PATAPSCO Communications

LIBERATOR 'S'

ISDN converter, switch, concentrator and simulator

Supports 1, 2 or 3 PRI/E1/T1 interfaces and 4, 8 or 16 'S/T' BRIs (see Liberator DUO for 'U' versions).

Features

- PRI/BRI ISDN switch or concentrator
- Converts between PRI and BRI
- Connects to ISDN networks and/or local ISDN devices
- ISDN Simulator
- Least Cost Routing
- Dynamic re-directing of calls if destinations unavailable
- Full cross-connection between all 'B' channels
- Local connectivity between any ports
- Build multiple BRI networks ports into a local PRI
- Supports E1/T1 PRI and leased lines
- NT and TE 'S' interfaces supported (see TD-012 for 'U' models)
- Tones generated from network and/or by Liberator
- Different models available to support different I/O combinations
- Field-upgradeable versions to remotely enable additional ports
- Remotely manageable and software upgradeable
- Many applications and uses

1. Overview

The Liberator models detailed within this document support up to 3 E1/T1/PRI interfaces and either 0, 4, 8, or 16 BRI 'S' interfaces (see TD-012 for 'U' BRI versions).

As standard Liberator 'S' can be user-configured with either all E1 or all T1 PRI interfaces. Purchasing the optional E1 T1 conversion pack means both E1 and T1 can be supported on the same unit.

The BRI ports can be ordered as NT (simulates a network and connects to CPE) or TE (simulates CPE and connects to a network) in blocks of 4, 8 or 16. NT and TE BRIs can be populated within the same unit. Options also are available for Te and NT PRI presentations. See the Price List at www.isdnconnect.com or on request.

The unit will connect any port to any port and any 'B' channel to any 'B' channel giving full cross-connectivity between all local ports and network channels.

Through the intuitive GUI (supplied), different options can be set to tailor the use, connectivity, least cost routing and other advanced features.

The platform supports many applications, some of which are covered in Application Notes available on the web site www.isdnconnect.com or directly from Patapsco.

If your requirement is not specifically identified here, or in the Application Notes, please contact Technical Support or Sales at Patapsco. The flexibility and modularity of the Liberator means it can often be put to many varied uses.

2. Operation

2.1 ISDN Services

Signalling is carried/converted between ports and ISDN types.

Supplementary services from the network are passed transparently to local devices.

Sub-addressing is supported.

Bearer capability (data or voice).

CLIs can be locally generated.

SPIDs (US - based BRIs) are supported.

2.2 Configuration/Management

Liberator is configured and managed by Patapsco's DbManager Version 8.0 or above. See separate Tech Sheets.

DbManager is an intuitive GUI which supports multiple real-time workstations and is the common platform for all Patapsco products.

Versions are available which can be configured for the smallest installation, or up to many thousands of devices.

Configuration/management sessions can be established remotely via an ISDN call or locally through one of the Control Ports (Asynchronous RJ or Ethernet).

SNMP Traps & Alarms are supports as is a call analysis tool.

3. Ports, inter-connectivity and routing

3.1 Ports, Channels and Groups

Liberator employs a simple system where BRI and PRI ports or individual 'B' channels can be allocated to one or more customer-named Groups.

These Groups form the basis of all configuration, making it fast, simple and intuitive. As an example you can refer to a Group of 4 BRI ports as 'Video 1' and subsequently use this term on all routing parameters.

'Hunt Groups' or 'rotaries' are as easy to establish.

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3.2 Call Routing

Calls can be routed on the number dialled, the sub-address, CLI, originating port or time-of-day or a combination of the above.

Images taken from DbManager

3.3 Cross-Connection

Any 'B' channel can be connected to any other within Liberator, so local devices can inter-connect through Libertor with making a call to the exchange.

Any port can be barred from calling any other port or number.

Any call can be routed to a Group of ports or 'hunt-group'. Multiple devices can be configured to accept calls dialling to a range of numbers.

In-coming calls can be automatically re-routed to alternate pre-programmed numbers if the main number is unavailable.

3.4 Redirection on 'busy' or 'unavailable'

In-coming calls can be automatically re-routed to alternate pre-programmed numbers or Groups if the main number is unavailable.

If an out-going call to the ISDN network cannot be established (user or network busy, for example), Liberator can automatically redial via other network ports without the end user having to take any action. This can be particularly useful in Least Cost Routing when the primary route is busy and Liberator redirects the call via another route so the end user is unaware of this re-routing.

3.5 Nailed Calls

Timeslots or 'B' channel capacity can be established on behalf of devices which are unable to handle dialling protocols. For example, Liberator can provide capacity for non-switched Factional E1 and T1 circuits.

These 'Nailed' calls can be configured as temporary or permanent, giving the ability to profile capacity to match needs.

3.6 Channel Reservation and Scheduling

Time-of day

A Group can reserve a number of Channels based on the time-of-day.

The period that these Channels will be held, without use, is configurable.

Maximum & Minimum

A Group can be configured to have a number of destination Channels, permanently available reserved for the Group's use.

A maximum capacity can also be set.

The Maximum and Minimum access rates can be varied based on day and time. Up to eight different profile schedules can be configured per Group.

If any schedules overlap, a warning is given.

This facility gives flexibility when allocating network access to different devices, allowing each to have a reserved minimum capacity available for immediate use. Setting the maximum capacity means the ISDN devices can share and contend for the remaining 'B' channels yet any device cannot take an unfair proportion.

3.7 Least-Cost-Routing

A number of options are available to assist with selecting the best route.

Calls beginning or ending with particular numbers can be routed to a specific Group or 'B' channel. Additional Ports can be configured as secondary/tertiary destinations should the preferred Port(s) be busy or unavailable.

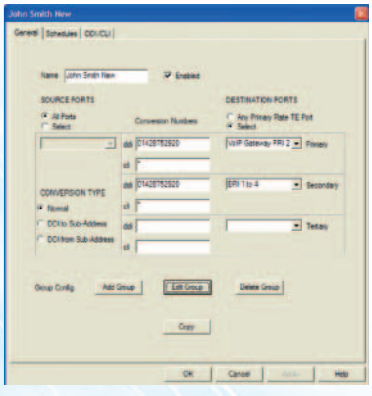
See also the section above on 'Redirection' when a route or destination is unavailable.

Liberator has the ability to convert or translate any in-coming or out-going number into any other number. See below 'Number Translation'.

3.8 Number Translation or Conversion

Any in-coming dialled number can be converted by Liberator and presented on any ISDN interface.

For example an in-coming call to 12345 is converted to 98765 because the original extension at 12345 has moved onto a VoIP gateway on a different ISDN PRI and now has a different DDI number.



Any out-going number dialled by a local device can be converted into any other number or have leading digits added for LCR.

3.9 Tone Generation

Liberator normally passes the tones transparently between ISDN points but this is not always possible in all instances, such as some least-cost-routing applications, if there is no network at all, or in certain other circumstances. In these instances, Liberator can be configured to generate dial, ring, busy, N/U tones itself.

3.10 CLI Generation

Liberator is able to generate a CLI field. The number of the CLI can be programmed for individual ports or calling numbers.

3.11 Power Feed (Phantom Power)

Some ISDN devices do not have a power supply and are powered through the BRI interface. Liberator supports Power Feed for BRI NT interfaces with an option that is specified at the time of ordering.

4. General

4.1 Clocking

Software-selectable clock source using any E1/T1/PRI/BRI interface which provides clock, or Internal Clock.

Auto-switchover to secondary/tertiary clocks on clock loss.

Up to 19 different hierarchical clock sources can be configured.

Internal clock accurate to +/- 25ppm.

4.2 Real-Time Clock

Internal battery-backed real-time clock for Event Log time-stamps.

4.3 Events

Up to 5000 Events are held within the Liberator in NV RAM on a FIFO basis

Events include all call information such as port dialling, number dialled, sub-address, time of call and time of call clear-down, time of incoming call and to which port and if there is a CLI attached, time of clear-down and which 'end' cleared.

Events can be reported automatically to the DbManager or other tools via an ISDN call or through the local Console port or across the LAN. This can be on a timed schedule or when the Event Log reaches 90%.

Once Events are successfully reported to the DbManager the log is cleared.

DbManager can also access the logs and down-load them when required.

4.4 Routing and Prioritisation Summary Windows

A choice of easy-to understand summary windows display the routing configurations. These include a complete display of all routing profiles, their order of priority, names, numbers, ports etc.

These windows are particularly useful in more complicated configurations with multiple network ISDNs, multiple local ports/devices and perhaps re-direction facilities.

4.5 Configuration

Held in non-volatile RAM (retained during power-off) and downloadable to/from the Dbmanager.

4.6 Software

New versions of software can be remotely uploaded to Liberator via the DbManager. This is loaded to an off-line sector of FLASH and a confirmation check-sum given. The operator can switch software banks at any time and revert to the original software at any time. If the Liberator is unable to run from the new software, it will revert to the original.

5. Specification

5.1 Interfaces

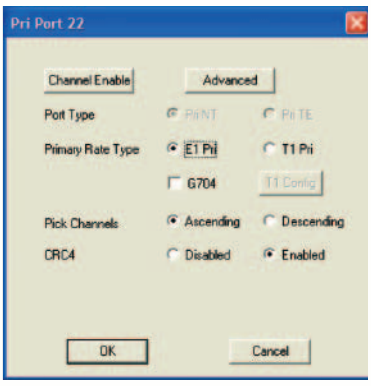
- **5.1.1 PRI/E1/T1 - 1, 2 or 3 PRI ports.**

  Marked as 'PRI21' 'PRI22' and 'PRI23'

  PRI1 supports TE ISDN stack (user-side); PRI2 NT (network-side) and PRI3 is software switchable TE/NT

  See Section 6 below for Models available

  Interfaces PRI1 and PRI2 are protected against power failure



E1

RJ45 120Ohm balanced (E1)

G.704 HDB3 encoded

Software selectable CRC4 or non-CRC4 framing (Multiframe or Doubleframe)

Support of non-switched E1 and Fractional E1 services

ISDN PRI ETSI Q.931/921

T1

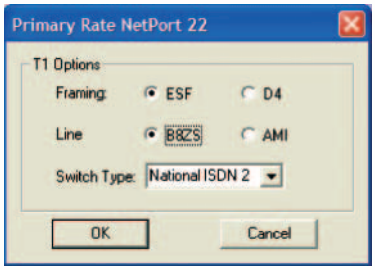
RJ45 100Ohm balanced T1

ESF or D4 Framing selectable

B8ZS or AMI Line code selectable

NI-2, DMS-100, AT&T 5ESS Switch selectable

AT&T TR-62411 and ANSI T1.403 Compliant



- **5.1.2 BRI 0, 4, 8 or 16 Ports** (depending upon Model)

  Marked as 'BRI1' through to 'BRI16'

  RJ45

  4-wire S0 compatible (see TD-012 for 'U' products)

  NT options (present as a network) See Section 6 below for Models available

  TE options (present as CPE). See Section 6 below for Models available

  Optional SPID settings for US-based applications. Support for NI-1, DMS100, AT&T 5ESS

  Single and Dual SPID configurations

  Driving distance on UTP CAT5 cable typically up to 750m depending upon DTE and environment

  Optional Terminal Power-Feed with external 40VDC supply for NT ports. Provides 40V 1W to ISDN BRI devices which do not have their own power supply

  Field-upgradeable versions available See Section 6 below for Models available

- **5.1.3 Control Ports**

  RJ11

  Marked 'Cmd'

  Asynchronous

  8 data, 1 stop bit no parity

  19.2kbps to 64kbps

  Password protected

  Ethernet RJ45

  Marked 'LAN'

  10baseT or 100baseT

  Password protected

5.2 LEDs

PRI x 3

Each PRI has 2 associated LEDs

Upper LED - fl=synchronising to Layer 1; solid=Layer 2 established

Lower LED - fl=call establishing; solid=at least 1 call in place

BRI x 8 or 16

Each BRI has 2 associated LEDs, 1 for each 'B' channel

Fl=call establishing/dialling; solid=call in place

LAN COL x 1

Red=data collision on LAN

PWR x 1

Unlit=no power

Green=power on unit

Run x 1

Slow flash=microprocessor OK and configured; fast flash=internal error or lost base configuration

LAN ACT x 1

Activity on the LAN

LAN 100 x 1

Off=LAN running at 10baseT; on= LAN running at 100baseT

5.3 Relays

Interfaces PRI21 and PRI22 are Power-Failure Relay protected

On power-loss, a critical failure or under operator control, the relays close forming a metallic path between the two interfaces

5.4 Power

Power (mains)

Internal switch-mode supply

IEC connector

Voltage range 85-264VAC auto-sensing

Input frequency 47-63Hz

Max current consumption 200mA @ 230VAC

Power (optional for Power Feed)

External in-line supply

IEC connector

Voltage range 90-264VAC

Input frequency 47-63Hz

Current consumption 700mA @230VAC

Max DTE draw 1W @ 40VDC

5.5 Environment

Operating 0 - 45 °C

Humidity 10-90% non-condensing

Natural convection cooling

5.6 Physical

290mm wide x 199mm deep x 41mm high

Weight 1.2kgs

Optional 19' rack-mounting kit

5.7 Maintenance

There are no serviceable parts or maintenance required

The battery used for the real-time clock and some NV RAM elements has a 10 year (typical) life-time

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6 Configurations and Port numbers/types

Liberator 'S' Chassis	
3007/CHA/1	Liberator 'S' chassis with internal PSU
3007/RMK/1	19" rack-mount extender kit
Liberator 'S' PRI Options	
Single PRI Liberators (non-Upgradeable)	
3007/PRI1/1TENT	Single PRI (user selectable TE or NT*)
Single PRI Liberators upgradeable to 2 or 3 PRIs	
3007/PRI3/1TENT	Single PRI (user selectable TE or NT*) with 2 further PRIs for later field upgrade
Upgrades for single PRI Liberators to 2 or 3 PRIs.	
3007/U1/2TENT	Software upgrade from a single upgradeable PRI unit to a 3007/PRI3/2TENT
3007/U1/2TETE	Software upgrade from a single upgradeable PRI unit to a 3007/PRI3/2TETE
3007/U1/2NTNT	Software upgrade from a single upgradeable PRI unit to a 3007/PRI3/2NTNT
3007/U1/3	Software upgrade from a single upgradeable PRI unit to a 3007/PRI3/3
Two port PRI Liberators upgradeable to 3 PRIs	
3007/PRI3/2TENT	Two PRIs (1 NT* and 1 TE*) with third PRI available for later field upgrade
3007/PRI3/2TETE	Two PRIs (both TE*) with third PRI available for later field upgrade
3007/PRI3/2NTNT	Two PRIs (both NT*) with third PRI available for later field upgrade
Upgrades for 2 port PRI Liberators to 3 PRIs.	
3007/U2/3	Software upgrade from a dual PRI unit to a 3007/PRI3/3
3 PRI port Liberators	
3007/PRI3/3	Three PRIs (1 NT, 1 TE, 1 switchable)
Liberator 'S' BRI NT* options	
3007/BRI4/NT	4 BRI NT* ports
3007/BRI8/NT	8 BRI NT* ports
3007/BRI16/NT	16 BRI NT* ports
Liberator 'S' BRI TE* options	
3007/BRI4/TE	4 BRI TE* ports
3007/BRI8/TE	8 BRI TE* ports
3007/BRI16/TE	16 BRI TE* ports
Other Liberator 'S' Options	
E1 T1 PRI Conversion	
3007/E1T1/Con	Software option for E1/T1 PRI conversion facility
BRI Power Feed	
3007/BRI4/PF	Power Feed option for up to 4 BRI NT ports
3007/BRI8/PF	Power Feed option for up to 8 BRI NT ports
3007/BRI12/PF	Power Feed option for up to 12 BRI NT ports
3007/BRI16/PF	Power Feed option for up to 16 BRI NT ports
Liberator 'S' Cable Packs	All packs include Controller Cable, 3 PRI cables and appropriate BRI cables. No Mains IEC cable.
Lib/cpack/0	Cable pack for PRI-only Liberators
Lib/cpack/4	CP for Liberators with 4 BRIs and PRI
Lib/cpack/8	CP for Liberators with 8 BRIs and PRI
Lib/cpack/12	CP for Liberators with 12 BRIs and PRI
Lib/cpack/16	CP for Liberators with 16 BRIs and PRI

* NT simulates a network and connects to a local device; TE acts like a local device and connects to the ISDN network.

7. History

Release 1.1 March '03

Release 2.1 November '03 with TE BRI options

Release 3.1 April '04 with T1 and other additions

Release 4.1 February '05 Redesign

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