



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

F5-4511V Series V.35,10Base-T to E1 Converter

F4-516 User Manual

(Version: 1.0)

BEIJING FIBRIDGE CO., LTD.

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1 Overview

F5-4511V Series F4-516 converter gives the interface conversion between V.35/10Base-T and G.703 E1. This device have high performance and low price which is produced by BEI JING FIBRIDGE Co.,Ltd. F4-516 converter can give not only interface conversion between V.35 and G.703 E1 but also interface conversion between 10Base-T and G.703 E1, in addition F4-516 converter can also make 10Base-T and V.35 together and transmit used E1 channel. 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. 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, from the Data Port 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.F4-516 is widely used in communication network, both in WAN and LAN field.

2 Feature

- Interface conversion between V.35/10Base-T and E1
- Support ITU-T V.35, G.703, G.704, G.823
- Standalone and chassis module available, support hot-swap

- Framed (N*64Kbps) and unframed (2.048Mbps) optional, support continuous and discontinuous timeslots setting
- Frame mode support PCM30/ PCM31
- CRC/non-CRC auto-negotiation on E1 interface
- Support remote bandwidth control, and remote loop back under framed mode
- Support internal clock, E1 recovery clock or V.35 line clock
- Provide local loop back test, functional diagnostic loop back test and remote loop back test
- For V.35 interface, at receive side, clock is reversed and non-reversed auto-negotiation, while at transmission side, clock can be configured reversed or non-reversed
- For E1 interface, 75 ohm (unbalanced) and 120 ohm (balanced) available and auto-negotiation
- For V.35 interface, DCE and DTE mode are optional
- 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 available and auto-negotiation
- 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
- Comprehensive LED indicators on front panel, convenient for the diagnosis of equipment working state
- -48VDC& 220VAC power supply selectable

3 Specification

3.1 E1 interface

- a) Data rate: $N \times 64\text{Kbps}$, $N=1 \sim 32$
- b) Code type: HDB3
- c) Compliant with G.703, G.704
- d) Line impedance: 75Ω (Unbalanced) / 120Ω (Balanced)
- e) Interface connector: BNC(75Ω) / RJ45(120Ω)
- f) Jitter performance: Compliant with ITU-T G.742 and G.823
- g) Frame mode: Framed / Unframed optional

Definition of RJ45 connector (120Ω E1 balanced)

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

3.2 V.35 Interface

- a) Data rate: 2.048Mbps or $N \times 64\text{Kbps}$, where N equals to 1 to 31 in PCM31(CCS) or 30 in PCM30(CAS)
- b) Jitter performance: Compliant with ITU-T V.35 standard
- c) Connector: DB25 female jack
- d) Operation mode: DTE/DCE optional

Definition of V.35 interface (DB25 pins)

No.	Definition	Description
1	GND	Ground
2	TDA	Transmit data line A
3	RDA	Receive data line A
4	RTS	DTE ask for transmitting data
5	CTS	DCE clear the transmitting
6	DSR	DCE ask for transmitting data
7	GND	Ground
8	DCD	DCE transmit carrier wave signal
9	RCB	Receive clock line B
11	XTCB	DTE transmit clock B
12	TCB	Transmit clock line B
14	TDB	Transmit data line B
15	TCA	Transmit clock line A
16	RDB	Receive data line B
17	RCA	Receive clock line A
20	DTR	DTE Prepare for receiving data
24	XTCA	DTE transmit clock A
Others, N.A.		

3.3 Ethernet interface

- a) Data rate: 10Mbps, Half/Full Duplex

- b) Compliant with IEEE802.3, 802.3x
- c) Connector: RJ45 Connector
- d) Full Duplex/Half Duplex auto-negotiation
- e) MDI/MDI-X auto-negotiation
- f) Support VLAN data package up to 1.6K byte

3.4 Size

Standalone: 252 (Width) × 136 (Depth) × 36 (Height) mm

3.5 Power

Power supply:

AC Power: 85V-265V, 0.4-0.2A, 50/60 Hz

DC Power: -48V, 0.4A

Power consumption <5W

4 Environment

Operation

Temperature: 0°C ~ 50°C;

Humidity: 90%(non-condensed)

Air pressure: 86kPa ~ 106 kPa.

Transport and store

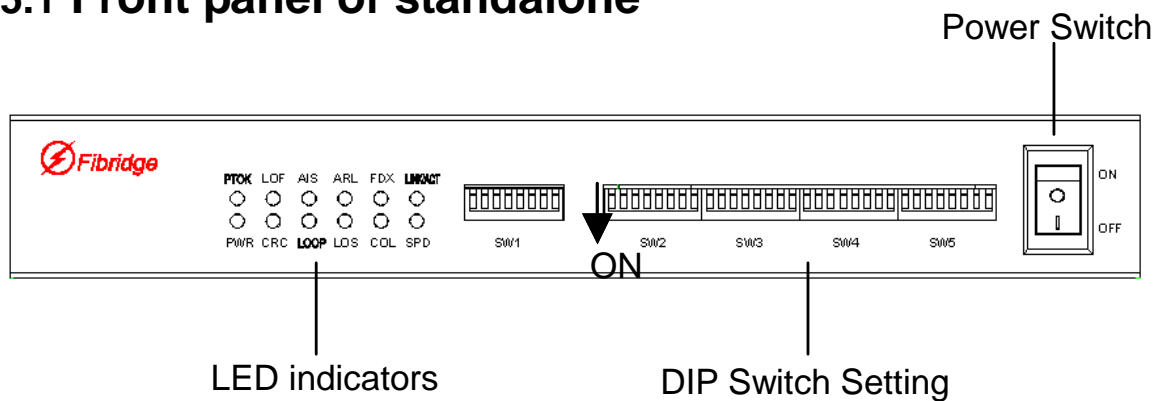
Temperature: -20°C ~ 60°C;

Humidity: 95%(non-condensed)

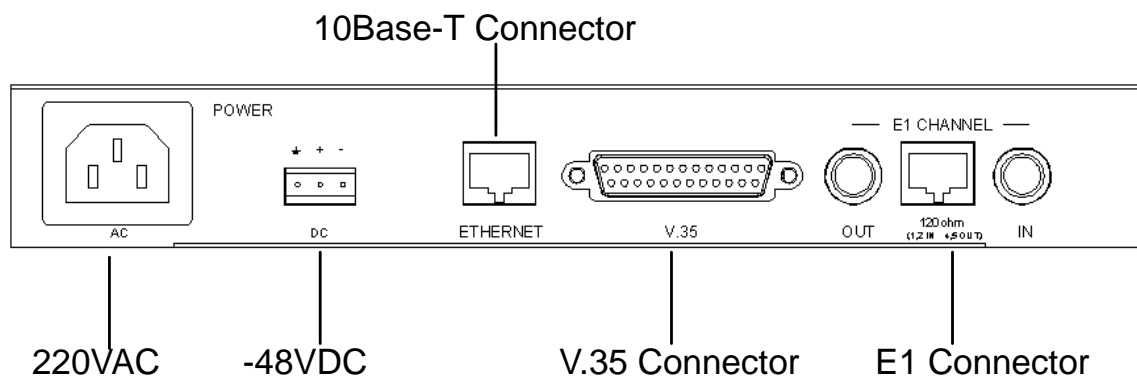
Air pressure: 86kPa ~ 106 kPa

5 Appearance

5.1 Front panel of standalone



5.2 Back panel of standalone



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

5.3 LED Description

Table 1 LED Description

LED	Color	Status	Function Description
PWR	Green	ON	Power OK
		OFF	Power off or failed
PTOK	Yellow	ON	No bit error
		OFF	If test enabled, it means bit errors, and no meaning if test disabled.
LOOP	Green	ON	Local/Diagnostic loop back or the remote device set remote loop
		BLINK	Remote loop back or the remote device set diagnostic loop.
		OFF	Normal operation
FDX	Green	ON	Ethernet is working at Full Duplex mode
		OFF	Ethernet is working at Half Duplex mode
LINK/ ACT	Yellow	ON	Ethernet port link OK
		BLINK	Receiving or transmitting data
		OFF	No link or link failed
SPD	Green	ON	Ethernet speed is 100Mbps
		OFF	Ethernet speed is 10Mbps
CRC	Red	ON	Local E1 CRC wrong
		BLINK	Remote E1 CRC wrong
		OFF	E1 CRC right
LOF	Red	ON	Local E1 synchronization loss

		BLINK	Remote E1 synchronization loss
		OFF	No E1 synchronization loss
AIS	Red	ON	Local AIS
		BLINK	Remote AIS
		OFF	NO E1 AIS
LOS	Red	ON	Local E1 signal loss
		BLINK	Remote E1 signal loss
		OFF	No E1 LOS
ARL	Red	ON	Local system general alarm
		BLINK	Remote system general alarm
		OFF	No alarm
COL	Red	ON	Ethernet line collision
		OFF	No collision

5.4 DIP SWITCH DESCRIPTION

Table 2 Function Description of SW1

Bit	ON Definition	OFF Definition	Default
1	Remote loop back	No loop back	OFF
2	Diagnostic loop back	No loop back	OFF
3	Local loop back	No loop back	OFF
4	Use local time-slot settings	Follow remote time-slot settings	OFF
5	Bit error test	Normal operation	OFF
6	V.35 clock NORMAL	V.35 clock RESERVED	OFF
7	Timing mode selection. Referring to table 3		OFF
8			OFF

Note: 'Follow remote timeslot setting' means you needn't set

one F4-516's timeslot, which is the same as that of the other F4-516 all the time. Only in framed mode & Bit7 Bit8 should be set as ON OFF, it is available. For example, you use one pair of F4-516 device. One named A, the other named B. For setting B's timeslot following A, you should set the 'SW1' DIP SWITCH as follows,

Bit	1	2	3	4	5	6	7	8
A	OFF	OFF	OFF	OFF	OFF	X1	ON	OFF
B	OFF	OFF	OFF	X2	OFF	X1	ON	ON

X1 lies on the router, for X2, either ON or OFF are OK.

Table 3: Timing Mode Selection

BIT 7	BIT 8	Timing Mode
ON	ON	Internal OSC.
OFF	ON	Receiving clock recovered from E1, and transmission clock follow the internal OSC.
ON	OFF	Receiving and transmission clock recovered from E1
OFF	OFF	V.35 DTE Clock

Note: in Framed mode, one F4-516 should be set as internal timing mode (ON ON), the other should be set recovered timing mode (ON OFF).

Table 4: Time-slot Setting

DIP Switch TS0-TS31	Function	ON	OFF
TS0	Time-slot 0	Available	Not Available
TS1	Time-slot 1	Available	Not Available
TS2	Time-slot 2	Available	Not Available
TS3	Time-slot 3	Available	Not Available
TS4	Time-slot 4	Available	Not Available
TS5	Time-slot 5	Available	Not Available
TS6	Time-slot 6	Available	Not Available
TS7	Time-slot 7	Available	Not Available
TS8	Time-slot 8	Available	Not Available
TS9	Time-slot 9	Available	Not Available
TS10	Time-slot 10	Available	Not Available
TS11	Time-slot 11	Available	Not Available
TS12	Time-slot 12	Available	Not Available
TS13	Time-slot 13	Available	Not Available
TS14	Time-slot 14	Available	Not Available
TS15	Time-slot 15	Available	Not Available
TS16	Time-slot 16	Available	Not Available
TS17	Time-slot 17	Available	Not Available
TS18	Time-slot 18	Available	Not Available
TS19	Time-slot 19	Available	Not Available

TS20	Time-slot 20	Available	Not Available
TS21	Time-slot 21	Available	Not Available
TS22	Time-slot 22	Available	Not Available
TS23	Time-slot 23	Available	Not Available
TS24	Time-slot 24	Available	Not Available
TS25	Time-slot 25	Available	Not Available
TS26	Time-slot 26	Available	Not Available
TS27	Time-slot 27	Available	Not Available
TS28	Time-slot 28	Available	Not Available
TS29	Time-slot 29	Available	Not Available
TS30	Time-slot 30	Available	Not Available
TS31	Time-slot 31	Available	Not Available

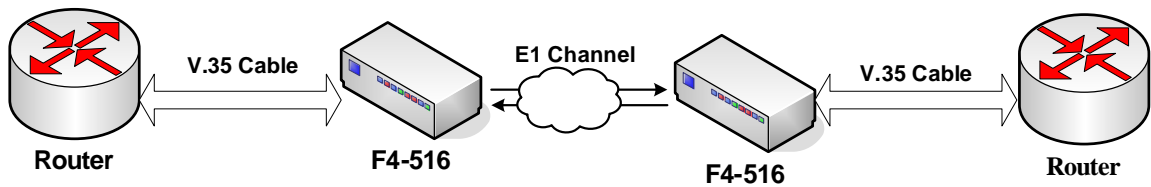
Notice:

- a) Set TS0 to TS31 all to ON or OFF, the converter will work under unframed mode, and E1 speed is 2048Kbps. If you set TS0 to TS31 all to OFF, all 32 timeslots are used to transmit Ethernet signal; if you set TS0 to TS31 all to ON, all 32 timeslots are used to transmit V.35 signal.
- b) If the TS0 is set to OFF, then timeslots “ON” carry V.35 signal while timeslots “OFF” carry transmit Ethernet signal.
- c) Under framed PCM30 mode, TS16 of E1 channel is used to carry command instead of payload. So, at most up to 30 time-slots are available, and the bandwidth is 1920Kbps.
- d) Timeslots can be chosen continuously or discontinuously.

For example, if you want to use 5 timeslots, you could set TS1-TS5 to ON and set TS6-TS31 to OFF as table. And also, you could set 5 random timeslots to ON.

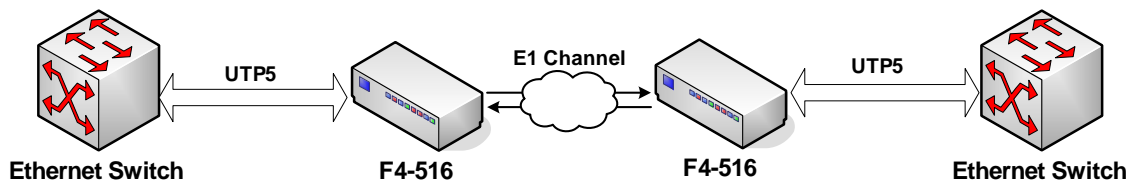
6 Typical Application

(1)



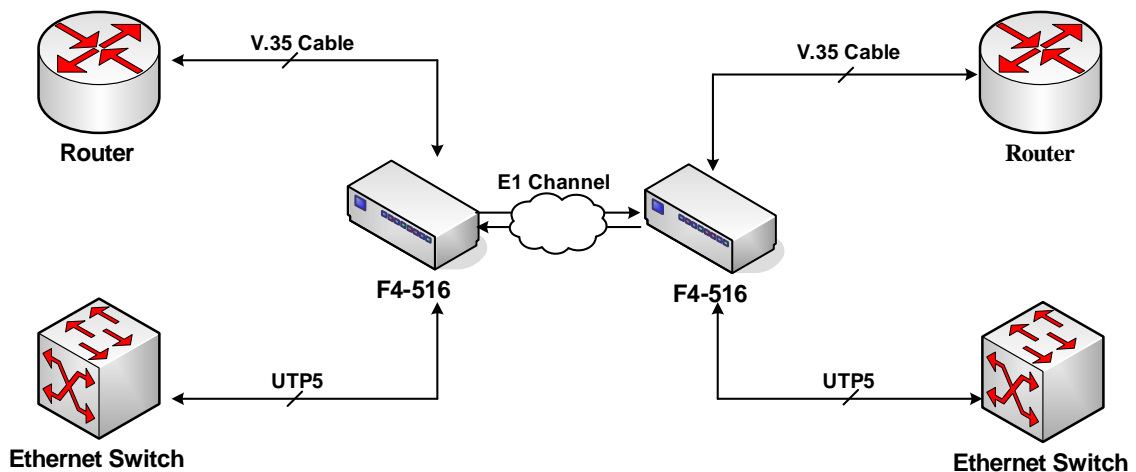
Make use of F4-516 to link routers by E1 channel.

(2)



Make use of F4-516 to link Ethernet switches by E1 channel.

(3)



Make use of F4-516 to link routers and Ethernet switches by

E1 channel.

In the above application, it is recommended that user select F4-516 device's timing signal as unique timing source, and all the other equipment follow this timing source. F4-516 should be used in pairs.

7 Diagnosis and Maintenance

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

7.1 Step of installing

- a) 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.
 - V.35 tester, to test the V.35 transmission line.
- b) Check the device and accessories according to Packing List when open the box. If something missing or damaged, please contact us immediately.
- c) 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.

- d) Place the equipment on neat table or the other platform.
- e) Set dip switches according to your demand. We suggest when setting timing mode, make sure there is only one master clock in the channel. Connect the V.35 cable, 10Base-T cable and E1 cables to the interfaces. Please reference the Notice ②.
- f) Make sure power switch is off. Connect power line to device, then turn on the power switch.
- g) If the equipment works normally, all LED indicators are off except for PWR. When you connect equipments to Ethernet, the indicator LINK/ACK is on or blink and the indicator FDX is on, which means Ethernet is working at Full Duplex mode. If there is something wrong, please refer to '8 Fault and Solution'.

Notice:

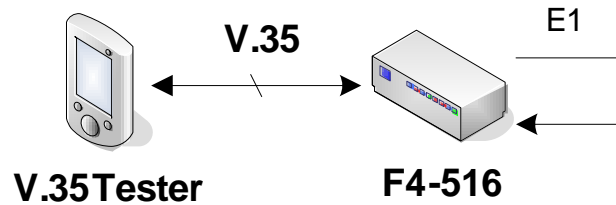
- ① Make sure the type of power supply is in accordance with the equipment request.
- ② For preventing equipment from damage, we suggest mightily you connect or disconnect V.35 cable with power off.
- ③ It is very important that equipments are connected to earth rightly and firmly. Check the distributing of the power supply and the connection to the earth.

7.2 Local Loop Back Setting

- a) Set bit 3 of SW1 ON, then the F4-516 is forced to local loop

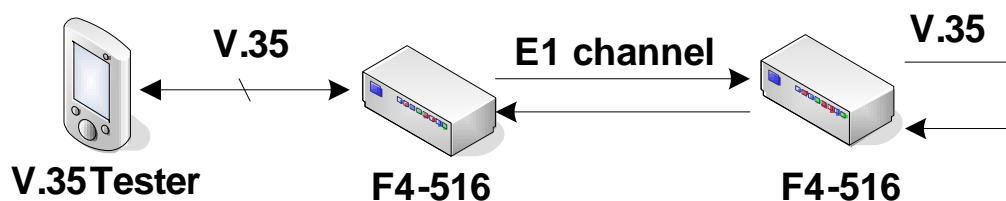
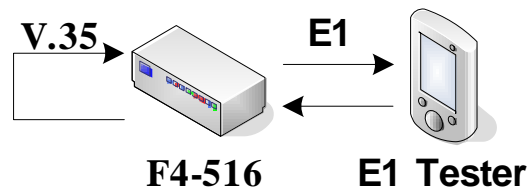
back test mode.

- b) Or, connect the IN and OUT connectors with a coaxial cable.



- c) Connect F4-516's V.35 port to a Router or a Transmission Analyzer, as the picture above.
- d) If the loop back set up successfully, all red LEDs on the converter should be off.

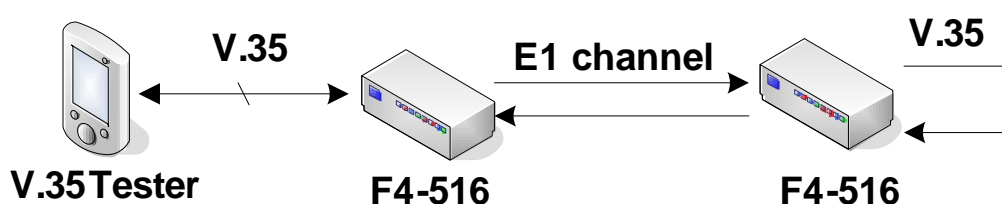
7.3 Diagnostic Loop Back Setting



- a) As the picture above, set two converters working in framed mode, except one device's testing;
- b) Set bit 2 of SW1 ON of Local end.
- c) Set bit7 and bit8 of SW1 on remote end ON, which means remote end is the timing source.

- d) Set bit7 ON and bit8 OFF of local SW1, which means local end follows the E1 port timing.
- e) If diagnostic loop back successful, LOS LEDs on local and remote end should be off, LOOP on local end should be on, LOOP on remote end should blink.

7.4 Remote Loop Back Setting



- a) As the picture above, set two converters working in framed mode.
- b) Set bit 1 of SW1 ON of local end.
- c) Set bit7 and bit8 of SW1 on local end ON, which means local end is the timing source.
- d) Set bit7 ON and bit8 OFF of remote SW1, which means remote end follows the E1 port timing.
- e) If remote loop back successful, LOS LEDs on local and remote end should be off, LOOP on local end should be blink, and LOOP on remote end should on.

7.5 Setting remote's bandwidth

Purpose: make remote converter's bandwidth follow that of local one.

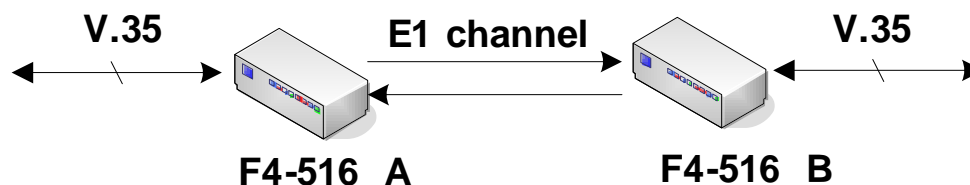
Condition:

- a) Set bit7 and bit8 of SW1 on local end ON, which means

- local end is the timing source. Set bit7 ON and bit8 OFF of remote SW1 to make remote end follow the E1 port timing.
- Set local and remote converter to work under framed mode.
 - Set bit4 of SW1 on remote end OFF.

7.6 Bit error test online

F4-516 provides a useful function, bit error test online, to diagnose device and transmission line, with loop back test functionality. And the PTOK led shows the test result.



Step:

- Set converter A to remote loop back (set bit1 of SW1 ON) or local loop back (set bit3 of SW1 ON), then LOOP LED on A should blink (remote loop back) or be ON (local loop back).
- Set bit5 of SW1 on converter A ON, which means A is working under Bit Error Testing Online mode. If PTOK led on A is ON, there is no error bit in the signal. If LOOP led is OFF, it means there are error bits in the signal. Then, if bit3 of SW1 on A is ON (local loop back), there maybe some troubles occur in the equipment A. if bit1 of SW1 on converter A is ON (remote loop back), there maybe some troubles occur in converter A, or in E1 channel, or in device B.

7.7 Selection of V.35 data and timing phase

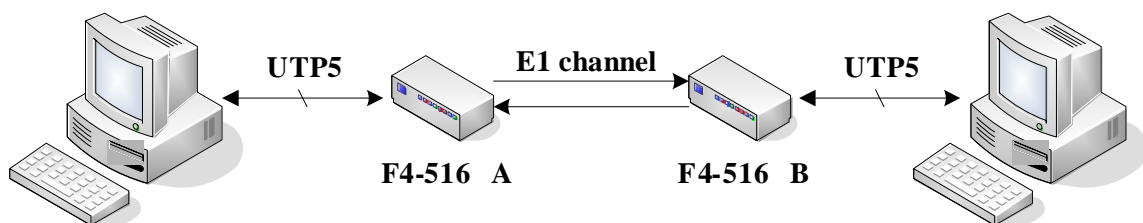
F4-516 can examine and adapt to the phase of data received from V.35 port, without any manual setting. For timing phase, there is a bit in dip switch to setup it. Generally, equipment can work well without setting timing phase. Only if converters cannot synchronize with link partner, or have lot of bit errors, you should change this setting. You can make it though bit6 in the table 2.

7.8 Testing interface of Ethernet

Connect Ethernet port and turn on the power switch. If the connection is all right, some LEDs on the equipment may show as follow:

- All red LEDs are OFF.
- LINK turns ON, which means Ethernet port is linked with no data receiving or transmitting, or blink, which means Ethernet port is linked with data receiving and transmitting.
- If converter is working at Full Duplex mode, FDX turns ON.

You can use PING command to test the Ethernet channel. The connection is shown as picture below.



8 Fault and Solution

Here are some reasons of familiar faults and expelling methods for your reference. If you still can't make sure the reasons of the faults or settle the faults according to the methods below, please contact us immediately.

- **All indicators are not lighted on after power-on.**

Reason	Solution
Power switch is off	Turn on the switch.
The power supply cable is defective.	Change the power cable.
If the power supply is -48VDC, the polarity connecting is reversed.	Change the polarity of the power supply.
LED Indictors are damaged	Contact our company or suppliers immediately.

- **LOS lights on**

Reason	Solution
The E1 interface IN/OUT connection is reversed	Interchange the IN/OUT E1 cable.
The E1 interface cable connects falsely.	Replace the new cables or new connectors
Equipment is failed. The LOS is still on in loop back mode.	Contact our company or suppliers immediately.

- **AIS is on**

Reason	Solution
Local end and remote end bandwidth are not consistent under the framed mode.	Make the local end and remote end bandwidth consistent.
The PCM30/31 selection of local and remote are not consistent.	Make them consistent.
Bit error rate is too high.	Test the E1 channel with E1 analyzer.

- **LINK/ACK is off when Ethernet port is connected.**

Reason	Solution
Equipment isn't connected to Ethernet network.	Connect equipment to Ethernet with twisted-pair cable.
Twisted-pair cable is damaged.	Check and change the twisted-pair cable.
Equipment failure.	Contact our company or suppliers immediately.

- **The Ethernet LED indicators are normal but there are some packages lost during data transmitting or receiving**

Reason	Solution
There are more than one master clock in the signal channel.	Make sure there is only one master clock in the signal channel.
The link partner works at forced 100Mbps.	Set link partner working at auto-negotiation mode or forced 10Mbps, full duplex.

- **All indicators are normal but equipments cannot communicate with each other.**

Reason	Solution
Timing phase is not consistent with user's equipment.	Change timing phase to make it consistent with user's equipment.

9 Order Information

Model:

F5-4511V E1 to V.35 Converter Series

P/N:

F4-516A Standalone, 220VAC Power input

F4-516D Standalone, -48VDC Power input