AMC2348XLSB Additional Commands for SDLC Control

The information in this document should be read in conjunction with the TDK V.22bis modem command set and includes explanation of the appropriate S-Registers and how to set them for reliable SDLC connections when using the AMC2348XLSD SDLC capable modem. When connected, the modem will take care of all the synchronous modem functions in addition to the SDLC packetising and de-packetising, resulting in an error free modem link. The user application must be capable of supporting CTS/RTS flow control as this method is used to control the flow of data in to and out of the modem during a data connection. To successfully send complete SDLC packets that are not split and send as smaller packets, the DTE serial data rate should be set to at least twice the modem line data modulation rate. E.g. if the line data modulation speed is 1200bps then the DTE should be set to 2400bps, 4800bps or 9600bps to ensure correct operation.

Background:

When using the AMC2348XLSB modem is SDLC mode, and typically dialling in to a Hypercom NAC, the line data rate (the modem training and handshake speed on the telephone line) should be limited to 1200bps maximum. This is the data speed at which most testing has been performed, and is the only data rate seen in the field to date. The modem has been tested successfully with the modem line speed set to 2400 bps but most (if not all) NACs will slow this down to 1200bps during training. Once connected, the AMC2348XLSB modem will always train it's synchronous data clock to the speed of the NAC, rather than it's own internal crystal clock, and in this way, data is always transmitted to the NAC at the same speed that it transmits to the AMC2348XLSB modem. This is designed to limit the number of received data errors at the NAC by preventing data from drifting in and out of lock.

The rest of this document assumes a basic knowledge and understanding of dial-up modem technology, including a working knowledge of using TDK based dial-up modem designs that use the Hayes "AT" command set to control their operation.

What is SDLC:

SDLC is simply another acronym and stands for Synchronous Data Link Control, and was a signalling standard developed by IBM that would allow for packets of data to be transmitted from point to point on multi-drop signalling lines. SDLC allows for error free data transmission by including a header that indicates the destination for the data packet, and a footer that contains a CRC generated checksum for the packet as a whole. In terms of data traffic, the line never has to be left idle, as there will always be one modem or the other talking at any time.

The SDLC algorithm implemented on a typical Hypercom NAC is slightly removed from the initial standard, and the system of fast handshaking employed further complicates the issue and leads to many questions and errors. Once connected the basic SDLC protocol is adhered to save for a few limitations, but the user must ensure that all credit card transactions are contained within a single SDLC data packet. Split packets, although supported by the SDLC standard, tend to be rejected by the banking hosts themselves and hence should be avoided. Packets will not be split if the data arrives at the modem fast enough and hence the requirement to set the DTE speed a factor of two, faster than the line speed.

AMC2348XLSB S-Register definitions:

To get around issues raised from the Hypercom implementation, there are a number of S-Registers supported on the AMC2348XLSB modem that should allow the user flexibility to connect in situations that would otherwise fail. The changes and additions in the Alpha Micro modem code, that are over and above that supported in the standard TDK modem code are listed and explained below:

S100: SDLC base address on this modem. – Default 0

It is a good idea to leave this register set to it's default value of 0. When set to 0, the modem will grab whatever address is requested by the NAC and set itself to that address for the duration of the connection. By default the NAC will request to talk to address 48! Setting S100 to and address other than 0 or 48 may result in the failure of a data connection.

S101: SDLC control flags – Default 0

Bit 7: Attempt SDLC connections following training.
Bit 6: If bit7=1 then connect SDLC only and ignore Async connections.
Bit 5: Receiving a DISC frame forces an immediate line drop.
Bit 4: Support V.22 Quick Connect handshake.
Bit 3: Work around satellite delay found on intercontinental links.
Bit 2: Debug display SDLC state machine.
Bit 1: Respond to NAC with RNR if DTE busy.
Bit 0: Display connection states (affects handshake timings).

To initiate and SDLC call, set ATS101=16 prior to dialling.

S102: SDLC flag search timing during training – Default 50

S102 sets the maximum length of time that the modem searches for the synchronous SDLC flag stream during training. Again it is a good idea to leave this at the default value of 50. If no sync flags are detected then the modem will fall back to async mode, and extending this delay will slow down asynchronous connection times.

S103: Maximum SDLC transmit block size – Default 250

S103 sets the maximum length of any SDLC transmit frame. The size of the transmit frame is four times the number stated in the S103 register PLUS 4 bytes for header and CRC information. ATS103=250 sets the maximum transmit block size to 1004 bytes including header and CRC checksum. Again, the default value has been tried and tested and should not be altered without good reason.

S104: Not used

S104 is a redundant register that used to be used to time SDLC training. Thie value saved in this register is ignored.

S105: SDLC frame timer used in satellite bypass mode only – Default 40

S105 is used for testing into foreign NACs from the Alpha Micro office in the UK using inter-continental connections. The satellite delays incurred can often prevent these lines from successfully connecting and hence yield little or no information about any problems experienced in the field. By predicting the delays expected, it has been possible to make successful connections into both North and South America from the UK.

S40: Dialtone/Answer tone tweaks – Default 0

Setting bit 7 of S40 (ATS40=128) will force the modem to detect dialtone very quickly, and may be used for very fast detection before dialling. This doesn't meet any specifications but does make for very fast connections. This also bypasses answer tone detection and allows the modem to train on NACs that skip generating this tone altogether. However this setting should be used with caution as ALL call progress detection will be disabled if this flag is set and the modem will be blind to both busy detection and number-unavailable tones.

If Bit 7 is set this can also speed up call answering by skipping all unnecessary delays in the handshake sequence, saving 2 to 3 seconds in some cases. Again this does not meet all specification, but can be the only way to connect to certain systems.