Aliathon’s 100GE-OTU4 regenerator/repeater is targeted towards long haul transport in the OTN network. The application is either the simple repeating of the same signal, including FEC type or the introduction of eFEC on the egress side to enable distance boosting regeneration.

The solution is fully ITU G.709 compliant and resides in a single FPGA.

### Headline Features

- **200MHz+ push button core performance.**
- **OTL4.4 client & line interface.**
- **All products designed from ground up to allow future datapath & channel scaling.**
  - Built on technology developed at 10G & 40G rates.
  - Enabling migration path to 400G solutions in the future.
- **Softcore Microprocessor subsystem connected to generic core registers.**
  - Enabling instant abstraction layer access or easy integration with existing software environment.
- **OTU4 framing and section/path overhead processing.**
- **Support for both standard and enhanced FEC:**
  - 7db NECG @ 6.7% OH G.709 GFEC.
  - 9.35db NECG @ 7% OH Enhanced FEC (CI-BCH-3™).

### Figure 1 Overview

On the ingress OTU4 side the design implements an OTL4.4 interface (supports 1024bits of skew matching the IEEE MLD Requirement). This incorporates 4 27.95G SERDES with individual lane framing (based on the OTU4 FAS pattern and the inserted LLM bytes), skew adjustment and reordering.

The ingress OTU4 core provides standard G.709 OTN framing, scrambling, detection of parity errors and adds/drops the overhead.

FEC Options on both ingress & egresss side’s are:

- **G.709 Standard Compliant FEC: 6.7% OH, delivering 7db of Net Electrical Coding Gain (NECG).** Stats provided are corrected/uncorrected bits, blocks and codes

- **Continuously Interleaved, 3-error correcting BCH (CI-BCH-3™) eFEC - 7% OH, delivering 9.35db of Net Electrical Coding Gain (NECG).** Stats provided are corrected/uncorrected bits, blocks and codes

In both directions, asynch FIFO’s are used to lock the respective ingress and egress interfaces together and ensure datapath integrity.

On the egress OTU4 side the design implements an OTL4.4 interface (supports 1024bits of skew matching the IEEE MLD Requirement). This incorporates 4 27.95G SERDES with individual lane framing (based on the OTU4 FAS pattern and the inserted LLM bytes), skew adjustment and reordering.

The egress OTU4 core provides standard G.709 OTN framing, scrambling, detection of parity errors and adds/drops the overhead.
Figure 1: Architectural Block Diagram

100G OTN Regenerator/Repeater (OTL4.4)

Product Brief

OTU4/OTU4
Regenerator / Repeater

OTU4 Frame Core
512 bits wide @ 220MHz

OTU4 Frame Core

OTU4 Frame Core

OTU4 GFEC/EFFC Core

OTU4 Frame Core
512 bits wide @ 220MHz

OTU4 GFEC/EFFC Core

10G Optical Module (CFP2)
OTL4.4 Link
27.95G Serdes (x4)
1:5 Lane Mux/Demux
Lane Sync and LLM processing (x20)
Lane Deskew and Re-ordering (x20)
Block Interleaving

10G Optical Module (CFP2)
OTL4.4 Link
27.95G Serdes (x4)
1:5 Lane Mux/Demux
Lane Sync and LLM processing (x20)
Lane Deskew and Re-ordering (x20)
Block Interleaving

Softcore uProcessor Sub-system

Terminal Interface

512 bits wide @ 220MHz

10G Optical Module (CFP2)
OTL4.4 Link
27.95G Serdes (x4)
1:5 Lane Mux/Demux
Lane Sync and LLM processing (x20)
Lane Deskew and Re-ordering (x20)
Block Interleaving

10G Optical Module (CFP2)
OTL4.4 Link
27.95G Serdes (x4)
1:5 Lane Mux/Demux
Lane Sync and LLM processing (x20)
Lane Deskew and Re-ordering (x20)
Block Interleaving
100G OTN Regenerator/Repeater (OTL4.4)

Product Brief

OTN Overhead Alarms Supported / Processed

**Frame**
- OOF: Out of Frame (FAS error).
- LOF: Loss of Frame (OOF persistence).
- OOM: Out of Multiframe (MFAS error).
- LOM: Loss of Multiframe (OOM persistence).

**OTU Section Monitoring**
- SM-BIP-8: SM Bit Interleaved Parity.
- OTU-AIS: OTU Alarm Indicator Signal.
- SM-BDI: SM Backward Defect Indicator.
- SM-IAE: SM Incoming Alignment Error.

**ODU Path Monitoring & TCM**
- PM-BIP-8: PM BIP Error
- PM-BEI: PM Backward error Indication.
- ODU-OCI: ODU Open Connection Indication.
- ODU-LCK: ODU Lock Defect.
- PM-BDI: PM Backward Defect Indication.
- PM-TIM: Trace Identified Missmatch.
- TCMi-BIP-8, TCMi-BEI, TCM-BDI, TCM-BIAE, TCM-AIS, TCM-OCI, TCM-LCK, TCM-LTC, TCM-IAE, TCM-TIM.

**OPU**
- PTM: Payload Type Missmatch
- CSF: Client Signal Fail.

Target Families & Deliverables

**Altera**
- Stratix
- Arria

**Xilinx**
- Virtex
- Kintex

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