VTRx/VTTx
Status and production plan

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Versatile Link Overview

1 Introduction

The purpose of this document is to define the purchasing strategy for optical link components for users identified to date: LHCb, CMS HCAL, and CMS Pixel phase 1 upgrade. An overview of a typical optical link is given in Figure 1. This document gives an overview of the items to be procured and how these will be matched to the CERN purchasing procedures. Three types of CERN purchasing procedure are available:

- Market Survey, Call for Tender, and contract placement
- Price Enquiry and contract placement
- Grade-a-grade purchase order

Use of the different procedures is dictated by the total value of CERN funds used to pay for the supply. It is therefore instructive to review the total quantities and costs as estimated at present, which are given in Table 1. We note that the majority of the funding for the purchase of these items is likely to come from the experiments’ common funds.

2 Purchasing Strategy

The supply of all items will be broken down as indicated in Table 1. The details of each of the procedures in approximate time order (see Section 3) are given below:

- Grade-a-grade Supply of Single-mode (SM) TOSAs, manufacturer to supply objects meeting our technical specification. Justification:
  - Excellent candidate already identified - significantly more rad-hard than others.
  - Previous good experience with supplier in context of CMS Tracker optical links.

Figure 1: Overview of the two optical link variants showing the various components and sub-components: (top) bidirectional link with a VTRx and TRx (SFP+) module; and (bottom) uni-directional link with VTTx and DRx12.
# Design Status

<table>
<thead>
<tr>
<th>Variant</th>
<th>Laser Driver</th>
<th>TOSA</th>
<th>ROSA</th>
<th>Picture</th>
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<tbody>
<tr>
<td>Single-mode VTRx</td>
<td>GBLD v4.1</td>
<td>Edge Emitter Laser</td>
<td>InGaAs GBTIA v2</td>
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<td>Multi-mode VTRx</td>
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<td>850 nm VCSEL</td>
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<td>GBLD v4.1</td>
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<td>850 nm VCSEL</td>
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<td><img src="rad-soft_vttx.png" alt="Picture" /></td>
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- Performance demonstrated at TWEPP 2012
- Final circuit board layout now complete
- Prototypes available
Comparison to an SFP
Latch

- MM latch design (VTRx & VTTx) complete
  - To be produced by injection moulding by PEP Ltd, UK
    - Ultem 1000 material (rad hard)
- First prototypes being evaluated these days
  - Functionality proven
  - Metrology ongoing

- SM latch design being prototyped now
  - CERN rapid prototyping facility
- Production method TBD
Performance: MM VTRx GBTIA v.2

- Very good Rx performance
  - 2nd source identified
- Specifications easily met
GBLD performance

- Verified performance of GBLD v4.1 to operate over specified operating temperature range.
Versatile Link Procurement

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3 Procurement by CERN on behalf of users

**Singlemode**

EEL/InGaAs

Multimode

VCSEL/GaAs

**Multimode**

VCSEL

**Procurement by users**

Figure 1: Overview of the two optical link variants showing the various components and sub-components: (top) bidirectional link with a VTRx and TRx (SFP+) module; and (bottom) uni-directional link with VTTx and DRx12.
Procurement quantities

<table>
<thead>
<tr>
<th>Radn Grade &amp; User</th>
<th>TOSA</th>
<th>ROSA</th>
<th>Latch</th>
<th>VTRx</th>
<th>VTTx</th>
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<td>Pre-Prod Eval.</td>
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</table>

- **Pledges so far**
  - ALICE is now also showing interest, likely to represent a large (30-50%) extra number of links

- **We procure on your behalf**
  - Need funding for parts as well as final modules
  - Need to take funding profiles into account?
Summary

● Feasibility of Versatile transmitter and transceiver modules proven
  ● Functional and environmental testing
  ● Final ASIC versions available and ready for production

● Prototypes are with users
  ● CMS HCAL, LHCb
  ● More prototypes for distribution are available

● Procurement process defined and started