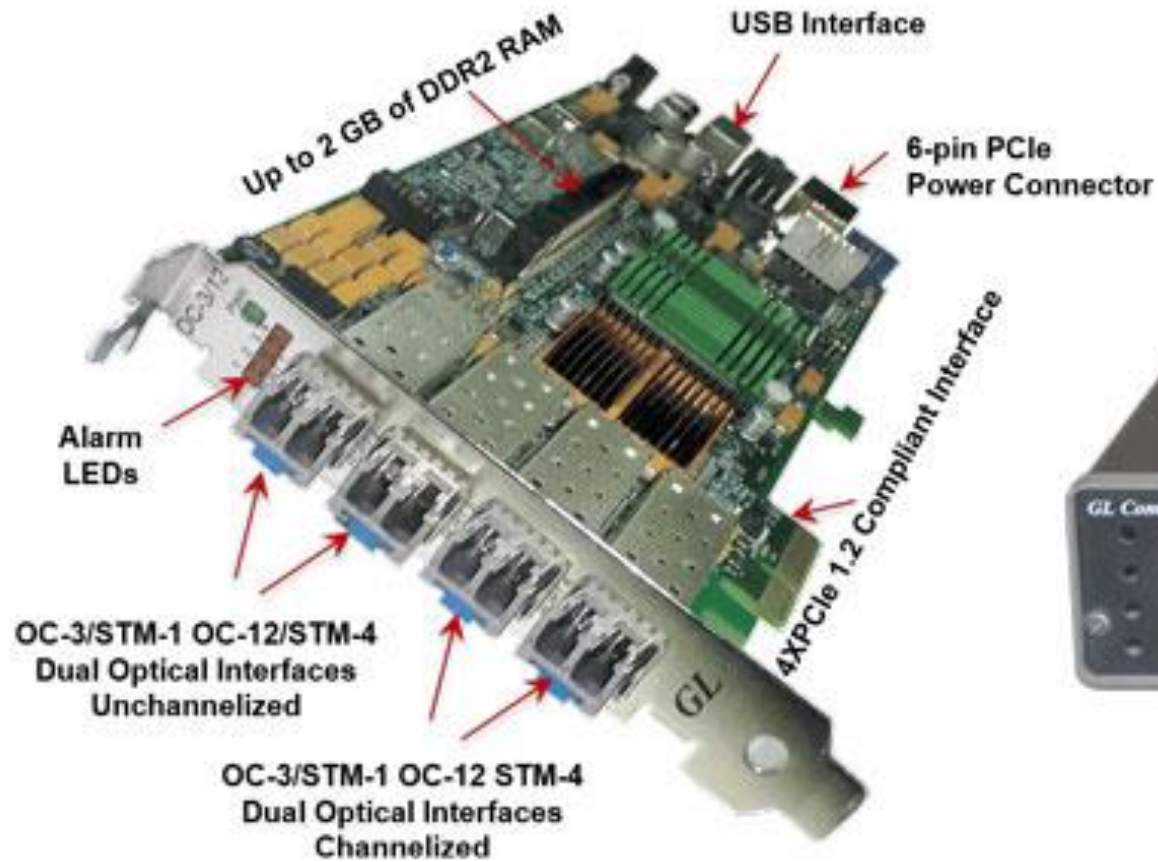

ATM BERT



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

OC-3 / STM-1 and OC-12 / STM-4 Platforms



Similar Optical Interfaces for
OC-3/12 STM-1/4 Unchannelized

GigE Port

T1 E1 Platforms



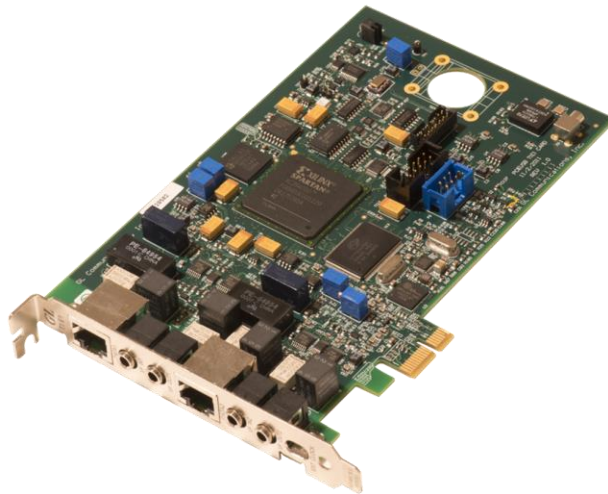
Front Panel

Back Panel

**tProbe™ - Portable USB based T1 E1 VF
FXO FXS and Serial Datacom Analyzer**

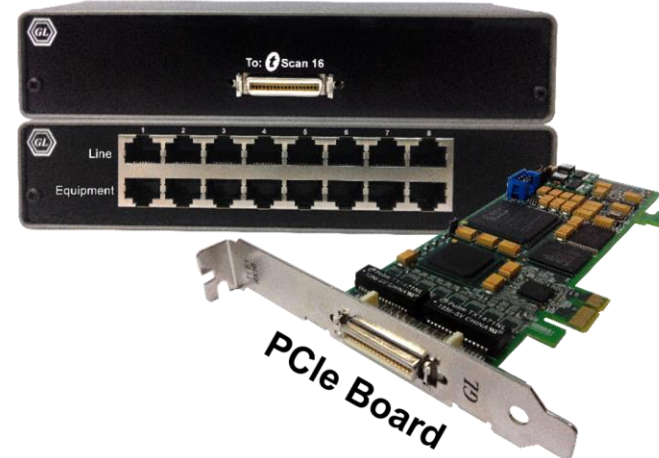


Quad / Octal T1 E1 PCIe Card



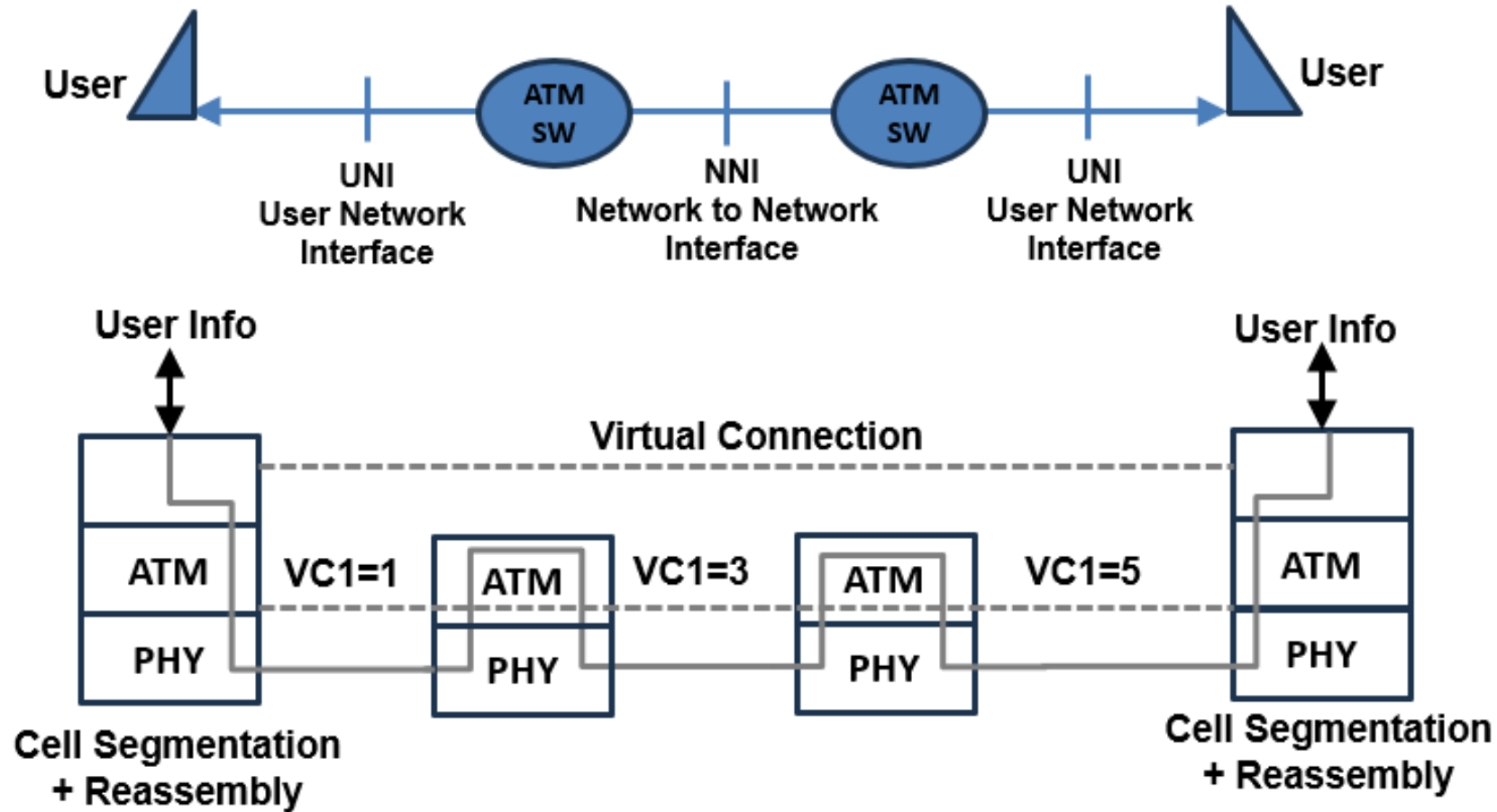
Dual T1 E1 Express (PCIe) Board

**tScan16™ with
16-port T1 E1 Breakout Box**



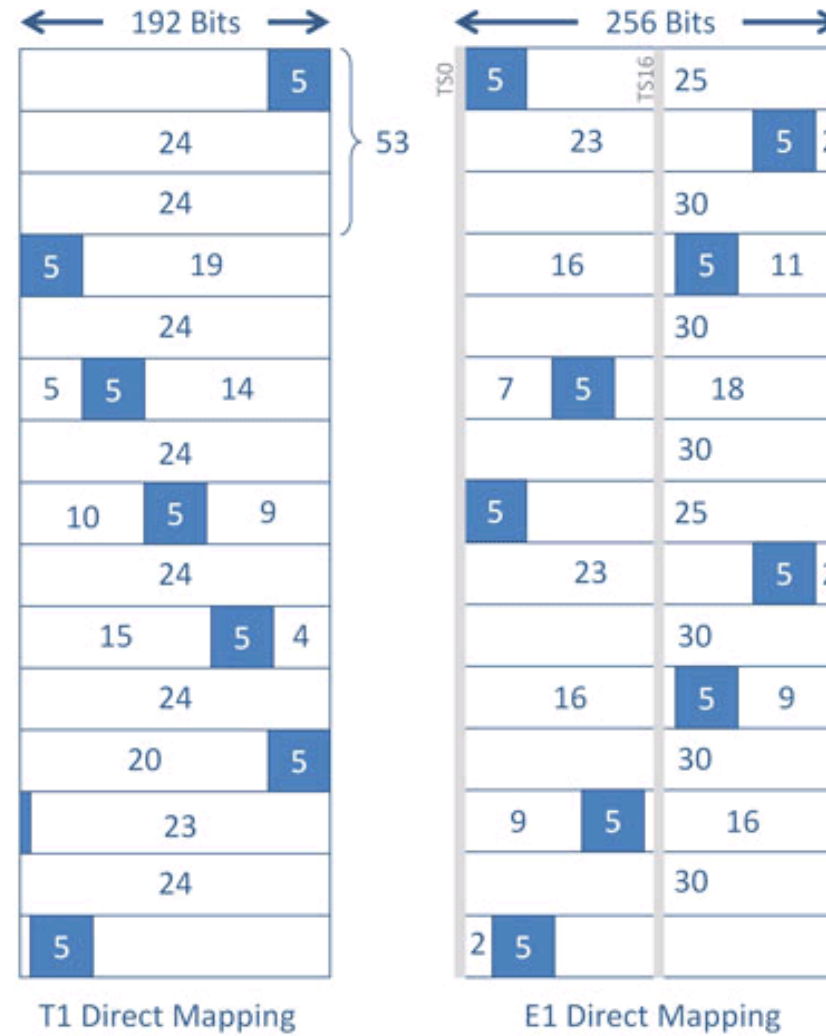
PCIe Board

A Typical ATM Circuit

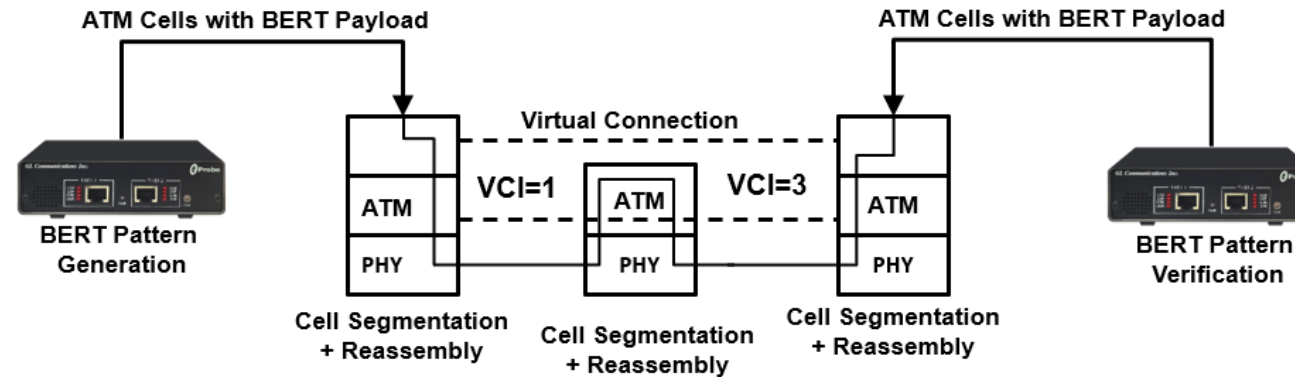


- ATM BERT: A typical ATM BERT application is the verification of end-to-end integrity in an ATM virtual connection

T1 and E1 ATM Direct Mapping



ATM BERT



- Capable of generating /receiving traffic
- Support user-defined ATM header configuration for GFC, VPI, VCI, PT, CLP
- User-defined traffic rate to the accuracy of 1% of total bandwidth
- Supports different QRSS, PRBS patterns 2^9-1 , $2^{11}-1$, $2^{15}-1$, $2^{20}-1$, $2^{23}-1$, All one's, All zero's, alternate 1's and 0's, 1:1, 1:7, and User - defined pattern (ranging between 3 to 32 bits)
- Supports inverting, and scrambling payload data. Scrambling is according to ITU-T G.804
- Supports single bit error insertion, and error rate insertion
- Provides ATM QoS measurement (bit error count/ rate/seconds, sync Loss, no rx data etc.)
- Provides ATM Statistics (total cell count, rejected / pass / idle cell counts, cell rate, and HEC error count)
- Provides throughput details, error, and alarm LEDs for easy analysis
- Supports testing on multiple cards simultaneously with consolidated result view
- Tx and Rx settings for multiple cards can be independently controlled or coupled
- Capable to save and load the configuration settings

ATM BERT GUI

ATM Bert - [Untitled]

File View Windows Help

Ports: Port 1

Configurations

- Port 1
 - Bert
 - Tx Config
 - Rx Config
 - Results
 - Statistics
- Port 2
 - Bert
 - Tx Config
 - Rx Config
 - Results
 - Statistics

Tx Config

Port Selection: Port 1 ☐ Tx Rx coupled settings

Layer: ATM Header | Payload | Traffic Rate | Impairments

ATM Header Fields

User/Network Interface

☒ UNI ☐ NNI

GFC: 0 Generic Flow Control (0-15)

VPI: 1 Virtual Path Identifier (0-255)

VCI: 2 Virtual Channel Identifier (0-65535)

PT: 0 Payload Type (0-7)

CLP: 0 Cell Loss Priority (0-1)

Rx Config

Port Selection: Port 1 ☐ Tx Rx coupled settings

Layer: Recv Filter | Payload

BERT Configuration

BER Pattern: QRSS

31 User Defined Pattern 0 Length

000 3 bits

All Ones All Zeros 0

☐ Invert Pattern ☐ Scramble

Timeslot Selection

"Control + click" to select TS

1	5	9	13	17	21	25	29
2	6	10	14	18	22	26	30
3	7	11	15	19	23	27	31
4	8	12	16	20	24	28	

Select All Unselect All

Sub Channel Selection

7							0
1	1	1	1	1	1	1	FF

Results

Port Selection: Port 1 Reset Clear LED History In

Bert Status		
Rx No Traffic		Not Active
Sync Loss		Not Active
Bit Error		Not Active

Bert Statistics	Values
BERT Status	SYNC
Test Time	00:00:06
No Rx Data Count	0
No Rx Data Seconds	0
Bits Received	91145
Bit Error Count	0
Bit Error Rate	0.0000E+000
Bit Error Seconds	0
Sync Loss Count	0
Sync Loss Seconds	0
Error Free Seconds	6

Statistics

Port Selection: Port 1 Reset Rx

Tx	Values	Rx	Values
Cell count	-	Total cell count	48810
Byte count	-	Cell rate	483
		Idle Cell count	43944
		Rejected cell count	0
		Pass cell count	4885
		HEC error count	0

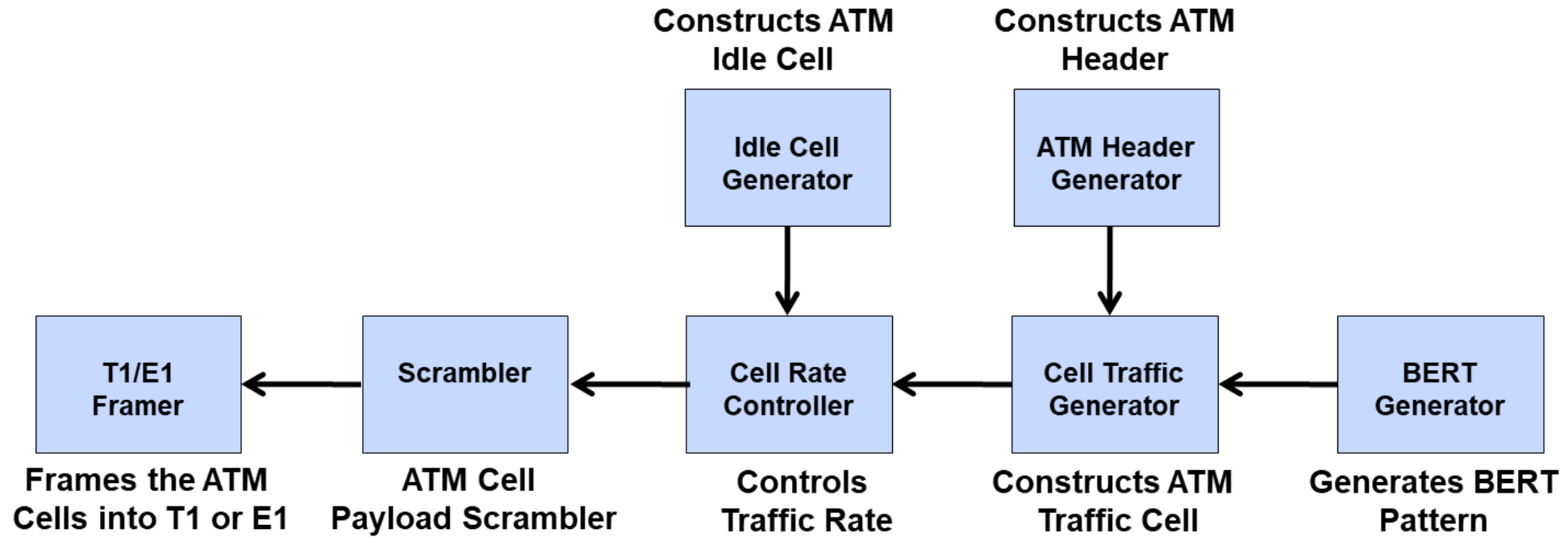
Ready

CAP NUM SCRL

Tx and Rx Configuration

- Tx configuring allows to configure the parameters in the Tx direction i.e., outgoing traffic
- **Tx Config** option allows -
 - Configuring ATM Header fields
 - Configuring various BERT patterns
 - Applying traffic type
 - Invert BER patterns
 - Scrambling
 - Single bit error insertion or error rate insertion
- Rx configuration allows to configure the parameters for the Rx direction i.e., incoming traffic. Rx parameters are used to compare against incoming traffic and perform BERT measurements
- **Rx Config** option allows configuring –
 - ATM Header fields
 - BERT Patterns
 - Receive Filters

Transmit ATM Block Diagram

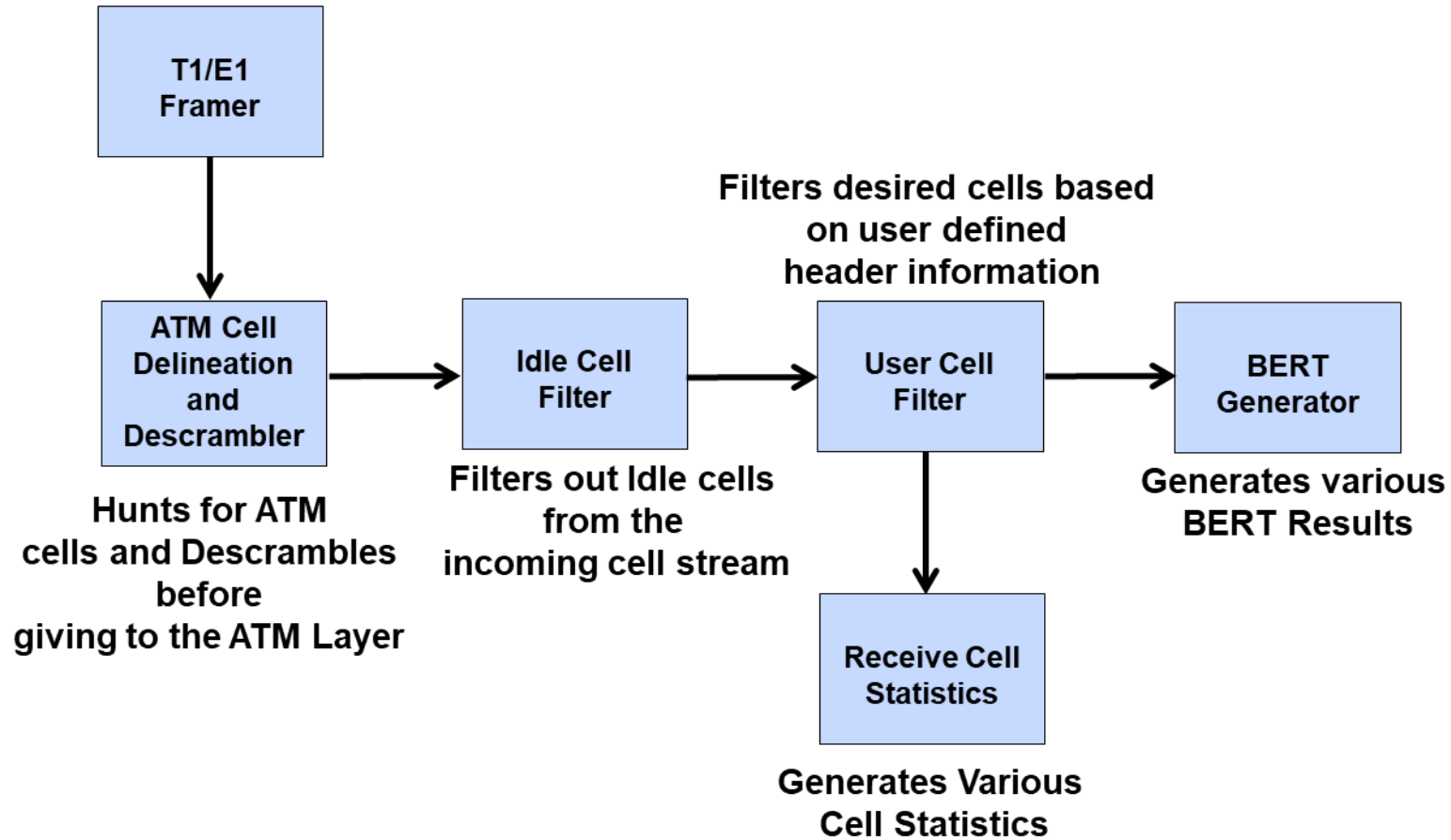


Description of Transmit ATM Blocks

- BERT GENERATOR – This logic generates BERT pattern to be transmitted in the payload of the ATM cell. This logic is same as raw BERT logic and provides all functionalities like PRBS, Static and user defined Patterns. Error insertion is also part of this logic
- ATM Header Generator – This logic constructs traffic cell header using user provided values for VPI, VCI, GFC etc. The transmitter calculates the HEC value across the entire ATM cell header and inserts the result in the appropriate header field
- Cell Traffic Generator – This logic constructs the 53-byte ATM cell using the ATM header generated by the ATM Header generator block and puts the BERT pattern stream in the 48-byte payload area
- Idle Cell Generator – This logic provides Idle cells to rate control logic. Idle cells have constant headers and payload
- Cell Rate Controller – This logic controls rate of total traffic (both traffic cells as well as idle cells). IDLE:TRAFFIC cell ratio is derived from user defined traffic rate
- Scrambler – The ATM cell payload (48 bytes) can be scrambled before mapping into the T1 E1 Frame. A self-synchronizing scrambler with the generator polynomial $x^{43} + 1$, as described in Recommendation I.432.1
- T1 E1 Framer – Frames the ATM cells into a T1 or E1 bit stream using direct mapping as defined by ITU specifications. T1 uses timeslots 0-23 and E1 uses timeslots 1-15 and 17-31 to carry

Receive ATM Block Diagram

Gives Raw data stream after removing T1/E1 framing

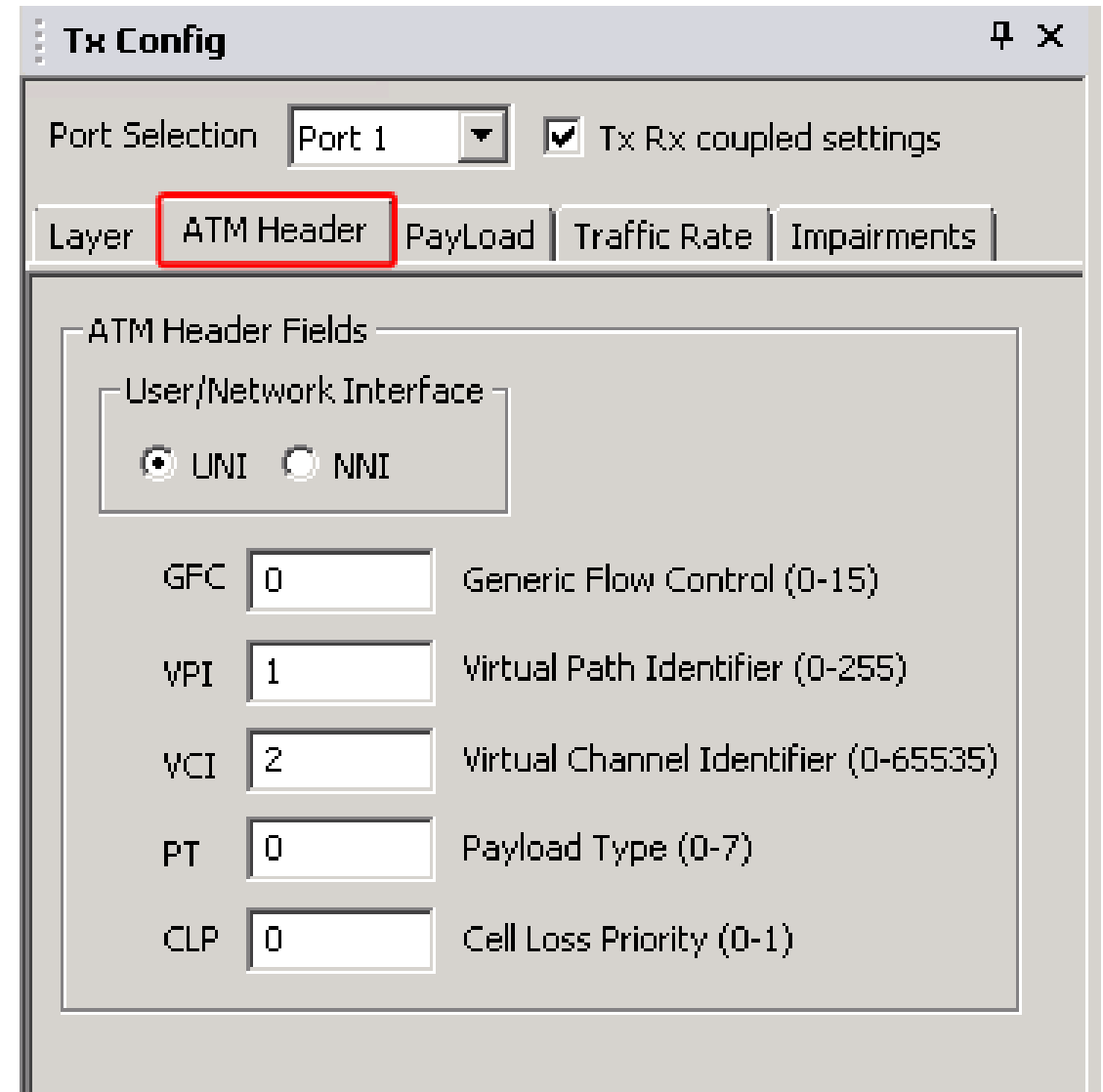


ATM Receive Description

- **T1 E1 Framer** – Gives raw data stream to the ATM block after removing the T1 or E1 framing information. ATM cells are carried over timeslots 0-23 for T1 and timeslots 1-15 and 17-31 for E1
- **ATM Cell Delineation and Descrambler** – This logic hunts for ATM cells by performing HEC calculation and keeps retrieving ATM cells while in sync mode. The ATM cell payload will be descrambled before being passed to the ATM layer
- **Idle Cell filter** – Filters out idle cells from the incoming cell stream
- **User Cell filter** – This logic filters desired cells based on user defined header information VPI, VCI, GFC etc. It checks the received header information like VPI, VCI, GFC etc. against the corresponding values set in the user defined header information. If the filter criteria matches then it extracts the payload and passes to the payload analyzer, otherwise it drops the cells
- **Receive Cell Statistics** – Determines the Cell statistics to be displayed by the application
- **BERT Verification** – This takes the payload data from the User Cell filter to determine pattern synchronization. This logic generates various BERT results

ATM Header Configuration

- Configures the ATM header fields such as VPI, VCI, PT, CLP, and GFC
- ATM header fields for UNI will have GFC (Generic Flow Control) enabled, while for NNI interface GFC field is disabled



The screenshot shows a software window titled "Tx Config" with a standard Windows-style title bar (minimize, maximize, close buttons). Inside the window, there's a "Port Selection" dropdown menu set to "Port 1" and a checked checkbox for "Tx Rx coupled settings". Below these are four tabs: "Layer", "ATM Header" (which is highlighted with a red rectangle), "Payload", "Traffic Rate", and "Impairments". The "ATM Header" tab contains a section titled "ATM Header Fields" which includes a sub-section "User/Network Interface" with two radio buttons: "UNI" (selected) and "NNI". Below this, there are five rows of configuration fields, each with a label, a text input box, and a description: "GFC" with value "0" and description "Generic Flow Control (0-15)", "VPI" with value "1" and description "Virtual Path Identifier (0-255)", "VCI" with value "2" and description "Virtual Channel Identifier (0-65535)", "PT" with value "0" and description "Payload Type (0-7)", and "CLP" with value "0" and description "Cell Loss Priority (0-1)".

Traffic Rate

- The Traffic Rate for ATM BERT can be configured in two ways:
 - Percent of total bandwidth with range starting from 1% to 100%
 - Cell Ratio, where users can set the ratio of ATM traffic cells to idle cells

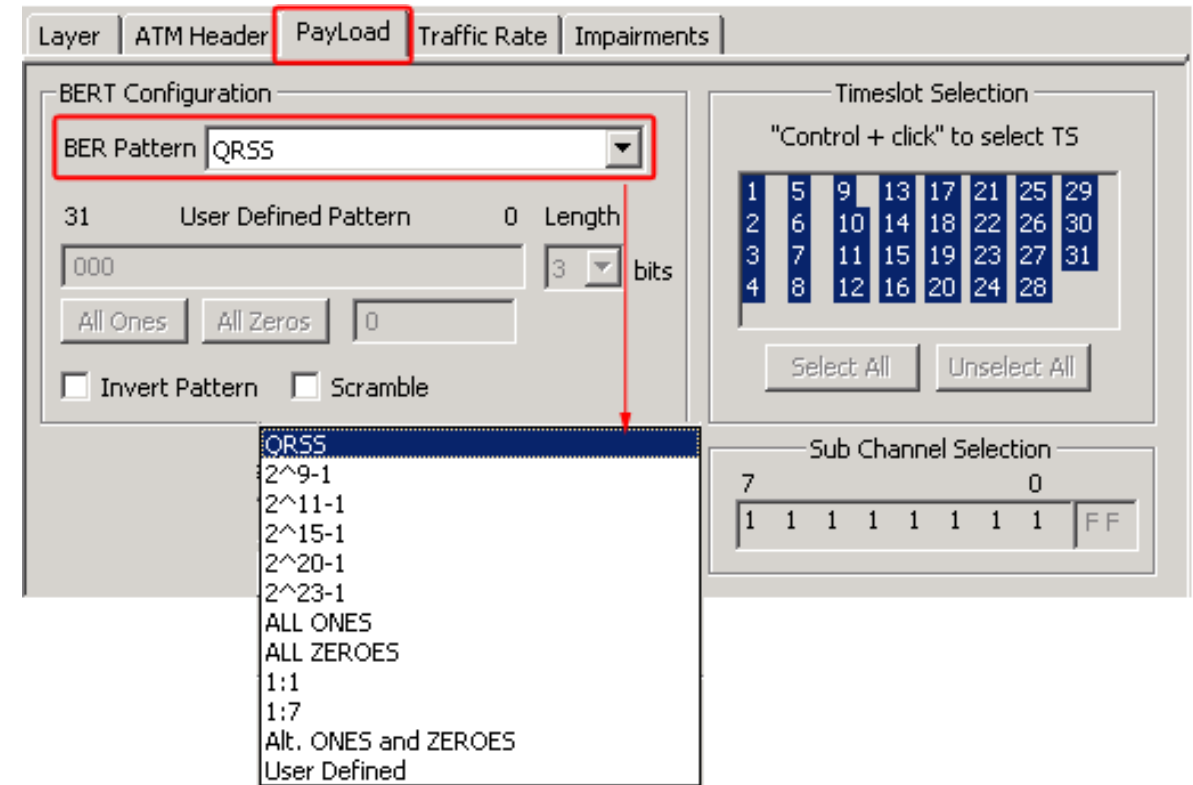
The screenshot shows a software window titled "Tx Config" with a tabbed interface. The "Traffic Rate" tab is selected and highlighted with a red rectangle. The window contains the following elements:

- Port Selection:** A dropdown menu showing "Port 1" and a checked checkbox for "Tx Rx coupled settings".
- Bandwidth Type:** A dropdown menu showing "%".
- Bandwidth Rate:** A sub-section containing a "Rate" input field with the value "100.00".
- Interleaved Cells:** A sub-section containing two input fields: "Traffic Cells" with the value "1" and "Idle Cells" with the value "1".

A red arrow points from the "Bandwidth Type" dropdown to a secondary dropdown menu that shows the "Cell Ratio" option, indicating the configuration method described in the text.

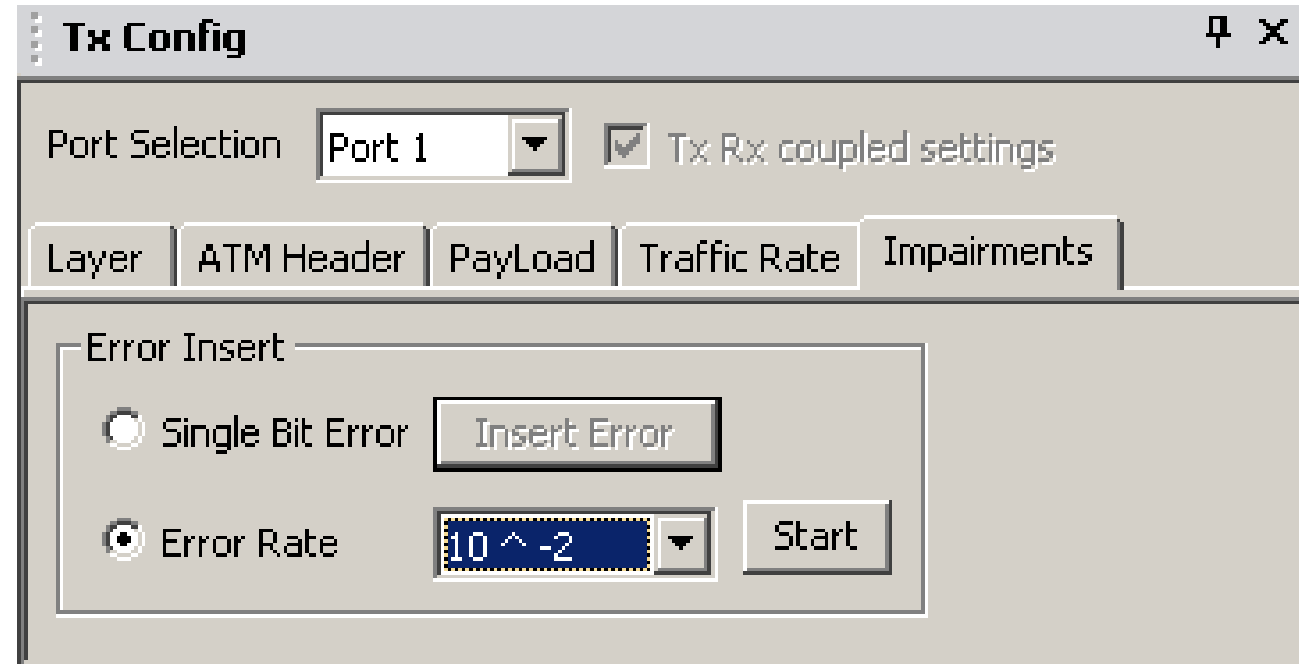
BERT Generation and Detection

- Payload at the Tx configuration allows user to select specific Bit Error Rate test pattern for transmission
- Supports various BERT patterns; QRSS, PRBS (2^9-1 , $2^{11}-1$, $2^{15}-1$, $2^{20}-1$, $2^{23}-1$), fixed patterns like all ones, all zeros, alternate 1s and 0s, 1:1, 1:7, and user-defined patterns
- Rx configuration pattern is used to verify the incoming BERT pattern
- Other options such as invert and scrambling options (according to ITU-T G.804) are provided



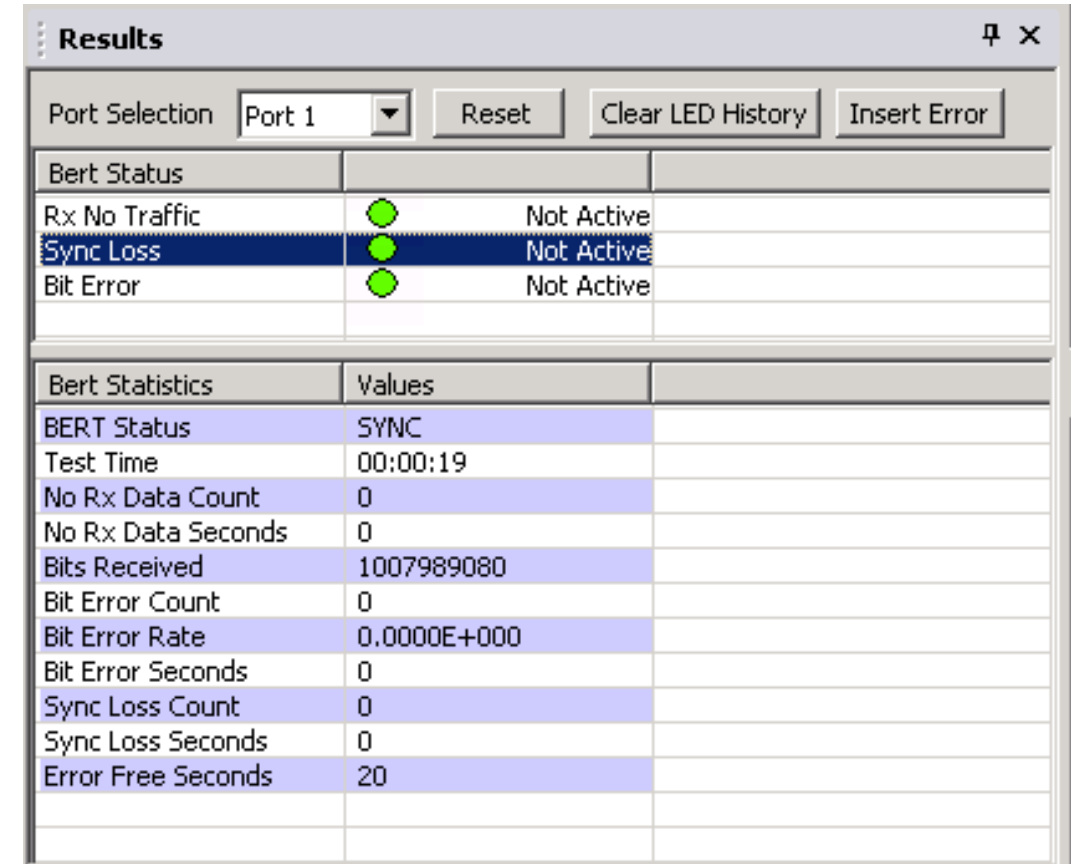
Error Insertion

- Allows single bit error insertion
- Also, supports Insertion of Error rate from 10^{-2} to 10^{-9} into the outgoing (TX) stream



Results

- Displays both BERT Status with LEDs and BERT Statistics
- BERT statistics includes BERT status, Test Time, no Rx data, no Rx data seconds, bits received, bit errors, bit error rate, bit error count/seconds, sync loss count/seconds, and error free seconds
- BERT Status provides a quick view of the test status in the form of Alarm LEDs



The screenshot shows a software window titled "Results" with a port selection dropdown set to "Port 1" and buttons for "Reset", "Clear LED History", and "Insert Error". It contains two tables: "Bert Status" with LED indicators and "Bert Statistics" with numerical values.

Bert Status		
Rx No Traffic		Not Active
Sync Loss		Not Active
Bit Error		Not Active

Bert Statistics	Values
BERT Status	SYNC
Test Time	00:00:19
No Rx Data Count	0
No Rx Data Seconds	0
Bits Received	1007989080
Bit Error Count	0
Bit Error Rate	0.0000E+000
Bit Error Seconds	0
Sync Loss Count	0
Sync Loss Seconds	0
Error Free Seconds	20

Statistics

- Displays Tx and Rx statistics of the ATM BER test
- Rx statistics includes total cell count, cell rate, idle cell count, rejected cell count, pass cell count, and HEC error count

Statistics					
Port Selection		Port 1	Reset Rx		
Tx	Values		Rx	Values	
Cell count	-		Total cell count	50538	
Byte count	-		Cell rate	468	
			Idle Cell count	45503	
			Rejected cell count	0	
			Pass cell count	5059	
			HEC error count	0	

Thank you