DATA-CONNECT

The Right Connection!

SE2130B

Serial Ethernet Bridge

User Manual

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SE2130B SERIAL - ETHERNET Bridge

Overview

The SE2130B Network Bridge is a high performance, remote, self-learning Ethernet bridge. Its compact size and low cost make it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. Several selectable data interfaces, including V.35, RS-530, RS-449, X.21, and RS-232, make this Ethernet Bridge's connection between 10Base-T and 100Base-TX LAN and various SYNC data port interfaces convenient.

Features

- Supports raw HDLC, Cisco® HDLC, and PPP encapsulation
- 10BASE-T/100BASE-TX, Full Duplex or Half Duplex
- HP Auto-MDI/MDIX detects and corrects crossed cable
- Automatic address learning, aging and deletion after 5 minutes
- Forwarding and filtering rate at wire speed with through put latency of 1 frame.
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Ethernet interface has automatic Twisted Pair polarity correction
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

- **LAN**

Standard	Fully compliant with IEEE 802.3/802.3u
Connector	Shielded RJ-45
Speeds	10BASE-T/100BASE-TX, Full or Half Duplex
MTU	1522 bytes

- **WAN**

Interface	Selectable RS-232(SYNC), V.35, RS-449/530, and X.21
Protocol	Synchronous HDLC, PPP or Cisco® HDLC
Connector	DB25 Male
Type	DTE port
Data Rates	n x 64(56)Kbps, up to 2048Kbps
Clock Source	Internal or External

- **General**

Power	AC Adapter; EUP 100~240VAC / 12VDC-1A Unit; DC9~12V/300mA
Environment	Temperature: 0~50° C Humidity: <90% non-condensing
Dimensions	135(L) x 80(W) x 25(H) mm
Weight	150g

- **LED INDICATORS**

SYNC (green)	ON=WAN Protocol Up
LINK (green)	ON=receiving CTS and DSR signal
Rx (green)	ON=WAN receive data (blinking)
Tx (green)	ON=WAN transmit data (blinking)
PWR (green)	ON=Power OK
ERROR (red)	OFF=system OK, 2 pulse=configuration error; 3 pulse=WAN CRC
ACT (green)	OFF=No link; Blinking=receiving data
LINK (green)	ON=LAN linked; OFF=no link

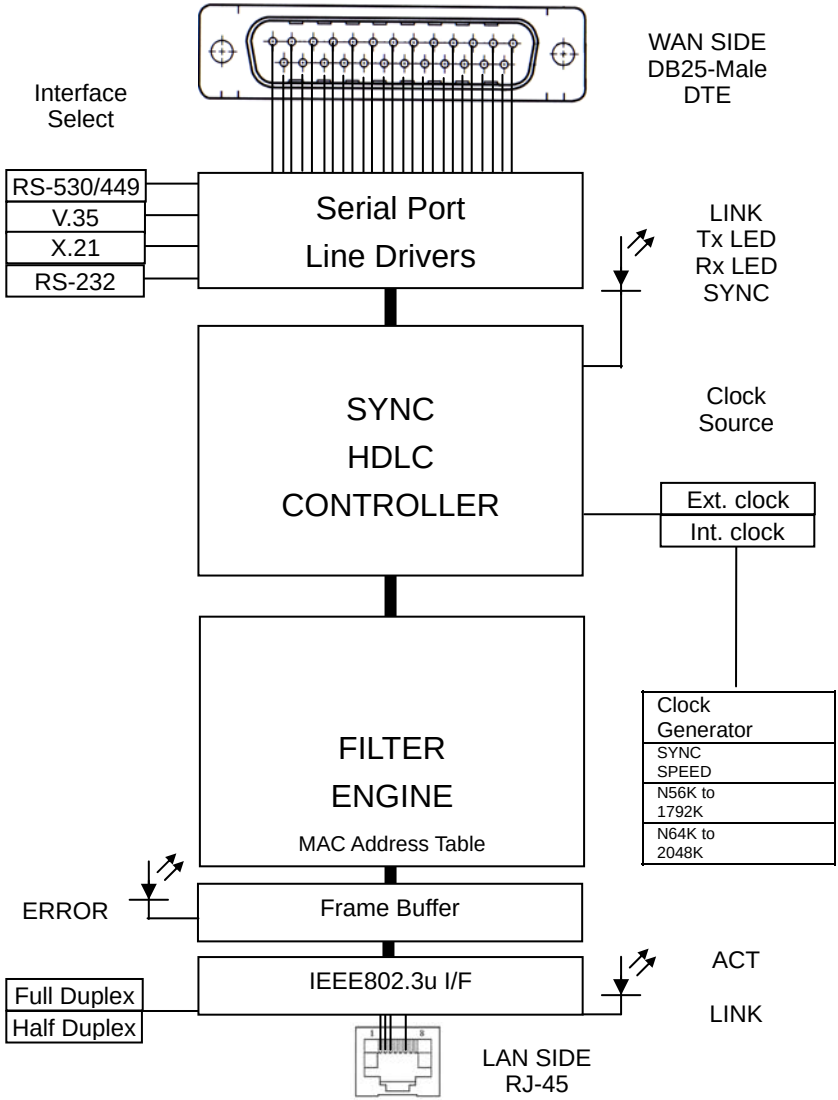


Figure 1: SE2130B Functional Block Diagram

Unit Detail

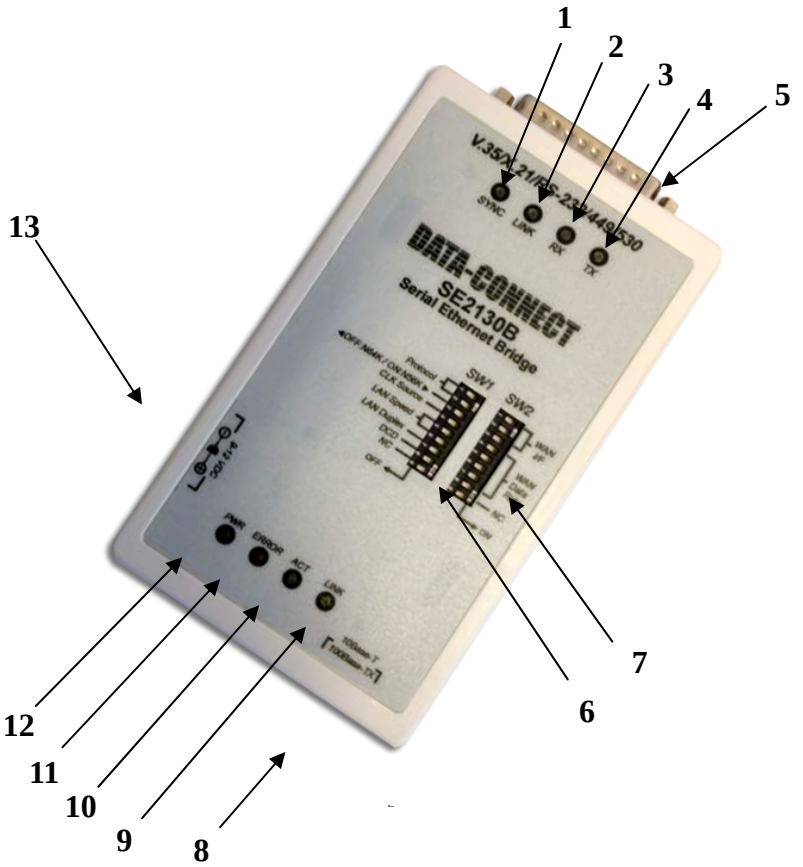


Figure 2. SE2130B Unit Detail

(1) SYNC LED:
Green, where ON indicates protocol is up. If OFF, first make sure physical link is up, then make sure protocol settings match.

(2) LINK LED:
Green, where ON indicates the presence of CTS / DSR signal on WAN connection.

(3) RX LED:
Green, on or flashing indicates receiving data on the WAN interface.

(4) TX LED:
Green, on or flashing indicates transmitting data on the WAN interface.

(5) DB25 Male Connector:
This connector connects to the appropriate adapter cable for connection to the various supported data interfaces. The **SE2130B** performs in DTE mode and its WAN port connector may be connected directly to a DCE device (such as a modem).

(6) SW1:
Configuration setting for the bridge. (Please refer to DIP SW setting table.)

(7) SW2:
Configuration setting for the bridge. (Please refer to DIP SW setting table.)

(8) RJ-45 Ethernet LAN Port:
This is an auto-MDI/MDIX port for connection to the LAN.

(9) LINK LED: (LAN)
Green, indicates the Ethernet has a link to an external device.

(10) ACT LED: (LAN)
Green, indicates data being received from the LAN connection.

(11) ERROR LED:
Red, indicates an error condition as follows:
ON - System Error
Pulse 2 - Configuration error
Pulse 3 - WAN receive has CRC errors

(12) PWR LED:
Green on, when external power adapter is plugged in and AC power is supplied to it.

(13) DC 9~12V
This jack receives power from the external DC 9~12V AC power adapter. The center pin is positive voltage.

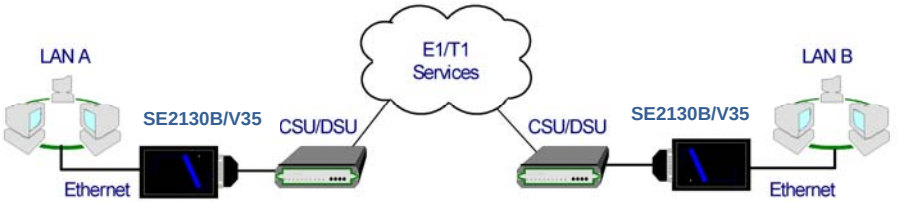
Theory of Operation

A bridge is used to connect networks locally or remotely such that they appear to the user to be the same network. An Ethernet LAN bridge will connect two LAN segments at the Data Link Layer (ISO Layer 2). At this layer, the MAC (Media Access Control) addresses, are used for low level addressing to send information to devices. The bridge builds tables of MAC addresses for each network segment based on the source and destination addresses of the packets it receives and forwards, then filters the traffic not destined for the remote network.

The Ethernet-WAN bridge will connect two remote Ethernet networks over bit stream interfaces such as that of modems or DSU/CSUs. One method to do this is to use HDLC, an international standard set by the ISO, a set of protocols for carrying data over a link with error and flow control. Another method uses PPP and a third uses Cisco® HDLC.

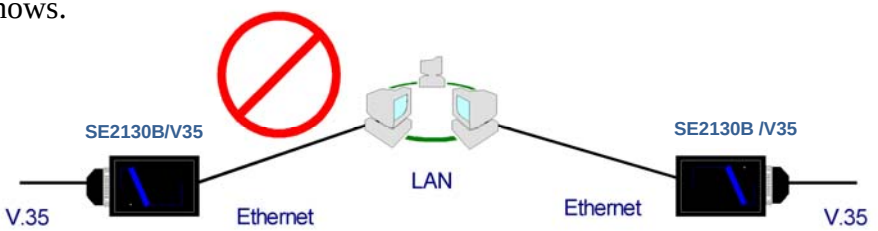
The **SE2130B** utilizes both Ethernet Bridging and encapsulation to provide a connection between LANs over bit stream architectures. The LAN side of the **SE2130B** receives an Ethernet packet and examines its destination MAC address. If it knows the MAC is on the local network then it simply drops the packet. Otherwise, if it knows the packet destination is on the remote side, or if it cannot be determined because its MAC cannot be found in the table, then it forwards it. During forwarding, the packet is processed for transmission across the WAN link. Here is where the Ethernet packet in encapsulated.

When the HDLC or PPP packet is received on the remote side unit's data port, the packet is checked for transmission errors, then the original Ethernet packet(s) is recovered and sent out the remote's LAN port completing the transmission. Here is the typical application of the **SE2130B**.



Typical application of SE2130B LAN-WAN Bridge.

Many times the **SE2130B** is commonly referred to as an Ethernet to V.35, Ethernet to X.21, or Ethernet to Datacom 'converter'. As a sales/marketing term or non-technical reference, the term is OK. However, from a technical standpoint, the term is a misnomer. The Ethernet is not "converted" to V.35, it is run "over" the V.35 link. Conversion also implies that the interface can work both ways. This is NOT the case for the LAN-WAN Bridge as the following application shows.



Application NOT ALLOWED for SE2130B.

Why does the previous application not work? It won't work because the application requires a bit stream to be encapsulated into Ethernet packets, or into TCP/IP and then Ethernet, for transmission across the LAN. This requires more than just manipulation at the Data Link layer (ISO Layer 2), it requires programming to include all seven layers including the Application layer. Transmitting bit stream or TDM (time division multiplexed) data over Ethernet requires a device such as an IP-Multiplexer.

Please refer to the "Applications" section at the end of this manual for additional application examples.

DIP Switch Setting Tables:

When the **SE2130B** is set to internal WAN clock, SW2-4 to SW2-8 configure the data rate. If WAN clock is set external, these are ignored.

DATA RATE						
SW2-4	SW2-5	SW2-6	SW2-7	SW2-8	SW1-3 ON	SW1-3 OFF
OFF	OFF	OFF	OFF	OFF	56K(1*56K)	64K(1*64K)
ON	OFF	OFF	OFF	OFF	112K(2*56K)	128K(2*64K)
OFF	ON	OFF	OFF	OFF	168K(3*56K)	192K(3*64K)
ON	ON	OFF	OFF	OFF	224K(4*56K)	256K(4*64K)
OFF	OFF	ON	OFF	OFF	280K(5*56K)	320K(5*64K)
ON	OFF	ON	OFF	OFF	336K(6*56K)	384K(6*64K)
OFF	ON	ON	OFF	OFF	392K(7*56K)	448K(7*64K)
ON	ON	ON	OFF	OFF	448K(8*56K)	512K(8*64K)
OFF	OFF	OFF	ON	OFF	504K(9*56K)	576K(9*64K)
ON	OFF	OFF	ON	OFF	560K(10*56K)	640K(10*64K)
OFF	ON	OFF	ON	OFF	616K(11*56K)	704K(11*64K)
ON	ON	OFF	ON	OFF	672K(12*56K)	768K(12*64K)
OFF	OFF	ON	ON	OFF	728K(13*56K)	832K(13*64K)
ON	OFF	ON	ON	OFF	784K(14*56K)	896K(14*64K)
OFF	ON	ON	ON	OFF	840K(15*56K)	960K(15*64K)
ON	ON	ON	ON	OFF	896K(16*56K)	1024K(16*64K)
OFF	OFF	OFF	OFF	ON	952K(17*56K)	1088K(17*64K)
ON	OFF	OFF	OFF	ON	1008K(18*56K)	1152K(18*64K)
OFF	ON	OFF	OFF	ON	1064K(19*56K)	1216K(19*64K)
ON	ON	OFF	OFF	ON	1120K(20*56K)	1280K(20*64K)
OFF	OFF	ON	OFF	ON	1176K(21*56K)	1344K(21*64K)
ON	OFF	ON	OFF	ON	1232K(22*56K)	1408K(22*64K)
OFF	ON	ON	OFF	ON	1288K(23*56K)	1472K(23*64K)
ON	ON	ON	OFF	ON	1344K(24*56K)	1536K(24*64K)
OFF	OFF	OFF	ON	ON	1400K(25*56K)	1600K(25*64K)
ON	OFF	OFF	ON	ON	1456K(26*56K)	1664K(26*64K)
OFF	ON	OFF	ON	ON	1512K(27*56K)	1728K(27*64K)
ON	ON	OFF	ON	ON	1568K(28*56K)	1792K(28*64K)
OFF	OFF	ON	ON	ON	1624K(29*56K)	1856K(29*64K)
ON	OFF	ON	ON	ON	1680K(30*56K)	1920K(30*64K)
OFF	ON	ON	ON	ON	1736K(31*56K)	1984K(31*64K)
ON	ON	ON	ON	ON	1792K(32*56K)	2048K(32*64K)

Table 1: Data Rate Settings

DIP SW1	STATE	FUNCTION	REMARK
-4	OFF	WAN CLK: External	
	ON	WAN CLK: Internal	

Table 2: Clock Source Setting

SW1-1	SW1-2	FUNCTION	REMARK
OFF	ON	HDLC	
ON	OFF	Cisco HDLC	
OFF	OFF	PPP	

Table 3: Encapsulation Protocol Setting

WAN INTERFACE			
SW2-1	SW2-2	SW2-3	TYPE
OFF	OFF	OFF	V.35
ON	OFF	OFF	X.21/RS-530/RS-449
ON	ON	OFF	RS-232

Table 4: WAN Interface Type Setting

SW1-5	SW1-6	FUNCTION	REMARK
OFF	OFF	Auto Negotiation**	
ON	OFF	Forced 10M	
OFF	ON	Forced 100M	

Table 5: LAN Port Speed Setting

DIP SW1	STATE	FUNCTION	REMARK
-7	OFF	Ethernet Full Duplex	Ignored if Auto**
	ON	Ethernet Half Duplex	Ignored if Auto**
-8	OFF	flow control follows CTS / DSR	
	ON	flow control follows DCD	

Table 6: Miscellaneous Settings

When the **SE2130B** leaves the factory, all DIP switch settings are set to the OFF position.

Auto-negotiation:

When this feature is enabled (SW1-5=OFF, SW1-6=ON), the Duplex (SW1-7) and Speed settings are ignored and are automatically determined from the LAN connection. When this feature is disabled, the Duplex and Speed settings of the LAN follow the settings of SW1-5/SW1-6 and SW1-7. Use with caution to avoid Duplex Mismatch.

Protocol Selection:

The **SE2130B** supports selecting one of three encapsulation protocols. When selecting HDLC, the encapsulation is per When this feature is enabled (SW1-5=OFF, SW1-6=ON), the Duplex (SW1-7) and Speed settings are ignored and are automatically

Clock Selection:

The **SE2130B** inherently acts as a DTE device. A 1:1 cable is used to connect to a DCE device such as a modem or multiplexer. Clock source comes from the DCE so the clock setting must be external (SW1-4 OFF). The **SE2130B** is also capable of acting as a DCE. In this case a crossover cable is required and clock setting (SW1-4 ON) is internal. Data rate is then set by SW2, 4~8 and **SE2130B** provides clock source.

WAN Port Pin Assignment

The following tables give the pin, circuit, function and signal direction as seen on the SE2130B's DB25M connector for each of the selectable interfaces. RS-232 and RS-530 connections may be made directly. Adapter cables are required to match the physical connectors for V.35 (MB34), X.21 (DB15) and RS-449 (DB37).

a. V.24/RS-232 INTERFACE PIN ASSIGNMENT

PIN	CIRCUIT	FUNCTION	DIRECTION	EIA
1	FGND	Protective GND		AA
2	TD	Transmit data	OUT	BA
3	RD	Receive data	IN	BB
4	RTS	Request to send	OUT	CA
5	CTS	Clear to send	IN	CB
6	DSR	Data set ready	IN	CC
7	GND	Signal ground		AB
8	DCD	Carrier detect	IN	CF
15	TC	Transmit clock	IN	DB
17	RC	Receive clock	IN	DD
20	DTR	Data term ready	OUT	CD
24	XTC	DTE xmit clock	OUT	DA

Table 7: RS-232 Interface Pin Assignment

SW2-1/2/3 ON/ON/OFF

b. V.35 INTERFACE PIN ASSIGNMENT

PIN	CIRCUIT	FUNCTION	DIRECTION	CCITT
1	FGND	Protective GND		101
2	TD(A)	Xmit data A	OUT	103
3	RD(A)	Receive data A	IN	104
4	RTS	Request to send	OUT	105
5	CTS	Clear to send	IN	106
6	DSR	Data set ready	IN	107
7	GND	Signal ground		102
8	DCD	Data carrier detect	IN	109
9	RC(B)	Receive clock B	IN	115
11	XTC(B)	DTE Xmit clock B	OUT	113
12	TC(B)	Xmit clock B	IN	114
14	TD(B)	Xmit data B	OUT	103
15	TC(A)	Xmit clock A	IN	114
16	RD(B)	Receive data B	IN	104
17	RC(A)	Receive clock A	IN	115
20	DTR	Data terminal ready	OUT	108
24	XTC(A)	DTE Xmit clock A	OUT	113

Table 8: V.35 Interface Pin Assignment

SW2-1/2/3 OFF/OFF/OFF

c. RS-449/RS-530 INTERFACE PIN ASSIGNMENT

PIN	CIRCUIT	FUNCTION	DIRECTION	CCITT
1	FGND	Protective GND		101
2	SD(A)	Xmit data A	OUT	103
3	RD(A)	Receive data A	IN	104
4	RS(A)	Request to send A	OUT	105
5	CS(A)	Clear to send A	IN	106
6	DM(A)	Data set ready A	IN	107
7	GND	Signal ground		102
8	RR(A)	Data carrier detect A	IN	109
9	RT(B)	Receive clock B	IN	115
10	RR(B)	Data carrier detect B	IN	109
11	TT(B)	DTE Xmit clock B	OUT	113
12	ST(B)	Xmit clock B	IN	114
13	CS(B)	Clear to send B	IN	106
14	SD(B)	Xmit data B	OUT	103
15	ST(A)	Xmit clock A	IN	114
16	RD(B)	Receive data B	IN	104
17	RT(A)	Receive clock A	IN	115
19	RS(B)	Request to send B	OUT	105
20	TR(A)	Data terminal ready A	OUT	108
22	DM(B)	Data set ready B	IN	107
23	TR(B)	Data terminal ready B	OUT	108
24	TT(A)	DTE Xmit clock A	OUT	113

Table 9: RS-449/RS-530 INTERFACE PIN ASSIGNMENT

SW2-1/2/3 ON/OFF/OFF

d. X.21 INTERFACE PIN ASSIGNMENT

PIN	CIRCUIT	FUNCTION	DIRECTION	CCITT
1	FGND	Protective GND		101
2	T(A)	Xmit data A	OUT	103
3	R(A)	Receive data A	IN	104
4	C(A)	Request to send A	OUT	105
7	GND	Signal ground		102
8	I(A)	Data carrier detect A	IN	109
9	S(B)	Receive clock B	IN	115
10	I(B)	Data carrier detect B	IN	109
14	T(B)	Xmit data B	OUT	103
16	R(B)	Receive data B	IN	104
17	S(A)	Receive clock A	IN	115
19	C(B)	Request to send B	OUT	105

Table 10: X.21 INTERFACE PIN ASSIGNMENT

SW2-1/2/3 ON/OFF/OFF

Cable Pin Assignments:

RS-530 Cable, 25 conductor round, 1 to 1, 1m.

(Use this cable for RS-232 applications as well.)
Part#:58-D2FD2M007, RS-530 Cable, DB25 Female <=> DB25 Male, 1 Meter
Part#:58-D2FD2F010, RS-530 Cable, DB25 Female <=> DB25 Female, 1 Meter

DB25(Female) PIN		DB25(Male/Female) PIN
1	<==========>	1
2	<==========>	2
3	<==========>	3
4	<==========>	4
5	<==========>	5
6	<==========>	6
7	<==========>	7
8	<==========>	8
9	<==========>	9
10	<==========>	10
11	<==========>	11
12	<==========>	12
13	<==========>	13
14	<==========>	14
15	<==========>	15
16	<==========>	16
17	<==========>	17
18	<==========>	18
19	<==========>	19
20	<==========>	20
21	<==========>	21
22	<==========>	22
23	<==========>	23
24	<==========>	24
25	<==========>	25

V.35 Cable, multi-conductor round, 1m.

Part#:58-D2FM3M001, V.35 Cable, DB25 Female – MB34 Male, 1 Meter
Part#:58-D2FM3F000, V.35 Cable, DB25 Female – MB34 Female, 1 Meter

DB25(Female) PIN		MB34(Male/Female) PIN
2	<==========>	P
14	<==========>	S
3	<==========>	R
16	<==========>	T
4	<==========>	C
5	<==========>	D
6	<==========>	E
20	<==========>	H
8	<==========>	F
24	<==========>	U
11	<==========>	W
15	<==========>	Y
12	<==========>	AA
17	<==========>	V
9	<==========>	X
1	<==========>	A
7	<==========>	B
22	<==========>	J

NOTE: TWISTED PAIRS;

P,S
R,T
U,W
Y,AA
V,X

RS-449 Cables, multi-conductor round, 1m.

Part#:58-D2FD3M003, RS-449 Cable, DB25 Female – DB37 Male, 1M
Part#:58-D2FD3F000, RS-449 Cable, DB25 Female – DB37 Female, 1M

DB25(Female) PIN		DB37(Male/Female) PIN
1	<==========>	1
7	<==========>	19
(the following are all twisted pairs)		
2	<==========>	4
14	<==========>	22
3	<==========>	6
16	<==========>	24
4	<==========>	7
19	<==========>	25
5	<==========>	9
13	<==========>	27
6	<==========>	11
22	<==========>	29
20	<==========>	12
23	<==========>	30
8	<==========>	13
10	<==========>	31
24	<==========>	17
11	<==========>	35
15	<==========>	5
12	<==========>	23
17	<==========>	8
9	<==========>	26

X.21 Cables, multi-conductor round, 1m.

Part#:58-D1MD2F003, X.21 Cable, DB25 Female – DB15 Male, 1M
Part#:58-D1FD2F001, X.21 Cable, DB25 Female – DB15 Female, 1M

DB25(Female) PIN		DB15(Male/Female) PIN
1	<==========>	1
7	<==========>	8
(the following are all twisted pairs)		
2	<==========>	2
14	<==========>	9
3	<==========>	4
16	<==========>	11
4	<==========>	3
19	<==========>	10
8	<==========>	5
10	<==========>	12
17	<==========>	6
9	<==========>	13

Sync Mode Clock Settings

Interface	RS-530/449/232 or V.35		X.21	
Signals	TD(103)	RD(104)	TD(103)	RD(104)
WAN TCLK External	From TC(114)		From RC(115),S	
WAN TCLK Internal	Internal		(Internal)*	
WAN RCLK External		From RC(115)		From RC(115),S
WAN RCLK Internal		Internal		(Internal)*

Table 11: SYNC Mode Clock Settings

* Because the **SE2130B**'s WAN port is DTE, the X.21 clock sources for transmit and receive are always issued from the DCE side S signal. Setting the **SE2130B**'s X.21 clock mode to internal is not recommended.

Application Examples

In the following example, the **SE2130B** is configured for bridging over an E1 (or T1) carrier provider's network. The **SE2130B**'s interface is set to V.35 to match the CSU/DSU unit. The CSU/DSU may be set unframed or may be set to use a fraction (n x 56 or n x 64) of the E1 (or T1) line. The CSU/DSU timing is received from the carrier provider's network so the **SE2130B**'s timings for Tx and Rx clocks should both be set to external. In this configuration, the rate DIP settings of the SE2130B are ignored.

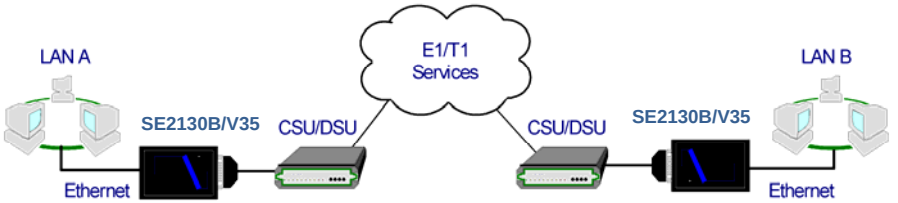


Figure 3: Bridging over E1 services

APPLICATIONS

In the next example, the **SE2130B** is setup to bridge over a PSTN's leased line. The **SE2130B**s speed settings depend upon the speed of the leased line and the settings of the modems. The timing scheme recommended is this application is for the Tx and Rx Clocks of each unit to be set to External while the clocks of the modems are set to Internal for both or Internal for one and Loop for the other.

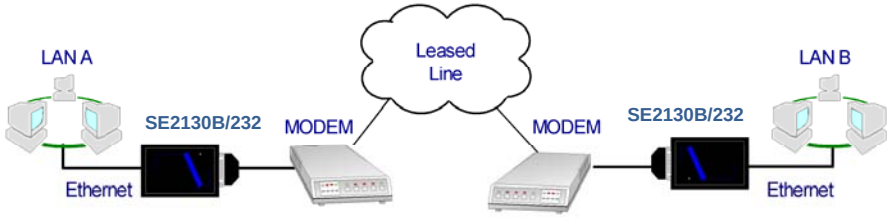


Figure 4: Bridging over Synchronous leased line.

APPLICATIONS

In the following example, the **SE2130B** is paired with a G703/64K interface converter to provide connection over G.703 64Kbps services. If the G.703 transmit and receive clocks are provided by the central carrier, each G703/64K converter will be set to centra-directional line timing. Both **SE2130B**'s will have their Tx / Rx clocks set external.

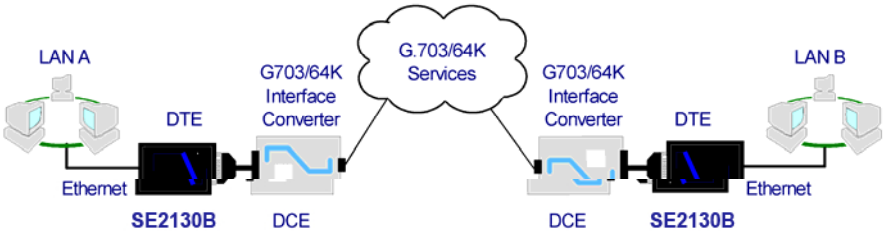


Figure 6: SE2130B bridge over G.703 64K services.

RMA PROCEDURE

Before returning any DCE product, an RMA number must be obtained. Before asking for an RMA number, ascertain that the product was purchased from DCE. If you bought the product from a Distributor or Systems Integrator, the product should be returned to that vendor.

The most convenient method to obtain an RMA authorization for a product purchased from DCE is to submit a request by fill in the form from www.data-connect/returns.htm. Information required must include:

-Company name
-Address (including any Mail Stop or specific delivery information)
-Name, contact information, and e-mail address for the technical contact(s) at your company
If the above information is on your letterhead, that format is acceptable

.For each item you wish to return, please include:

-The product model number (usually found on the serial number tag)
-The serial number for each item you wish to return
-A description of the problem you are encountering
-The cause of the problem (if known)A product support specialist may call to verify that the product is properly installed or may ask you to perform tests to insure that the product has actually failed.

After reviewing the problem, DCE will assign an RMA number and you will be notified by email or FAX.

The product must be properly packed and returned to:

Data Connect Enterprise
3405 Olandwood Court,
Olney, MD 20832
Attn: RMA Technical Support

The RMA number must be legibly displayed on the shipping carton. No RMAs will be issued without a product review. DCE will not be responsible for any product returned without an RMA number.

If you believe the product may be out of warranty, include a method of payment for repairs (either a Purchase Order number or credit card number), card holder name, date of expiration on the RMA request. Repairs currently require 5 working days and are returned FEDEX ground.

Contact us by e-mail mspellerberg@data-connect.com or call 301.924.7400 x25 if you should have any questions.