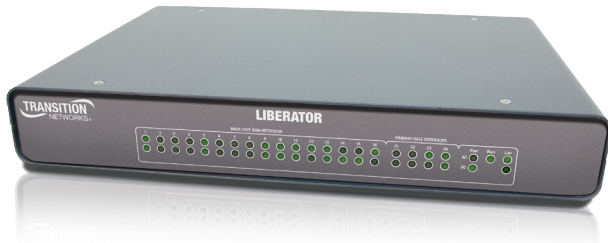# Liberator S
Technical Specification

ISDN Converter, ISDN Splitter, Switch, and Concentrator Supports 1, 2 3 or 4 PRI interfaces and 4, 8, 12 or 16 'S/T' BRIs - Different configurations options available

Features

- Very flexible PRI/BRI ISDN switch
- ISDN splitter, sharer or concentrator
- Converts between PRI and BRI
- Connects to ISDN networks and/or local ISDN devices
- Shares ISDN access between multiple local devices
- Full cross-connection between any/ all 'B' channels
- BRI Power Feed options
- Least Cost Routing
- Dynamic re-directing of calls if destinations unavailable
- Local connectivity between any ports
- Build multiple BRI networks ports into a local PRI
- NT BRIs and NT/TE user switchable
- BRI Power Failure Relay Protection option
- PRI ports NT/TE user switchable
- PRI ports Power Failure Relay protected
- Standard ETSI to ANSI PRI to BRI conversion
- BRI ANSI to ETSI conversion
- Supports A-Law to µ-Law for voice conversion
- Support for "Call Deflection"
- 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
- Off-line Call Routing configurator
- Many applications and uses

1. Overview

The Liberator models detailed within this document support up to 4 PRI interfaces and 0, 4, 8, 12, or 16 BRI 'S' interfaces.

A standard Liberator 'S' can be user configured with all PRI interfaces the same.

The BRI ports are supplied as standard to be NT presentation (simulates a network and connects to CPE).

Software enables BRIs to be user-configured as NT or TE (simulates CPE and connects to a network) in blocks of 4.

BRI NT and TE ports can optionally be fitted with Power Failure Relay Protection.

BRIs can be set for ETSI (Euro-ISDN) or ANSI (US-ISDN) on a per-port basis and can perform ANSI to ETSI conversion.

The unit will connect any port to any port and any 'B' channel to any 'B' channel without constraint giving full cross-connectivity between all ports, both local and network channels.

The intuitive DbLite GUI (supplied) enables fast and simple configuration. All options can be set to tailor the use, connectivity, least cost routing and other advanced features to match the requirements. The platform supports many applications, some of which are covered in application notes available on our web site www.transition.com If your requirement is not specifically identified here, or in the Application Notes, please contact Technical Support or Sales at Transition Networks.

The flexibility and modularity of the Liberator means it can be put to many varied uses.

2. Operation

2.1 ISDN Services

Signalling is carried/converted between ports and ISDN types including when converting between ETSI and ANSI standards.

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

Sub-addressing handling and routing is supported, as is the ability to route on Bearer Capability (call type).

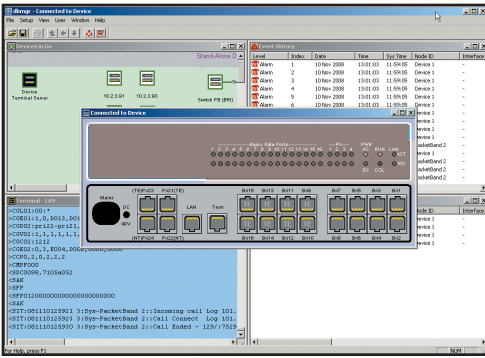CLIs can be locally generated and SPIDs (US - based BRIs) are supported.

2.2 Configuration/Management

Full version of DbManager showing all management windows and image of unit to which the DbManager has connected.

Liberator is configured and managed by Transition's DbManager.

DbManager is an intuitive GUI which supports multiple real-time workstations.

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 the unit's LAN/Ethernet port or the RJ serial port. SNMP Traps & Alarms are supported 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 configurations, making it fast, simple and intuitive to your applications. As an example you can refer to a Group of 4 BRI
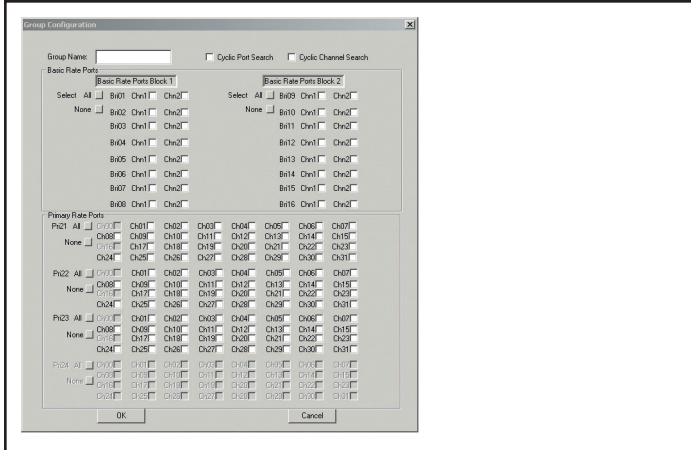
ports as 'Video 1' and subsequently use this term on all routing parameters.
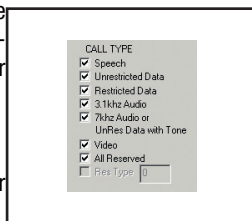
'Hunt Groups' or 'rotaries' are as easy to establish.

3.2 Call Routing
Calls can be routed on the number dialled, the sub-address, CLI, Call Type, originating port, time-of-day or a combination of the above. Whatever your routing requirements; Liberator can help.

3.3 Cross-Connection
Any 'B' channel can be connected to any other

within Liberator without constraints (unless some are programmed).

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 and the calls can be routed to a Group in a variety of ways (sequential, always the lowest available port etc).

Incoming calls can be automatically rerouted to alternate preprogrammed destinations if the main number is busy or unavailable, or after a set time (1-20 seconds).

3.4 Redirection on 'Busy' or 'Unavailable'
Incoming calls can be automatically rerouted to alternate preprogrammed
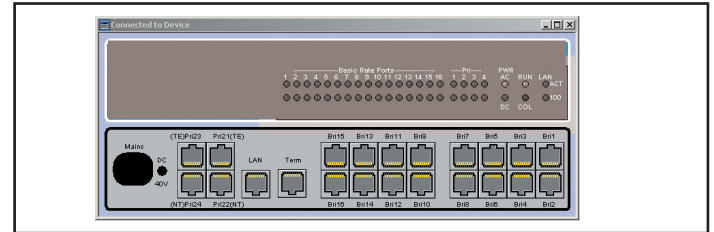
numbers, Groups or ports if the main number or port is unavailable. This gives the ability to automatically switch to backup or standby device for resilience purposes.

Liberator supports a Secondary and Tertiary destination or Routing Profile.

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. The same can be done for incoming calls switching between local devices.

3.5 Call Deflection
Some carriers support the "Call Deflection" service. With Liberator calls can be automatically diverted to a different destination, without using any local ISDN channels, based on a number of criteria including DDI number, time-of-day, and/or no answer.

3.6 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 Fractional E1 and T1 circuits.

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

3.7 Channel Reservation and Scheduling
This features has the ability to change and structure profiles in an efficient way and to vary them if your routing or capacity requirements change during the day or week.

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

A Group can also be configured to have a Minimum and Maximum number of destination channels available and reserved for the Group's use.

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.

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.

3.8 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.

Liberator has the ability to convert or translate any incoming or outgoing number into any other number, to add/remove leading, middle and trailing digits. See below 'Number Translation'.

3.9 Number Translation or Conversion
Any incoming dialled number can be converted by Liberator and presented on any ISDN interface.
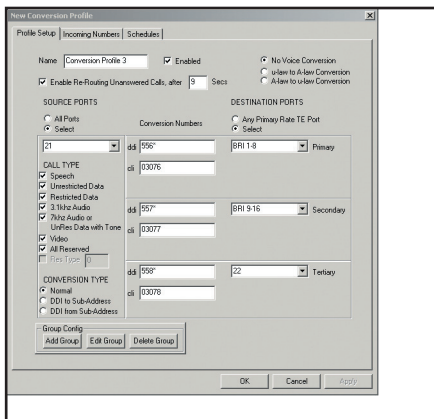
Routing Profile showing Source port 21 and their Destination Groups, together with Secondary and Tertiary destinations and number/CLI conversion.

For example an incoming call to 12345 may be converted to 98765 because the original extension at 12345 has moved onto a VoIP gateway on a different ISDN PRI and now the users has a different DDI number.

Liberator can convert/add/delete leading digits, digits in the middle of numbers and/or trailing digits. It can also manipulate subaddresses and CLIs.

All of this flexibility is not required by all, but if you should need it, it is easy to use and configure.

3.10 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 such as when Liberator cannot make a final routing decision until the number is dialled. In these instances, Liberator can be configured to generate dial, ring, busy, N/U tones itself.

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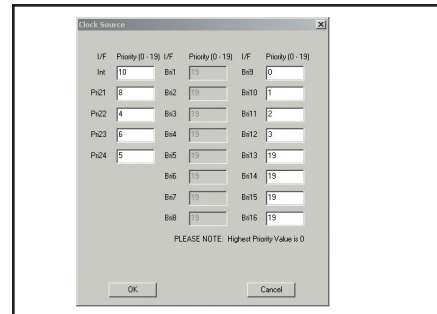
4. General

4.1 Clocking
Software-selectable clock source using any PRI port any BRI NT interface, 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 +/- 10ppm.

Any PRI port and any NT BRI port can be used to source clock. Automatic switch-over when a clock is lost/recovered with no impact on user traffic.

4.2 Real-Time Clock
Internal battery-backed real-time clock for Event Log time-stamps and debugging purposes.

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, subaddress, 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, 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 download them when required. DbManager writes all Events and Alarms to a flat .csv file in real-time and this file can be manipulated by external tools to format and extract information, for example for billing.

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.

Routing summary of all Profiles and key information.

4.5 Off-Line Routing Profile Configurator
For large configurations with many Routing Profiles, Transition supplies an off-line Configurator that enables multiple routes to be loaded directly to the machine instead of adding Profiles individually.

4.6 Diagnostics
Liberator provides excellent diagnostic and debug tools with visibility of all routing decisions taken across the unit and all messages from attached devices.

4.7 Approvals
The Liberator "S" benefits from a wide range of approvals for connection to ISDN services. All Transition Networks equipment is RoHS compliant without having to resort to the use of temporary "Exemptions".

4.8 Configuration
Held in non-volatile RAM (retained during power off) and downloadable to/from the DbManager. Configuration files can be saved to a file on a PC.

4.9 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 - 1, 2, 3 or 4 PRI ports.**
Marked as 'PRI21' 'PRI22' 'PRI23' and 'PRI24'
By default PRI21 and PRI23 are configured for TE ISDN stack (user-side); PRI22 and PRI24 for NT (network-side)
The default configurations can be changed by the user but crossed cables are necessary
Interfaces PRI21 - PRI22 and PRI22 – PRI24 are protected against power failure by relays which provide a metallic path in the event of failure.

E1
RJ45 120Ohm balanced (E1)
G.704 HDB3 encoded
Auto-detect CRC4 or non- CRC4 framing (Multiframe or Doubleframe)
Support of non-switched E1 and Fractional E1 services
ISDN PRI ETSI Q.931/921, ETSI-DSS1, ETSI 300-011, ETSI300-125, ETSI 300-102, approved to TBR4
A-Law and µ-Law tones

T1
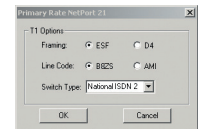RJ45 100Ohm balanced T1
ESF or D4 Framing selectable
B8ZS or AMI Line code selectable
NI-2, DMS-100, AT&T 5ESS Switch selectable
AT&T TR-62411 and ANSI T1.403 Compliant
Hong Kong variant available
A-Law and µ-Law tones

• **5.1.2 BRI 0, 4, 8, 12 or 16 Ports (depending upon Model)**
Marked as 'BRI1' through to 'BRI16'
RJ45
4-wire S0 compatible
Configured as NT but user-switchable in blocks of 4 ports to TE mode (requires crossed cables)
Blocks of 4 NT and 4 TE ports can be optionally Power Failure Relay Protected which means the two ports are linked via metallic path in the event of power loss so the attached device(s) still have network access.
BRIs can be user configured for US and ETSI on a per port basis
Can be configured for Point-to-Point or Multipoint
SPID settings for US-based applications.
Support for NI-1, DMS100, AT&T 5ESS and Auto Single and Dual SPID configurations
Driving distance on UTP CAT5 cable typically up to 750m depending upon DTE and environment

• **5.1.3 Control Ports RJ11 Marked 'Cmd'**
Asynchronous 8 data, 1 stop bit no parity 19.2kbps to 115kbps
Password protected
Dry contact alarm relay

Ethernet RJ45 Marked 'LAN'

10baseT or 100baseT
Password protected

5.2 LEDs

PRI x 4

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

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

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

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 pairs PRI21 and PRI22 and PRI23 and PRI 24 are Power-
Failure Relay protected as standard.

Interfaces will be connected together using relays in the event of
power failure. This forms a metallic path between the two ports.
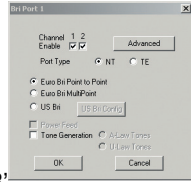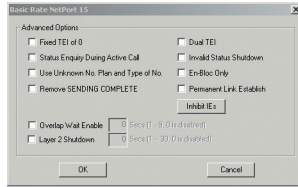
5.4 Power
1. Mains - AC
Internal switch-mode supply IEC connector
Voltage range 95-240VAC autosensing
Input frequency 47-63Hz
Max current consumption 200mA @ 230VAC
2. DC -48VDC nominal
4mm terminal block
-33VDC to -75VDC
0.35A max
MTBF 179,000 hrs
3. DC -24VDC
4mm terminal block
-18VDC to -75VDC
0.55A max
MTBF 800,000 hrs

5.5 Environment
Operating 0 – 55 °C
Humidity 10-90% non-condensing
Natural convection cooling

5.6 Physical
292mm wide x 200mm deep x 44mm high
Metal chassis, front and rear panels
Weight is 1.1Kgs 2.4lb
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.

5.8 Approvals
All approvals completed in UK
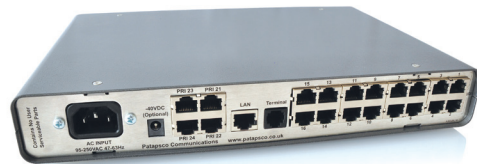Accredited laboratory - reports available

Telecomms
TBR12/TBR13
TBR4:1995, 1997 Amendment
TIA/E1A-IS/968
TNA117
AS-ACIF-S006/S016
CS-03 Canada
TIA-968-A USA

EMC
EN55022:1998
EN55024:1998
A12001
EN61000-3-2/3:1995
AS/NZS CISPR22:2000

Safety
IEC60950-1:2007
ACS/NZS60950:2000
AS/NZS3260:1993
ACA TS001:1997

Important Configuration and Cabling Information

Liberator "S" PRI Cables

All PRI ports on Liberator "S" are user-selectable between TE (connects to a network) and NT (looks like a network and connects to a piece of user equipment), however each port is pre-set to be one or the other.

Port 21 TE
(Relay-protected to)
Port 22 NT

Port 23 TE
(Relay-protected to)
Port 24 NT

When purchasing, please identify what configuration you require and the units will be shipped in the most appropriate way for straight cables and for use of the relays. For example:

If you need 2 x TE ports the unit will be shipped with ports 21 and 23 enabled.

If you need 1 x NT and 1 x TE ports 21 and 22 will be enabled, and so-on

If you wish to change a port from its default to the opposite setting, a CROSSED CABLE will be required and can be supplied by Transition - NOTE: PRI crossed cables have a different pin-out to Ethernet crossed cables and to BRI crossed cables.

Liberator "S" BRI Cables

All BRI ports present as NT ports (look like a carrier network port and connect to user equipment) but there is a configuration option to allow any/all ports to be user-configured as TE (connects to a carrier network and looks like a piece of user equipment).

Any BRI port configured as TE must use a CROSSED CABLE.

Please ensure you specify your PRI ports as NT/TE and order crossed cables for BRI TE ports.

Transition Networks can supply the crossed cables.

NOTE: BRI crossed cables have a different pin-out to Ethernet crossed cables and to PRI crossed cables.