Zypcom Application Note

Product:
Z34-SX, Z34-RX, Z34-SE, Z34-RE, Z32t-SX, Z32t-SE, Z32t-RX, Z32b-SX, Z32b-SE, Z32b-RE and Z32b-RX

Application:

Leased Line Operation with Asynchronous Data

Asynchronous leased line operation can be set using DIP switches or AT commands. Two basic asynchronous setups are described below, one using DIP switch setup and one using AT commands. Your application may require some additional commands.

When selecting speed it is important to remember that the serial port speed and the line speed are independent of one another when using asynchronous buffered mode (&Q0) or error control mode (&Q6 or &Q5). One can have the serial port locked at 38,400bps (AT%X=38.4 #L1 &W) and the line rate forced at 19,200 (ATS37=21 N0 &W).

Asynchronous leased line application considerations are:

Leased line type   4-wire (&L2) or 2-wire (&L1)
Note: SX-/RX-Series modems support 2-/4-wire and SE-/RE-Series are 2-wire

DTE port speed (%X=)   _____
Note: Example, AT%X=19.2

Transmit level (S35)   Set to -6dBm (S35=6)

Port speed lock (#Ln)   Yes (#L1) or No (#L0)

Line speed (S37=nn)   Auto (S37=0) or selectable (S37=nn)

Line speed forced (Nn)   Yes (N0) or No (N1)
Note: N1 allows the modem to select the best line rate and allows the modem to lower speed if lines conditions change. The command N0 forces the line to a specific speed. It is a good idea to use N1 with line rates above 19,200bps and use N0 on line rates below 19,200bps.

Flow control (&Kn)   RTS/CTS (&K3) or Xon/off (&K4)
Note: Use RTS/CTS if possible, but most importantly the DTE and modem flow control settings must match

Messages off (Qn)   On (Q0) or Off (Q1)
Note: After setup usually turn off (Q1)

Echo off (En)   On (E1) or Off (E0)
Note: After setup usually turn off (E0)

Error control mode (&Q)   Auto, V.42bis, MNP, None
Note: Usually auto mode (&Q6) or off (&Q0)

Force error control (S36)   Yes (S36=0) or No (S36=1)
Note: It is best to force error control (S36=0) for asynchronous leased line applications

EIA signals: CXR (&Cn) Normal (&C1) or Forced (&C0)
**   DSR (&Sn)   Normal (&S1) or Forced (&S)**
**   CTS (&Rn)   On (&R1) or Follow CXR (&R2)**
**   DTR should be forced ON (&D0)**

Also, one modem will be the answer side (S0=1) and the other will be the originate side (S0=0).

Hardware Jumpers:

The Zypcom modems need to have their leased line jumpers (one set of jumpers for 2-wire, two sets of jumpers for 4-wire) installed per Leased Line Operation Chapter section titled Mandatory Setup Procedures. Jumpers JP3 and JP4 should be in there default position which is no connection. If you ordered an "SXL" model then the jumpers are already installed.

Leased Line Telco Cable:

Zypcom has several different leased line cables depending on the modem model. For all RX-/RE-Series modems use 91009-200 an octopus chassis cable for 2-wire (&L1) or 4-wire (&L2) operation. For the SE-Series modems use cable 91009-202 for 2-wire operation. For SX-Series use 91009-202 for 2-wire operation and use 15080-001 for 4-wire operation.   On external modems all leased line telco cables are installed into the modems modular phone jack labelled PHONE.

AT Command Setup

For complete control over all modem options use AT commands to setup leased line operation. The ability to fine tune the modem to your application using DIP switch setup is limited. One would use AT commands for leased line setup if the DIP settings didn't provide the needed selections for your application.

38,400bps Leased Line with Asynchronous Data—Answer Side
The following procedure explains how to setup leased line operation for an answer-side modem using AT commands. The following sample command strings might need to be changed slightly for your application. The command &W writes the command settings to memory.

1.   Set the EIA and speed options and any other options required for your application. For example, it is recommend that asynchronous applications use forced error controlled mode (S36=0). Often CXR (&C1) and DSR (&S1) need to be set to normal. Also, CTS should follow true carrier (&R2) for most applications but some may require CTS ON (&R1). Also, you probably want a non-fixed line speed (N1 S37=25) for your application. Set the serial port speed and lock it (%X=38.4 #L1) so the modem ignores data at any speed except the desired modem serial port speed.

38,400 Async. Setup: 38,400bps serial port locked and a top line rate of 28,800bps.

> AT S36=0 &C1 &S1 &R1 N1 S37= 25 %X=38.4 #L1 &W<ENTER>

2.   Issue the data type command, leased line command (&L1 for 2-wire, &L2 for 4-wire), register S0 setting, turn off echo/messages and set transmit level (on most leased lines set S35=6 but back-to-back bench testing set S35=20) then write it to memory.

For an asynchronous two-wire answer modem, type:
> AT &Q6 &L1 S0=1 %Q1 E0 Q1 S35=6 &W<ENTER>

For an asynchronous four-wire answer modem, type:
> AT &Q6 &L2 S0=1 %Q1 E0 Q1 S35=6 &W<ENTER>

NOTE: The OK message is not sent after the command in step 2 due to Q1 command.

3.   Turn power off and then on. After about five seconds the commands take effect and the modem goes off-hook and begins sending answer tone.

4.   In asynchronous communication, the modem's serial port speed must be set to match the speed of the device connected to the modem. Therefore, set the terminal that you will use to configure the modem to the same speed as the device that will ultimately be connected to the modem. To verify terminal speed, type AT<ENTER> and then AT&V<ENTER>. Look at the value of %X command in the Active Profile, this is the speed your terminal is set to currently.

38,400bps Leased Line with Asynchronous Data—Originate Side
The following procedure explains how to setup leased line operation for an originate-side modem using AT commands.

1.   Set the EIA and speed options and any other options required for your application. For example, it is recommend that asynchronous applications use forced error controlled mode (S36=0). Often CXR (&C1) and DSR (&S1) need to be set to normal. Also, CTS should follow true carrier (&R2) for most applications but some may require CTS ON (&R1). Also, you probably want a non-fixed line speed (N1 S37=25) for your application. Set the serial port speed and lock it (%X=38.4 #L1) so the modem ignores data at any speed except the desired modem serial port speed.

38,400 Async. Setup: 38,400bps serial port locked and a top line rate of 28,800bps.

> AT S36=0 &C1 &S1 &R1 N1 S37= 25 %X=38.4 #L1 &W<ENTER>

2.   Issue the data type command, leased line command (&L1 for 2-wire, &L2 for 4-wire), register S0 setting, turn off echo/messages and set transmit level (on most leased lines set S35=6 but back-to-back bench testing set S35=20) then write it to memory.

For an asynchronous two-wire answer modem, type:
> AT &Q6 &L1 S0=0 %Q1 E0 Q1 S35=6 &W<ENTER>

For an asynchronous four-wire answer modem, type:
> AT &Q6 &L2 S0=0 %Q1 E0 Q1 S35=6 &W<ENTER>

NOTE: The OK message is not sent after the command in step 2 due to Q1 command.

3.   Turn power off and then on. After about five seconds the commands take effect and the modem goes off-hook and begins looking for answer tone from the answer modem..

4.   In asynchronous communication, the modem's serial port speed must be set to match the speed of the device connected to the modem. Therefore, set the terminal that you will use to configure the modem to the same speed as the device that will ultimately be connected to the modem. To verify terminal speed, type AT<ENTER> and then AT&V<ENTER>. Look at the value of %X command in the Active Profile, this is the speed your terminal is set to currently.

9600bps 2-wire Leased Line Example

9,600bps 2-Wire Leased Line with Asynchronous Data—Answer Side
9600 Async. Setup: 9,600bps serial port locked and forced line rate of 9,600bps.

AT S36=0 &C1 &S1 &R1 N0 S37=17 %X=9.6 #L1 &W<ENTER>

AT &Q6 &L1 S0=1 %Q1 E0 Q1 S35=6 &W<ENTER>

9,600bps 2-Wire Leased Line with Asynchronous Data—Originate Side
9600 Async. Setup: 9,600bps serial port locked and forced line rate of 9,600bps.

AT S36=0 &C1 &S1 &R1 N0 S37=17 %X=9.6 #L1 &W<ENTER>

AT &Q6 &L1 S0=0 %Q1 E0 Q1 S35=6 &W<ENTER>

DIP Switch Setup

DIP switches are a quick and easy way to setup leased line operation. Make sure that the modems jumpers are installed properly. This method only allows control over the basic leased line settings. The DIP switch block is found on the bottom of the modem. When selecting settings the modem should be powered off.

1.   Set SW1 to the ON position to enable the rest of the switches.

2.   For asynchronous communication set SW2 to OFF.

3.   Set the serial port speed using switches SW3 and SW4. The actual line speed will vary depending on the modem model and the line conditions. Only four asynchronous speeds (19.2K, 38.4K, 57.6K and 115.2K) are selectable using the DIP switch.

4.   Set SW5 to select which modem will originate and which modem will answer. Set SW5 to the OFF position on the originating modem and SW5 ON on the answering modem.

5.   Set switch SW6 to the ON position to enable leased line operation.

6.   Set switch SW7 to the OFF for two-wire leased line and to the ON position for four-wire leased line communication.

Once the switches have been set, reconnect the DTE's serial cable, leased line telco cable (remember that this cable installs into the PHONE jack on the modem) and return power to the modem.

When the leased line configured modem is powered up, it will automatically go off-hook in 5 seconds. The handshaking tone will be heard on the answer modem. Once the originate modem hears the answer modem's handshake tone it will respond with its own unique tone. After going off-hook and putting out answer tone for about 30-40 seconds, the answer modem then goes on-hook waits 4 or 5 seconds and repeats the process. The originate-side modem goes off-hook in originate mode, waiting to detect answer tone. If the leased line is installed properly, the modems will handshake and return a call progress message indicating the speed of the connection and the EC LED will go ON if error control and data compression are used on this connection.

If call progress messages are not needed in your application, then set AT commands for echo (En) off and response messages (Qn) off before setting the DIP switches to their positions. Also, you probably want set the EIA to normal (AT&C1&S1&W) condition before setting the DIP switches to their position.

38,400bps 4-Wire Leased Line with Asynchronous Data—Answer Side
DIP SW1   ON
DIP SW2   OFF
DIP SW3   OFF
DIP SW4   ON
DIP SW5   ON
DIP SW6   ON
DIP SW7   ON
DIP SW8   OFF
DIP SW9   OFF
DIP SW10   OFF

38,400bps Leased Line with Asynchronous Data—Originate Side
DIP SW1   ON
DIP SW2   OFF
DIP SW3   OFF
DIP SW4   ON
DIP SW5   OFF
DIP SW6   ON
DIP SW7   ON
DIP SW8   OFF
DIP SW9   OFF
DIP SW10   OFF