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OPCOM3101-155 User Manual

2006-10

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Technical Assistance Center

The Raisecom TAC is available to all customers who need technical assistance with a Raisecom product, technology, or, solution. You can communicate with us through the following methods

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World Wide Web

You can access the most current Raisecom product information on the World Wide Web at the following URL:

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Feedback

Comments and questions about how the device works are welcomed. Please review the FAQ in the related manual, and if your question is not covered, send email by using the following web page:

http://www.raisecom.com/en/xcontactus/contactus.htm.

If you have comments on the device specification, instead of the web page above, please send comments to:

export@raisecom.com

We hope to hear from you!

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

⚠ **Warning**	This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

⚡	Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

⏚	Protective earth: the marked lug or terminal should be connected to the building protective earth bus.

⚠ **Warning**	Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions: • Before turning on the chassis with optic module, make sure that the fiber optic cable is intact and is connected to the transmitter. • Do not attempt to adjust the laser drive current. • Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam. • The use of optical devices with the equipment will increase eye hazard. • Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure. **ATTENTION:** The laser beam may be invisible!

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

All extension slots are not hot-swappable

Before operating modules in the electricity conditions, please be noticed that optical modules shall be connected with optical fiber wires or shield with optical module cover for fear that laser light harms to operator's eyes.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building

installation.

Preventing Electrostatic Discharge Damage

Modules which can be plugged into chassis are sensitive to damage from static electricity. Conversely, static voltages as high as 35,000V can be generated just by handling plastic or foam packing material, or by sliding assemblies across plastic and carpets. Not exercising the proper electrostatic discharge (ESD) precautions can result in intermittent or complete component failures. To minimize the potential for ESD damage, observe the following guidelines:

- Always use an ESD-preventive antistatic wrist strap or ankle strap and ensure that it makes good skin contact.
- When removing or installing a component, make sure the equipment end of your antistatic strap leash is connected to the ESD connection sockets on the front of the chassis or to a bare metal surface on the chassis. Avoid contact between the component and your clothing. The wrist strap only protects the component from ESD voltages on the body; ESD voltages on your clothing can still cause component damage.
- Always place a card component-side-up on an antistatic surface, in an antistatic card rack, or in a static shielding bag. If you are returning the item to the factory, immediately place it in a static shielding bag.
- Handle Modules by the metal card carrier edges only; Avoid touching the board or any connector pins.

CONTENTS

1. Overview

1.1 Introduction

OPCOM3101-155 is a compact 63 E1 SDH optical multiplexer developed by Raisecom, there are two types: OPCOM3101-155 and OPCOM3101-155-BL, the difference between the two types is OPCOM3101-155 provides 75Ω unbalanced E1 interface and OPCOM3101-155-BL provides 120Ω balanced E1 interface. And in this manual OPCOM3101-155 indicates both of the two types.

OPCOM3101-155 can provide 63 E1 and technical feature and indexes meet every norm of ITU-T and national SDH. It deploys 1U structure, and is suitable for the access of end business of Telecom. OPCOM3101-155 is mainly applied to service access and transmission of access layer in communication networks; it also can make up communication networks through E1 interface together with access devices, GSM mobile cellular base station, ETS wireless access base station, switches and routers.

OPCOM3101-155 is available for flexible topology: point-to-point, chain and ring and supports 1+1 low path protection to guarantee high reliable transportation.

You can manage OPCOM3101-155 by in-band or out-of-band network management channel; Raisecom network management platform NVIEW NNM is also available for figure information of monitoring, alarms, management and maintenance.

1.2 Main Features

- Provide two STM-1 interfaces, with options of either two individual STM-1 or 1+1 path protection;
- Provide 63 E1;
- Support 126*126 VC12 non-blocking cross connection;
- Network Element type: TM and ADM;
- Network topology type: point-to-point, chain and ring; provide 1+1 low path protection, and the switch time is less than 50ms.
- Master/slave clock mode supports clock holding, locking, and free running compliant with G.813 standard.
- Provide SNMP and CONSOLE network management interfaces and ECC embedded channel, available for both local and remote field upgrade and is very convenient for maintenance.
- Provide fault alarm and performance monitor, optical interface and E1 interface provide loop back function for convenient equipment maintenance.
- Optical interface supports Automatic Laser Shutdown function
- Redundant power supply: 220V, -48V and +24V
- Power consumption: <20W, temperature: -5～50℃;

1.3 Explanation of device number

Whole device number:

OPCOM3101-155－ A - B

OPCOM3101-155－BL- A - B

Number explanation:

OPCOM3101 indicates the product series of OPCOM3100;

155 indicate the optical interface rate is 155M

BL indicates the E1 interface is 120Ω balanced, and without BL indicates75Ωunbalanced.

A field indicates the type of optical connector: M/S1/S2/S3/SS1/ SS2

M   dual-strand multi mode and transmission distance is 0～2km

S1   dual-strand single mode and transmission distance is 0～25km

S2   dual-strand single mode and transmission distance is 10～60km

S3   dual-strand single mode and transmission distance is 15～120km

SS1   single-strand single mode, dual-wavelength and transmission distance is 0～25km, EAST

optical interface TX wavelength is 1310nm and WEST optical interface TX wavelength

is 1550nm.

SS2   single-strand single mode, dual-wavelength and transmission distance is 10～50km, EAST optical interface

TX wavelength is 1310nm and WEST optical interface TX wavelength is 1550nm.

Optical connector is SC.

B field indicates power supply type:

AC indicates AC power supply

DC indicates -48V DC power supply

1.4 Dimension

OPCOM3101-155 adopts international 19-inch chassis and is convenient for installation.

Dimension: 440(W)mm*43.6mm(H)*330mm(D)

2. Technical Parameters

2.1 Basic Configuration

● 2 STM-1 interface, 63 E1 interface

● Power supply module: 220VAC, -48VDC or +24V DC for redundant power supply

● Management interface: CONSOLE and SNMP interface

2.2 SDH Optical Interface Parameters

● Rate: 155.52Mb/s

● Coding: NRZ

● Optical connector: SC

2.3 E1 Interface Parameters

● Rate: 2048Kb/s±50ppm

● Interface coding: HDB3 code

● Physical electric feathers compliant with ITU-TG.703 standards

● Jitter performance compliant with ITU-TG.823 standards

● Input jitter compliant with ITU-TG.823 standards

● Output jitter compliant with ITU-TG.783 standards

● Interface Impedance: OPCOM3101-155: 75ohm, OPCOM3101-155-BL: 120ohm

2.4 Console Interface Parameters

● Interface type: RJ-45

● Compliant with RS232 standard

● Rate: 9600bps

2.5 SNMP Network Management Interface Parameters

● Interface type: RJ-45

● Compliant with IEEE802.3 standard

● 10/100M auto-adapt

● Cable sequence is the same with that of PC

2.6 Power Supply Parameters

● Voltage: -48V DC, tolerance range: -36V～-72V

+24V DC, tolerance range: +18V～+36V

220V AC, tolerance range: 180V～ 260V

- Power consumption: <20W

2.7 Working Environment

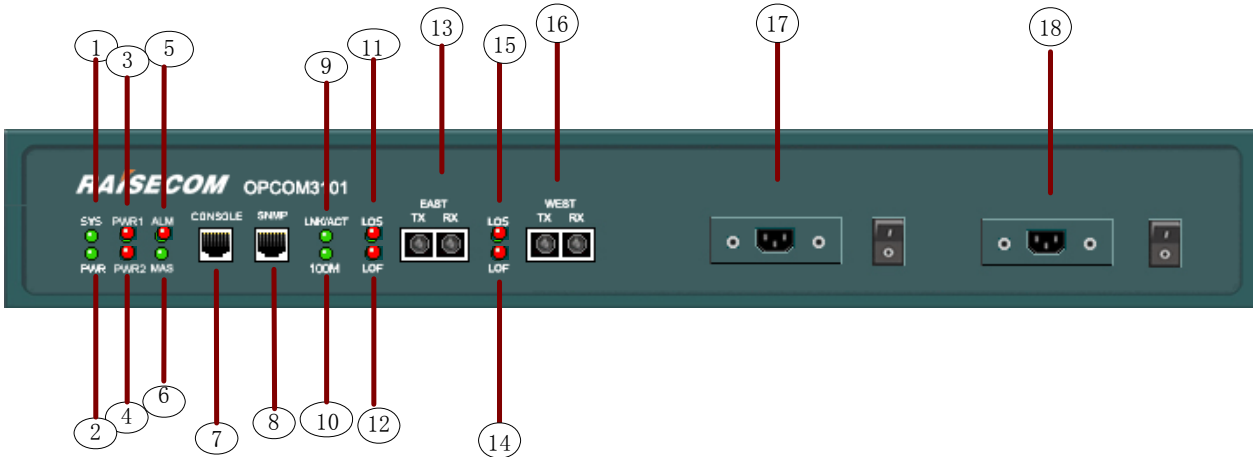● Temperature:-5℃～50℃

● Humidity: ≤90 %(35℃)

3. Structure and Indicator Explanation

3.1 Front Panel View

Figure 3-1 OPCOM3101-155 front panel

Figure 3-2 OPCOM3101-155 Indicator explanation of front panel

Number	Explanation	Indicator color	Description
1	SYS	Green	System indicator, flashing indicates normal work status of CPU
2	PWR	Green	Power supply indicator, steady on indicates normal work status of power supply
3	PWR1	Red	First power supply alarm, steady on indicates abnormal status of power supply and off indicates normal.
4	PWR2	Red	Second power supply alarm, steady on indicates abnormal status of power supply and off indicates normal.
5	ALM	Red	Global alarm indicator, steady on indicates there is alarm
6	MAS	Green	Steady on indicates master station and off indicates slave station
7	CONSOLE		Local control platform, connects to PC series interface

8	SNMP		Ethernet interface provides SNMP network management
9	LNK/ACT indicator	Green	SNMP interface indicator. Steady on indicates normal connection with Ethernet, flashing indicates receiving data.
10	100M Indicator	Orange	SNMP interface indicator. Steady on indicates Ethernet rate is 100M and off indicates 10M
11,15	LOS Indicator	Red	Steady on (red) indicates loss of optical signal, off indicates normal
12,14	LOF Indicator	Red	Steady on (red) indicates loss of SDH frame, off indicates normal
13,16	1 and 2 optical interface		STM-1 optical interface
17,18	Power supply socket		18 is PWR1, 17 is PWR2, AC 220V, DC -48V/+24V is optional

3.2 Real Panel View

Figure 3-3 OPCOM3101-155 real panel
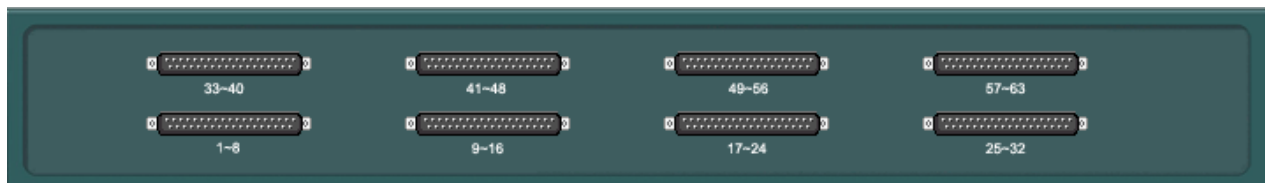
There is 8 DB37 connectors in real panel. OPCOM3101-155 can provide 63 E1, DB37 connector with number 57-63 provides 7 E1, left each of DB37 connector provides 8 E1.

4. Function and Application

4.1 Real Panel View

Working process of OPCOM3101-155 basic service is: 63 E1 signal in SDH can be mapped and de-mapped.

4.2 Basic Application Mode

OPCOM3101-155 is suitable for network end access. It can be configured as TM, ADM

1. Terminal multiplexer (TM)

The main function of terminal multiplexer (TM) is multiplexing low speed E1 signal to high speed
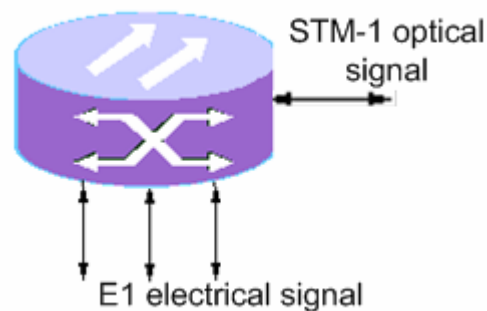STM-1 SDH signal and de-multiplexing high speed STM-1 SDH signal to low speed E1 signal.

Figure 4-1 TM network element type

2. Add/Drop multiplexer (ADM)

Add/Drop multiplexer (ADM) is the most common network element type in SDH network, it has both synchronous
multiplexing function and digital cross connection function, and can add/drop the tributary signal flexibly. For example
the access E1 signal can be multiplexed to both east STM-1 signal and west STM-1 signal.
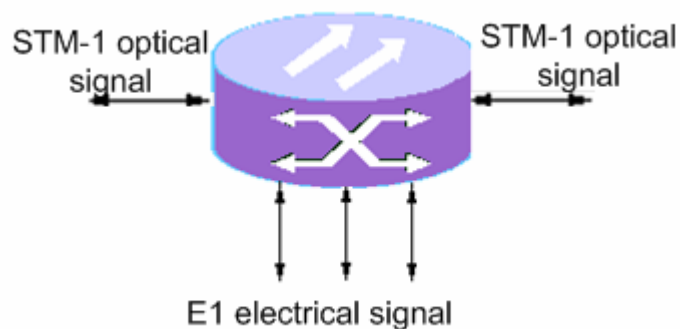

Figure 4-2 ADM network element type

4.3 Network Topology

OPCOM3101-155 has flexible networking capacity, it supports point-to-point, chain and ring network topology.

1. Point-to-point network consists of 2 TM devices and transmits STM-1 and E1 service
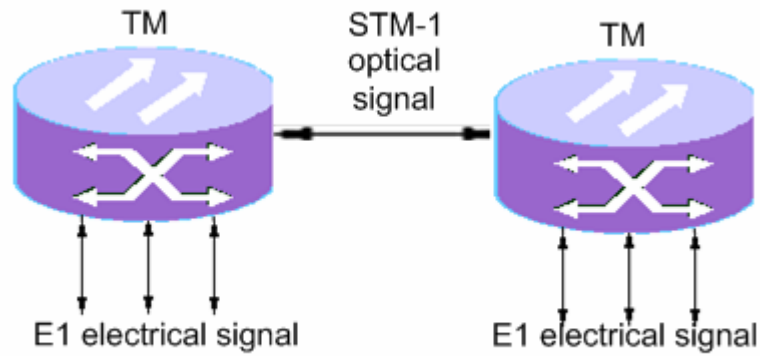
Figure 4-3 point-to-point topology

2. Chain topology

Chain topology is made up of two TM devices and several ADM devices. Data is often transmitted in bi-direction and less optical fiber is needed.
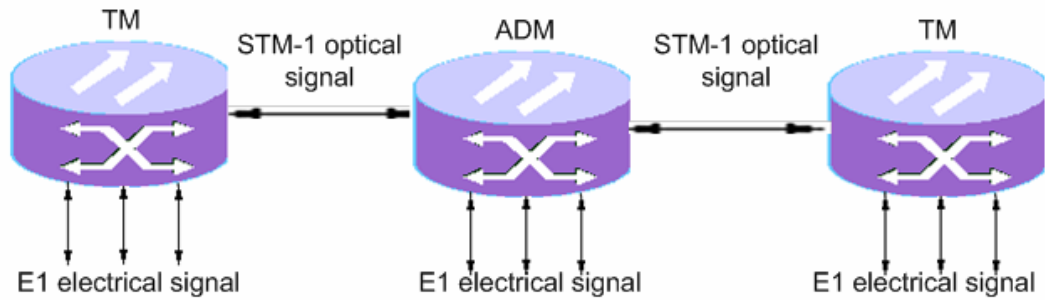

Figure 4-4 chain topology

3. Ring topology

OPCOM3101-155 can organize ring topology network at STM-1speed with flexible service configuration and high reliability, it also can realize 2F SNC-P function.
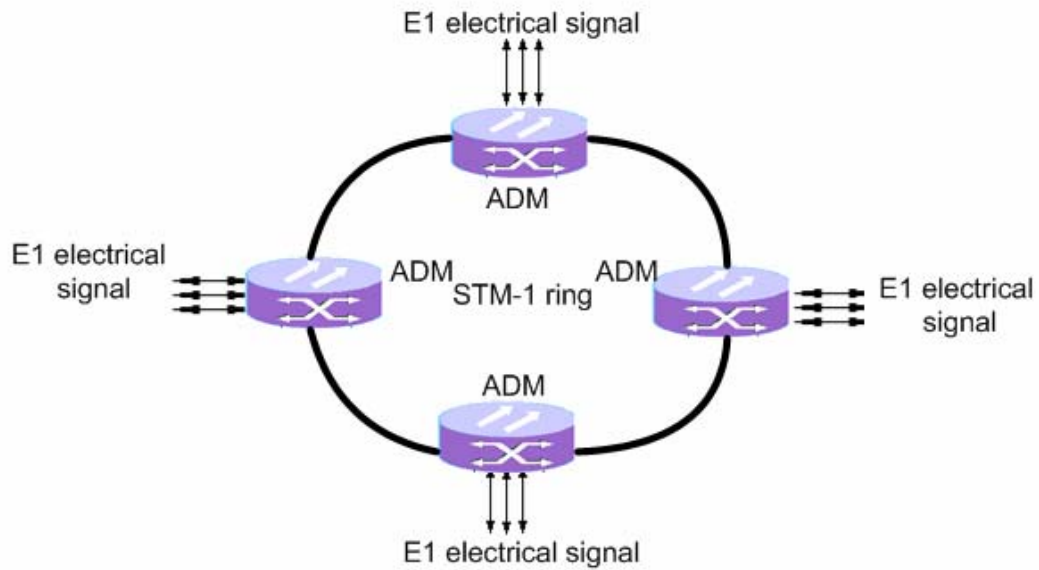
Figure 4-5 ring topology

4.4 Clock

The clock mode of OPCOM3101-155 is related to master/slave station. Master station uses free running mode and slave station uses recovered clock. For slave station, there are two recovered clock references: the first optical line (primary reference clock) and the second optical line (standby reference clock). OPCOM3101-155 will switch the reference clock from the first optical line to the second if the primary reference clock is not available (including there is LOS and the frequency offset is more than 4.6ppm), and if the primary reference clock has recovered it will switch back.

4.5 Protection switch

OPCOM3101-155 provides 1+1 low path protection in the case that the optical fiber is broken off, PCB is damaged or middle notes are invalid, and the protection switch time will be less than 50ms. There are two kinds of protection switch: automatic protection switch and force protection switch, the force protection switch can be configured through network management.

1. Protection switch in chain topology:

In the following figure, in chain 1+1 path protection between two ends, there are two transmission lines transmitting the data, and every note receives the data twice. One of the transmitting lines is working line and the other one is protection line. Receiving end will select a better quality signal from the two lines. Generally the Rx data is from working line and if there is protection switch the Rx data is from protection line. When the working line has recovered the Rx data is from working line again.
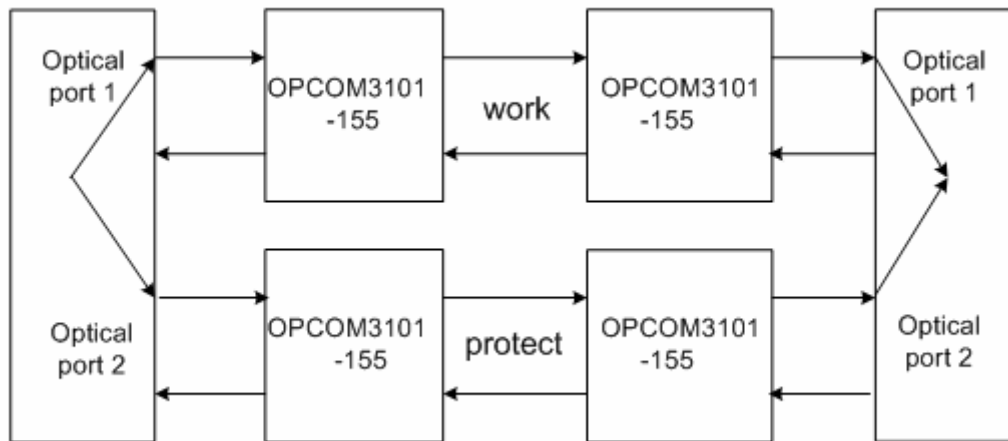
2. 2F SNC-P

The principle of 2F SNC-P protection is that: "transmit data bi-directionally, receive data bi-directionally, select one better quality signal and use the other signal as standby". 2F SNC-P uses one fiber to transmit service, called S fiber (working fiber); uses another fiber for protection, called P fiber (protection fiber). If every note of the ring works normally, the direction Tx signal and Rx signal is the same (that is to say, if a note transmits data clockwise so does it receives data), but the routing is not the same (e.g. if station A transmits data to station C, the routing is A→B→C; and if station A receives data from C, the routing is C→D→A, so the middle stations passed by are not same). See in the following figure:
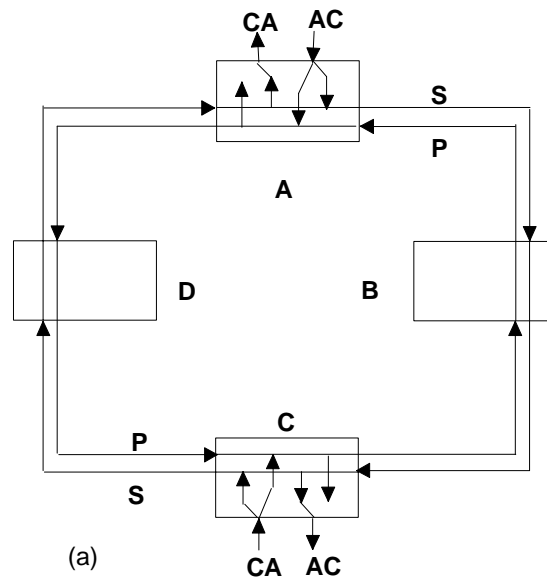
(a)
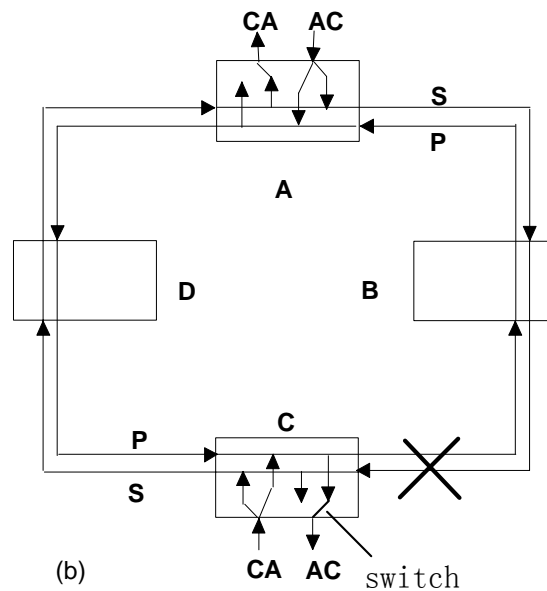
(b)

The Tx and Rx routing is in figure (a) when it works normally: data from A to C is transmitted both in S fiber and P fiber, S fiber will transmit the data from A to C clockwise though middle station B, and P fiber will transmit the data from A to C anticlockwise though middle station D. C receives two signals bi-directionally and it will select a better quality signal (the signal in working line S fiber generally). Data from C to A is the same process.

The Tx and Rx routing is in figure (b) when the fiber is cut off: for the signal in S fiber is lost the switch will shift from S fiber to P fiber to receive the data transmitted by P fiber, so the service between station A and C will go on. After $5\sim12$ minutes the switch will recover if the fault is resolved and the service from C to A will not be effected.

5. Installation & Preparation

5.1 Cautions

Check whether the type of device, spare parts and number are same with that of packing list. Make sure the device appearance is in excellent condition. There must be drying process if the device has been damp.

To make sure normal working of the device, please follow the following steps:

- Read this manual carefully
- Fix and install the device
- Prepare the fiber and E1 cable
- Connect the fiber or other cables
- If this is your first use of the device, please refer to configuration manual and command manual.
- Use the device properly

5.2 Installation

5.2.1 Cable preparation

Table 5-1 OPCOM3101-155 cable specifications

Interface	Specifications
10/100Mbps Ethernet electrical interface/SNMP interface	100Base-T category-5 UTP, the maximum distance is 100m.(users provide)
CONSOLE cable	Refer to appendix.(Raisecom provides)
Optical fiber	Multi mode fiber or single mode fiber with SC/SC or SC/FC connector (customized)
E1 cable	There are two types of E1 cable for OPCOM3101-155 CBL-E1-DB37F/16BNC：75ohm cable for OPCOM3101-155； CBL-E1-S-DB37F/8RJ45：120ohm cable for OPCOM3101-155-BL
Power socket	AC: 220V/10A power supply cable; DC: user prepares and Raisecom dose not provide

5.2.2 Connect 155M SDH Interface

- Connect the fiber to the SDH interfaces on front panel
- If proper connected the LOS indicator light will turn off.
  Prepare the fiber and E1 cable

5.2.3 Connect E1 electrical port

OPCOM3101-155 provides 75Ω E1 cable and OPCOM3101-155-BL provides 120Ω E1 cable.

Connector of 75Ω cable in user side is BNC and each E1 cable includes 8 IN and OUT, there is E1 number on each coaxial, "RX" and "TX" indicate the SDH signal direction. For example: "RX1" stands for the RX of the first E1 and "TX1" stands for the TX of first E1.

Connector of 120Ω cable in user side is RJ45, each RJ45 connects to one E1 signal, and the definition of RJ45 signal is: 1, 2 receiving and 4, 5 transmitting. There are labels on each RJ45 cable to indicate E1 channel. For example: CH1 indicates the first E1.

5.2.4 Connect SNMP network management port

Connect the SNMP network management port through Ethernet cable with related device and the LNK/ACT will ON if the connection is correct.

5.2.5 Connect CONSOLE port

Connect the RJ45 connector of CONSOLE cable with CONSOLE interface on the front panel.

- Connect the DB9 connector PC serial interface.
- Start Hyper Terminal on PC:
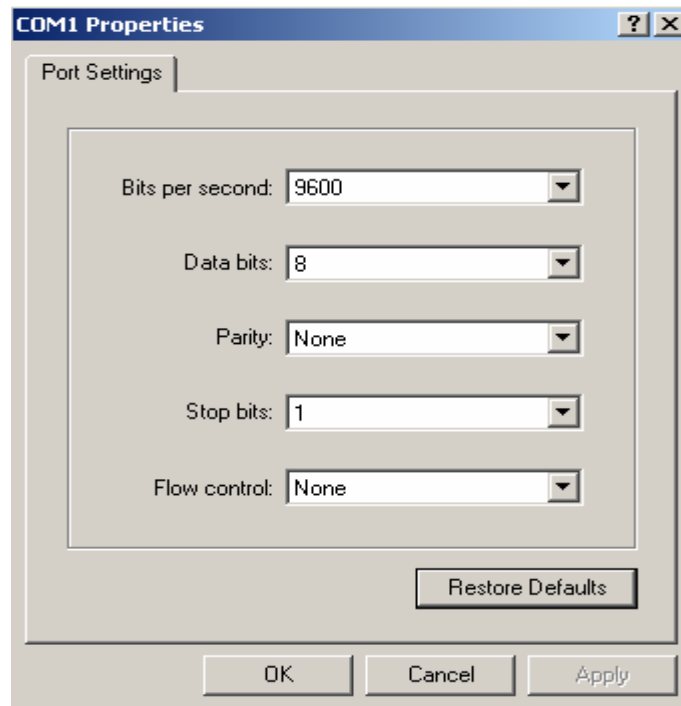
- Configure the network management of OPCOM3101-155; please refer to command manual and configuration manual of OPCOM3101-155.

5.2.6 Power on

If you use -48V DC as power supply, connect the ground with protection grounding first, "-48V" with low level voltage cable and "0V" with high level voltage cable. Make sure of firm installation and no short-circuit, then power on.

If you use 220V AC, use the affixing power supply cable.

After powered on, PWR indicator light will be normal, and the system has finished initialized if SYS starts to flash

Appendix A: Terminologies and abbreviations

STM-1	Synchronous Transport Module(-N)
SDH	Synchronous Digital Hierarchy
TM	Terminal Multiplexer
ADM	Add/Drop Multiplexer

Appendix B: FAQ

If you have problems during the installation or application, please try to solve them through the following suggestions. And if it does not work, please contact the sellers to get technical supports.

● PWR light of power supply card turns OFF.

Check the power supply cable first, and then the power supply card.

● LOS alarms of SDH optical interface

That is to say, there is receiving signal loss. First, check whether the cable is connected correctly; second, if there are still alarms when self-loop the cable (perhaps optical attenuation is needed), change the cables; if there are still alarms then there is something wrong with device.

● Indicator light of SNMP network management interface is OFF.

First, check whether the cable works normally or not; then, check whether the devices connect to SNMP network management interface works normally or not. And make sure the cable is correct.

● E1 channel failed

Check the E1 cable, optical interface and time slot configuration, check the alarms in the EMS and use loop back function to find where the problem is.
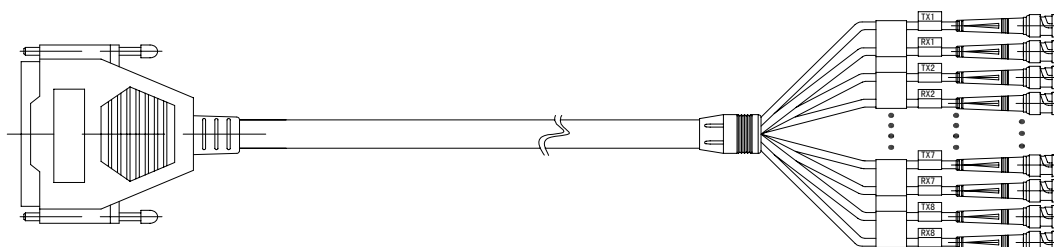
Appendix C: How to Make CONSOLE Cable

CONSOLE cable

CONSOLE interface uses RJ45 connector and the pin definition is as follows:

RJ-45 Pin number	Signal	Relative PC Pin number
1	NC	-
2	DSR#	6
3	RxD	3
4	GND	5
5	GND	5
6	TxD	2
7	DTR#	4
8	NC	-

Appendix D: How to Make E1 Cable

1. Making method of CBL-E1-DB37F/16BNC-2.5M is following:

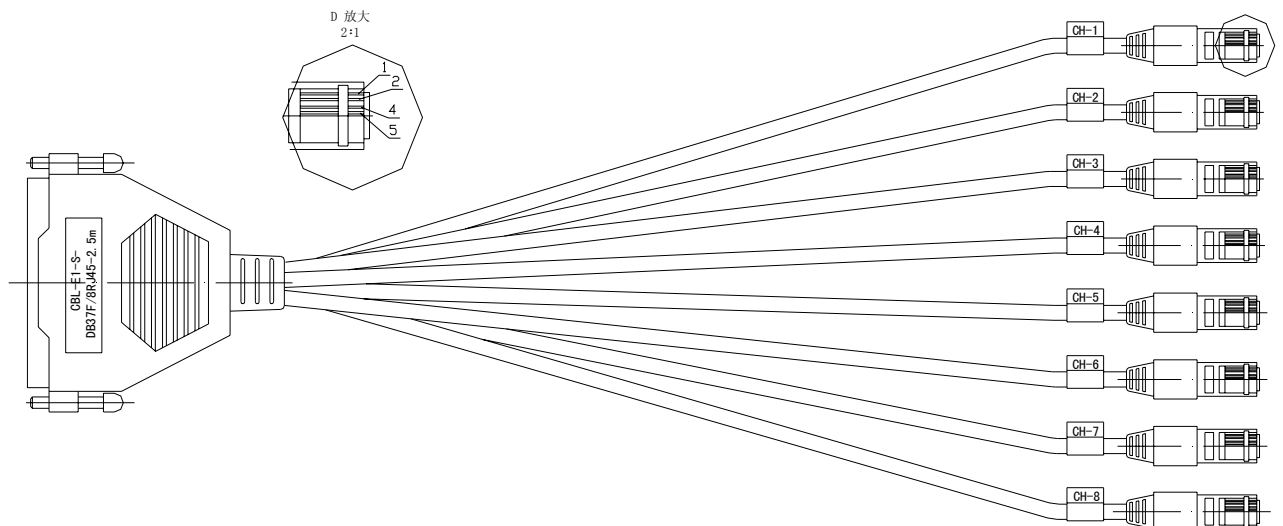| DB37 diagram	DB37F	Pin definition	Cable mark	DB37F	Pin definition	Cable mark
	1			20		
	2			21	IN1+	RX1
	3	OUT1-	TX1	22	IN1-	
	4	OUT1+		23	IN2+	RX2
	5	OUT2-	TX2	24	IN2-	
	6	OUT2+		25	IN3+	RX3
	7	OUT3-	TX3	26	IN3-	
	8	OUT3+		27	IN4+	RX4
	9	OUT4-	TX4	28	IN4-	
	10	OUT4+		29	IN5+	RX5
	11	OUT5-	TX5	30	IN5-	
	12	OUT5+		31	IN6+	RX6
	13	OUT6-	TX6	32	IN6-	
	14	OUT6+		33	IN7+	RX7
	15	OUT7-	TX7	34	IN7-	
	16	OUT7+		35	IN8+	RX8
	17	OUT8-	TX8	36	IN8-	
	18	OUT8+		37		
	19					

Notes:
① "+" Express core of coaxial cable, it indicates weld of pin and core of coaxial cable.
② "-" Express shield-layer of coaxial cable, it indicates weld of pin and shield-layer of coaxial cable.

Technics Requirement			
End A		End B	
Outer layer	Strip layer 35mm	Outer layer	Strip layer 500mm Encapsulation with protector
Outer skin of inner layer	Strip layer 25mm	Outer skin of inner layer	Strip layer 15mm
Shield layer	To bury line 25mm, then feed it into plastic pipe	Shield layer	To bury line 15mm
Inner layer	Strip core 2mm	Inner layer	Strip core 2mm
Connecting	Welding	Connecting	Welding
Encapsulation	Plastic encapsulation of outer and inner film	Encapsulation	Plastic encapsulation of outer and inner film

Notes: End A is DB37F connector, End B is BNC male/female connector

2. Making method of CBL-E1-S-DB37F/8RJ45-2.5M is following:

DB37	RJ45			DB37	RJ45	
3 4 21 22	5 4 > TWISTED 2 > TWISTED 1		CH-1	11 12 29 30	5 4 > TWISTED 2 > TWISTED 1	CH-5
5 6 23 24	5 4 > TWISTED 2 > TWISTED 1		CH-2	13 14 31 32	5 4 > TWISTED 2 > TWISTED 1	CH-6
7 8 25 26	5 4 > TWISTED 2 > TWISTED 1		CH-3	15 16 33 34	5 4 > TWISTED 2 > TWISTED 1	CH-7
9 10 27 28	5 4 > TWISTED 2 > TWISTED 1		CH-4	17 18 35 36	5 4 > TWISTED 2 > TWISTED 1	CH-8

Technics Requirement			
End A		End B	
Outer layer	Strip layer 35mm	Outer layer	Strip layer 18mm
Shield layer	Burying line, then weld shield layer of each cable and ground of DB37	Shield layer	Burying line, then crimp shield layer and ground of RJ45
Inner layer	Strip core 2mm	Inner layer	
Connecting	Welding	Connecting	Crimping with special forceps
Encapsulation	Plastic encapsulation of outer and inner film	Encapsulation	Encapsulation with protector

Notes: DB37 diagram is same as CBL-E1-DB37F/16BNC

End A is DB37F connector, End B is RJ45 connector