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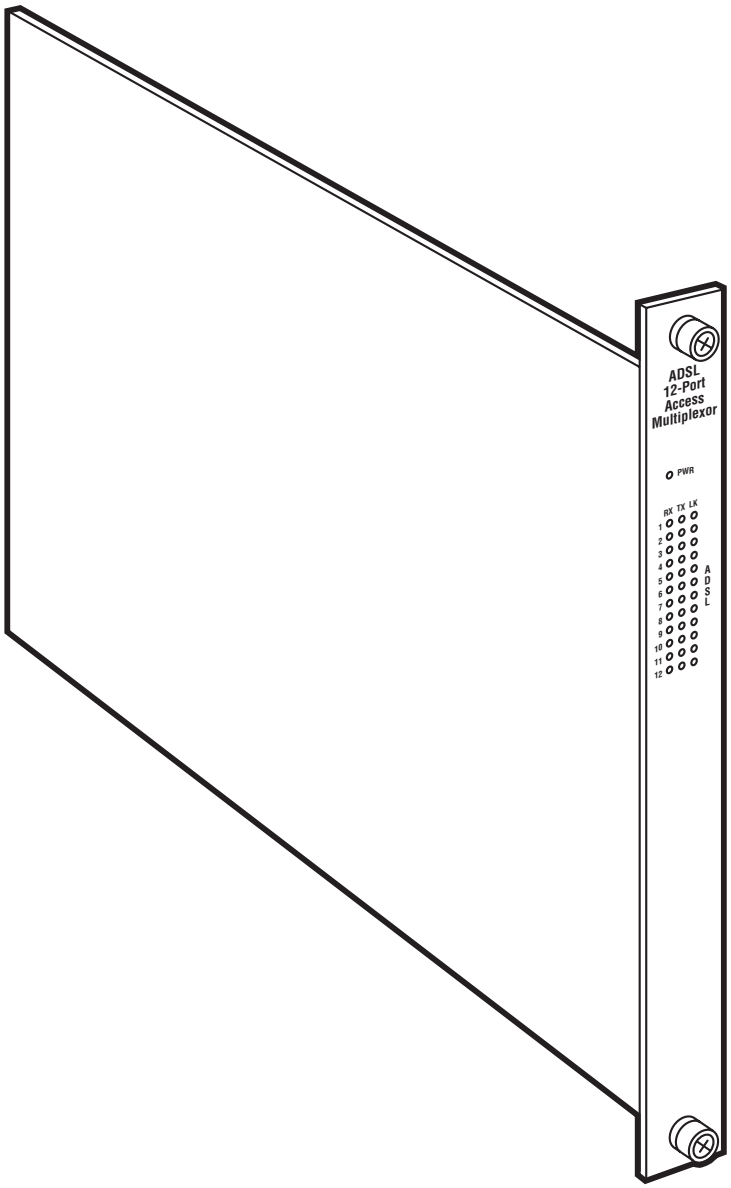
BLACK BOX®
NETWORK SERVICES

JANUARY 2001
LRA1204C

ADSL/G. Lite 12-Port Access Multiplexor Module



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
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FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
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 J 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 Industry Canada.

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 Industrie Canada.

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

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.

Contents

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

1. Specifications

Bandwidth—Asymmetric 8 Mbps downstream/1.5 Mbps upstream with selectable speed settings (full-rate modes: G.dmt, T1.413, and Alcatel); 1.5 Mbps downstream/512 kbps upstream with selectable speed settings (G. Lite)

Distance—Up to 18,000 ft. (5.5 km)

Interface—(12) ADSL ports ([1] RJ-21 50-pin Telco, DMT encoding); (2) IP DSLAM backplane

Standards—IPacket™ and AutoIP™ compliant

Compliance—NEBS: GR-63-CORE; EMC: FCC Part 15; CSA/C108.8; EN55022; EN55024 CE marking; Safety: UL® 1950, CSA C22.2 No. 950; EN60950 CE marking

Temperature Tolerance—Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +158°F (-40 to +70°C)

Humidity—5 to 95% noncondensing

Altitude— -200 to +16,500 ft. (-61 to +5,029.2 m)

Power— -48 VDC 1.3A (supplied by host chassis)

Size—12.75"H x 1.15"W x 16.75"D (32.4 x 2.9 x 42.5 cm)

Weight—5.6 lb. (2.5 kg)

2. Introduction

2.1 Overview

The ADSL/G. Lite 12-Port Access Multiplexor Module provides high-speed asymmetrical bandwidth for the IP DSLAM. The standards-based multiplexor module interoperates with any standard ADSL or G. Lite modem over the local loop while still preserving the benefits of a packet-based architecture. Simultaneous voice and data support allows providers to take advantage of line-sharing agreements, reducing the overall cost of deploying residential DSL services.

ADSL is an ideal voice and data solution for residential use. It supports data and Plain Old Telephone Service (POTS) over a single copper pair. By maintaining lifeline POTS, the voice connection is never terminated if the power fails. ADSL supports data rates up to 8 Mbps downstream and up to 1.5 kbps upstream, which is an ideal bandwidth for home Internet use.

2.2 Features

- Uses IPacket™ architecture.
- AutoIP™ for plug-and-play configuration and operation.
- Twelve fixed ADSL ports supporting industry-standard asymmetrical rates for both full-rate and G. Lite ADSL.
- Distances up to 18,000 ft. (5.5 km) over a single copper pair.
- Hot-swappable module.
- Embedded Web-based management system for easy platform-independent remote management.
- Supports both ITU G.992.1 and G.992.2 splitterless ADSL standards, including integrated voice.
- Interoperable with standard subscriber ADSL and G. Lite modems.

2.2.1 IPacket™ Technology

Using Ethernet on the service network results in an easy-to-deploy network that is optimized for IP services. By eliminating ATM and Frame Relay from this portion of the network, administration and configuration costs are greatly reduced. More bandwidth can be used for data transport, regaining up to 20% of bandwidth that was previously lost to transport overhead.

2.2.2 AutoIP™ Architecture

The AutoIP Architecture gives you the easiest-to-deploy DSL solution on the market, delivering IDSL, SDSL, Full Rate and G.Lite ADSL, VoDSL, and T1/E1 rapidly and with lower provisioning costs. Services include AutoSync line provisioning, AutoConfig configuration management, AutoRestore backup/recovery services, and AutoFilter traffic management. Together, these services deliver IP broadband services simply and easily.

3. Installation

1. Make sure that you're using proper grounding techniques when installing modules into the IP DSLAM.
2. Align the module with the slot module guides and slide the module gently, but firmly, all the way into the chassis.
3. Tighten the screws on the front of the Module.

NOTE

All modules for IP DSLAMs are hot-swappable. Installing or removing a module while the chassis is powered on does not affect operational status of other modules within the chassis.

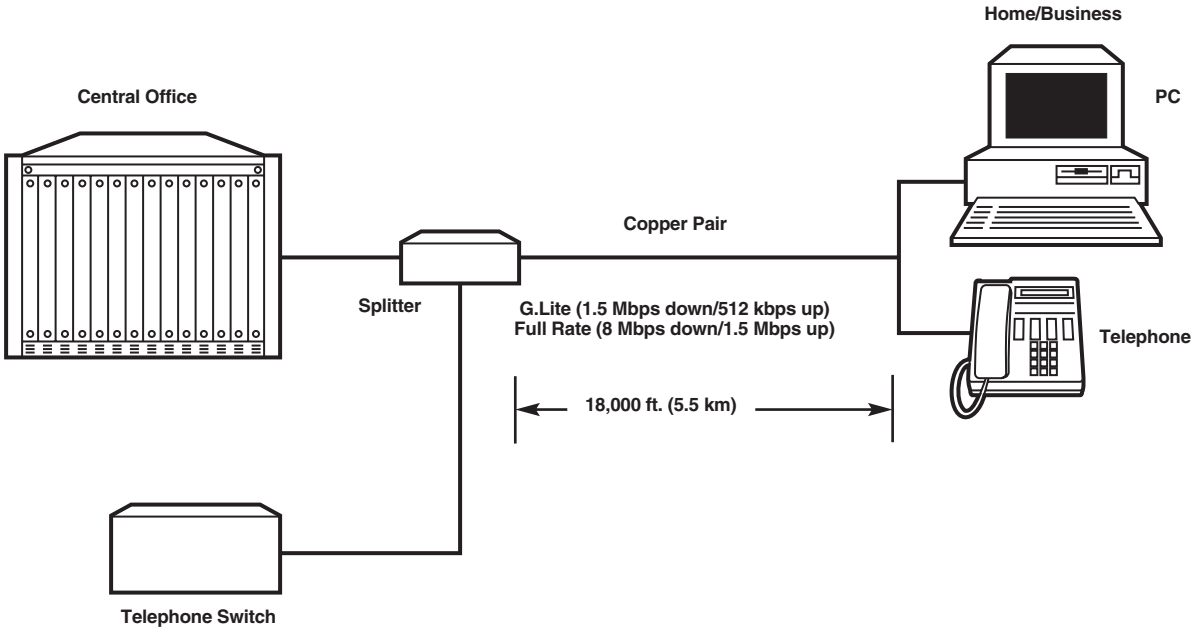

Figure 1. Typical installation.

4. Operation

4.1 Operational Modes

Each ADSL port may run in one of four operational modes: G.DMT, T1.413, Alcatel, or G.Lite.

G.DMT, T1.413, and Alcatel operational modes are full-rate ADSL options, allowing for up to 1.5 Mbps upstream bandwidth and 8 Mbps downstream bandwidth. Full-rate modes require an in-line splitter to be installed both at the customer premise as well as at the central office, or wherever the DSLAM may be located.

G.Lite allows for up to 512 kbps upstream bandwidth and 1.5 Mbps downstream bandwidth and requires splitters at the central office and microfilters for the customer premise.

The Multiplexor Module default setting is the multimode setting, which means the module will automatically detect the mode that the ADSL modem is running.

4.2 Bandwidth Selection

Each port may be set to run in adaptive mode, which allows the ADSL line to train up to the best possible speed supported by the DSLAM, modem, and the copper pair over which the ADSL line is running. You can set each port to run at specific upstream and downstream bandwidths. These settings are shown in Table 1.

Table 1. Full-rate and G.Lite upstream and downstream settings

Full-Rate Upstream	Full-Rate Downstream	G.Lite Upstream	G.Lite Downstream
64 kbps	128 kbps	64 kbps	128 kbps
128 kbps	256 kbps	128 kbps	256 kbps
192 kbps	384 kbps	192 kbps	384 kbps
256 kbps	512 kbps	256 kbps	512 kbps
320 kbps	768 kbps	320 kbps	768 kbps
384 kbps	1024 kbps	384 kbps	1024 kbps
448 kbps	1280 kbps	448 kbps	1280 kbps
512 kbps	1536 kbps	512 kbps	1536 kbps
768 kbps	1792 kbps		
1024 kbps	2048 kbps		
1280 kbps	2304 kbps		
1536 kbps	2560 kbps		
	3584 kbps		
	4608 kbps		
	5632 kbps		
	7680 kbps		

NOTE

The default speed setting for the Multiplexor Module is set for adaptive rate, meaning that the ADSL line will adjust to the best possible speed.

4.3 Distance Support

In full-rate modes, the Module will support distances up to 12,000 ft. (26 AWG). The G.Lite mode supports up to 18,000 ft. (26 AWG). The actual speed and distance settings will be determined by the quality of copper pair and the ADSL modem you're using on the other end of the circuit.

4.4 Setting Up the Permanent Virtual Circuit (PVC)

The Multiplexor Module supports one PVC per port (only a single PVC is required). Each port automatically defaults to a VPI/VCI value of 0/35. Each port will also automatically "snoop" the line to automatically detect on which VPI/VCI the ADSL modem on the other end of the line is transmitting. Because the Multiplexor Module terminates each PVC on the module itself, all ports may use the same VPI/VCI values. The VPI/VCI values are set by using the web-based management system on the DSL Access Multiplexor Uplink Module (part #LRA1203C).

Encapsulation Options

The Multiplexor Module supports both RFC1483 LLC encapsulation and RFC1483 VCM encapsulation methods. Each port defaults to LLC encapsulation. The encapsulation methods are set by using the Web-based management system on the DSL Access Multiplexor Uplink Module (LRA1203C).

Table 2. Port pinouts

Port	Pin	
1	26	Tip
	1	Ring
2	27	Tip
	2	Ring
3	28	Tip
	3	Ring
4	29	Tip
	4	Ring
5	30	Tip
	5	Ring
6	31	Tip
	6	Ring
7	32	Tip
	7	Ring
8	33	Tip
	8	Ring
9	34	Tip
	9	Ring
10	35	Tip
	10	Ring
11	36	Tip
	11	Ring
12	37	Tip
	12	Ring

4.5 LED Indicators

Each ADSL module features the following status LEDs for at-a-glance monitoring.

PER MODULE

- PWR: Steady green indicates normal operation for the entire module.

PER PORT

- LNK: Pulsing green (once per second) indicates that ADSL connection is operational and the unit is receiving data packets from or transmitting data packets to the remote unit on the other side of the ADSL connection. Steady green indicates that the ADSL link exists, but there is no traffic flow.
- RX: Flashing amber indicates data receive from the ADSL line.
- TX: Flashing amber indicates data transmit to the ADSL line.