



The DataBand "BU+1" Technical Specification

T1/E1 Leased Line Backup System

Features

- Provides backup for a leased line
- Support for "ring" Topologies
- Sophisticated line failure detection
- Fast switch-over to backup circuit
- Monitoring of primary circuit for error-free recovery
- Automatic or manual switch-back
- "Point-to-point" or "ring"
- Power failure relay protection
- BERT test
- Automatic scheduled or manual testing of backup circuit
- Link status reported to DbManager
- DbManager provides full view of status of all circuits
- E1 or T1
- Channelised or clear-channel
- Support for Fractional circuits
- AC or DC PSU options (internal)
- Clocking hierarchy
- Easy and intuitive to configure via GUI management package
- Approved (Telecoms, Emissions, Safety)
- RoHS compliant



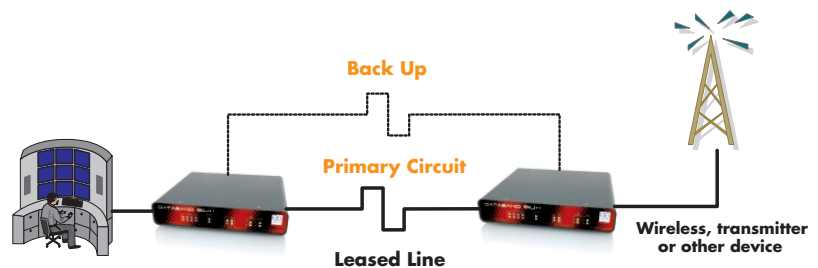
1. Overview

DataBand "BU+1" (BackUp+1) is designed to provide fast backup for E1 or T1 circuits in critical applications.

It interfaces to the application's hardware and the primary WAN link, typically a leased line. An alternate WAN route is provided as backup and this could be a second leased line or perhaps a satellite link. DataBand switches to the backup circuit in the event of a failure or customer-set error thresholds being exceeded for a configured period of time.

DataBand monitors the failed circuit for full-duplex error-free recovery and then either switches back to this route automatically, or notifies the DbManager and awaits a manual switch-back instruction from the operator.

DbManager is a high-quality intuitive GUI that connects to and manages/monitors DataBand "BU+1"; several versions are available in addition to the free DbLite supplied.



Above diagram illustrates example applications using a leased line as the primary circuit which is backed up by a second "hot-standby" circuit. This link can be terrestrial or some other circuit such as via a satellite.

2. Operation

2.1 Line Monitoring

When running on a G.704 channelised leased line DataBand has the ability to use a spare timeslot for monitoring of the circuit for errors using a BERT (Bit Error Rate Test) as well as for complete failure. The detection system is capable of also identifying loops on the circuit and will take backup action under these circumstances as well.

The customer configures how many errors in a given number of seconds warrants backup action (0.5 to 10 seconds).

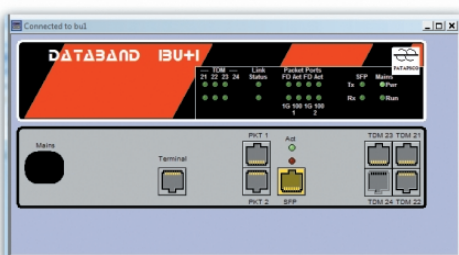
If there is no possibility of using a spare timeslot the usual leased line failure alarms are used to trigger the backup, again for a user-configured period of time. For G.703 circuits these are LOS and loss of data transitions (all "1s" or all "0s"). For G.704 this is LOS, loss of data transitions, AIS and RAI.

2.2 Switch-Over

Upon hitting the failure DataBand "BU+1" immediately reroutes the traffic from the primary route to the secondary. In the case of G.704 circuits the data can be presented on, or moved to, any timeslot on the backup circuit.

Switch-over takes no more than 1.5msecs

DataBand BU+1 has systems to identify half duplex failures, ensuring both ends of the link recognise and instigate backup during a circuit failure or degradation.



2.3 Recovery

When in backup the two DataBand BU+1 devices attempt to establish full duplex communications over the original circuit. Once the primary circuit has been tested and verified as error free for a user defined period, the DataBand system will instigate the switch back operation. The switch back system is designed to ensure a clean and rapid return to the primary circuit with no "ping-pong" between the two routes.

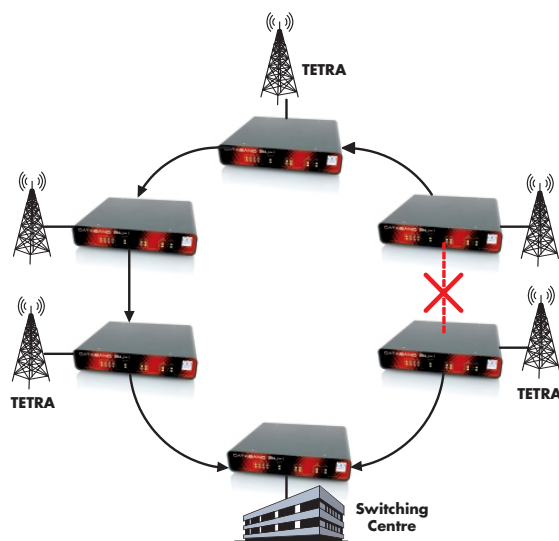
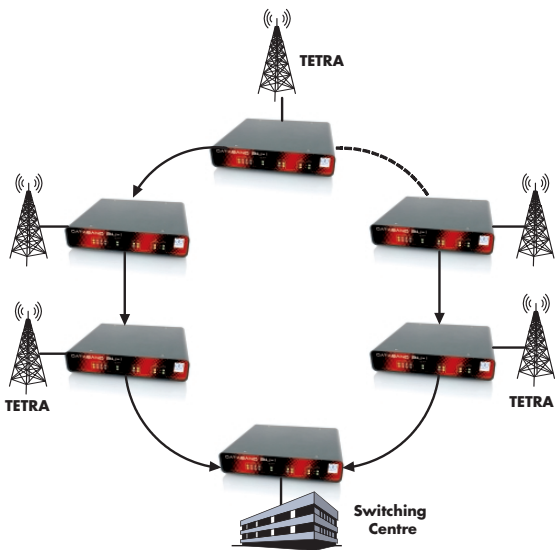
Facilities exist prevent switch back until the user authorises the move.

2.4 "Ring" Topologies

Some networks, for example TETRA or telemetry, use a ring network to provide resilience without having to run all circuits back to the central location.

In this scenario timeslots have to be pre-allocated, in both directions around the ring, for each end point. The traffic presented to the end point takes either the Primary route, or in case of failure, the Secondary. The standard BU+1 unit supports this feature.

It can be seen that the central site needs some additional intelligence to accept traffic from both directions around the ring and to present traffic from a specific end point from one direction or the other, into a configured set of timeslots. The BU+1 central site version supports this capability.



Below left is an example of a ring network which is designed to provide resilience.

When a circuit fails or exceeds error thresholds the DataBands re-route the traffic and the central site device picks up the relevant timeslots from the new route.

3. Ports, inter-connectivity and routing

3.1 Ports, Channels and Groups

DataBand "BU+1" supports three E1/T1 G.703/4 circuits.

Ports are user-configured between structured (G.704) and unstructured (G.703). When using structured the timeslot to be used for monitoring is user configured.

The link between the customer equipment and the primary route is power-failure relay protected so if power is lost to DataBand the leased line is directly connected to the application via a metallic path.

3.2 Cross-Connection

When in channelised G.704 mode, timeslots used on the primary route can be routed to different timeslots on the backup link.

4. General

4.1 Management

Units are configured via an intuitive GUI with options to have visibility of the whole network and its status, both links and DataBand devices. See the DbManager for further information.

Access via an Ethernet port or via local serial interface.

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 DataBand in NV RAM on a FIFO basis

Events can be reported automatically to the locally-attached DbManager or across the LAN.

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.

4.4 Diagnostics

DataBand provides excellent diagnostic and debug tools with visibility of all routing decisions taken across the unit and all messages from attached devices. Loops can be set in both directions.

4.5 Approvals

The DataBand "BU+1" benefits from a wide range of approvals for connection to leased lines. All Patapsco equipment is RoHS compliant.

4.7 Configuration

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

4.8 Software

New versions of software can be remotely uploaded to DataBand 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 or revert to the original software at any time. If the DataBand is unable to run from the new software, it will revert to the original.

5. Specification

5.1 Interfaces

• 5.1.1 E1/T1 - 3 ports.

Marked as '21' '22' '23'

By default 21 and 23 are configured to be DTE (connect to leased lines); 22 as DCE (connect to CPE)

The default configurations can be changed by the user but crossed cables are necessary

Interfaces 21 - 22 are protected against power failure by relays which provide a metallic path in the event of failure.

E1

RJ45 user-switchable between:

120Ohm balanced

75Ohm unbalanced (requires converter cable)

G.703 unstructured

G.704 HDB3 encoded

Auto-detect CRC4 or non-CRC4 framing

(Multiframe or Doubleframe)

Support of non-switched E1 and Fractional E1 services

T1

RJ45 100Ohm balanced

ESF or D4 Framing selectable

B8ZS or AMI Line code selectable

• 5.1.2 Control Ports

RJ11 Marked 'Cmd'

Asynchronous 8 data, 1 stop bit no parity 19.2kbps to 115kbps (auto-detect)

Password protected

Dry contact alarm relay

Ethernet RJ45 Marked 'LAN' 10baseT or 100baseT or 1GGE

Password protected

5.2 LEDs

TDM x 3

Each TDM Interface has 2 associated LEDs

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

Lower LED - fl=circuit establishing; solid=at least 1 64kbps channel in place LAN ACT x 1 Activity on the LAN

LAN 100 x 1 Off = 10baseT operation; on = 100baseT operation

5.3 Relays

Interfaces 21 and 22 are Power-Failure Relay protected and will be connected together in the event of power failure. This forms a metallic path between the two ports

5.4 Power

1. Mains AC

Internal high-quality switch-mode supply IEC connector

Voltage range 95-240VAC auto-sensing

Input frequency 47-63Hz

Max current consumption 200mA @ 230VAC

2. Power - DC

Internal -48VDC nominal

-33VDC to -75VDC

0.35A max

4mm Terminal Block

MTBF - 1,790,000 hrs

3. Power - DC

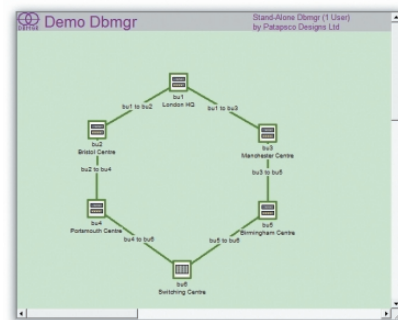
Internal -24VDC nominal

-18VDC to -75VDC

0.55A max

4mm Terminal Block

MTBF - 800,000 hrs



5.5 Environment

Operating 0-55 °C

Humidity 10-90% non-condensing

Natural convection cooling

5.6 Physical

225mm wide x 200mm deep x 44mm high

Metal chassis, front and rear panels

Weight is 0.9Kgs 2lb

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 7 year (typical) life-time.

5.8 Approvals

All approvals completed in UK

Accredited laboratory - reports available

1. Telecoms

TBR12/TBR13

TBR4:1995, 1997 Amendment

TIA/E1A-IS/968

TNA117

AS-ACIF-S006/S016

CS-03 Canada

TIA-968-A USA

2. Safety

IEC60950-1:2007

ACS/NZS60950:2000

AS/NZS3260:1993

ACA TS001:1997

3. EMC

EN55022:2006

EN55024:2001

A12001

EN61000-3-

2/3:1995

AS/NZS

CISPR22:2000

All details subject to change without notification E&OE

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