.: 2048 (bytes)

ASDP-uart0/0 Cfg>
```

2.2.11.3 LIST SERIAL-PARAMETERS

Displays configuration parameters relative to the ASDP interface serial communication.

Syntax:

```
ASDP-X Cfg>list serial-parameters
```

Example:

```
ASDP-uart0/0 Cfg>list serial-parameters

Serial parameters
-----------------
Interface  : RS485
Mode       : FULL DUPLEX
Term. Res. : DISABLED
Link speed.: 9600 (bit/sec)
Data bits..: 8
Stop bits..: 1
Parity.....: NONE

ASDP-uart0/0 Cfg>
```

2.2.11.4 LIST TCP-PARAMETERS

Displays configuration parameters relative to the ASDP interface serial communication.

Syntax:

```
ASDP-X Cfg>list tcp-parameters
```

Example:

```
ASDP-uart0/0 Cfg>list tcp-parameters

TCP parameters
--------------
ASDP operation mode.....: MASTER
Local TCP port number...: 35
Remote TCP port number..: 35
Remote IP address.......: 172.24.78.125
Max TCP session time....: 20s
Max TCP idle time.......: 0s
Maximum data block size.: 8192 (bytes)

ASDP-uart0/0 Cfg>
```

2.2.12 LOCAL-PORT

Configures the TCP port associated with the ASDP interface. Allowed TCP ports are between 1 and 65535. Default is 35. By omission, this value is taken from the RFC 1700 [RFC1700], where port number 35 is reserved for any private printer server. Given that the most common uses for this type of interface is for remote communications with a serial printer, this value has been chosen.

Note

We strongly RECOMMEND using the default TCP port value (35). This is because the ASDP interface may not work correctly if this parameter is configured incorrectly. It could even affect the operation of other router services such as TELNET, FTP, etc., if one of the standard ports designated for these services is configured.

Syntax:

```
ASDP-X Cfg>local-port <TCP Port>
```

Example:

```
ASDP-uart0/0 Cfg>local-port 23456
ASDP-uart0/0 Cfg>
```

2.2.13 MODE

Sets the ASDP protocol operating mode (MASTER and SLAVE).

In SLAVE mode, the router behaves in a passive mode, i.e., it does not initiate TCP sessions. The router simply waits for the remote device to establish a TCP session with it. The serial interface should only activate its control signal. Data received by the interface when there is no TCP session established is discarded.

In MASTER mode, the router behaves in an active mode i.e., initiates TCP sessions when data is received from the serial interface. As well as waiting for a remote device to establish a TCP session with it, the router also tries to establish a TCP session with a remote device when receiving data from the device connected to the serial interface.

Default is SLAVE.

Syntax:

```
ASDP-X Cfg>mode <mode>
```

Example:

```
ASDP-uart0/0 Cfg>mode MASTER
ASDP-uart0/0 Cfg>
```

2.2.14 NO

This command is used to set the distinct parameters to their default value.

Syntax:

```
ASDP-X Cfg>no ?
  application-block-size    Set default TCP application block size
  flow-control              Set default flow control mode
  idle-time                 Set default max TCP idle time
  interdigit-delay          Set default interdigit delay time
  interface-buffer-size     Set default serial interface frame size
  local-port                Set default port number
  mode                      Set default ASDP mode
  remote-ip                 Set default remote IP addres
  remote-port               Set default port number
  serial-parameters         Set default serial parameters
  session-time              Set default max TCP session time
```

The default values are as follows:

Command	**Default value**
application-block-size	8192
flow-control	Hardware
idle-time	0 (sec.)
interdigit-delay	0 (x10 msc.)
interface-buffer-size	2048
local-port	35
mode	SLAVE
remote-ip	0.0.0.0
remote-port	35
serial-parameters	See the below example.
session-time	0 (sec.)

Example:

```
ASDP-uart0/0 Cfg>no serial-parameters ?
  data-bits    Set default number of bits per character
  parity       Set default character parity
  speed        Set default speed
  stop-bits    Set default number of stop bits per character
ASDP-uart0/0 Cfg>
```

The default values are as follows:

Command	Default value
data-bits	8
parity	None
speed	9600
stop-bits	1

2.2.15 REMOTE-IP

Configures the IP address for a device accessible through TCP. This parameter is used when the router is configured as MASTER. This address is used to try and establish the TCP session. This option has no significance in SLAVE mode.

Syntax:

```
ASDP-X Cfg>remote-ip <ip address>
```

Example:

```
ASDP-uart0/0 Cfg>remote-ip 192.234.55.2
ASDP-uart0/0 Cfg>
```

2.2.16 REMOTE-PORT

Configures the TCP port for a device accessible through TCP. This parameter is used when the router is configured as MASTER, this port being used to try and establish the TCP session. This option has no significance in SLAVE mode. Default is 35.

Syntax:

```
ASDP-X Cfg>remote-port <ip address>
```

Example:

```
ASDP-uart0/0 Cfg>remote-port 192.234.55.2
ASDP-uart0/0 Cfg>
```

2.2.17 SERIAL-BROADCASTING

Creates a table of SLAVE routers in the MASTER router. The MASTER sends all asynchronous traffic received through the serial port to the SLAVE routers in this table. The table contains a list of all SLAVE IP addresses and associated TCP listening ports.

Syntax:

```
ASDP-X Cfg>serial-broadcasting peer <peer-id> remote-ip-address <ip_address>
  <1..8>    Peer ID
  <a.b.c.d> Remote IP address
ASDP-X Cfg>serial-broadcasting peer <peer-id> remote-tcp-port <port>
  <1..8>     Peer ID
  <1..65535> Value in the specified range
```

Example:

```
ASDP-uart1/0 Cfg>serial-broadcasting peer 1 remote-ip-address 10.10.10.1
ASDP-uart1/0 Cfg>serial-broadcasting peer 1 remote-tcp-port 4010
```

2.2.18 SERIAL-PARAMETERS

Configures the different serial interface parameters:

Syntax:

```
ASDP-X Cfg>serial-parameters <Parameter, Parameter Value>
  data-bits    Set number of bits per character
  parity       Set character parity
  speed        Set speed
```

```
  stop-bits    Set number of stop bits per character
  termination-resistor    set a resistor at the end of the wires
```

2.2.18.1 SERIAL-PARAMETERS DATA-BITS

Establishes the number of data bits. The available values are 5, 6, 7, and 8. Default is 8.

Syntax:

```
ASDP-X Cfg>serial-parameters data-bits <Number of data bits>
```

Example:

```
ASDP-uart0/0 Cfg>serial-parameters data-bits 7
ASDP-uart0/0 Cfg>
```

2.2.18.2 SET SERIAL-PARAMETERS PARITY

Establishes type of parity used. The available values are as follows:

- EVEN: EVEN Parity.
- MARK: MARK Parity.
- NONE: No type of parity is used.
- ODD: ODD Parity.
- SPACE: SPACE Parity.

Default is *NONE*.

Syntax:

```
ASDP-X Cfg>serial-parameters parity <Parity type>
  even
  mark
  none
  odd
  space
```

Example:

```
ASDP-uart0/0 Cfg>serial-parameters parity even
ASDP-uart0/0 Cfg>
```

2.2.18.3 SERIAL-PARAMETERS SPEED

Establishes the transmission/reception speed on the serial line (in bits/s). The available values are between 300 and 115200 bps. Default is 9600 bps.

Syntax:

```
ASDP-X Cfg>serial-parameters speed <Speed>
```

Example:

```
ASDP-uart0/0 Cfg>serial-parameters speed 57600
ASDP-uart0/0 Cfg>
```

2.2.18.4 SERIAL-PARAMETERS STOP-BITS

Establishes the number of stop bits. Available values are: 1 and 2. Default is 1.

Syntax:

```
ASDP-X Cfg>serial-parameters stop-bits <Number of data bits>
```

Example:

```
ASDP-uart0/0 Cfg>serial-parameters stop-bits 2
ASDP-uart0/0 Cfg>
```

2.2.18.5 SERIAL-PARAMETERS TERMINATION-RESISTOR

Enables/disables the termination resistor in RS-485 interfaces.

Syntax:

```
ASDP-X Cfg>serial-parameters termination-resistor <value>
  disable
  enable
```

Example:

```
ASDP-uart1/0 Cfg>serial-parameters termination-resistor enable
```

This command is available on routers that allow you to dynamically control the termination resistor. Default is disabled.

2.2.19 SESSION-TIME

Configures the maximum duration of a TCP session time. A zero value prevents this function i.e., the TCP session is not released due to session duration time.

Values are between 0 seconds and 2 days. Default is zero. Minimum units handled are seconds.

Syntax:

```
ASDP-X Cfg>session-time <time>
```

Example:

```
ASDP-uart0/0 Cfg>session-time 180
ASDP-uart0/0 Cfg>
```

2.2.20 EXIT

Exits the ASDP interface configuration environment. Returns to the general configuration prompt.

Syntax:

```
ASDP-X Cfg>exit
```

Example:

```
ASDP-uart0/0 Cfg>exit
Config>
```

Chapter 3 Monitoring the ASDP Interface

3.1 ASDP interface monitoring commands

This section explains the ASDP interface monitoring commands. To enter these commands, access the ASDP interface monitoring prompt. To do this, execute the following steps:

(1) At the prompt (*), enter **process 3** or **P3**. This takes you to the monitoring prompt +.

```
*p 3
+
```

(2) At the (+) prompt, enter **network** and the name identifying the interface associated with a preconfigured ASDP device (generically called *<ifc>*).

Syntax:

```
+network <ifc>
```

Example:

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

The following commands are available in the ASDP interface monitoring environment:

Command	Function
? (HELP)	Lists the commands or the available options.
CLEAR	Resets the ASDP monitoring information counters.
LIST	Displays the ASDP interface monitoring information.
EXIT	Exits the ASDP monitoring prompt.

3.1.1 ? (HELP)

This command is used to list all the valid commands at the level where the router is programmed. You can also use this command after a specific command to list the available options.

Syntax:

```
ASDP-X+?
```

Example:

```
ASDP-uart0/0+?
  clear    Reset monitoring counters
  list     Display monitoring information
  exit
ASDP-uart0/0+
```

3.1.2 CLEAR

Run **clear** to reset the statistics counter related to the ASDP interface.

```
ASDP-X+clear ?
  all                    All the statistics counters
  interface-statistics   Statistics counter related to the serial device
  tcp-statistics         Statistics counter related to TCP application
ASDP-X+
```

3.1.2.1 CLEAR ALL

Resets all the ASDP interface statistics counters relative to the interface and the TCP application.

Syntax:

```
ASDP-X+clear all
```

Example:

```
ASDP-uart0/0+clear all
ASDP-uart0/0+
```

3.1.2.2 CLEAR INTERFACE-STATISTICS

Resets the ASDP interface statistics counter associated with the serial device.

Syntax:

```
ASDP-X+clear interface-statistics
```

Example:

```
ASDP-uart0/0+clear interface-statistics
ASDP-uart0/0+
```

3.1.2.3 CLEAR TCP-STATISTICS

Resets the ASDP interface statistics counter relative to the TCP application.

Syntax:

```
ASDP-X+clear tcp-statistics
```

Example:

```
ASDP-uart0/0+clear tcp-statistics
ASDP-uart0/0+
```

3.1.3 LIST

Run **list** to display the ASDP interface monitoring information.

Syntax:

```
ASDP-X+list ?
  all                     All the statistics counters
  interface-statistics    Display monitoring information
  tcp-statistics          Statistics counter related to TCP application
ASDP-X+
```

3.1.3.1 LIST ALL

Displays all the ASDP interface statistics.

Syntax:

```
ASDP-X+list all
```

Example:

```
ASDP-uart0/0+list all

Interface statistics:
---------------------
Device status.............................: PRESENT
Frames sent to serial device..............: 105
Bytes sent to serial device...............: 5893
Frames received from serial device........: 67
Bytes received from serial device.........: 754
Frames dropped (received from serial device).: 0
Bytes dropped (received from serial device)..: 0

TCP statistics:
---------------
TCP connection.......................: LISTEN

Total connections....................: 9
Total input connections..............: 3
```

```
Total output connections.............: 6
Failed connections (interface failure).: 0

Bytes sent to TCP remote peer.........: 754
Bytes received from TCP remote peer....: 5893

ASDP-uart0/0+
```

3.1.3.2 LIST INTERFACE-STATISTICS

Displays the ASDP interface statistics associated with the serial device.

Syntax:

```
ASDP-X+list interface-statistics
```

Example:

```
ASDP-uart0/0+list interface-statistics

Interface statistics:
---------------------
Device status.............................: PRESENT
Frames sent to serial device..............: 34
Bytes sent to serial device...............: 34
Frames received from serial device........: 27716
Bytes received from serial device.........: 11134924
Frames dropped (received from serial device).: 0
Bytes dropped (received from serial device)..: 0

ASDP-uart0/0+
```

The meaning of the different fields is as follows:

Device status	Indicates whether a serial device is correctly connected to the router serial line. Possible values are *present* (if the device is connected) or *absent* (if the device is not connected).
Frames sent to serial device	Displays the number of packets sent to the serial device connected to the interface.
Bytes sent to serial device	Displays the accumulated size, in bytes, of the packets sent to the serial device connected to the interface.
Frames received from serial device	Displays the number of packets received from the serial device connected to the interface.
Bytes received from serial device	Displays the accumulated size, in bytes, of the packets received from the serial device connected to the interface.
Frames dropped	Displays the number of packets discarded. (Packets received from the serial device where no TCP connection is open to send data.)
Bytes dropped	Displays the accumulated size, in bytes, of packets discarded. (Packets received from the serial device where no TCP connection is open to send data.)

3.1.3.3 LIST TCP-STATISTICS

Displays the ASDP interface statistics relative to the TCP application.

Syntax:

```
ASDP-X+list tcp-statistics
```

Example:

```
ASDP-uart0/0+list tcp-statistics

TCP statistics:
---------------
TCP connection.........................: ESTABLISHED
   Local Address : 172.24.78.53   , Local Port : 35
   Remote Address: 172.24.51.20   , Remote Port: 1277

Total connections......................: 11
```

```
Total input connections.................: 0
Total output connections................: 0
Failed connections (interface failure).: 0

Bytes sent to TCP remote peer..........: 11658455
Bytes received from TCP remote peer....: 246609

ASDP-uart0/0+
```

The meaning of the fields is as follows:

TCP connection	Indicates the status of the TCP connection associated with the interface. Possible values are: *established* (if the connection is open and operative), *listen* (if the router is waiting for a TCP connection request) or *closed* (if the router does not detect a device connected to the ASDP serial interface so does not accept TCP connections).
Local Address	Indicates the router address where the TCP connection was carried out. This parameter is only available if the TCP connection is established.
Local Port	Indicates the router's TCP port number where the TCP connection was carried out. This parameter is only available if the TCP connection is established.
Remote Address	Indicates the TCP connection remote end address. This parameter is only available if the TCP connection is established.
Remote Port	Indicates the remote end TCP port number for the TCP connection. This parameter is only available if the TCP connection is established.
Total connections	Indicates the total number of TCP connections established with the router.
Total input connection	Indicates the number of input TCP connections established with the router.
Total output connections	Indicates the number of output TCP connections established with the router.
Failed connections	Displays the number of failed TCP connections (device connected to the serial ASDP interface is no longer available).
Bytes sent to TCP remote peer	Displays the accumulated size, in bytes, of the data sent to a remote device through the TCP connection.
Bytes received from TCP remote peer	Displays the accumulated size, in bytes, of the data received from a remote device through a TCP connection.

3.1.4 EXIT

Exits the ASDP interface monitoring environment. Returns to general monitoring prompt.

Syntax:

```
ASDP-X+exit
```

Example:

```
ASDP-uart0/0+exit
+
```

3.2 The DEVICE command from the general MONITORING process (+)

Run **device** followed by the interface identifier associated with the ASDP interface to display a series of statistics associated with the interface.

Syntax:

```
+device <ASDP interface identifier>
```

Example:

```
+device serial0/0

                                  Auto-test   Auto-test     Maintenance
Interface            CSR    Vect      valids    failures        failures
serial0/0       FA200A00      5E           1           0               0
 Interface DCE
   Circuits:     105 106 107 108 109 125 141
   Nicknames:    RTS CTS DSR DTR DCD RI  LL
   State:        ON  ON  ON  ON  ON  --- ---
```

```
Speed   (bps)            =       9600
Throughput (bps)         =      10560
Last throughput (bps)    =      10800
Bits per character       =          8
Stop bits                =          1
Parity selected          =       EVEN
Parity errors            =          0
Data errors              =          0
Overrun errors           =          0
Last reset               = 37 minutes 50 seconds
+
```

The meaning of the different fields is as follows:

Interface	Name and number of the interface instance.
CSR	Control/status register addresses and the physical interface data.
Vect	Vector interruption associated with the interface given in hexadecimal.
Auto-test valids	Number of successful auto-tests.
Auto-test failures	Number of failed auto-tests.
Maintenance failures	Number of maintenance failures.
Interface DCE/DTE	DTE (Terminal) or DCE (MODEM) interface performance mode.
RTS	Request To Send.
CTS	Clear To Send.
DSR	Data Send Ready.
DTR	Data Terminal Ready.
DCD	Data Carrier Detect.
Speed	Transmission/reception speed (bps).
Throughput	Throughput (bps).
Last throughput	Last throughput (bps).
Bits per character	Data bits per character.
Stop bits	Stop bits.
Parity selected	Type of selected parity: EVEN, MARK, NONE, ODD, SPACE.
Parity errors	Number of parity errors.
Data errors	Number of data errors.
Overrun errors	Errors due to the reception of more data than the interface can process.
Last reset	Time lapsed since the last interface reset.

Note

A UART based interface will always be shown as DTE, indicating the DSR as input control signal and DTR as output signal. UART interfaces only handle one input control signal and one output control signal and the two data signals, one input and the other output. When connecting a serial device to this type of interface, the name of the signals defined for this interface in the Installation Manual should be ignored, only taking into account the type of interface (data or control) and direction (input or output).

Chapter 4 Configuration Examples

4.1 Configuring in standard combined mode

This scenario corresponds to a 2-port asynchronous serial end-to-end connection over an IP network.

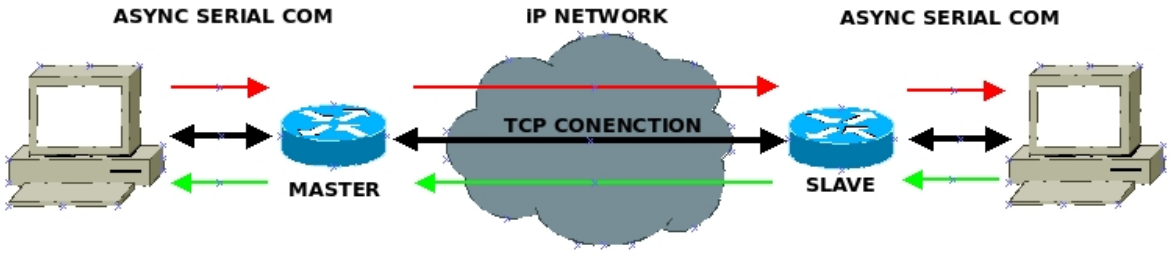

Fig. 6: Example of a serial end-to-end connection

MASTER configuration parameters:

- SLAVE IP address (IP_SLAVE).
- TCP listening port in the SLAVE (PORT_SLAVE).
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface setup (SPEED, DATA_LEN, DATA_PARITY,DATA_STOP).

MASTER configuration:

```
 set data-link asdp uartX/X
;
   network uartX/X
; -- ASDP Interface Configuration --
      mode master
      remote-port PORT_SLAVE
      remote-ip IP_SLAVE
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      interface-buffer-size MAX_RCV_BUFFER_LEN
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      dtr-signal-ignored
   exit
;
```

SLAVE configuration parameters:

- Local TCP listening port (LOCAL_PORT_TCP=PORT_SLAVE):
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface setup (SPEED, DATA_LEN,DATA_PARITY,DATA_STOP).

SLAVE configuration:

```
 set data-link asdp uartX/X
;
   network uartX/X
```

```
; -- ASDP Interface Configuration --
      interface-buffer-size MAX_RCV_BUFFER_LEN
      local-port LOCAL_PORT_TCP
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      dtr-signal-ignored
   exit
;
```

4.2 Configuring in broadcast mode

Example scenario with one MASTER router and two SLAVE routers.

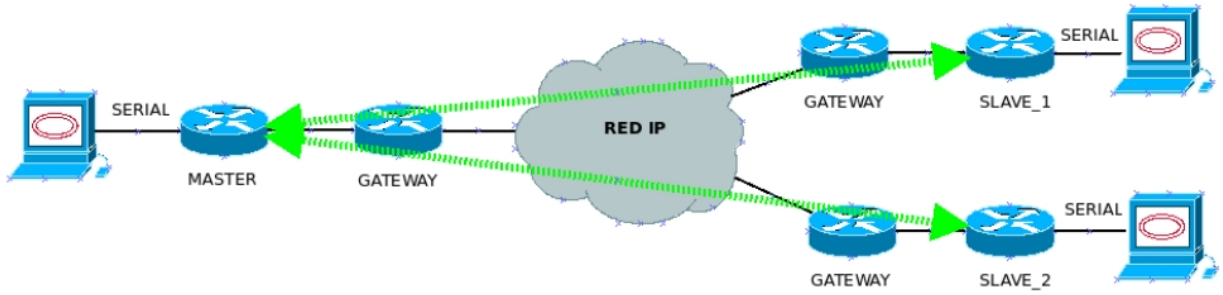

Fig. 7: Example of BROADCAST mode

MASTER configuration parameters:

- SLAVE IP address (IP_SLAVE).
- TCP listening port in the SLAVE (PORT_SLAVE).
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface setup (SPEED, DATA_LEN,DATA_PARITY,DATA_STOP).
- SLAVE routers' IP addresses and TCP ports (IP_ADDR_SLAVE_X,TCP_PORT_SLAVE_X).

MASTER router configuration:

```
set data-link asdp uartX/X
;
   network uartX/X
; -- ASDP Interface Configuration --
      mode master
      remote-port PORT_SLAVE
      remote-ip IP_SLAVE
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      interface-buffer-size MAX_RCV_BUFFER_LEN
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      serial-broadcasting peer 1 remote-ip-address IP_ADDR_SLAVE_1
      serial-broadcasting peer 1 remote-tcp-port TCP_PORT_SLAVE_1
      serial-broadcasting peer 2 remote-ip-address IP_ADDR_SLAVE_2
      serial-broadcasting peer 2 remote-tcp-port TCP_PORT_SLAVE_2
      advanced-applications mode serial-to-TCP-broadcast
      dtr-signal-ignored
```

```
   exit
;
```

SLAVE configuration parameters:

- Local TCP listening port (LOCAL_PORT_TCP=PORT_SLAVE).
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface setup (SPEED,DATA_LEN,DATA_PARITY,DATA_STOP).

SLAVE router configuration:

```
 set data-link asdp uartX/X
;
   network uartX/X
; -- ASDP Interface Configuration --
      interface-buffer-size MAX_RCV_BUFFER_LEN
      local-port LOCAL_PORT_TCP
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      advanced-applications mode serial-to-TCP-broadcast
      dtr-signal-ignored
   exit
;
```

4.3 Configuring in dial-up mode

MASTER configuration parameters:

- SLAVE IP address (IP_SLAVE).
- TCP listening port in the SLAVE (PORT_SLAVE).
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface setup (SPEED,DATA_LEN,DATA_PARITY,DATA_STOP).
- SLAVE routers' phone numbers, IP addresses and TCP ports (PHONE_X,IP_ADDR_SLAVE_X,TCP_PORT_SLAVE_X).

MASTER router configuration:

```
   set data-link asdp uartX/X
;
   network uartX/X
; -- ASDP Interface Configuration --
      mode master
      remote-port PORT_SLAVE
      remote-ip IP_SLAVE
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      interface-buffer-size MAX_RCV_BUFFER_LEN
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      advanced-applications mode dialup-to-TCP
      serial-broadcasting peer-phone PHONE_1 remote-ip-address IP_ADDR_SLAVE_1
```

```
      serial-broadcasting peer-phone PHONE_1 remote-tcp-port TCP_PORT_SLAVE_1
      serial-broadcasting peer-phone PHONE_2 remote-ip-address IP_ADDR_SLAVE_2
      serial-broadcasting peer-phone PHONE_2 remote-tcp-port TCP_PORT_SLAVE_2
      dtr-signal-ignored
   exit
;
```

SLAVE configuration parameters:

- Local TCP listening port (LOCAL_PORT_TCP=PORT_SLAVE).
- Idle-time (IDLE_TIME_TCP).
- Session time (SESSION_TIME_TCP).
- Receiver buffer size (MAX_RCV_BUFFER_LEN).
- Maximum time between characters (MAX_TIME_CHAR).
- Serial interface configuration (SPEED,DATA_LEN,DATA_PARITY,DATA_STOP).

SLAVE router configuration:

```
 set data-link asdp uartX/X
;
   network uart1/1
; -- ASDP Interface Configuration --
      interface-buffer-size MAX_RCV_BUFFER_LEN
      local-port LOCAL_PORT_TCP
      idle-time IDLE_TIME_TCP
      interdigit-delay MAX_TIME_CHAR
      session-time SESSION_TIME_TCP
      serial-parameters data-bits DATA_LEN
      serial-parameters parity DATA_PARITY
      serial-parameters speed SPEED
      serial-parameters stop-bits DATA_STOP
      advanced-applications mode dialup-to-TCP
      dtr-signal-ignored
   exit
;
```