Teldat Router

ASDP Interface

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Chapter 1 Introduction

1. ASDP Interface

ASDP is an acronym for *Asynchronous Serial Device Proxy*. As the name indicates, the objective of the ASDP interface is to provide remote access to an asynchronous serial device. This access is achieved through a TCP connection to a determined configurable router port.

The ASDP interface transparently sends all the data received through a TCP connection to a device connected to a serial interface and viceversa.

The user scenario for an ASDP interface is seen in the following figure:

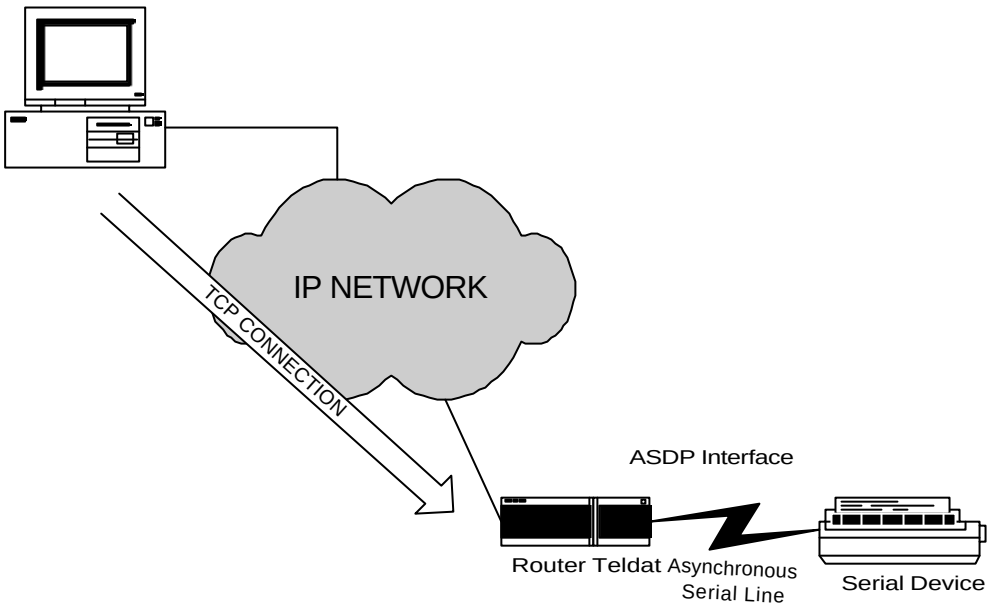

Illustration 1: ASDP interface user scenario

1.1. Operation Scenario

The general operation scenario is as follows:

1. The device you wish to use to send data to a serial device must establish a TCP connection with the router to a determined port. This connection can only be established in the cases where there is a device connected to the corresponding serial interface.
2. If the connection is satisfactorily established, the device will send data through the said connection. The router will send this data via the serial line.
3. The serial device can, as a response, return the data which will then be collected by the router and sent through the TCP connection, if this is active.
4. When the remote device determines that the data transmission to the device is complete, has stopped sending data to the device, it should end the TCP connection.

1.2. Flow Control

In many cases, the router is able to send data to the serial device at a higher rate than the latter is capable of processing. For this reason, it is necessary to establish a mechanism in order to control the data flow between both devices. These types of mechanisms are known as the flow control mechanisms. In the serial mechanisms there exist a variety of flow control mechanisms. The most common are Hardware and XON/XOFF flow controls.

The first of these is based on the use of some serial interface signals (RTS/CTS) so the device indicates when it can receive data. In the second case, the device sends a special character to indicate when it wishs to temporarily stop the transmission (XOFF) and another when it wishes to restart (XON).

Similarly, a flow control must exist between the router and the remote end of the connection as if this does not exist, the router will be inundated with data coming from the remote end due to the fact it cannot deliver it (due to the flow control with the device) at the same rate as received from the connection. In this case, the said flow control mechanisms are provided by the use of TCP already contemplated for this situtation.

Therefore, in the scenario previously given, two possible flow controls are presented:

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

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.

2.1. Serial Interface

The ASDP interface is an asynchronous serial line with the following characteristics:

- The possibility of acting as DTE or DCE.
- Speed: up to 64000 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.
- Flow control through signals (hardware) 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. In the same way, it also processes the data received via the serial line and progresses this towards the application level.

2.2. TCP Application

The ASDP application level manages the commuication with the remote end. It accepts a single TCP connection to the port which it has configured, and progresses all the data received from said connection towards the seral interface. In the same way, this sends all the data received from the serial interface through the TCP connection, provided that this connection is established.

The application has the following characteristics:

- It only accepts requests in a configurable TCP port.
- Only negotiates one simultaneous TCP connection.
- Does not establish access controls (You can establish access controls in IP protocol if you wish).
- Does not carry out data processing, restricting itself to redirecting the data to the TCP connection or the interface accordingly.

2.3. Interface – Application Relationship

The serial interface and the application level are two entities that operate independently, but cooperate in order to carry out the ASDP tasks. The relation between both modules is described below:

- The application level only accepts TCP connections in cases where a device connected to the serial interface is detected.
- In cases where the device connected to the serial interface disconnects, the applications level discards all the data it has to send and closes the TCP connection, should this connection be established.
- The serial interface discards all the packets received from the device connected to the line while an established TCP connection does not exist in the application level.

Chapter 2
Configuration

1. Assigning the ASDP interface

The ASDP interface operates over a serial line. Therefore, in order to add an ASDP interface, you need to assign one of the router's serial lines as ASDP through the **SET DATA-LINK** command in the general configuration menu. To carry this out enter:

```
Config>SET DATA-LINK ASDP
Interface name [serial0/0]?
Config>
```

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

```
Config>SET DATA-LINK ASDP
Config>
```

Once the interface is assigned, you can now configure it. However in order for the changes to take effect and that the interface can be monitored, you need to save the configuration and reboot the device.

2. ASDP Interface Configuration Commands

In this section the steps required in order to configure the ASDP interface are explained.

To access the ASDP interface configuration environment, you must introduce 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
User Configuration
Config>NETWORK serial0/0
ASDP Interface Configuration
ASDP-1 Cfg>
```

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

Command	Function
? (HELP)	Lists the commands or the available options.
APPLICATION-BLOCK-SIZE	Set TCP application block size.
FLOW-CONTROL	Set flow control mode.
INTERFACE-BUFFER-SIZE	Set serial interface frame size.
LIST	Displays the ASDP interface configuration.
NO	Restores the interface default configuration.
PORT	Set port number.
SERIAL-PARAMETERS	Set serial parameters.
EXIT	Exits the ASDP configuration prompt.

Generally, if all the necessary parameters are not introduced in the commands line in order to complete a command, the device will request them.

2.1. ? (HELP)

This command is used to list all the valid commands in 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-1 Cfg>?
APPLICATION-BLOCK-SIZE      Set TCP application block size
FLOW-CONTROL                Set flow control mode
INTERFACE-BUFFER-SIZE       Set serial interface frame size
LIST                        List configuration
NO                          Set default config
PORT                        Set port number
SERIAL-PARAMETERS           Set serial parameters
EXIT                        Return to previous menu
ASDP-1 Cfg>
```

2.2. APPLICATION-BLOCK-SIZE

Configures the size (in bytes) of the buffer used in the TCP connection. The permitted values are between 100 and 65535 bytes. The default value is 4096 bytes.

Syntax:

```
ASDP-X Cfg>APPLICATION-BLOCK-SIZE <TCP buffer size>
```

Example:

```
ASDP-1 Cfg>APPLICATION-BLOCK-SIZE
Type data block maximum size (100 - 65535) [4096]? 2048
ASDP-1 Cfg>
```

2.3. 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* or *XON-XOFF*. The value used by default is *HARDWARE*.

Syntax:

```
ASDP-X Cfg>FLOW-CONTROL <Flow control type>
HARDWARE
XON-XOFF
```

Example:

```
ASDP-1 Cfg>FLOW-CONTROL XON-XOFF
ASDP-1 Cfg>
```

2.4. 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 transmited in a single operation. The permitted values are between 100 and 2048 bytes. The default value is 1024 bytes.

Syntax:

```
ASDP-X Cfg>INTERFACE-BUFFER-SIZE <Interface buffer size>
```

Example:

```
ASDP-1 Cfg>INTERFACE-BUFFER-SIZE
Type interface buffer size (100 - 2048) [1024]? 2048
ASDP-1 Cfg>
```

2.5. LIST

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

Syntax:

```
ASDP-X Cfg>LIST <Type of information displayed>
ALL
INTERFACE-PARAMETERS
SERIAL-PARAMETERS
TCP-PARAMETERS
```

a) LIST ALL

Displays ALL the ASDP interface configuration information.

Syntax:

```
ASDP-X Cfg>LIST ALL
```

Example:

```
ASDP-1 Cfg>LIST ALL

Serial parameters
-----------------
Link speed.: 9600 (bit/sec)
Data bits..: 8
Stop bits..: 1
Parity.....: NONE


Interface parameters
--------------------
Flow control type.....: Hardware
Interface buffer size.: 1024 (bytes)


TCP parameters
--------------
TCP port number.........: 35
Maximum data block size.: 4096 (bytes)


ASDP-1 Cfg>
```

b) LIST INTERFACE-PARAMETERS

Displays the configuration parameters relative to the ASDP interface part.

Syntax:

```
ASDP-X Cfg>LIST INTERFACE-PARAMETERS
```

Example:

```
ASDP-1 Cfg>LIST INTERFACE-PARAMETERS

Interface parameters
--------------------
Flow control type.....: Hardware
Interface buffer size.: 1024 (bytes)

ASDP-1 Cfg>
```

c) LIST SERIAL-PARAMETERS

Displays configuration parameters relative to the ASDP interface serial communication.

Syntax:

```
ASDP-X Cfg>LIST SERIAL-PARAMETERS
```

Example:

```
ASDP-1 Cfg>LIST SERIAL-PARAMETERS

Serial parameters
-----------------
Link speed.: 19200 (bit/sec)
Data bits..: 8
Stop bits..: 1
```

```
Parity.....: NONE

ASDP-1 Cfg>
```

d) LIST TCP-PARAMETERS

Displays configuration parameters relative to the ASDP interface serial communication.

Syntax:

```
ASDP-X Cfg>LIST TCP-PARAMETERS
```

Example:

```
ASDP-1 Cfg>LIST TCP-PARAMETERS

TCP parameters
--------------
TCP port number.........: 35
Maximum data block size.: 4096 (bytes)

ASDP-1 Cfg>
```

2.6. NO

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

Syntax:

```
ASDP-X Cfg>NO ?
APPLICATION-BLOCK-SIZE      Set TCP application block size
FLOW-CONTROL                Set flow control mode
INTERFACE-BUFFER-SIZE       Set serial interface frame size
PORT                        Set port number
SERIAL-PARAMETERS           Set serial parameters
```

The default values are as follows:

Command	Default value
APPLICATION-BLOCK-SIZE	8192
FLOW-CONTROL	Hardware
INTERFACE-BUFFER-SIZE	2048
PORT	35
SERIAL-PARAMETERS	See the below example.

Example:

```
ASDP-1 Cfg>NO SERIAL-PARAMETERS ?
DATA-BITS      Set number of bits per character
PARITY         Set character parity
SPEED          Set speed
STOP-BITS      Set number of stop bits per character
ASDP-1 Cfg>
```

The default values are as follows:

Command	Default value
DATA-BITS	8
PARITY	None
SPEED	9600
STOP-BITS	1

2.7. PORT

Configures the TCP port that is associated to the ASDP interface. The permitted TCP ports are between 1 and 65535. The default value 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 that the default TCP port value (35) is used. This is due to the face that if this parameter is incorrectly configured, the ASDP interface may not work correctly and this can even affect the operation of other router services such as TELNET, FTP, etc. should one of the standard ports designated for these services is configured.

Syntax:

```
ASDP-X Cfg>PORT <TCP Port>
```

Example:

```
ASDP-1 Cfg>PORT
Type TCP port number to be used (1 - 65535) [35]? 9876
ASDP-1 Cfg>
```

2.8. SERIAL-PARAMETERS

Configures the different serial interface parameters:

Syntax:

```
ASDP-X Cfg>SERIAL-PARAMETERS <Parameter, Parameter value>
DATA-BITS
PARITY
SPEED
STOP-BITS
```

a) SERIAL-PARAMETERS DATA-BITS

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

Syntax:

```
ASDP-X Cfg>SERIAL-PARAMETERS DATA-BITS <Number of data bits>
```

Example:

```
ASDP-1 Cfg>SERIAL-PARAMETERS DATA-BITS 7
ASDP-1 Cfg>
```

b) 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.

The default value is *NONE*.

Syntax:

```
ASDP-X Cfg>SERIAL-PARAMETERS PARITY <Parity type>
EVEN
MARK
NONE
ODD
SPACE
```

Example:

```
ASDP-1 Cfg>SERIAL-PARAMETERS PARITY EVEN
ASDP-1 Cfg>
```

c) SERIAL-PARAMETERS SPEED

Establishes the transmission/reception speed on the serial line (in bits/s). The available values are between 300 and 64000 bps. The default value is 19200 bps.

Syntax:

```
ASDP-X Cfg>SERIAL-PARAMETERS SPEED <Speed>
```

Example:

```
ASDP-1 Cfg>SERIAL-PARAMETERS SPEED
Type link speed (300 - 64000) [19200]? 64000
ASDP-1 Cfg>
```

d) SERIAL-PARAMETERS STOP-BITS

Establishes the number of stop bits. The available values are: 1 and 2. The default vaule is 1.

Syntax:

```
ASDP-X Cfg>SERIAL-PARAMETERS STOP-BITS <Number of data bits>
```

Example:

```
ASDP-1 Cfg>SERIAL-PARAMETERS STOP-BITS 2
ASDP-1 Cfg>
```

2.9. EXIT

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

Syntax:

```
ASDP-X Cfg>EXIT
```

Example:

```
ASDP-1 Cfg>EXIT
Config>
```

Chapter 3
Monitoring the ASDP Interface

1. ASDP interface monitoring commands

This section explains the ASDP interface monitoring commands. In order to introduce these commands it is necessary to access the ASDP interface monitoring prompt.

To access the ASDP interface monitoring environment, you must enter the **NETWORK <id_ifc>** command at the general monitoring prompt, (+), where <id_ifc> is the ASDP interface identifier being configured.

Example:

```
+NETWORK serial0/0
ASDP Monitoring
ASDP-1+
```

The following commands are available within 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 information.
EXIT	Exits the ASDP monitoring prompt.

Generally, if all the necessary parameters are not introduced in the commands line in order to complete a command, the device will request them.

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 in order to list the available options.

Syntax:

```
ASDP-X+?
```

Example:

```
ASDP-1+?
CLEAR
LIST
EXIT
ASDP-1+
```

1.2. CLEAR

The CLEAR command permits you to reset the statistics counter related to the ASDP interface.

Syntax:

```
ASDP-X+CLEAR <ASDP Interface statistics>
ALL
INTERFACE-STATISTICS
TCP-STATISTICS
```

a) CLEAR ALL

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

Syntax:

```
ASDP-X+CLEAR ALL
```

Example:

```
ASDP-1+CLEAR ALL
ASDP-1+
```

b) CLEAR INTERFACE-STATISTICS

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

Syntax:

```
ASDP-X+CLEAR INTERFACE-STATISTICS
```

Example:

```
ASDP-1+CLEAR INTERFACE-STATISTICS
ASDP-1+
```

c) CLEAR TCP-STATISTICS

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

Syntax:

```
ASDP-X+CLEAR TCP-STATISTICS
```

Example:

```
ASDP-1+CLEAR TCP-STATISTICS
ASDP-1+
```

1.3. LIST

The LIST command displays the ASDP interface monitoring information.

Syntax:

```
ASDP-X+LIST <ASDP interface statistics>
ALL
INTERFACE-STATISTICS
TCP-STATISTICS
```

a) LIST ALL

Displays all the ASDP interface statistics.

Syntax:

```
ASDP-X+LIST ALL
```

Example:

```
ASDP-1+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
Failed connections (interface failure).: 0

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

ASDP-1+
```

b) LIST INTERFACE-STATISTICS

Displays the ASDP interface statistics associated to the serial device.

Syntax:

```
ASDP-X+LIST INTERFACE-STATISTICS
```

Example:

```
ASDP-1+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-1+
```

The meaning of the different fields is as follows:

Device status	Indicates if there is a serial device is correctly connected to a the router serial line. The possible values are PRESENT if the device is found 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 that have been discarded as they were received from the serial device where there was no existing TCP connection open in order to send the data.
Bytes dropped	Displays the accumalted size, in bytes, of the packets that have been discarded as they were received from a serial device where there was no existing TCP connection open in order to send the data.

c) LIST TCP-STATISTICS

Displays the ASDP interface statistics related with the TCP application.

Syntax:

```
ASDP-X+LIST TCP-STATISTICS
```

Example:

```
ASDP-1+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
Failed connections (interface failure).: 0
Bytes sent to TCP remote peer..........: 11658455
Bytes received from TCP remote peer....: 246609

ASDP-1+
```

The meaning of the different fields is as follows:

TCP connection	Indicates the status of the TCP connection associated with the interface. The 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 and for this reason does not accept TCP connections.
Local Address	Indicates the router adddress where the TCP connection was carrried 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 that have been established with the router.
Failed connections	Displays the number of failed TCP connections due to the fact that the 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 accumuated size, in bytes, of the data received from a remote device through a TCP connection.

1.4. EXIT

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

Syntax:

```
ASDP-X+EXIT
```

Example:

```
ASDP-1+EXIT
+
```

2. The DEVICE command from the general MONITORING process (+)

On introducing the **DEVICE** command followed by the interface identifier associated to the ASDP interface, a series of the statistics associated to the interface are displayed.

Syntax:

```
+DEVICE <ASDP interface identifier>
```

Example:

```
+DEVICE serial0/0

                                    Auto-test   Auto-test     Maintenance
Interface            CSR    Vect      valids    failures       failures
serial0/0       fa200a20      5D           1           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  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:

Ifc	Interface number.
Interface	Name and number of the interface instance.
CSR	Control/status register addresses and the physical interface data.
Vect	Vector interruption associated to 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.