SDLC Protocol Configuration

This chapter discusses Synchronous Data Link Control (SDLC) protocols that you can configure on a BANDIT device’s ports. See the following sections:

- Section 4.1, SDLC with IP
- Section 4.2, SDLC 1490 Configuration
- Section 4.3, SDLC Routing

Note: See the Protocols Module for a full list of protocols.

4.1 SDLC with IP

To provide support for legacy networks in banking, manufacturing, and other businesses, the BANDIT products can use SDLC-to-IP protocol conversion or transport. This is a cost-effective solution for upgrading legacy SDLC networks to IP; it provides a more immediate upgrade at a lower cost than does replacement of legacy products.

There are two ways to use SDLC with IP:

- SDLC over IP Transport
- SDLC to IP Conversion

4.1.1 SDLC over IP Transport

In the SDLC network, the mainframe uses a front-end processor (FEP) to talk with the remote terminals. The BANDIT sits between the FEP and the IP network.

The BANDIT device receives SDLC transmissions from the FEP and spoofs the response—that is, the BANDIT responds to the FEP as if the BANDIT were the remote SDLC device. Then the BANDIT encapsulates SDLC within IP packets, and sends the transmission to the remote device (Figure 4-1).
On the remote end, a BANDIT device receives the transmission, removes the IP packets surrounding SDLC, and sends the SDLC transmission to the remote SDLC device. (The BANDIT on the remote side is spoofing the SDLC devices by polling them as if it were the FEP.)

**Note:** In the legacy SDLC network, the connection between the FEP and the remote SDLC devices was over leased lines. In this setup, the connection is over the public internet or a private IP network. There is a BANDIT, acting as an IP gateway–router, at each end.

### 4.1.2 SDLC to IP Conversion

There is no front-end processor. The network mainframe sends IP packets (through an IP router) to the remote end of the network. In this setting, there is no SDLC on the host network—only IP (Figure 4-2).

A BANDIT is the IP router on the remote end, spoofing the SDLC devices. The BANDIT receives the IP packets from the mainframe, converts IP to SDLC, and sends the SDLC transmissions to the SDLC devices. In reverse, the BANDIT receives SDLC from the devices, converts SDLC to IP, and sends the IP packets to the mainframe.
Note: Non-use of a front-end processor is called NCP bypass (Network Control Protocol bypass).

4.1.3 Configuring SDLC with IP

Perform the following steps to configure the BANDIT device for SDLC with IP:

1. Set up a serial port or a CSU/DSU T1/E1 port to carry the SDLC 1490 protocol. See Section 4.2, SDLC 1490 Configuration.

2. Set up a path for data entering this port to reach the remote IP host. (The path will also be used in the reverse direction, for data from the remote IP host to reach the SDLC device.) See Section, Defining Global Paths.

3. SDLC is secure because the lines are private. IP travels over the public internet. To set up secure transmissions, IP uses VPN tunnels. See The BANDIT Products in Virtual Private Networks, to set up a VPN tunnel for the connection over the public internet.

4.2 SDLC 1490 Configuration

SDLC 1490 configuration provides connectivity between SDLC devices in conformance with the IBM recommended SDLC protocol standards. SNA devices comprise the following:

- IBM SNA host, terminals, routers, and bridges
- IBM SNA-compatible hosts, terminals, routers, and bridges

You can use the SDLC 1490 COnfiguration option to make the following connections:

- Local SDLC Terminal to Remote SDLC/Frame Relay host, as shown in Figure 4-3 (A host is typically an IBM-compatible 3745 or an AS400.)
- Local SDLC host to Remote SDLC/Frame Relay terminal, as shown in Figure 4-4
Figure 4-3. Local SDLC Terminals Connected to Remote SDLC/Frame Relay Hosts

Figure 4-4. Local SDLC Host Connected to Remote SDLC Terminals
How to Configure SDLC 1490

Note: You must complete the SNA Routing Table with the addresses of all units in your network. (See Section 6.1, SNA Routing for 1490.)

Also see Section 4.9, SDLC 1490 Configuration Statistics.

1. From the Main Menu, select Advanced Configurations, Data Configurations, and select a serial port or a CSU/DSU T1/E1 port. Then select Undefine Logical Protocol. Finally, select Protocol, SDLC 1490 Configuration.

   ❖ When you select SDLC 1490 Configuration (E) from the Logical Port Protocol Selection menu, the following menu is displayed:

   SDLC 1490 Config Parameters :
   -----------------------------
   1) Speed : 9600
   2) Polling Emulation Type : TERMINAL
   3) Data Format : NRZ
   4) Idle Character : FLAG
   5) DCD : FORCED
   6) User Buffers HWM : 18
   7) User Buffers LWM : 12
   8) SDLC 1490 Controllers

   Enter Choice :

2. Select Speed. This option allows you to set the synchronous clock speed that units configured as DCE will use to provide clocking to the user’s equipment.

   ❖ The following menu will be displayed.

   Configure Synchronous Clock Speed
   ----------------------------------
   1) 2400
   2) 4800
   3) 9600
   4) 19200
   5) 38400
   6) 48000
   7) 56000
   8) 64000
   9) 96000
   A) 128000
   B) 192000
   C) 256000
   D) 384000
   E) 512000
   F) 768000
   G) 1024000
   H) 1536000
   I) 2048000
   J) External (DTE)

   Enter Choice :
**Note:** This menu reflects that, when this port is DTE, the speed is provided by the external device connected to the port.

3 **Polling Emulation Type.** This option allows you to specify whether the unit port is connected to a terminal or to a host. Select “Polling Emulation Type” from the SDLC 1490 Configuration menu.

❖ The following menu appears.

```
Configure SDLC2 Type (HOST TERMINAL)
--------------------------------------
1) Host End
2) Terminal End
Enter Choice :
```

a If the unit is connected to a host, select **Host End.** If the unit is connected to a terminal, select **Terminal End.**

4 Select **Data Format.**

❖ The following options are displayed:

```
Configure Data Format
---------------------
1) NRZ
2) NRZI
Enter Choice:
```

a Select the data format your host/terminal expects to receive: Non-Return-to-Zero (NRZ) or Non-Return-to-Zero Inverted (NRZI).

5 Select **Idle Character.** This parameter specifies whether Mark or Flag characters (7E) should be transmitted between frames.

❖ The following menu is displayed:

```
Configure Idle Character
-----------------------
1) MARK
2) FLAG
Enter Choice:
```

a Select one of the following options:

- **Mark.** This option configures the unit to send solid Mark characters (all binary ones) in the idle state, except when the Poll/Final (P/F) bit (bit 0x10 of the second byte of the frame) is clear (off). This exception was explicitly designed for compatibility with IBM AS400s. However, it does not reflect the actual state of an HDLC line over half-duplex modems.
- **Flag.** This option configures the unit to send HDLC Flag characters (0x7e with no zero insertion) in the idle state, which is the normal state.

6 Select **DCD.** This parameter specifies whether Data Carrier Detect (DCD) is FORCED or SWITCHED.

❖ The following menu is displayed:

```
Configure DCD
-------------
1) SWITCHED
2) FORCED

Enter Choice:
```

**Note:** DCD is effective only on ports with DCE interfaces.

7 Select one of the following:

- **Switched.** This option allows you to activate DCD only when valid data is sent to the port.
- **Forced.** This option allows you to activate DCD at all times.

8 The high-water mark (HWM) and low-water mark (LWM) control the flow of traffic through the SDLC link.

For example, suppose traffic is being passed from a high-speed Frame Relay link through an SDLC link. When the buffers in the SDLC link are filled to the level specified in the **High Water Mark** setting and the SDLC link is in danger of becoming congested, the SDLC link sends a message to the high-speed link, requesting that it slow down the flow of traffic.

When the SDLC link has emptied its buffers to the level specified in the **Low Water Mark** setting, the SDLC link sends another message to the high-speed link, asking it to resume its normal flow.

Do the following:

a Select **High Water Mark.**

❖ The following prompt is displayed:

```
Enter User Buffer HWM (16 to 31)[18]:
```

b Type the high-water mark buffers you want to use and press **Enter.** (It is strongly recommended that the default value be used.)

c Select **Low Water Mark.**

❖ The following prompt is displayed:
d Type the low-water mark buffers you want to use and press Enter. (It is strongly recommended that the default value be used.)

9 Controllers are the SNA terminal devices with control unit (CU) addresses. To make entries in the controller table, select SDLC 1490 Controllers.

❖ The following prompts are displayed:

```
Empty Controller Table
Add Controller Table Entry
Enter SDLC Controller Address(2 Hex Digits):
```

a Type an SDLC Controller address with two hexadecimal digits and press Enter.

❖ The following prompt is displayed:

```
Do you want rest of the parameters to be default?(y/n)
```

b Do one of the following:

• Select Yes to use default parameters.

❖ If you select y, you are given the opportunity to add more SDLC Controller Addresses to the table. The following prompt appears. Repeat Step 9a.

• Select No.

❖ If you select n, the following prompt is displayed:

```
For the following, press <Enter> for default value[xxx]
Enter Receive Window Size(1 to 7)[7]:
```

c Receive Window Size. This option reflects the SDLC Sliding Window protocol. Type the Receive window size you want, and press Enter.

❖ The following prompt is displayed:

```
Enter Transmit Window Size (1 to 7)[7]:
```
**d** Transmit Window Size. This option reflects the SDLC protocol transmit window size. Type the size you want to use and press **Enter**.

- The following prompt is displayed.

```
Enter Acknowledge Timer T1 (Seconds) (1 to 60)[3]:
```

**e** Acknowledge Timer T1. This option reflects the amount of time the system waits for acknowledgment of transmitted frames. Type the Acknowledge Timer T1 (time in seconds) and press **Enter**.

- The following prompt is displayed:

```
Enter Maximum Retries N2(0 to 60)[5]:
```

**f** Maximum Retries N2. This option reflects the number of times the system tries to retrieve an acknowledgment. Type the Maximum Retries N2 and press **Enter**.

- The unit will display a message confirming that the entry was added and then prompts you for the next SDLC Controller Address.

```
Entry Added
Enter SDLC Controller Address (2 Hex Digits):
```

10 Do one of the following:

- **a** Repeat Step 9a.

- **b** If you have finished entering SDLC addresses, press **Escape** to return to the SDLC 1490 Configuration Parameters menu.

### 4.3 SDLC Routing

In addition to Protocol Emulation (Spoofing) and Bit Sync Encapsulation, and SNA 1490, you can configure the unit to support SDLC using SDLC Routing. When a unit port is configured for SDLC Routing, it reads only the addressing portion of the SDLC frame. This is a more efficient method of transmitting SDLC than SNA RFC 1490.

The DCD (SWITCHED) and Idle Character (MARK) options are intended primarily for use with half-duplex SNA/SDLC applications, particularly in conjunction with the IBM AS400.
**How to Configure SDLC Routing**

Note: Make sure you have configured a Frame Relay port with a matching DLCI. This protocol is proprietary and requires a unit at both ends of the link.

Note: See Section 4.10, *SDLC Routing Statistics*, for a description of the statistics used to monitor this protocol.

1. From the Main Menu, select Advanced Configurations, Data Configurations, and select a port. Then select Undefine Logical Port, Protocol, SDLC Routing.

   ❖ When you select SDLC Routing from the Logical Port Protocol Selection Menu, the following menu is displayed:

```
SDLC Routing Parameters : SERIAL
-----------------------------------
1) Speed : 9600
2) Data Format : NRZ
3) DCD : FORCED
4) Idle Character : FLAG
5) Routing Entries
Enter Choice :
```

2. **Speed.** This option allows you to specify a synchronous clock speed for units configured for DCE. Select Speed.

   ❖ The following menu of speeds is displayed.
Note: When the port is configured as DTE, as opposed to DCE, the parameters menu reflects that the speed is provided by the device connected to the unit. In this case, you do not need to configure speed. If you attempt to configure the speed, the following message is displayed and you are returned to the parameters menu:

*Port is DTE, Cannot Change Speed*

3 **Data Format.** This option allows you to specify whether the data format should be Non-Return-to-Zero (NRZ) or Non-Return-to-Zero Inverted (NRZI). Select Data Format.

❖ The unit will display the menu below:

```
Configure Data Format
---------------------
1) NRZ
2) NRZI
Enter Choice:
```

4 Enter the number of the format your host/terminal expects to receive.

5 **DCD.** This option allows you to specify whether Data Carrier Detect (DCD) is FORCED or SWITCHED. Select DCD from the SDLC Routing Parameters menu.

❖ The unit will display the following menu:

```
Configure DCD
------------
1) SWITCHED
2) FORCED
Enter Choice:
```
Note: DCD is effective only on ports with DCE interfaces.

a **Switched.** This option allows you to activate DCD only when valid data is sent to the port. If you want to do this, select SWITCHED (1) and the unit will redisplay the SDLC Routing Parameters menu.

b **Forced.** This option allows you to activate DCD at all times. If you want to do this, select FORCED (2) and the unit will redisplay the SDLC Routing Parameters menu.

6 **Idle Character.** This option allows you to specify whether MARK or FLAG characters (7E) should be transmitted between frames. Select Idle Character.

❖ The following menu is displayed:

```
Configure Idle Character
-------------------------
1) MARK
2) FLAG
Enter Choice:
```

a **Mark.** This option allows you to configure the unit to send solid Mark characters (all binary ones) in the idle state, except when the Poll/Final (P/F) bit (bit 0x10 of the second byte of the frame) is clear (off). If you want to do this, select MARK (1) from the “Configure Idle Character” menu. This exception was explicitly designed for compatibility with IBM AS400’s. However, it does reflect the actual state of an HDLC line over half-duplex modems.

b **Flag.** This option allows you to configure the unit to send HDLC Flag characters (0x7e with no zero insertion) in the idle state (normal state). If you want to do this, select FLAG from the “Configure Idle Character” menu and type the number of the option you want.

7 **Routing Entries.** This option allows you to create a routing table that maps the controller addresses, DLCIs, and ports. Select Routing Entries.

❖ The following prompt is displayed:

```
Add SDLC Routing Table Entry
Enter SDLC Address:
```

a Type the SDLC Address and press ENTER.

❖ The unit will display the following prompt:

```
Enter Path Name (1 to 10 Characters):
```
**b Path Name.** This option allows you to identify the Global Path entry that corresponds to the path this traffic will take through the network. You do this by entering the name you assigned to the Global Path. A global path entry contains information such as port numbers, path types, channel numbers, DLCIs, and X.121 addresses. This option is accessed from the Main Menu. Select GPT Name.

❖ The following prompt is displayed:

```
Enter GPT Name:
```

c Enter the Global Path Name and press Enter.

❖ If you enter a name that is not already associated with a Global Path, you are prompted to enter the path now:

```
Path Name Does Not Exist In GPT Table.
To Add Global Path Entry, Press "Y". Press Escape Otherwise.
```

d Press Enter or type “Y.”

❖ The unit will display the following menu:

```
Global Path Types
------------------
1) X25 SVC
2) X25 PVC
3) Frame Relay PVC
4) Port Type
5) IP/UDP
6) Voice

Enter Choice : (1 to 6)[1] :
```

**Note:** You cannot save this configuration if a valid GPT Name has not been entered.

e Press ESC to view the table of entries you have made. You can add, delete, or change the entries as necessary. When you have finished making changes, press ESC four times to return to the Main Menu.