Unmanaged (LB1301A) and Managed (LB1302A)
MultiLink II Media Converter
User and Installation Guide

FEDERAL COMMUNICATIONS COMMISSION

AND

CANADIAN DEPARTMENT OF COMMUNICATIONS

RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

Normas Oficiales Mexicanas (NOM)

Electrical Safety Statement

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada

Table of Contents

Thank you for purchasing this Black
Box®LB1301A/LB1302A quality converter.
We hope that this guide will help you to
obtain the best results from the device while
minimizing installation time.

*If you still need help installing or troubleshooting the **Black Box®** LB1301A/LB1302A converter after reading the detailed information in this guide, please, call Black Box Technical Support at 724-746-5500.*
<u>Note</u>: unless where indicated otherwise in this guide, Black Box® LB1301A/LB1302A applies also to Black Box® LB1301A/LB1302A/SC, LB1301A/LB1302A/ST,LB1301A/LB1302A/SM15, and LB1301A/LB1302A/SM40

1 - OVERVIEW

A media-converter may be defined as a device connecting two active network components point-to-point over a media that is different from the ports of at least one of these devices.

An ideal media-converter should be a transparent element in the network, and its ports may be considered as integral parts of the devices interconnected by it.

The IEE802.3u standard defines network span in terms of distances and bit times.

Conventional 100Base-TX/100Base-FX media-converters are based on repeater technology, and they form a part of the collision domain created by the interconnected devices. Therefore, the delay they introduce in the network severely affects the allowed distances. Furthermore, if two class II repeaters (i.e., 2 hubs) are already present in the same collision domain, then the use of a conventional converter is not allowed as the repeater count may - in such case - exceed the limits. In all other cases, meticulous PDV (Path Delay Value) must be performed prior to establishing the possible distances for both the fiber optic (F/O) and copper segments.

The Black Box® LB1301A/LB1302A products family implements a non-repeater, full re-timing approach. It creates a **B**uffered **M**edia **D**omain (BMD) over the F/O link, thereby eliminating all the above mentioned limitations.

The BMD created by two Black Box® LB1301A/LB1302A devices always operates at maximum performance - 100Mbps/Full Duplex - while interconnected devices may operate at different rates and modes. This provides full flexibility when planning a network.

The Black Box® **LB1301A** provides 2 TP ports sharing conversion to two FO ports, with the TP ports buffered and VLAN protected between themselves.

The Black Box® **LB1302A is the SNMP managed version.**

The device can be deployed in various topologies :
  a. Backup : redundant fiber-optic link for mission critical applications
  b. Ring / String topologies
  c. Point to point configuration (standalone units)

2 -PLANNING YOUR NETWORK WITH BlackBox®LB1301A/LB1302A

Below you will find typical configurations. The TP ports may be connected – without any restriction – to any of the following device types:
  ❑ Workstation (or server) – 10Mbps
  ❑ Workstation (or server) – 10/100Mbps (a/n)
  ❑ Hub – 10Mbps
  ❑ Hub – 100Mbps
  ❑ Hub - 10/100Mbps (A/N)
  ❑ Switch (Router) – 10Mbps
  ❑ Switch (Router) - 10/100Mbps (A/N)

Enterprise network with back-up for mission critical applications

In order to use your Black Box® LB1301A/LB1302A as a redundant device (back-up topology):

- Set switch #2 ("see configuration switches" –section 12, page 19) to UP position (Back-up mode).
  FX1 port is now configured as **MAIN** and FX2 port is configured as **BACK-UP** port.
- As long as **MAIN** detects a valid link, the **BACK-UP** is disconnected. Once **MAIN** senses LINK loss, the **BACK-UP** is linked up within approximately 1.5 seconds. When **MAIN** link is re-established, the **BACK-UP** link is automatically disconnected.

Remember: In all other topologies DIP switch #2 must be DOWN (Back-Up disabled)

There are two typical redundant point-to-point applications:

A. Point- to- Multi- Point Configuration

CRITICAL SITE PROTECTED AGAINST:
- **Failure of ANY of the 2 optical transceivers involved**
- **Failure of any individual transmitter OR receiver in these transceivers**
- **Failure of converter A or switch A**
- **Failure of the main F/O cable**
- **Failure of any fiber strand in the main F/O cable**
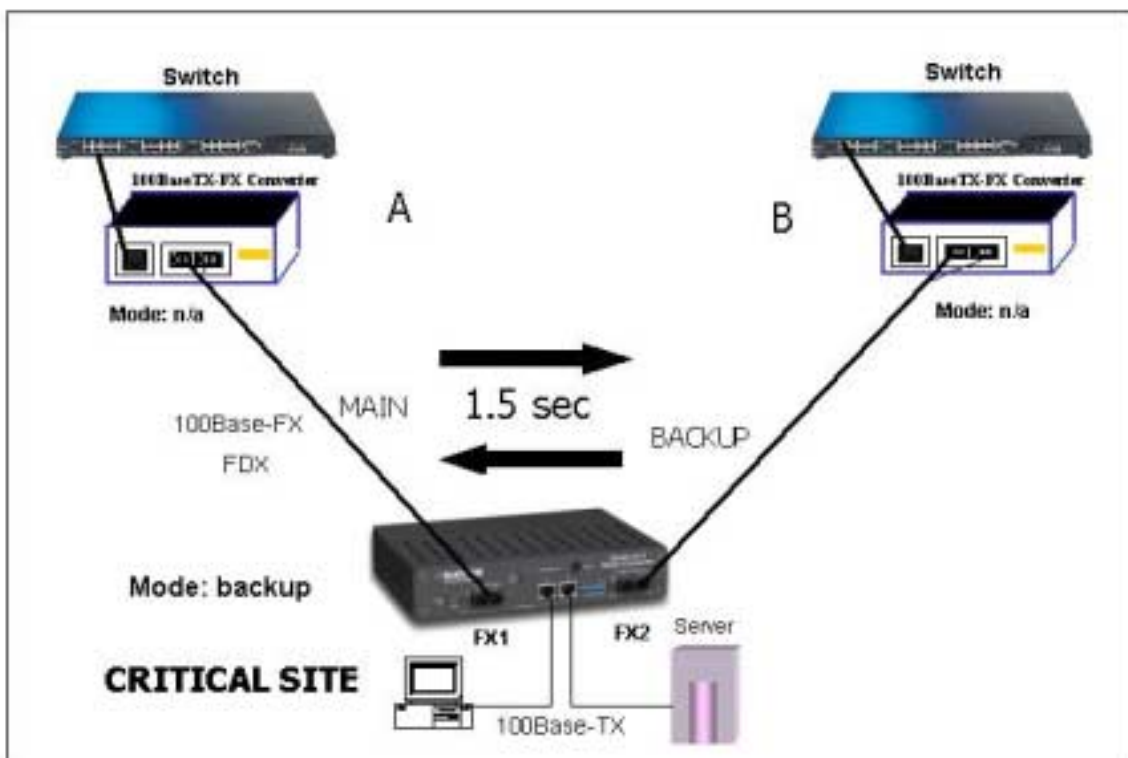
B. Point-to-Point Configuration

CRITICAL SITE PROTECTED AGAINST:
- **Failure of ANY of the 2 optical transceivers involved**
- **Failure of any individual transmitter OR receiver in these transceivers**
- **Failure of the main F/O cable**
- **Failure of any fiber strand in the main F/O cable**

RECOMMENDED: Run MAIN and BACKUP F/O cables via different routes
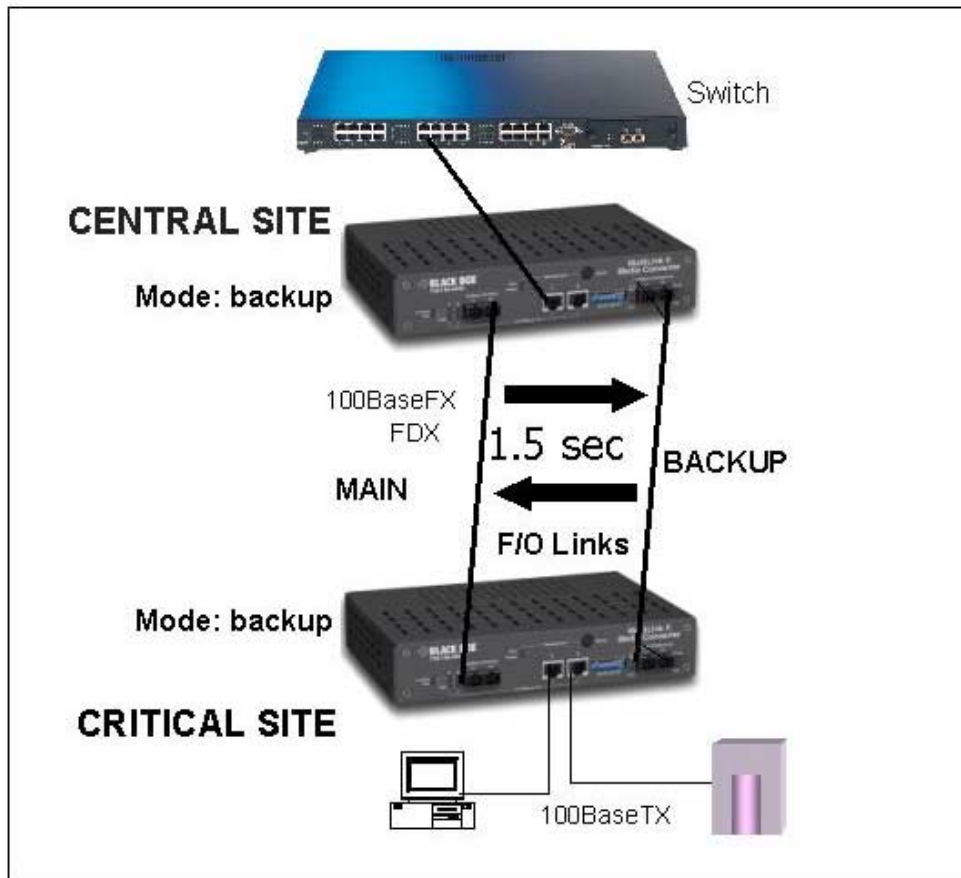
Ring and String topologies

The main purpose of deploying Ring/String topologies is **fiber savings** (up to 80%) and redundancy (Ring only). Typical applications are:
- **Power Intercity (surveillance /control**)
- **Highway (surveillance/control)**
- **Railway (surveillance/control)**
- **Pipeline (surveillance/control)**
- **Campus (peripheral security)**

See below typical configurations :

C. Ring Topology

1. Ring of three sites

CRITICAL SITE PROTECTED AGAINST:
- Failure of ANY of the 2 optical transceivers involved
- Failure of any individual transmitter OR receiver in these transceivers
- Failure of Black Box LB1302A or Switch A
- Failure of the main F/O cable
- Failure of any fiber strand in the main F/O cable

Switchover times :

- Link CA to CB – 1.5 sec
- Layer 2 traffic CA to CB – 1.5 sec
- Layer 2 traffic AC to BC – up to 300 sec
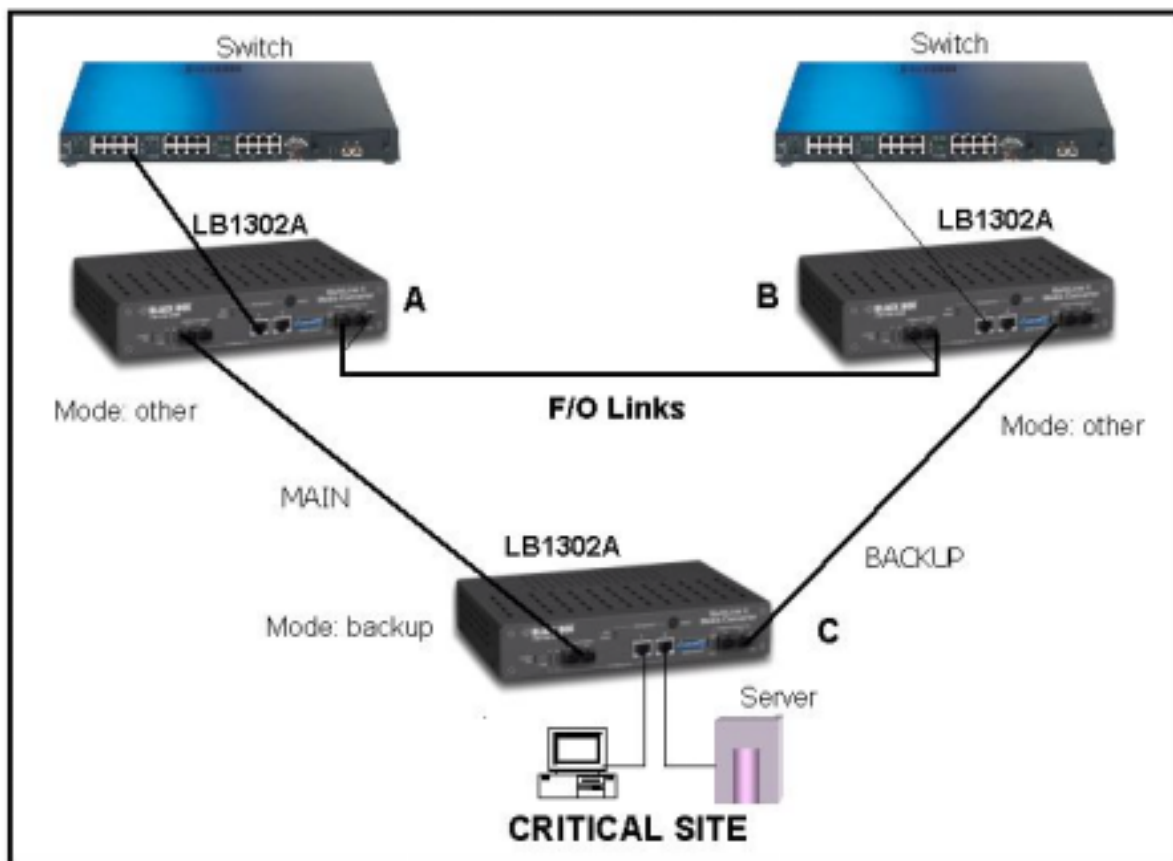
2. <u>Ring – Any number of sites</u>

- A switch MUST be part of the ring
- L2 switch will activate STA
- Switchover times depend on the switch
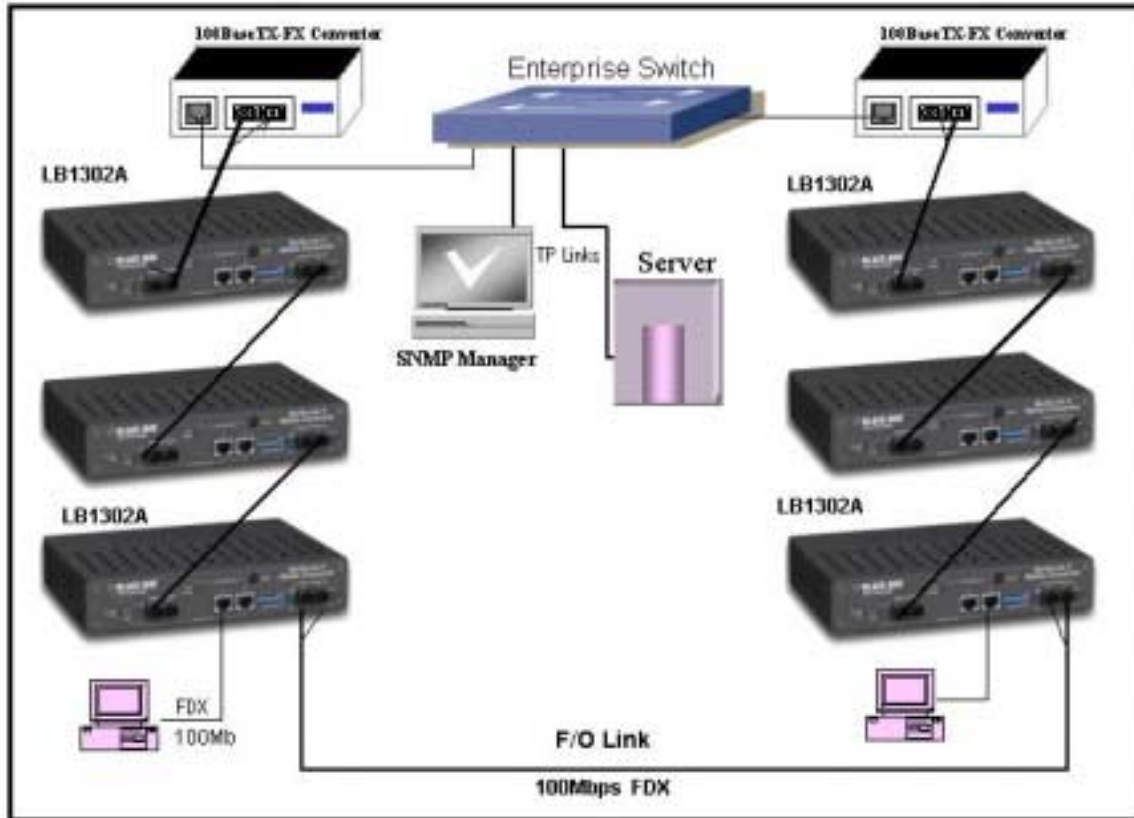
D. String Topology
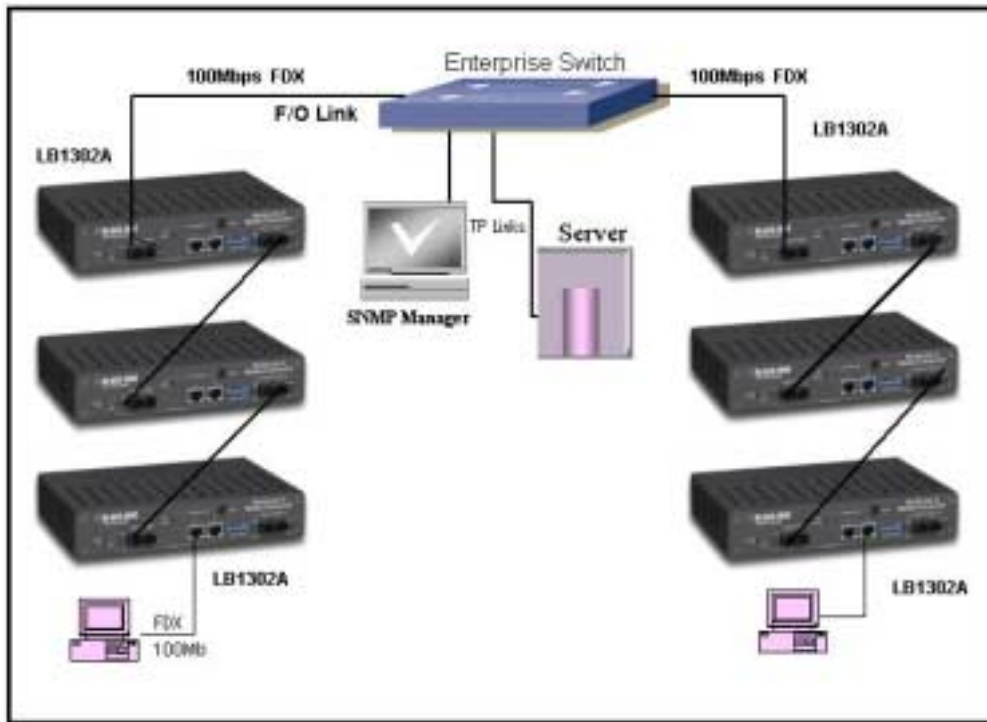
E. Typical application: Highway Surveillance Network
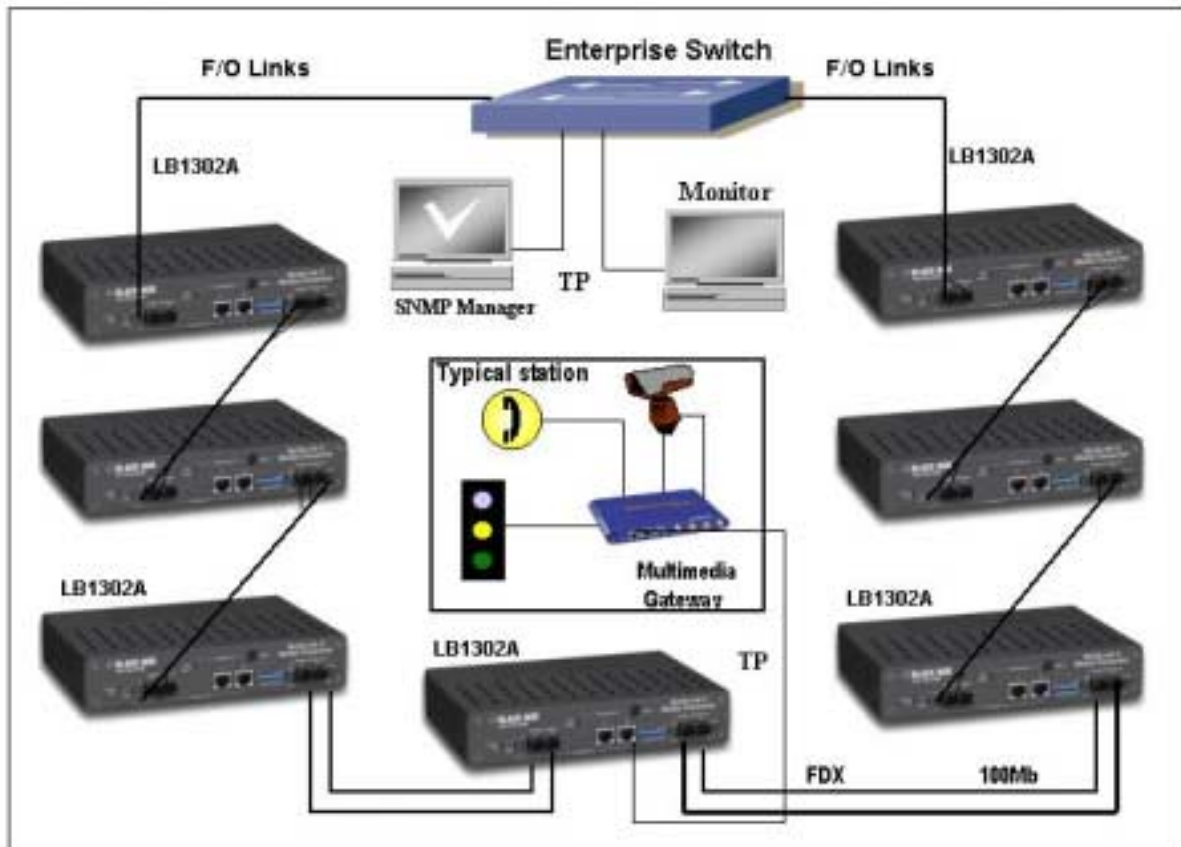
Surveillance stations can be allocated and installed in different locations along the Highway to monitor and control the traffic.

3 - NETWORK DESIGN CONSIDERATIONS

Some main issues need to be considered when deploying a network in a ring (or string) of Black Box®LB1301A/LB1302A (same will apply, in general, when deploying any ring or string of Fast Ethernet switches):

- **Number of Black Box®LB1301A/LB1302A devices in a single ring (string).** You need to remember that in such topology the bandwidth (100Mbps x 2 when FDX) will be shared by all devices. Therefore you need to consider what is the effective average BW you want to secure for each device. If, for instance, you want to ensure 1Mbps (FDX) for each user, thus 2Mbps per device (2 users may be connected), if you daisy-chain 40 Black Box®LB1301A/LB1302A the aggregate BW will reach 80Mbps which is the max. recommended for Fast Ethernet. This will be sufficient for most of plain data and control applications. However if you wish to ensure say 5Mbps per user (like for Video On Demand applications), then 10Mbps per Black Box®LB1301A/LB1302A and 80 Mbps aggregate if 8 Black Box® LB1301A/LB1302A are daisy-chained.

- **Delay and number of hops**: Black Box®LB1301A/LB1302A is a "hop" in the data path and adds a delay of up to 10μsecs and the aggregate delay need to be considered in light of the application. In the majority of pure data applications (e.g. control) this will not be an effective limitation, therefore 30-50 devices may be deployed in a Ring/String. However if the network runs time sensitive protocols (e.g. video) it is recommended to deploy no more than 10-15 Black Box® LB1301A/LB1302A devices in a single Ring/String configuration.

- **Distance between LB1301A/LB1302A** devices: When implementing a Ring topology in a linear geography (e.g. along a highway or pipeline) it is recommended to connect the Black Box®LB1301A/LB1302A in an interlaced manner: say going East to West connect 1-3-5-…n-2 -n then when going back connect n-n+1- n+3 - ……6-4-2. This is necessary to avoid a very long return path. However you need to consider as the maximal distance between any two Black Box®LB1301A/LB1302A adjacent segments. There will be no implementation problems as you can order the Black Box®LB1301A/LB1302A with F/O interfaces of up to 40Kms.

- **Loops**: When closing a ring of Fast Ethernet devices you create a logical loop which is considered illegal by the Ethernet standard. Therefore, there must be one managed switch at least in the Ring. Such switch will implement STA (part of IEEE802.1d) to open the loop logically and reconnect it again when a ring failure occurs. **Remember: creating a Ring of Black Box® LB1301A/LB1302A and closing it on a switch which does not support STA (Spanning Tree Alg.) <u>will result in network jam within seconds!</u>** However if a loop comprises of only two or three Black Box® LB1301A/LB1302A units, such is not required (see pages 6&7 for correct setup).

4 - CONTENTS OF THE SHIPPING CONTAINER

The contents of the Black Box® LB1301A/LB1302A shipping container are as follows:

- ❑ One converter Black Box® LB1301A or Black Box® LB1302A.
- ❑ One AC power cord (excluding shipment to certain countries).
- ❑ Four plastic "feet".

- ❑ Management serial cable (Black Box® LB1302A only).

Black Box ®
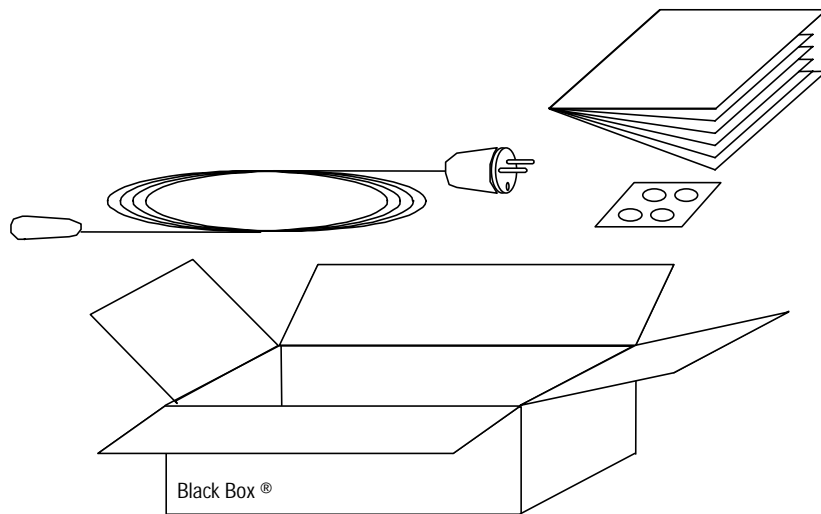
5 - PRODUCT GENERAL DESCRIPTION

The LB1301A/LB1302A comes in the following pre-configured versions as described below:

LB1301A-SC	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), multi-mode 2km, internal PS
LB1301A-ST	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex ST), multi-mode 2km, internal PS
LB1301A-SM15	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), SINGLE-mode 15km, internal PS
LB1301A -SM40	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), SINGLE-mode 40km, internal PS
LB1302A-SC	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), multi-mode 2km, internal PS, **SNMP Managed**
LB1302A-ST	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex ST), multi-mode 2km, internal PS, **SNMP Managed**
LB1302A-SM15	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), SINGLE-mode 15km, internal PS, **SNMP Managed**
LB1302A -SM40	Versatile 10/100TX-FX media converter and access device, BMD with two RJ-45 (switched) and two F/O ports (each duplex SC), SINGLE-mode 40km, internal PS, **SNMP Managed**

Feature Summary

- 10Base-T, 100Base-TX and 100Base-FX modes of operation
- Supports FEF feature (Far-End-Fault) to test Link integrity.
- Comprehensive LED support :Indicators for Link, Activity (Tx, Rx) , FDX, 100M, Power status and Link Test
- Hardware based 10/100, Full/Half, Flow control, Auto-Negotiation, MDI/MDI-X Auto-crossover.
- Wire speed reception and transmission
- Supports 1K Mac addresses
- Automatic address learning and address aging (aging period is 300s)
- **Frame length range :   64 ÷ 1536 bytes**
  VLAN tagged frames are thus supported and can pass thru the converter
- Desktop , shelf ,wall mount installation, or directly in a half 19" rack.
- **Port based VLAN**
- **LB1302A main management features :**

  1. **Full Remote monitoring and port setup**
  2. **Operation mode setup, temperature monitoring**
  3. **Extensive set of alerts**
  4. **Overriding user manual switch setting**
  5. **Feedback on remote changes**
  6. **VLAN/TOS   monitoring and setup**

General Description

The Black Box® LB1301A/LB1302A is a shared and buffered media converter. It converts 100Base-FX signals received on its F/O interface in 10/100Base-TX signals and distributes them to 2 TP (shielded RJ-45) ports. Each of these ports is buffered; furthermore, **factory set VLAN forms groups each including one TP port and both F/O ports, providing the users with basic security (no connection between the users)**. This architecture allows two users to share same F/O links.

(This default setting can be disabled by means of front panel dip switch # 10 –see section 12" Configuration Switches " page 19)

The TP ports are auto-negotiating and will automatically adapt themselves to the capacity of the users for highest performance (will negotiate 10/100 and FDX/HDX). Nevertheless, in some cases it may be necessary to force certain operation modes. For this purpose, all TP ports may be (individually) forced to 10Mbps/FDX operation Full front panel diagnostics provide information on the operation mode of every port.

The F/O ports are configured by default to FDX but if desired may be set to HDX as well. However it is essential to remember that when in **HDX, the F/O link maximal distance drops to 412m or less.**

The Black Box® LB1301A/LB1302A features a built in **Far End Fault** alerting the remote device of a problem in its transmission path. This function may be disabled by flipping a front panel setup switch (#8) and supported by the "TEST" LED for easy front panel diagnostics.

The Black Box® LB1301A/LB1302A is packaged in a rugged "half rack" enclosure allowing elegant and safe deployment in a variety of environments: desktop, 2 units on a 19" rack-shelf (or within a standard "half 19" rack -optional brackets required) and wall mount installation.

Its internal, high-power auto- range switching power supply ensures easy, safe and error-free deployment and enhanced MTBF.

The managed version – Black Box® LB1302A – provides full in-band SNMP manageability (both monitoring and control) and **port priority schemes** - see Appendix-A (pages 24 – 45 of this guide)
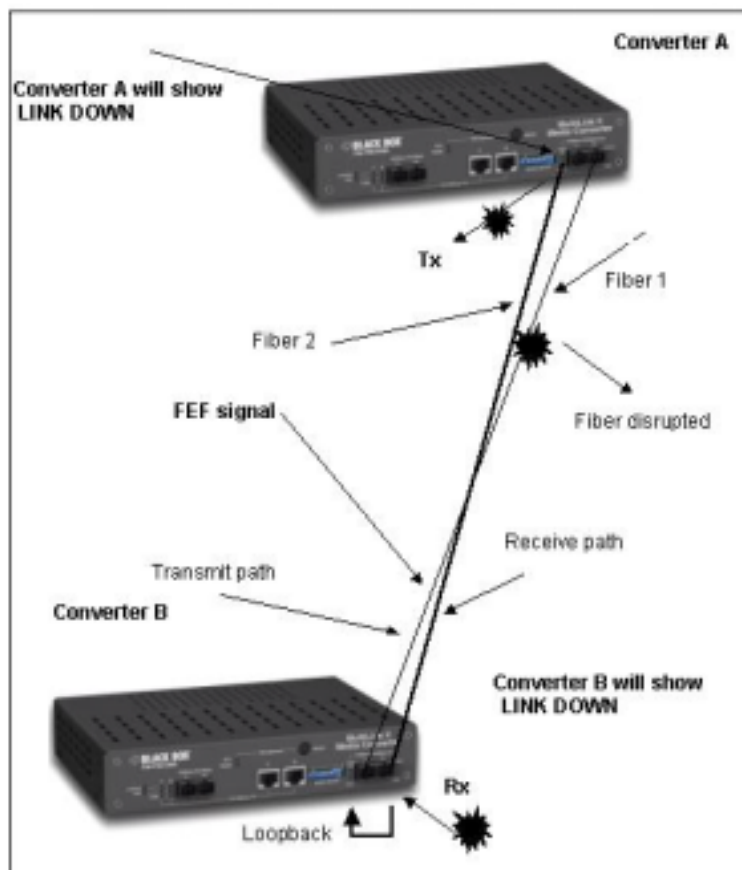
6 – FAR END FAULT (FEF)

Usually a "LINK" indication is related to the incoming fiber only: F/O Link ON shows that the path created by the remote transmitter, local receiver and the fiber connecting them is operational. However if there is a fault in the other – outgoing - path (created by the local transmitter, remote receiver and the fiber connecting them) – the indication for such fault can be seen on the remote device only.

The FEF implemented in the **Black Box®LB1301A/LB1302A** closes this gap: if there is a fault in the outgoing path and the remote device is FEF compliant , then the F/O Link LED will go OFF on both the local and remote devices. In this way we avoid the possibility of having a FX Link ON indication at one end while, in reality one of the data path is disrupted. The drawing below depicts the FEF functionality.

Converter B will send a FEF signal to Converter A if any of the Converter B receive path elements becomes faulty.

The FEF feature may be enabled/disabled by means of front panel dip switch # 8.

7 - PARTS IDENTIFICATION

LB1301A has same parts as LB1302A except parts 7,8,and 9 (management section).See table below.

	Black Box® LB1301A	Black Box® LB1302A	COMMENTS
1	Power ON LED	Power ON LED	
2	TEST mode LED	TEST mode LED	Linked to DIP switch #8 (Far End Fault)
3	FX-2 port, duplex SC	FX-2 port, duplex SC	Back-Up link when device in Back-up mode
4	FX-2 Port Link/Activity LED	FX-2 Port Link/Activity LED	Lit steady – LINK ON; blinking : receive mode
5	FX-2 port FDX mode LED	FX-2 port FDX mode LED	Lit– FDX forced
6	Mode Setup (DIP) switches	Mode Setup (DIP) switches	See section 12 for details (page 20)
7	N/A	Mini DIN RS-232 connector	
8	N/A	Receive LED	Management activity
9	N/A	Ready LED	SNMP Management module OK
10	TP ports 1 and 2	TP ports 1 and 2	Auto-Negotiation and Auto-Crossover
11	FX-1 port, duplex SC	FX-1 port, duplex SC	Main Link when device in Back-Up mode
12	Link/Activity ports FX-1 and TP ports 1 and 2 LED	Link/Activity ports FX-1 and TP ports 1 and 2 LED	Lit steady – LINK ON; blinking : receive mode
13	Full Duplex ports FX-1 and TP 1 and 2 LED	Full Duplex ports FX-1 and TP 1 and 2 LED	Lit when FDX detected or forced
14	100Mbps TP ports 1and 2 LED	100Mbps TP ports 1and 2 LED	Lit when 100Mbps detected or forced

NOTE: ALL Duplex mode LEDs – blinking indicates collisions on respective port (in HDX mode only)

8 - INSTALLATION

For wall mount installation

Three suitable holes on the back of the Black Box® LB1301A/LB1302A permit wall mount Installation either horizontally (underline preferred) or vertically.
Two holes are 188mm apart for horizontal wall mount installation, for vertical
wall mount installation the two holes are 107mm apart.
Use two suitable screws having heads diameter less than 8mm

For Desktop use: Affix the supplied plastic "feet" (after peeling off the adhesive protecting sheet) to the bottom of the devices, with each "foot" approximately 1 cm from each edge.

Place the device horizontally on a hard, clean surface (desk, shelf, etc.), leaving free space around it for natural ventilation. Avoid putting the device on other active, heat generating equipment and avoid putting such devices on the Black Box® LB1301A/LB1302A.

19" Rack installation

Use a standard flat shelf, install it in the rack and place one or two Black Box® LB1301A/LB1302A side by side on the shelf. Make sure to leave a gap of at least 2-3cm above the unit.

9 - POWER CONNECTION

> *CAUTION: When connecting a device to an AC power outlet, always first connect the cord to the device, and ensure that it is securely fastened. Only afterward connect the cord to the wall outlet. Make sure to use grounded (3 way) outlets .*

> *For each country Black Box provides with the product an appropriate power supply cord which is safety approved in accordance with such country's National Electric Code*

Black Box® LB1301A/LB1302A
Connect AC line voltage at the rear of the converter, using the included power cord. The Black Box® LB1301A/LB1302A will accept any line voltage from 100 to 240 VAC, 50-60 Hz.
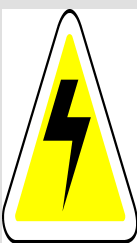There is no ON/OFF switch on the device. When the power is connected to the device, the device is ON. This will be indicated by the POWER LED ON.

> *Important: following any connection or setup change (sections 10,11,12 below) you must reset the device by either using S9 or by disconnecting power and reconnecting it after few seconds.*

10 – F/O CABLING CONNECTION

The Black Box® LB1301A/LB1302A is equipped with either a pair of SC-type connectors, or a pair of ST connectors.

Do not remove the protective covers on the fiber connectors until you are ready to connect the fiber optic cables. Power should be connected <u>before</u> attaching the fiber optic cables. When dealing with fiber optic cables, it is essential to ensure that the Tx at one end of the link is connected to the Rx at the other end of the link. Some duplex fiber optic cables are color coded to help monitor the direction of data transmission. If the fibers are not coded, special attention must be paid to ensure a proper connection.

⚠	*CAUTION* *Radiation emitted from a fiber optic connector may be hazardous to human vision. Therefore, the following rules must be strictly observed*
⚡	*All single-mode (SM) models are* *CLASS I LASER PRODUCTS* *And must be handled with special care* *When not in use, keep the fiber optic connector closed using its protective cover.*
⚡	*Never stare directly into the fiber optic connector of a powered device or into the end of a fiber connected to it.*

11 - TWISTED PAIR CABLE CONNECTION

Since each of the Black Box® LB1301A/LB1302A RJ-45 two ports supports: full auto-negotiation, auto-polarity and Auto-cross: you can simply connect <u>any device</u> to <u>any port</u> by using either a <u>standard straight or a crossed</u> cable. You may need to force an operation mode other than auto-negotiation; refer to section 12. ("Configuration switches", page 19)
Use a shielded Cable Type 5 or higher grade, up to 100m (330ft) long to ensure proper operation at 100Mbps.

12 – CONFIGURATION SWITCHES

The Black Box® LB1301A/LB1302A is equipped with an array of 10 DIP switches marked **"MODE SETUP"** that facilitate the proper setting of the device and individual ports. See section 7 ("Parts Identification" page 16)
Shaded areas indicate factory default setting.

Switch No.	Function	Up Position	Down Position	Comments
1	FX-1 port Duplex Mode	HDX	FDX	
2	Topology	Back-up	All other topologies	Enable / Disable Redundant F/O Link
3	TP port #1 operation mode	10Mbps/FDX (forced)	Auto-negotiation	
4	TP port #2 operation mode	10Mbps/FDX (forced)	Auto-negotiation	
5	Factory use only	N/A	N/A	Do NOT change setting
6	Factory use only	N/A	N/A	Do NOT change setting
7	FX-2 port Duplex Mode	HDX	FDX	
8	Far End Fault	Disabled	Enabled	
9	Reset	Operation	Reset	Reset momentarily (move down then up) following any setup change
10	VLAN ports default setting	Disable	Enable	By default, each TP port with both F/O ports forms a separated security VLAN. Both F/O ports form also a security VLAN

Use a small tool (pen tip or a tiny flat-head screwdriver) to set the switches.

13 – MANAGEMENT (Black Box® **LB1302A ONLY)**

The **Black Box® LB1302A** is a SNMP managed device.Management capabilities :
a. **Out-of-Band** with any terminal emulation program (RS232 port, front panel)
b. **In – Band management**.
c. **Supported MIBs** : MIB II (RFC1213 and RFC1215), RFC2474(DSCP) and private MIBs.
d. The **Black Box® LB1302A** converters may be managed from any SNMP management station   running popular management platforms (e.g. HP OpenView, SNMPc, etc).
Refer to **Appendix A** for the complete setup management procedures. (pages 24-45)

14. ADVANCED Features: Port Priority Schemes

The **Black Box® LB1302A (only!)** can determine priority through three different means.

The first method is a simple per port priority, the second is via the 802.1p frame tag and the third is by viewing the DSCP (TOS) field in the Ipv4 header. Two priority levels are deployed (High and Low)

Per Port Priority

General priority can be specified on a per port basis. In this type of priority
all traffic from the specified input port is considered high priority .

This can be useful in IP phone applications mixed with other data types . The IP phone traffic would be high priority .

802.1p Port Priority

This method works well when used with ports that have mixed data and media flows. The 802.1p priority tag (3 bits) are used to determine frame priority. The **inbound** port examines the priority field in the tag and determines the high or low priority.

VLAN tagging and priority. When frames are sent across the network, there needs to be a way of indicating to which VLAN the frame belongs. This info is added to the Ethernet frame in the form of a **tag header**.

Ethernet Frame Tag Header consists of a Tag protocol identifier (TPID) and Tag control information (TCI)

Ethernet frame :

DA	SA	TAG	PT	DATA	CRC
6B	6B	4B	2B		4B

Tag Header

TPID	TCI
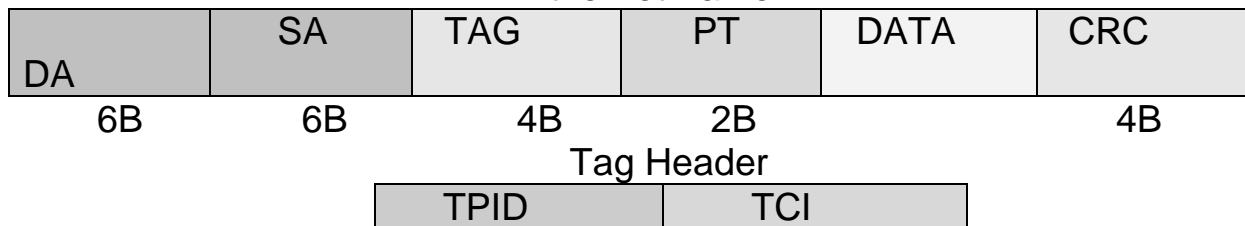
TPID is the tag protocol identifier which indicated that a tag header is following and the TCI contains the User priority, canonical format indicator (CFI) and VLAN ID.

TPID	User priority	CFI	VLAN ID
16 b	3b	1b	12b
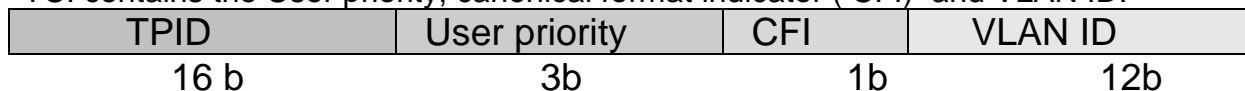
User priority is a 3 bit field which allows priority information to be encoded in the frame. 8 levels of priority are allowed, where zero is the lowest and 7 is the highest priority.(this field is used by 802.1p)

CFI : indicates presence/absence of RIF (routing info field) in the 802.3/Ethernet frames. The **VLAN ID** is used uniquely to identify the VLAN
to which the frame belongs. There can be a maximum of 4096 VLANs.

DSCP Port Priority

This is another **per frame** way to determine **outbound priority**.

The DSCP (Differentiated Services Code Point – RFC 2474) method uses the TOS field in the IP header to determine high or low priority on a per code point basis. Each fully decoded code point can have either a high or low priority.

The most significant 6 bits of the TOS field are fully decoded into 64 possibilities,(up to 64 distinct behaviors) and the resulted singular code is compared against the corresponding bit in the DSCP register. (in the **Black Box® LB1302A** unit) If the register bit is a 1, the priority is high and if 0, the priority is low. Thus the DSCP value classifies the packet service level.

When more than one scheme is enabled, priority conflicts are resolved by the following order : 802.1p based priority overrides port based priority and TOS based priority overrides 802.1p based priority

15 – TROUBLESHOOTING

Problem	Indication	Corrective Action
No power	**power** LED not lit	Check that the power supply cable is firmly connected to the device and to the wall power socket. Check that the AC input power source is between 100 and 240VAC.
Network problems	No communication on network	On the "mode setup switches", check that **S9** is in the UP position. (Normal operation) Reset the device using **S9**
Any problem related to FX-1 or FX-2 ports		Set device to TEST mode (**S8** UP), reset device (**S9**).If problem not solved, remain in TEST mode and proceed with troubleshooting
TP links not working	**Link** LED not lit	Check proper setting of dip switches Check that the connected device is working properly at 100Mbps or 10Mbps. Check that the connection cable is well connected at both ends.
TP link not working at 100M when Black Box® LB1301A or LB1302A is connected to 100Mbps or 10/100Mps device	Both **Link** LED and 100BaseTX LED not lit	On the "setup mode switches", check that respective switches **S3** and **S4** are in down position (Auto-Negotiation mode) Interchange between the suspected port and the other TP port Check that the connected device is working properly at 100Mbps. Check the interconnection between the Black Box®LB1301A/LB1302A and the device.
TP link not working at 10M when BlackBox®LB1301A or LB1302A connected to 10M device (copper side).	**Link** LED not lit	If suspected port is 1 or 2, move respective switch (**S3** thru **S4**) to up position. Reset the device using **S9.** Check that the connected device is working properly at 10Mbps Check the interconnection between the Black Box®LB1301A/LB1302A and the device.
BlackBox®LB1301A/LB1302A not recognizing full duplex	**FDX** LED not lit	Verify that connected device is FDX capable and set to FDX properly. If HDX then the indication is correct . Check Link/Activity LEDs Check the interconnection between the Black Box®LB1301A/LB1302A and the device.

Problem	Indication	Corrective Action
Fiber link not working	**Link** LED (100BaseFX) not lit	Move **S8** to UP position, now you can separate both directions (outgoing and incoming) to isolate failure (coordinate with remote device operator) Check that the receive fiber is properly connected to the transmit port of the remote fiber device **AND** the transmit port to the receive port of the remote device. Check that the fiber optic power is higher than –30 dBm on the receive fiber connector at the Black Box®LB1301A/LB1302A end. Check that remote device's receive port is properly connected to the transmit fiber optic port of the Black Box®LB1301A/LB1302A Verify FDX mode of the F/O port (**S1** or **S7** Down) Reset device by **S9.**
	Link LED OFF while corresponding FDX LED ON	Incoming fiber path OK, outgoing fiber path failed. To verify disable FEF (set **S8** to UP position) and proceed troubleshooting
Improper network traffic	Runt and late collision	Reset the device using **S9** Check configuration (section 12) on the "mode setup switches". Check that both ends of F/O link are set to same mode (Half Duplex **OR** Full Duplex). Check that both sides of TP connection are in same mode (10Mbps Half duplex **OR** 10Mbps full duplex **OR** 100Mbps Half duplex **OR** 100Mbps full duplex).

If the problem persists after carrying out the above procedure, do the following: replace the installed Black Box®LB1301A/ LB1302A,with another similar device and re-perform the requested setup. If that has solved the problem, send the faulty Black Box®LB1301A/LB1302A for repair. If the problem still persists, there is probably some sort of general network failure. Call Black Box Technical Support (Call 724-746-5500).

16 – SPECIFICATIONS for Black Box® LB1301A/LB1302A

Standard Compliance

IEEE 802.3u, IEEE802.1p, 100Base-TX, 100Base-FX, 10Base-T, FDX flow control(IEEE 802.3x), HDX back pressure flow control.

VLAN tagging support, DSCP (RFC2474) support (Black Box® LB1302A managed models only)
MIBs : MIB II (RFC1213,RFC1215), RFC 2474 (DSCP), and private MIBs.

Conversion Method : BMD (**B**uffered **M**edia **D**omain), two TP ports share two F/O links

100BaseTX ports (x 2)
❑ Shielded RJ-45 connector
❑ Supports Auto-negotiation
❑ 100m over UTP/STP 100ohm cat.5 cable
❑ Auto-polarity correction
❑ Auto-crossover
❑ 10BaseT/FDX (DIP switch selection)

100Base-FX ports (x2)
❑ 1310nm multi-mode, SC (or ST) connectors
❑ Distance: 2000m (6500ft) when used in pairs (Multi-mode)
❑ Covered distance : 15/40/km in SM
❑ Full/half duplex (dip switch selection)
❑ Output power: -19 dBm multi-mode
❑ single-mode: -16/ -11 dBbm respectively
❑ Input sensitivity: multi-mode: -31 dBm
single mode: -30/-33 dBm respectively
❑ Far End Fault signaling and detection
Diagnostics
❑ F/O ports: Link/Activity, FDX
❑ Per each TP port: Link/Activity, FDX, 100Mbps
❑ Power , Test   mode

Controls
F/O ports: HDX/FDX
TP ports 1-2: Auto-Negotiation , forced 10Mb/FDX option
System: Reset, link test

Environmental /Physical	
Power supply:	
LB1301A/LB1302A	100 ÷ 240 VAC, 50 ÷ 60 Hz
● Power consumption:	10W max.
● Operating temperature	0 ÷ 45°C (32-113°F)
● Storage temperature:	-30°÷ 65°C (-22° ÷ 149°F)
● Humidity:	10 ÷ 90% non-condensing
● Safety:	UL (UL 1950)
● Emissions:	FCC part 15 class A, CE
Dimensions and weight	220x150x45mm (8.7"x5.9"x1.6") 0.9kg (2lb) max.

Specifications subject to change without prior notice

Appendix A

"Installing, Configuring and Managing Black Box LB1302A

Table of Contents

Table of figures

1. Preface

This appendix provides you with the necessary information for managing your Black Box® LB1302A MultiLink Media Converter (monitor and control).

In order to start managing your Black Box® LB1302A you need to setup the management module parameters (section 2). In addition you will need to set proper network connection (section 3) and to install the attached MIB file (section 4).

After the management parameters are set, you can manage the Black Box® LB1302A in either of two ways: using **SNMP** (through a standard management station – section 5) and using a **Terminal** (section 6).

2. Setting Up Management Parameters

Terminal connection

Have available a PC equipped with any terminal emulation program (any ASCII terminal).

Use the supplied control cable to connect the converter to the PC: connect the miniDIN end of the cable to the RS232 port on the converter and the other end to an available DB9 (male) connector on the PC.

Configure the terminal emulation program as follows:

- baud rate: 9600

- parity: none

- start bits: 1

- stop bits: 1

- flow control: none

Start the terminal emulation then reset the device.

Startup screen

After a few seconds you will get the start up screen (figure 2-1).

Note: the parameters appearing in the figures are just examples. Set them to the values you need.

At this point, you should immediately press any key in order to get to the management configuration procedure. You will get a notification that will enable you to modify the current settings by typing 'm' (or 'M').

At this stage you will be prompted with a series of questions regarding the management parameters configuration. The configuration procedure screen is shown here in figure 2-2. Default value for each parameter appears in braces. If you do not wish to change a certain parameter, simply hit 'Return'.

The different parameters are explained in detail following figure 2-2.

```
Management card configuration
-----------------------------------------------------------------

NETWORK PARAMETERS:
```

```
-------------------
  IP address on LAN is 192.168.1.99

CONSOLE PARAMETERS:
-------------------
  console channel will use a baud rate of 9600

BOARD PARAMETERS:
-----------------
  Processor     : MPC850, Running at 50Mhz
  Board Info    : Management Board
  Board memory  : FLASH : 4Mbytes
                  SDRAM : 4Mbytes
  Board's Ethernet hardware address : 0:A0:D2:2F:80:82


------------------------------------------------------------------
To change any of this, press any key within 5 seconds
```

Figure 2-1 – management parameters setup screen

When configuration is complete, the startup screen will appear with the new parameters. If you still want to change any other parameters, type 'M' to modify. Otherwise type 'C' to continue. Configuration parameters will now be saved and the system will initialize (figure 2-3).

```
(M)odify any of this or (C)ontinue? [M] m

For each of the following questions, you can press <Return> to select the value shown in
braces, or you can enter a new value.


NETWORK PARAMETERS:
-------------------
Do you want a LAN interface? [Y]
This board's LAN IP address(0.0.0.0 = RARP)? [192.168.1.99]
Use a subnet mask for the LAN interface? [N] y
Subnet mask for LAN (0 for none)? [0.0.0.0]
Should there be a default gateway for packet routing? [N] y
What is its IP address? [0.0.0.0]

CONSOLE PARAMETERS:
-------------------
Baud rate for serial channels [9600]

ETHERNET PARAMETERS:
--------------------
Do you want to change the board's Ethernet address? [N] y

Byte 0 must be 00
 What should byte 1 be? [A0]
 What should byte 2 be? [D2]
 What should byte 3 be? [2F]
 What should byte 4 be? [80]
 What should byte 5 be? [82]

SNMP PARAMETERS:
----------------
Get community [public]
Set community [private]
Trap destination [192.168.1.15]
Trap community [trap]
System name [FibroLAN]
System location [Israel]
System Contact [Shamir]
How long (in seconds) should CPU delay before starting up? [5]
```

Figure 2-2 – management parameters configuration

Network parameters

- *IP address*: specify here the IP address you wish to assign the management module. This parameter must be set correctly (according to your network) in order to remotely control and monitor your device from a management station.

- *Subnet mask*: specify the required subnet mask to use within the network.

- *Default gateway*: specify the default gateway to be used by the management module where applicable.

Console parameters

- *Baud rate:* set the baud rate of communication between the Black Box® LB1302A and the terminal. It is recommended to leave this setting at default (9600baud).

SNMP parameters

- *Get community*: specify the get community string for the device.

- *Set community*: specify the set community string for the device.

- *Trap destination*: specify the IP address of the remote manager that will receive the traps sent by the Black Box® LB1302A

- *Trap community*: specify the trap community string for the device.

- *System name*: specify a name that identifies the device.

- *System location*: specify the physical location of the device. Setting this parameter properly helps to monitor the network and maintain order within it.

- *Contact name*: specify the person (most likely system or network administrator) that is responsible for managing and/or handling the converter.

- *Start up delay*: specify how many seconds the management module should wait between the appearance of the start-up screen and the system initialization. During this time it is possible to change the management parameters configuration.

```
Updating parameter storage. This may take a while...Done

Initialization...
```

Figure 2-3 – configuration complete; initialization

Your Black Box® LB1302A is now ready to be managed. The Ready LED should now be lit steady.

Disconnect the control cable and store it properly (unless you wish to manage the Black Box® LB1302A through a terminal).

3. Network Connection

One of the conditions that have to be met before you're able to manage the Black Box® LB1302A is to connect it to a network (IP).

This connection is achieved through the Fiber-Optic port of the device. Naturally, this port has to be connected to a network, on which the management station resides. Please note that all management traffic is in-band, along with normal traffic.

At this point your Black Box® LB1302A is ready to be managed by any Network Manager running on the network. In order to obtain full management functionality over the Black Box® LB1302A, you should install the MIB file and define the Black Box® LB1302A object in the management application (see next section).

Important: if you wish to manage the device (and/or other devices in the network) by connecting the management station directly to one of the device's RJ-45 ports, you **MUST** disable per port VLAN first (switch # 10 to UP position)!

---

4. Configuring the Management Station

Before you can begin to fully manage the Black Box® LB1302A from a management station using SNMP, you need to load and compile the MIB file(s), included with the management module, onto the management station.

In order to accomplish this you need to perform two steps:

- Copy the MIB file, supplied with the module, to the default directory that contains all other MIB files (varies between management software packages).

- In your management application, add the new MIB to the already existing list of MIBs and recompile them.

After MIB installation you should define a new managed object for the Black Box® LB1302A according to the SNMP parameters you have previously set. The way to define this object varies from one management application to another.

You have now completed all the necessary preparations required fully monitoring and controlling your Black Box® LB1302A from any management station on the network.

5. Managing the Black Box® LB1302A

You can monitor and control your Black Box® LB1302A MultiLink II Converter using SNMP with a management station. This station must have a management application and it should be connected to the device (via the network).

After the device and management station are connected and running you will be able to manage your device through the SNMP management application.

Use the management application to view the device's general information (figure 5-1) or the MIB tree for detailed status (figure 5-2). In order to monitor the device's status you should open the following branch of the tree:

```
enterprises/fibrolan/fibrolanSNMP/fibrolanDualLink/flDualDla22m
```

Through the various parameters given within the Black Box® LB1302A MIB, you can view the complete device status and the ports' status and you can configure most of these parameters.

The Black Box® LB1302A is a fully featured dual link access device that provides advanced capabilities such as VLAN tag insertion and stripping and an advanced set of priority schemes. These features are explained in details later on in the '*Managing with a terminal*' section. All settings are also accessible through SNMP and their meaning is the same (so the complete detailed explanation about each parameter is found only in the terminal section).

Keep in mind that the Black Box® LB1302A can be connected and operated in backup mode, providing fiberoptic link redundancy. Some features of the Black Box® LB1302A are not configurable when the device is in this mode. In such case, you may disable the backup mode, change the configuration and re-activate backup mode operation.

Warning

Disabling backup mode, while physical fiber-optic connection is intended for backup operation, may cause network loops and link failure. Make sure loops are avoided when taking such action.

Note: some configuration changes (mainly port connection and disconnection) require a few seconds to take effect.

6. Managing with a Terminal

The first option for managing your Black Box® LB1302A MultiLink Media Converter device is by using a terminal emulation program. In order to do this you will need a PC (or a terminal) with a terminal emulation program.
Connect the serial cable supplied with the Black Box® LB1302A between the device (miniDIN side) and a serial port on the PC with the terminal emulation (on the DB9 side). Start the emulation program and reset the device (recommended).
 After system initialization you will get to the device's main menu.

The main menu
This menu contains a header with the software version, the model of the device (LB1302A) and the vendor Black Box.
Following is a two-option menu. See figure 6-1.
Selecting option 1 will invoke the device's status menu, while option 2 will bring up the device control menu.

```
************************************************************
*                                                          *
* Software version: v1.0                                   *
* Version date:     16/10/02                               *
*                                                          *
* Vendor: Black Box                                        *
* Model:  LB1302A                                          *
*                                                          *
************************************************************

 1. Device status
 2. Device control
 Select (1-2):
```
figure 6-1 - main menu

The device status menu
This menu contains two options: 1 for basic status and 2 for advanced status. Figure 6-2 shows the menu. Figures 6-3 and 6-4 show the basic and advanced status respectively.

```
 Device status:
 ==============
 1. Basic status
 2. Advanced status
 0. Main menu
 Select (0-2):
```
figure 6-2 - device status menu

```
Basic ports' status:
 # Type  Link  Duplex  AutoNego  Rate  FO-Status  Connected
 ===========================================================
 1  FO   On    FDX      ----     100M   Active      Yes
 2  TP   Off   n/a     Enabled   n/a    ----        Yes
 3  TP   Off   n/a     Enabled   n/a    ----        Yes
 4  FO   Off   FDX      ----     100M   Down        Yes
 ===========================================================
 Basic device status:
 --------------------
 VLAN:  enabled
 Temperature: 36C
```

figure 6-3 - basic status

Basic status

This status includes the basic ports' status and the basic device status.

Basic port's status gives the following data about each port:

- Port number
- Interface type (TP/FO)
- Link status (On/Off)
- Duplex mode (FDX/HDX)
- Auto-Negotiation mode (enabled/disabled)
- Data rate (10/100M)
- FO link state (Down/Active/Standby) – mainly for backup mode
- Connection mode (connected/disconnected)

The **basic device status** includes:

- VLAN mode (enabled/disabled)
- Device's temperature (in centigrade)

```
Advanced ports' status:
 # Type  Tag: Insert Strip VID  | Priority: Port 802.1p TOS User
 ==============================|==============================
 1 FO         No     No      0 |              No    No    No    0
 2 TP         No     No      0 |              No    No    No    0
 3 TP         No     No      0 |              No    No    No    0
 4 FO         No     No      0 |              No    No    No    0
   Mgmt       No     Yes     0 |              No    No    No    0
 ==============================|==============================

 Advanced device status:
 ----------------------
 Test:               Off
 Backup:             Off
 Priority ratio:     Always high
 Broadcast:          Allow 25% broadcasts
 DSCP (63 <- 0):    0x00-00-00-00-00-00-00-00
 User priority: code: 0  1  2  3  4  5  6  7
                prio: LO LO LO LO HI HI HI HI
```

figure 6-4 - advanced status

Advanced status

A **port's advanced status** includes, in addition to its number and type:
- Tag insertion mode (Yes/No)
- Tag stripping mode (Yes/No)
- Port's VID (0-4095)
- Port based priority (Yes/No)
- 802.1p based priority (Yes/No)
- TOS based priority (Yes/No)
- Port's user priority (0-7)

When tag insertion is enabled on a port it means that any untagged frames coming out that port will be tagged. The inserted tag will include the ingress port's VID and user priority. For example, if port 1's VID is set to 100 and its priority is set to 4 and the FO port's tag insertion is on, then any untagged frame coming on port 1 and going out the FO port will carry a tag with VID 100 and priority 4.

When tag stripping is enabled, any tagged frame coming on the port, will lose its tag upon transmission. Default values are all 0s or No.

The Black Box® LB1302A supports 2 levels of traffic priority: high and low. The different priority settings enable or disable 3 different types of priority schemes: port based, 802.1p based and Type Of Service (TOS) based, dealing with DSCP (Diff Serve Code Points) field values.

When more than one scheme is enabled, priority conflicts are resolved by the following order: 802.1p based priority overrides port based priority and TOS based priority overrides 802.1p based priority. Default values are all No.

Please note that the advanced port settings apply to management traffic as well. Management can be thought of as a virtual, internal port.

The **device's advanced status** consists of:
- Test mode (FEF disable/enable)
- Backup mode (On/Off)
- Priority ratio (always hi/10:1/5:1/2:1)
- Broadcast protection (allow 25/12/6/3%)
- DSCP codes (64 bits)
- User priority classification (7 priority codes, set as high or low priority)

The test mode is used mainly for maintenance purposes and its meaning is that the FEF function is disabled (when Test is On). Default value is Test Off.

The Backup mode might become a very powerful feature when optical link redundancy is required. Once both optical links are connected in the backup mode, the main link (FO port 1) will be active while the backup link (FO port 4) will remain inactive, standing by. When the main link fails, the backup link will almost instantaneously become active. The main link's status will be down in such case. When main link is back up, it will become the active FO link, while the backup link will return to standby status.

The priority ration setting controls the priority traffic flow ratio. If for example, set to always hi, all high priority frames will be forwarded before low priority ones. At 10:1, after every 10 high priority frames, a single low priority frame will be forwarded and so on. Default value is always hi.

The broadcast protection indicates the relative amount of broadcast traffic that will be forwarded by the Black Box® LB1302A, starting at 25% maximum and down to 3% minimum. Default value is 25%.

The DSCP codes are represented as a series of 8 bytes, corresponding to 64 bits. These bits correspond, in turn, to 64 different DSCP codes. If you wish, for instance, to set code 45 as high priority, then bit 45 in this series needs to be set to '1' (this is done though the control menus, described later). Default values are all 0s (meaning all codes are low priority).

The user priority codes are used in conjunction with the 802.1p based priority scheme. For example, if a tagged frame arrives with a priority code of 6, the Black Box® LB1302A will look priority code 6 to see if it is set as high or low priority and handle the frame accordingly. Default values are low priority for codes 0-3 and high priority for codes 4-7.

The device control menu

The device control menu, shown in figure 6-5, enables the user to change the different settings and configuration of the Black Box® LB1302A

```
Device control:
===============
1. FO port 1 control
2. TP port 2 control
3. TP port 3 control
4. FO port 4 control
5. Device reset
6. Basic device control
7. Advanced device control
8. Management control
0. return to main menu
Select (0-8):
```

figure 6-5 – device control menu

Options 1 through 4 will invoke the corresponding port's control menu. Option 5 will result in a device reset (which will return the relevant configuration settings to the switches position). Options 6 and 7 will bring up the device control menu, respectively and the eighth option will get you to the management virtual port's settings.
All control functions are located in the same tables of the device's MIB sub-tree as their corresponding status. The only exception is the management control functions, which reside in the same table as the advanced device status.

Port control menus

The port control menu, as shown in figure 6-6, provides the user with two options: 1 for basic control and 2 for advanced control. The figures below show the menus for TP port 1. The menus are identical for TP ports 2 and 3 and almost the same as in FO port 4, the only difference being the exclusion of the data rate and auto-negotiation mode changes (not available for this port).

```
TP port 2 control:
==================
1. Basic control
2. Advanced Control
0. Back to control menu.
Select (0-2):
```

figure 6-6 – port control menu

Basic port control

The basic port control menu, shown in figure 6-7, is composed of the following options (TP ports only):

- Auto-Negotiation mode change
- Data rate change
- Duplex mode change
- Port disconnection
- Port connection
- Device reset

```
TP port 2 basic control:
========================
1. Change Auto-Negotiation
2. Change 10M/100M
3. Change duplex mode
4. Disconnect port
5. Connect port
6. Reset device
0. Back to port control menu
Select (0-6):
```

figure 6-7 – basic port control menu

Selecting any of these options will result in the appropriate action. The configuration changes require about a second to take effect. When you change the port's setup, it will be restored the next time the device is powered on.
Please note that the port can only be disconnected when the VLAN mode is 'enabled'.
Note that for the FO ports the only two options will be the duplex mode change and the device reset.

Advanced port control

The advanced port control menu, shown in figure 6-8, is composed of the following options:

- Set tag insertion mode (enable/disable)
- Set tag stripping mode (enable/disable)
- Set the port's VLAN ID (0-4095)
- Set port based priority mode (enable/disable)
- Set 802.1p based priority mode (enable/disable)
- Set TOS based priority mode (enable/disable)
- Set the port's user priority (0-7)

```
FO port 1 advanced control:
 ============================
 1. Enable/Disable tag insertion
 2. Enable/Disable tag stripping
 3. Set VLAN ID
 4. Enable/Disable port priority
 5. Enable/Disable 802.1p priority
 6. Enable/Disable TOS priority
 7. Set user priority
 0. Back to port control menu
 Select (0-7):
```

figure 6-8 – advanced port control menu

If you wish to change the port's VID or its user priority, you will be prompted for the desired values. Illegal values will not be accepted and will be rewarded with an 'Invalid value!' error message.
Setting any of the other options will cause the device to prompt the user for enabling (1) or disabling (0) the feature.
Please note that the VLAN related features (namely, tagging options) would take effect when the VLAN mode is 'enabled'.
Detailed information regarding these options can be found in the advanced status section.

Basic device control

The basic device control menu, illustrated in figure 6-9, enables you either to reset the device (1), change its VLAN mode (2) or to change its Backup mode (3).

```
 Basic device control:
 =====================
 1. Reset device
 2. Change VLAN mode
 3. Change Backup mode
 0. Back to control menu
 Select (0-3):
```

figure 6-9 – basic device control menu

Advanced device control

You will find the advanced device control menu (figure 6-10) providing you with the following options:
- Test mode changing (On/Off)
- Binding or splitting TP ports 2 and 3
- Set the high/low traffic priority ratio
- Set the broadcast protection mode
- Set the DSCP codes
- Set the 802.1p priority classification
- Restore the device default settings

```
Device advanced control:
 ========================
 1. Change Test mode
 2. Bind/Split ports 2 & 3
 3. Set hi/low priority ratio
 4. Set broadcast protection
 5. Set DSCP codes
 6. Set priority classification
 7. Restore device defaults
 0. Back to control menu
 Select (0-7):
```

figure 6-10 – advanced device control menu

Changing the device's Test mode will enable or disable its FEF function (Test off/Test on, respectively). Please note that during normal operation this should be set to Test off (FEF enabled).

When you choose to bind/split ports (option 2), you will be prompted whether you wish to bind or split the TP ports. Binding the ports means they will reside in the same port based VLAN, resulting in the ability to directly communicate with each other (assuming no other factors, such as different tagging setup, interfere). Splitting the ports will undo this operation. This option can only take effect when the VLAN mode is 'enabled'.

Selecting option 3 will prompt the user with the priority ratio mode selection menu (figure 6-11).

```
 Hi/Low priority ratio:
 1. Always Hi first
 2. Transmit at 10:1 ratio
 3. Transmit at 5:1 ratio
 4. Transmit at 2:1 ratio
 0. Skip without changing
 Select (0-4):
```

figure 6-11 – priority ratio mode select

Choosing to set the broadcast protection mode will prompt the user for the desired setting (figure 6-12).

```
 Broadcast protection:
 1. Allow 25% broadcast frames
 2. Allow 12% broadcast frames
 3. Allow 6% broadcast frames
 4. Allow 3% broadcast frames
 0. Skip without changing
 Select (0-4):
```

figure 6-12 – broadcast protection mode select

If you wish to change the DSCP codes or the 802.1p priority classification you will be prompted for the DSCP code or priority code and the corresponding value, as shown in figures 6-13 and 6-14, respectively.

```
DSCP configuration:
 Select DSCP code (0-63) or 64 to skip: 28

 Select hi(1) or low(0) priority for DSCP 28: 1
```
figure 6-13 – DSCP configuration change

```
 802.1p user priority classification:
 Select priority code (0-7) or 8 to skip: 3

 Select hi(1) or low(0) priority for priority 3: 1
```
figure 6-14 – 802.1p priority classification change

Choosing the last option (7) of the advanced device control menu will cause the device to return to its default settings and restart. This may require a few seconds to complete. The default values are given in the status section. It is recommended to reset the device after this operation.

Management control menu

The management control menu (figure 6-15) provides the same options as other advanced port priority menus. These settings apply to in-bound and out-bound management traffic going through the 'virtual management port'. Regard them as if they apply the same way as they do with any other port.

```
 Management control:
 ===================
 1. Enable/Disable tag insertion
 2. Enable/Disable tag stripping
 3. Set VLAN ID
 4. Enable/Disable priority
 5. Enable/Disable 802.1p priority
 6. Enable/Disable TOS priority
 7. Set user priority
 0. Back to port control menu
 Select (0-7):
```
figure 6-15 – management control menu

Note that changing some settings (such as the VLAN ID) may cause management traffic to be stopped, thus disconnecting the management station from the device. Please note that the VLAN related features (namely, tagging options) would take effect when the VLAN mode is 'enabled'.

7. Managing with SNMP

When you wish to manage your Black Box® LB1302A with SNMP using a management station, you should have the relevant MIB file (*bblb1302a.mib*) installed and compiled on any standard management application.
Once you have the appropriate network connection for managing the device you can start getting the device parameters' status and changing its settings.
Note that the meaning of each parameter is the same as its corresponding one in the menus. You can therefore find the detailed explanations regarding these parameters in the previous (terminal) section.
Note that viewing a parameter and setting its value is done in the same place in the table (the method for setting might differ from one management application to another).

System info

Figure 7-1 shows the basic, MIB standard, system info table. It is accessible through the standard's MIB system info table.

figure 7-1 – system info

Basic device configuration

Basic device configuration table is located under
`flDla22mDevice/flDla22mDeviceBasic` –
`tree`. The table is shown in figure 7-2.

figure 7-2 – basic device configuration

please note that the Test mode setting appears in this table, unlike the menus system in which it appears under advanced device status/control.
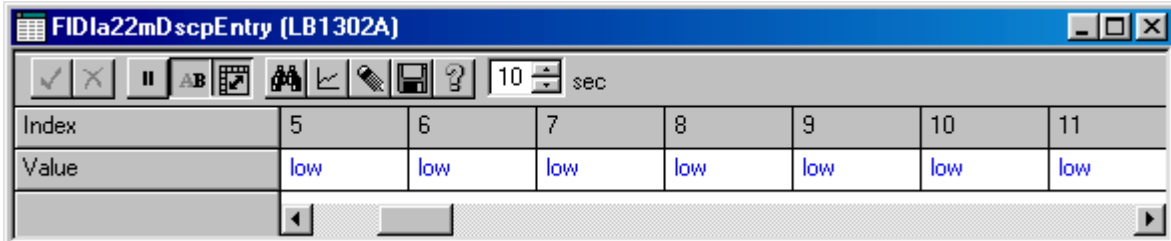
Advanced device configuration

Advanced device configuration table is located under
`flDla22mDevice/flDla22m`
`sub-tree`. The table is shown in figure 7-3.

figure 7-3 – advanced device configuration

please note that the management configuration (i.e. tagging and priority options) is found in this table as well.
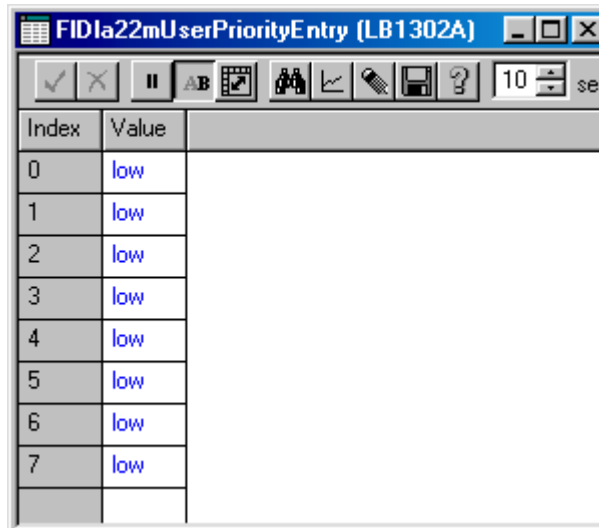
In addition to the above table, there are two more tables under this MIB branch: the DSCP settings table (figure 7-4) and the user priority settings table (figure 7-5).

figure 7-4 – DSCP configuration

each entry in the DSCP table corresponds to a DSCP code (0-63) and its value is either high or low priority.

figure 7-5 – user priority configuration

each entry in the user priority table corresponds to 802.1p priority classification code (0-7) and its value is either high or low priority.

Basic port configuration

Basic port configuration table is located under
`flDla22mPorts/flDla22m`   `-tree.`
The table is shown in figure 7-6.

figure 7-6 – basic port configuration

Advanced port configuration

Advanced port configuration table is located under
`flDla22mPorts/flDla22m`   –
`tree.` The table is shown in figure 7-7.

figure 7-7 – advanced port configuration

SNMP traps

The management application also allows you to receive traps sent by the device (figure 7-8). Traps are sent by the Black Box® LB1302A after every configuration change. In addition traps will be sent to alert of the following events:

- System up (cold start)
- Temperature (when exceeds 65^0C for more than 1 minute)
- TP link down
- FO link down
- TP link up (after at least 10 secs down)
- FO link up (after at least 10 secs down)
- Device reset (management initiated)

* traps for configuration changes will specify the initiator of the change (either local user or remote manager) where applicable.
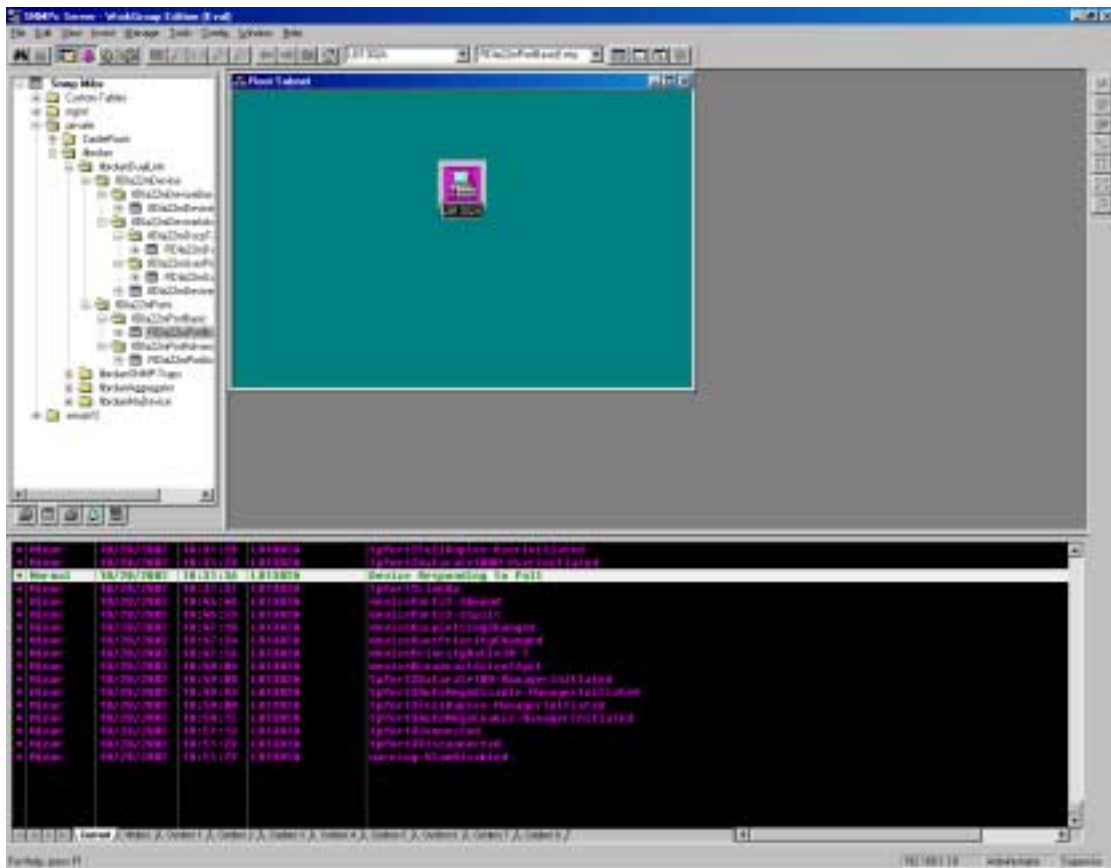

Figure 7-8 – traps (listed in bottom of screen)

8. Troubleshooting

Symptom	Probable Cause	Remedy
Ready LED doesn't turn on	Device is not powered up	Check the power cable connection inside the box.
Configuration menu isn't readable or doesn't appear at all	Problem with serial cable or terminal	Check the serial cable and the settings of the terminal.
No SNMP response from the manager	Wrong IP address settings	Check the IP address on the configuration menu. Try to use the "ping" command. If there is no ping answer try to check the Ethernet cable (you can check the LNK LED).
No traps	Trap destination IP address not configured properly	Check for the manager's IP address in the trap destination on the configuration menu.
Device doesn't appear in the MIB browser	MIB file not installed properly	Make sure you have copied the MIB file to the proper location in the manager station; make sure the MIBs are compiled with the new file.

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NETWORK SERVICES

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1000 Park Drive   Lawrence, PA 15055-1018   ·   724-746-5500   Fax 724-746-0746