Graftek Marketing

E1:Framed /unframed,75ohm/120ohm Compatible

F5-4511 Series Ethernet to E1 Converter
F4-51 User Manual

(Version: 2.5)

Table of Content

1 Overview

F5-4511 Series F4-51 converter 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 over bit stream type infrastructures. Its E1 data interface also provides an economical digital access solution for E1 and Fractional E1 network Services, which can work at data rates of 64Kbps to 2048Kbps. User data is placed into the E1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and manual setting of DIP switches. The main E1 link may be clocked from the recovered receive clock or from an internal oscillator. For easy to check the fault of network line, the device provides loop selection, both local loop and remote loop.

2 Features

- High performance bridge for 10Base-T Ethernet extension
- E1 channel: Full and Fabrication optional, 75/120ohm compatible
- Ethernet Port: 10Mbps, Full/Half Duplex Mode compatible
- Fully compatible with IEEE 802.3 and Ethernet Standards
- 10Base-T LAN Interface on RJ-45 connector and MDI/MDI-X optional
- Allow transmitting and receiving VLAN data packet
- 15000 frames per second filtering and forwarding rate
- 1000 MAC address LAN table, and automatic LAN table learning and aging.
- Abundant state indicators and warning indicators.
- Cards can be classed two kinds: Managed Card and Unmanaged Card. User can select freely according to your demand.
- Examine the state of local and remote device and set local device by managed card and managed software.
- Standalone and 16 slots chassis optional
- Power of Chassis: 2 Slots for slide in power supplier module, AC or DC power supplier module, Redundant Power supported

3 Specification

3.1 Ethernet Interface

1) Speed: 10Mbps
2) Compatible with IEEE802.3
3) Connectors: RJ-45 Connector
4) Full/Half duplex auto negotiate
5) MDI/MDI-X optional
6) Design specially for supporting VLAN package
7) Transfer distance: <100m

3.2 E1 interface

1) Data rate: N*64Kbps, N=1~32
2) Code type: HDB3
3) Compliant with G.703, G.704
4) Line impedance:75 Ω (Unbalanced) / 120 Ω (Balanced)
5) connector: BNC(75 Ω) / RJ45(120 Ω)
6) Jitter: Compliant with ITU-T G.742 and G.823
7) Framed / Unframed optional

Table1. Definition of RJ45 connector（120 Ω E1 balanced）

PIN	1	2	4	5	3，6	Others
Function	TX-	TX+	RX-	RX+	GND	Reserved

3.3 Size

◆ Standalone: 252 (W)×136 (D)×40 (H)mm
◆ Module: 220 (L)×176(W)×25.3(H) mm
◆ 16-slot chassis: 19 inch(W)×340mm (D)×4U (H)

3.4 Power

Power supply:

    AC Power: 100V-240V, 0.4-0.2A, 50-60 Hz

    DC Power: -48V, 0.4A

Power consumption <2W

3.5 Environment

Operation

    Temperature: 0℃～50℃;

    Humidity: 90%(non-condensed)

    Air pressure: 86kPa～106 kPa.

Transport and store

    Temperature: -20℃～60℃;

    Humidity: 95%(non-condensed)

Air pressure: 86kPa～106 kPa

4　Appearance

4.1.　Front panel of standalone

DIP Switch　　LOOP Button　　LEDs
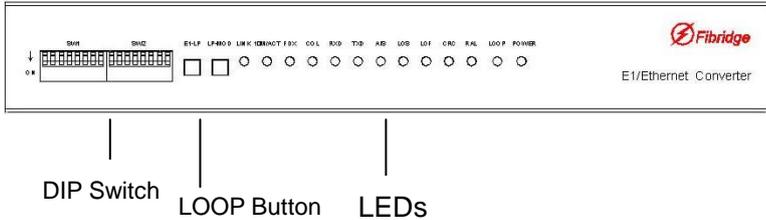
Figure1. Front Panel Diagram of Standalone

4.2.　Back panel of standalone

220VAC　　-48VDC　　E1 Port　　Console　　Ethernet Port
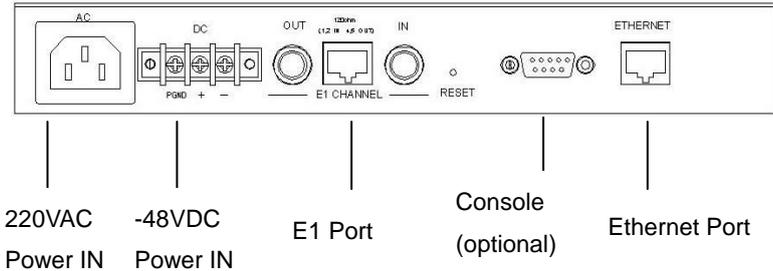Power IN　　Power IN　　　　　　(optional)

Figure2. Back Panel Diagram of Standalone

Note: 220VAC & -48VDC power input are alternative, in one device, there is only one kind of power input.
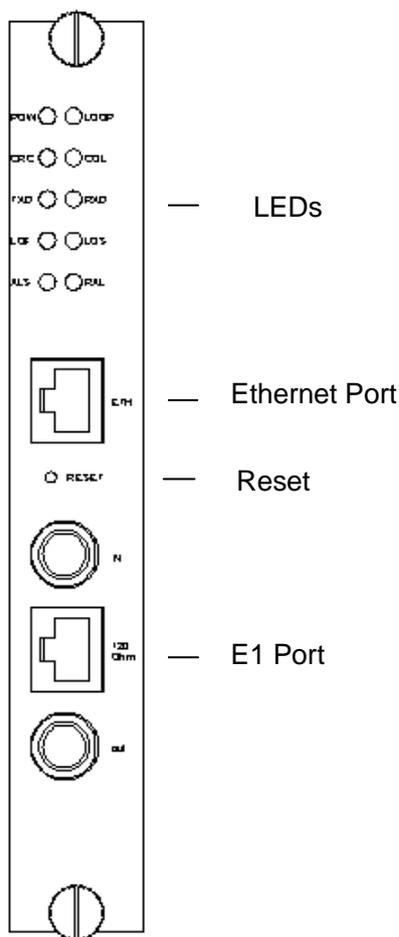
4.3. Front Panel of Module

Figure3 Front Plane Diagram of Module

4.4. LED Description

LED	Meaning	Color	Status	Function Description
PWR	Indicator of power	G	ON	Power OK
			OFF	Power off or failed
LOOP	Indicator of loop back	G& Y	OFF	Normal operation
			Green	Local loop back
			Yellow	Remote loop back
RAL	Worming indicator of remote device	R	ON	Remote device alarmed
			OFF	No RAL worming
CRC	Worming indica	R	ON	E1 CRC wrong
			OFF	E1CRC right
LOF	Warning indicator of E1 synchronization loss	R	ON	E1 synchronization loss
			OFF	No E1 synchronization loss
LOS	Warning indicator of E1 signal loss	R	ON	E1 signal loss
			OFF	No E1 signal loss
AIS	Warning indicator of AIS	R	ON	Alarm indication signal
			OFF	
TXD	Indicator of Ethernet transmitting data	Y	OFF	No data be transmitted
			BLINK	Transmitting data

			OFF	No data be receiving
RXD	Indicator of Ethernet receiving data	Y	BLINK	Receiving data
COL	Warning indicator of Ethernet collision	R	ON	Ethernet line collision
			OFF	No collision
FDX	Duplex mode indicator of Ethernet	G	ON	Ethernet is working at full duplex mode
			OFF	Ethernet is working at half duplex mode
10M/ACT	Speed and data transfer indicator of Ethernet	Y	OFF	No link or link failed
			ON	Ethernet is working at 10Mbps and has no data transmitting or receiving
			BLINK	Ethernet port is receiving or transmitting data
LINK	Connection indicator of Ethernet	Y	OFF	No link or link failed
			ON	Ethernet port link OK

Note: Y: yellow; G: green; R: red.

4.5. DIP SWITCH DESCRIPTION

You can set E1 framed/unframed module, the size of buffer and the speed of line on framed module by DIP SWITCHes. Table 2-Table4 will show the function of DIP SWITCHes.

Table2. Function Description of SW1

Name	BIT	Status	Mean
SW1 (Card)	BIT1	ON	Enable the function of Ethernet port controlling E1 port
		OFF	Disable the function of Ethernet port controlling E1 port
	BIT2	ON	Enable the function of E1 port controlling Ethernet port
		OFF	Disable the function of E1 port controlling Ethernet port
	BIT3	ON	Enable the function of SDRAM Testing
		OFF	Disable the function of SDRAM Testing
	BIT4	ON	Enable the function of Line Testing
		OFF	Disable the function of Line Testing
	BIT5	ON	Loop back
		OFF	No loop back
	BIT6	ON	Local loop back
		OFF	Remote loop back

NOTE：

(1) SW1 in table 2 is the DIP SWITCH on the Module Card(F4-51MM

or F4-51M).

(2) **BIT1 and BIT2 of SW1 are used to set the function of Port Control: if BIT1 is ON, when E1 signal losses, circuit make the Ethernet port shut down; when E1 signal resumes, circuit make the Ethernet port work normally. If BIT2 is ON, when Ethernet signal losses, circuit make the E1 port shut down, when Ethernet signal resumes, circuit make the Ethernet por work normally. The BIT1 and BIT2 of SW1 on module cards work in pairs shouldn't be "ON" at the same time, three at "ON" status at most; Or the card will not work.**

(3) **By SDRAM testing, line testing and loop back, you can use DIP SWITCHes and LEDS to check the status of the devices and line. The methods are shown on chapter 5.**

Table3. Function Description of SW1/SW2

Name	BIT	Status	Mean
SW1/SW2	BIT1	ON	Recovered clock
		OFF	Internal Oscillator
	BIT2	ON	Framed(Fractional) mode
		OFF	Unframed(Full) mode
	BIT3	ON	Full/Half Duplex Mode compatible
		OFF	Full Duplex Mode
	BIT4	BW0-BW4 are used as Binary Code and can provide 32 different kinds of Bandwidth. BW4 is the MSB, BW0 is the LSB. When is	
	BIT5		
	BIT6		

	BIT7	ON , it means 0, when is OFF, it means 1.
		See Table 6 to get more details.
	BIT8	**These settings will be ignored when Bit7 "Full/Fabr" is set OFF**.

Note: "SW1" is for standalone, and "SW2" is for module.

Table3. Function Description of SW2/SW3

Name	BIT	Status	Mean
SW2/SW3	BIT1	ON	Small buffer(transmitting image)
		OFF	Large buffer(transmitting data)
	BIT2	ON	PCM30 Module
		OFF	PCM31 Module
	BIT3	ON	E1 CRC
		OFF	No E1 CRC
	BIT4－8	NC	

NOTE: "SW2" is for standalone, and "SW3" is for module. BIT4-BIT8 on this DIP SWITCH are not defined. Please keep these BITs "OFF" when you use the devices.

Table4. E1_LP Button or JP4 Jumper Descriptions

E1_LP	Description
Up	None loop, work as normal
Down	Loop mode, usually used to check the fault of the network line. To configure either Local loop or Remote loop, please see table 5.

Table5. LP_MODE Button or JP5 Descriptions

LP_Mode	Description
Up	Remote Loop, only available on Fractional (framed) Mode
Down	Local Loop

Explanation:

1) **UP** is corresponding to ▮ , **Down** is corresponding to ▄

2) **Short** is corresponding to

NOTE:

(1) **Before you select remote loop or local loop, you should set E1_LP down first;**

(2) **Local Loop Back is available both in framed mode and in unframed mode;**

(3) **Remote Loop Back is only available in framed mode. In other words, if you want to use remote loop, you should set the bit7 of "SWITCH"(on the front panel of the device) ON. (see table 2 of the technical datasheet);**

(4) **If Unit A(F4-51) is at internal clock, Unit B(F4-51) is at recovered clock, and there is no other based clock in the whole network line, you can't set Unit B(F4-51) on remote loop.**
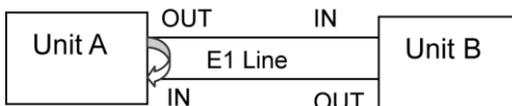
(5)

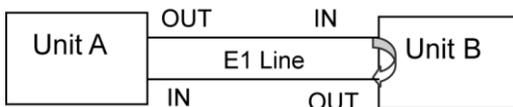**Figure4. Unit A's local loop back:**

Figure5. Unit A's remote loop back:

4.6. Bandwidth Selection

Table 6 Bandwidth Selections

No.	BW4	BW3	BW2	BW1	BW0	Bandwidth
1	ON	ON	ON	ON	ON	N.A.
2	ON	ON	ON	ON	OFF	64Kbps
3	ON	ON	ON	OFF	ON	128Kbps
4	ON	ON	ON	OFF	OFF	192Kbps
5	ON	ON	OFF	ON	ON	256Kbps
6	ON	ON	OFF	ON	OFF	320Kbps
7	ON	ON	OFF	OFF	ON	384Kbps
8	ON	ON	OFF	OFF	OFF	448Kbps
9	ON	OFF	ON	ON	ON	512Kbps
10	ON	OFF	ON	ON	OFF	576Kbps
11	ON	OFF	ON	OFF	ON	640Kbps
12	ON	OFF	ON	OFF	OFF	704Kbps
13	ON	OFF	OFF	ON	ON	768Kbps
14	ON	OFF	OFF	ON	OFF	832Kbps
15	ON	OFF	OFF	OFF	ON	896Kbps
16	ON	OFF	OFF	OFF	OFF	960Kbps
17	OFF	ON	ON	ON	ON	1024Kbps
18	OFF	ON	ON	ON	OFF	1088Kbps
19	OFF	ON	ON	OFF	ON	1152Kbps

20	OFF	ON	ON	OFF	OFF	1216Kbps
21	OFF	ON	OFF	ON	ON	1280Kbps
22	OFF	ON	OFF	ON	OFF	1344Kbps
23	OFF	ON	OFF	OFF	ON	1408Kbps
24	OFF	ON	OFF	OFF	OFF	1472Kbps
25	OFF	OFF	ON	ON	ON	1536Kbps
26	OFF	OFF	ON	ON	OFF	1600Kbps
27	OFF	OFF	ON	OFF	ON	1664Kbps
28	OFF	OFF	ON	OFF	OFF	1728Kbps
29	OFF	OFF	OFF	ON	ON	1792Kbps
30	OFF	OFF	OFF	ON	OFF	1856Kbps
31	OFF	OFF	OFF	OFF	ON	1920Kbps
32	OFF	OFF	OFF	OFF	OFF	1984Kbps

5 Diagnosis and Maintenance

Please install and operate equipments according to the instruction we provided. Equipments maybe damaged for improper installation and operation.

5.1 Prepare the tools that installation need

☐ Electric iron, which is used to weld the BNC connectors to E1 cable.

☐ E1 analyzer, which is used to test the E1 transmission line.

5.2 installing

(1) Check the device and accessories according to Packing List when open the box. If something missing or damaged, please contact us immediately.

(2) When making E1 cables, if you want to use the 75 ohm interface of E1 channel, please take out the BNC interface and fix it on E1 coaxial cable. If you want to use 120 ohm interface of E1 channel, please fix RJ45 connector on twisted-pair cable. The sequence of the pins is according to 3.1 of this manual. Notice the distinction of TX line and RX line. Please reference Table1.

(2) Set the DIP SWITCHes. Basing on using environment, something maybe set as follows: ①Framed or Unframed，②Number of using timeslot on framed module，③Clock of device, and so on.

5.3 Link and debug

5.1.1. The status of device working normally

Link the device to the line and turn on the power. If the equipment works normally, the LEDs should show as follows:

□ All warming indicators are OFF.

□ LINK and POWER are ON.

□ If data is not transmitted or received, 10M/ACT is ON.

□ If data is transmitted or received, 10M/ACT,RXD and TXD are blink.

□ If the equipment which connects to the converter is working on Full/Half Duplex compatible Mode, FDX is NO.

5.1.2. Test linking status by PING command
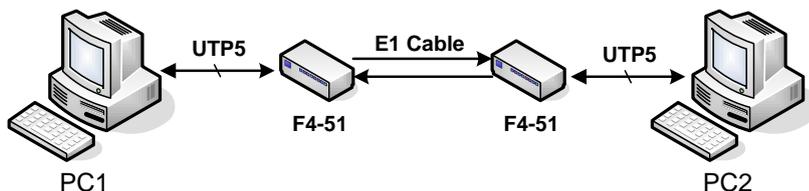
Connect the equipments and PC as figure6.

Figure6 Diagram of Ethernet port testing

Run ping command to test Ethernet port on PC1. Step of testing as follows: Click Start → Run, enter ping xxx.xxx.xxx.xxx –t in the dialog box and click the enter key. If the screen shows

Replay from xxx.xxx.xxx.xxx: byte=32 time=m TTL=64, that means the equipments are working normally. If no,

－17－

please find the problems as chapter6 or connect to our company's technology supporting engineer.

NOTE: Make sure that the operation system on tow computers are WINDOWS and computers are working at 100Mbps/10Mbps, Full/Half compatible mode. XXX.XXX.XXX.XXX in the command is PC2's IP address.

5.1.3.　SDRAM Testing and Line Testing

SDRAM Testing and Line Testing are additional functions of Module Card. You can check the status of devices by these functions.

(1) SDRAM Testing

Reset the Module Card, set the BIT3 on SW1 to "ON", then the SDRAM Testing function is enabled. It means to begin to test that D6 is ON. Several seconds later, D7 is on, that means test is over. In this process, if D5 is OFF, it means that equipment works normally, if D5 is ON, it means that there are something wrong in the equipment.

(2) Line Testing

Reset the Module Card, set the BIT4 on SW1 to "ON", then the Line Testing function is enabled. If the D6 is ON and the LOOP show yellow, it means that the equipment works normally. If not, it means there are something wrong in the equipment.

NOTE: The functions of SDRAM Testing and Line Testing are not

supported on standalone. Test only once every time power on or reset, otherwise, testing results are not correct. SDRAM Testing and Line Testing are not used at the same time. If the test is failed, please connect with our company.

6. Notice, Fault and Solution

6.1. Clock setting

When equipments are used in pair, the clocks are not set to internal oscillator at same time. We suggest that one is internal oscillator and the other is recovered clock. If you make sure there is a main clock in the line, tow equipments' clock can be set to recovered clock.

6.2. Loop back setting

Please make sure E1_LP and LP_MODE be not pressed when the equipments are using normally.

6.3. Fault and Solution

1）LOF is ON, please check if there are error bits in the E1 line.

2） LOS is ON, please check if the E1 cables connected wrong.

3）All worming indicators are OFF, but the line can not communicate. Please check if tow equipments are all working at Unframed or framed mode. If they are working at framed mode, make sure the bandwidth setting be same on tow equipments.

7. Typical Application
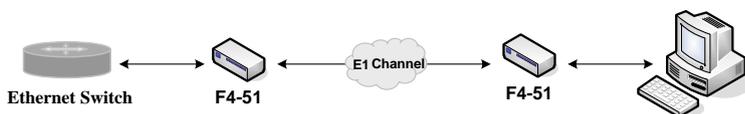
7.1. Peer to Peer

Figure7. Diagram of Peer to Peer application

In the above application, it is recommended that user select one F4-51 device's timing signal as unique timing source, and all the other equipment follow this timing source.

F4-51 should be used in pairs.
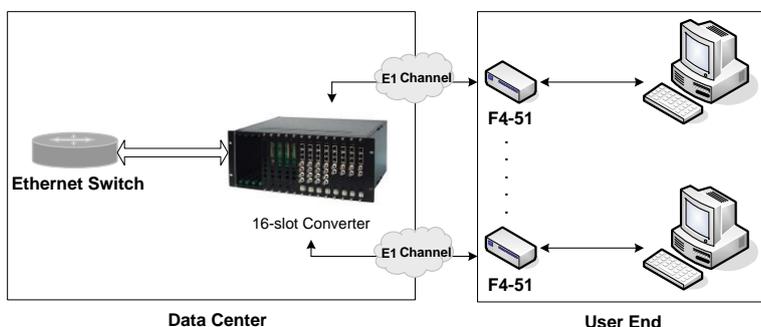
7.2. Star Topology

Figure8 Diagram of Star application

8. Order Information

Model:

F5-4511, Ethernet to 1-8 E1 Protocol Converter Series
P/N:

F4-51A 10Base-T to E1 Converter, Standalone Device, 220VAC Power input

F4-51D 10Base-T to E1 Converter, Standalone Device, -48VDC Power input

F4-51M 10Base-T to E1 Converter, Module Card

F4-51M-M 10Base-T to E1 Converter, Module Card, Managed

FC-416 16 Slots Chassis, Supply two Powers