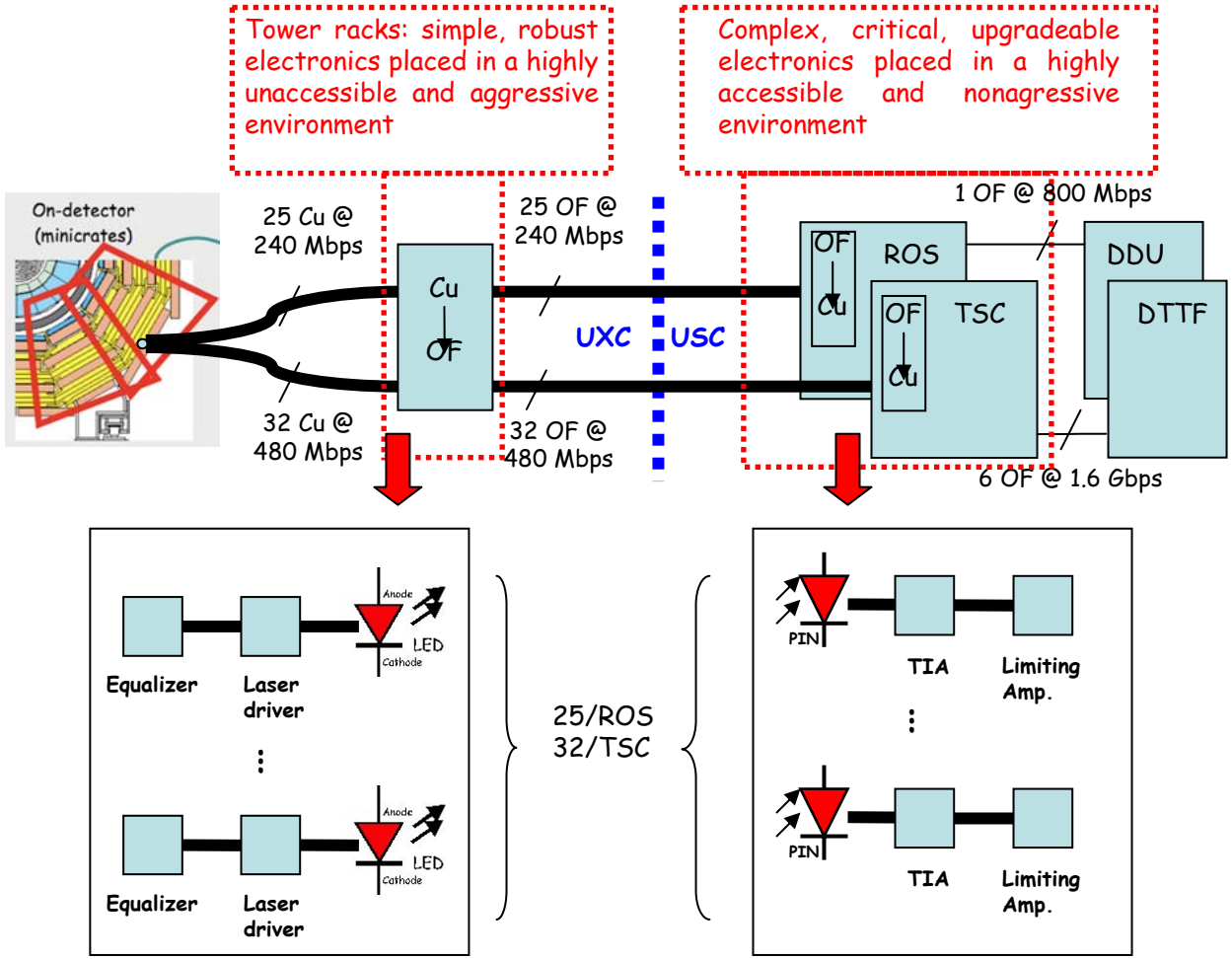
CuOF upgrade report, nov 2010

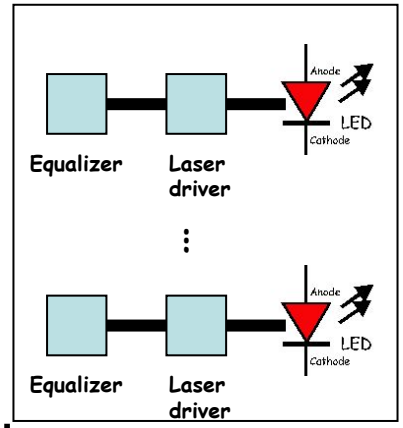
General architecture of the CuOF upgrade



Need to design, fabricate and test two modules:

Transmitter

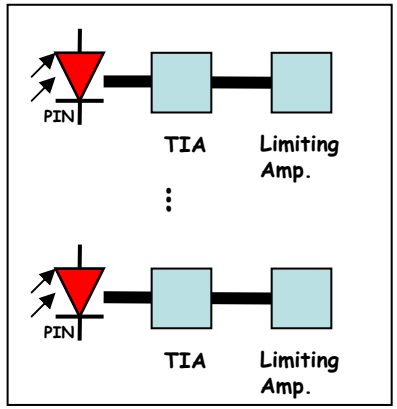
- UXC
- (radiation, magnetic f.)



- Almost mandatory to use a custom design
- Possibility to use CERN's Versatile link or input from Andrea Triosi.
- → Torino

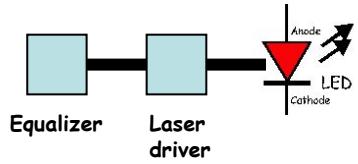
Receiver

- USC
- → CIEMAT (ROS)
- → Bologna (TSC)



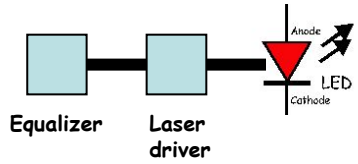
- At present, we have been working in a prototype in order to study feasibiity and limitations

Transmitter



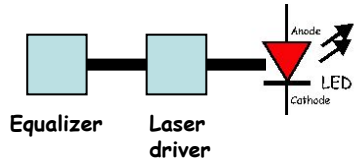
- Equalizer:
  - restores eye pattern from losses due to long (up to 40 m) LVDS links from minicrates
  - LMH0024 from Nat.Semi. is the 3.3V equivalent to CLC014AJE, currently used in ROS mezzanines. ~ half of needed units already purchased by CIEMAT.
  - Need to adjust the termination network impedance for optimal matching
  - MAX3800: possible alternative, slightly cheaper

Transmitter



- Laser driver:
  - Laser driver circuits usually make use of ferrite beads for bias current isolation and stabilization. We would prefer to avoid them.
  - Three laser drivers with typical application circuits not including inductors have been selected: MAX3643, MAX3646, SY88216
- Laser Diode:
  - HFE4190: already tested, in use in UXC (ROS-DDU link)
  - VCSEL, LC connectorized TOSA, 850 nm

Transmitter demonstrator



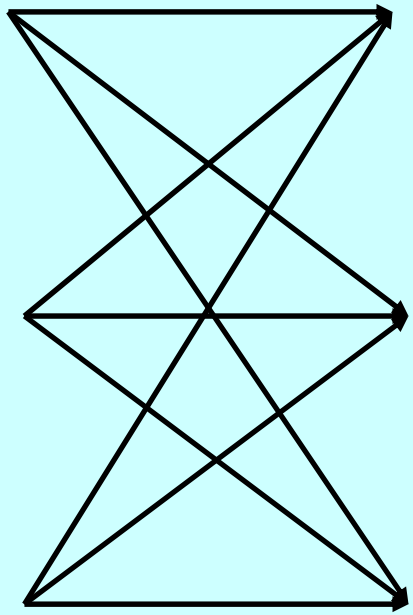
Power

RJ45 + Termination + LMH0024

RJ45 + Termination + LMH0024

RJ45 + Termination + MAX3800

Inter-connection matrix



MAX3643 + HFE4190

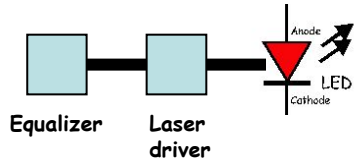
MAX3646 + HFE4190

SY88216 + HFE4190

A prototype has been developed to allow for Equalizers, Laser Drivers and Laser Diodes test.

Any combination of selected components can be evaluated.

Transmitter demonstrator



Power

RJ45 + Termination + LMH0024

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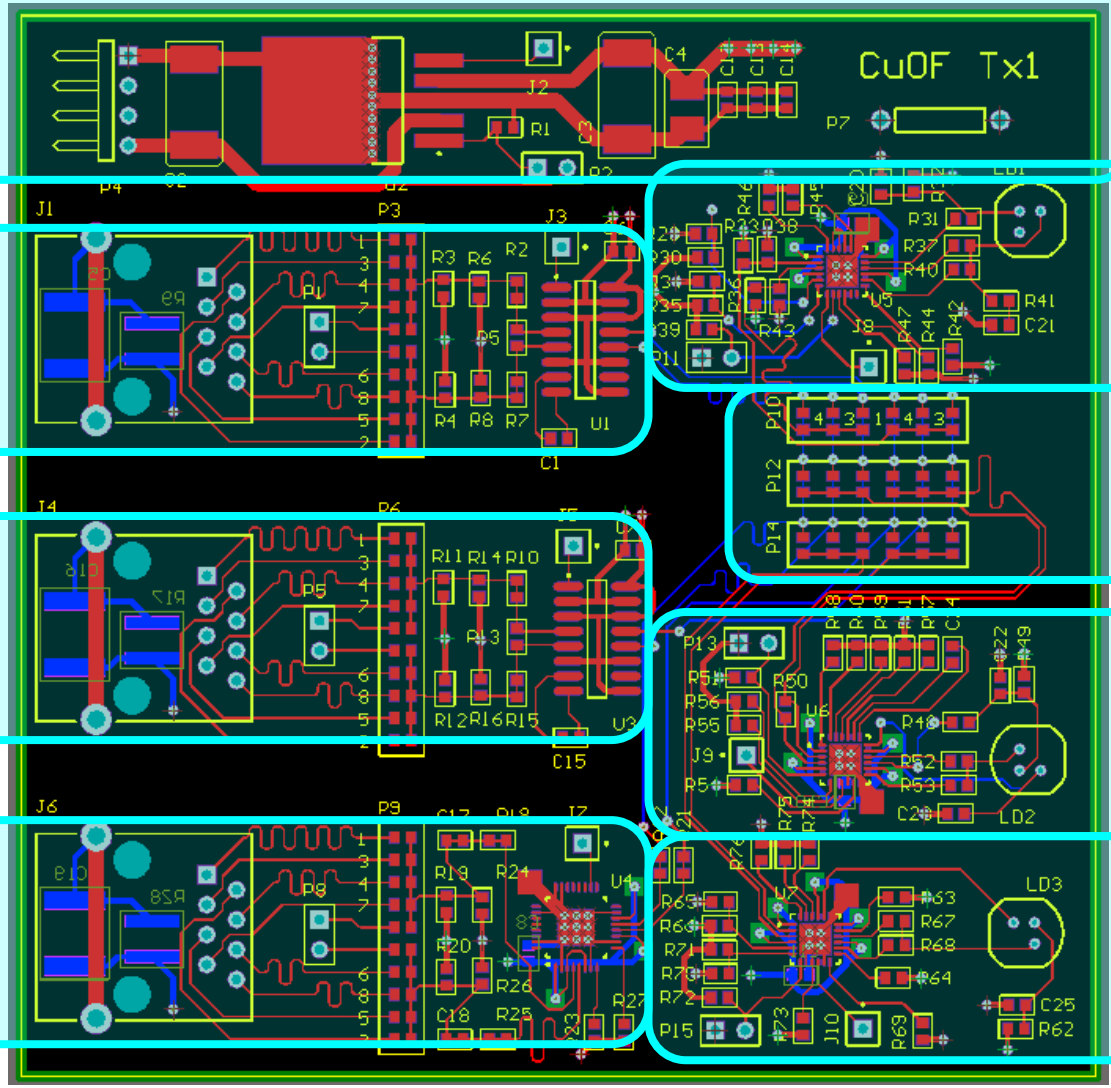


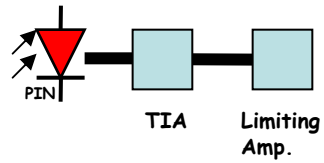
MAX3643 + HFE4190

Inter-connection matrix

MAX3646 + HFE4190

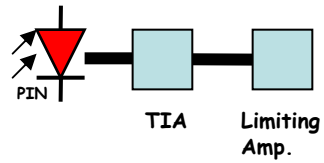
SY88216 + HFE4190

Receiver



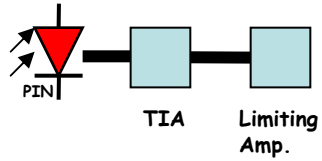
- Commercial off-the-shelf SFF modules:
  - Stratos S2R-25-C-1-E-R6 Dual Receiver
    - Replacement for Stratos part currently used in DDU
    - Most expensive solution: ~ 40 €/channel
  - Finisar FTLF8519F2xCL Transceiver
    - Cheaper per channel: ~ 25 €/channel
    - 1 un-needed transmitter per receiver.
    - Double space required

Receiver



- PIN + TIA
  - GaAs PIN photodiode + Trans-Impedance amplifier
  - LC connectorized ROSA, 850 nm
  - Several commercial possibilities: finisar HFD3180-108, HFD3180-103, **HFD3180-203**, JDSU PL-SLR-00-S23-C0, others.
- Limiting amplifier:
  - Amplifies received signal as needed and provides differential electrical output.
  - Three devices selected: MAX3787, MAX3748, ONET4201

Receiver demonstrator



Power

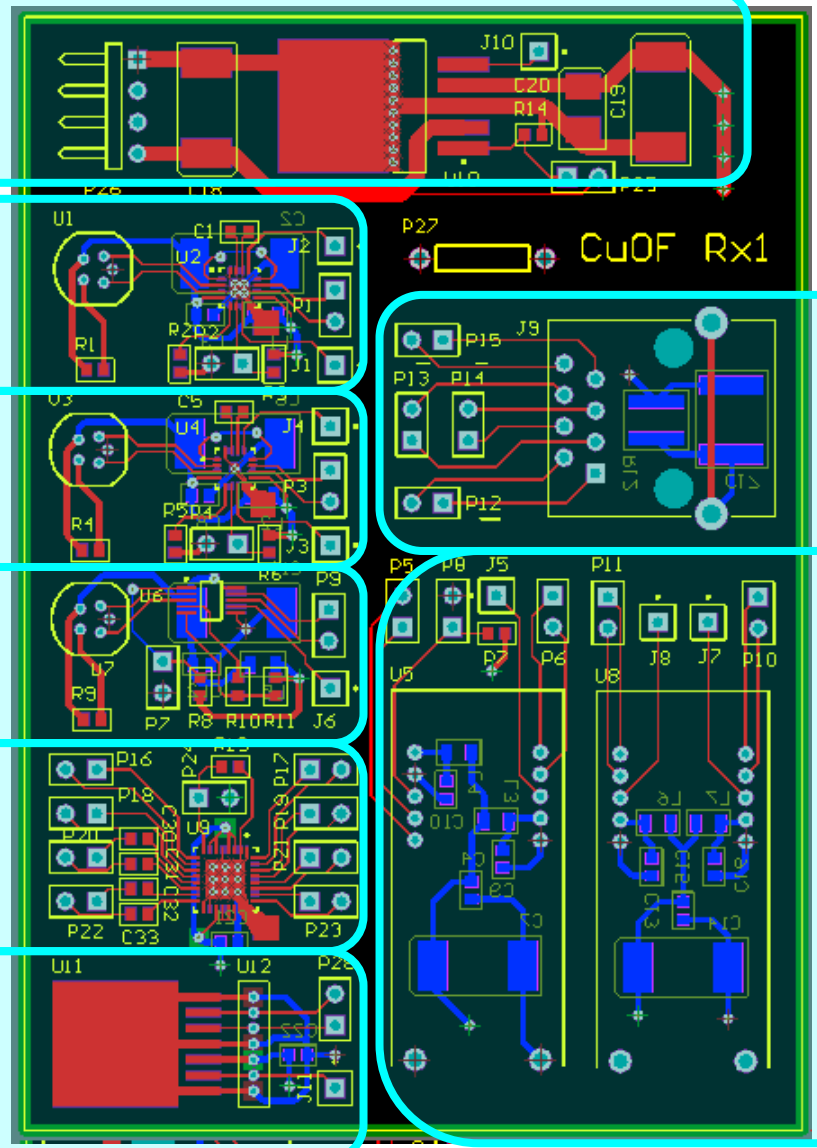
PIN/TIA + ONET4201

PIN/TIA + MAX3748

PIN/TIA + MAX3747

DS90LV804 4-ch LVDS buffer for Diff. Signal conversion

Chip-scale receiver footprint (no reasonable commercial availability)



RJ45 connector channel fan-out for easier access

Finisar FTLF8519F2xCL Transceiver (left)

Stratos S2R-25-C-1-E-R6 Dual Receiver (right)

Test plan at present

- BER test:
  - BER tester has been implemented in a Virtex-4 evaluation board and different transmitter/receiver combinations are under study.
- Testing ROB-ROS full link (ongoing)