Indus Usage

Usage of Indus-1 SR Beamline

BL-1 - HRVUV, BARC (0)
BL-2 - AIPES, TPCC-DAE-CSR (0)
BL-3 - ARPES, BARC (1)
SL-4 - Reflectivity, RRCAT (0)
BL-5 : PP, BARC (0)

Usage of Indus-2 SR Beamline

BL-8 - EXAFS, Spect Dev,BARC (0)
BL-11 - EDXRD, HPPD,BARC (0)
BL-12 - XRD, ISUD, RRCAT (1)
BL-13 - GIS, SINP (0)
SL-14 - PES, TPPED,BARC (0)

**Number enclosed in bracket indicates number of requests pending for approval.

Fig. I.2.2: Snapshot of Beam Usage Software.

The software is developed using Javascript for client side validations and Java Servlets with Oracle 10g database as back-end. This software is being regularly used by all beam line users of Indus-1 and Indus-2.

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I.3: Development in networking and communication at RRCAT

A) RRCATNet Planning, Expansion and Upgradation:

Under phase IV of OFC networking, OFC connectorization work has been completed in RF and MIA buildings. CAT5E based internal networking of RF building is completed. All inter building links connected using the media converters are now connected using the GBIC modules. In all, 60 nodes are added to RRCATNet. Network port augmentation requirements of various buildings are analysed and indents are raised to procure switches and other hardware.

B) Enhancements to RRCAT Data Centre:

A high speed, network based, large capacity, data storage system has been integrated with the server network to facilitate faster D2D (disk to disk) backup and retrieval of the user data, web and email access logs. This has helped in reducing the backup and restoration window of the data by a factor of three.

C) Email and Internet Access Setup Enhancements:

The current email setup at our Centre has been further enhanced to include user level control for forwarding of emails. Any user using the Webmail interface for accessing emails can use the "Set Mail Forward" option under the "Options" menu for affecting his / her email forwarding.

To further bring down the number of spam emails reaching the users, a DNS based blacklisting feature has been enabled on the gateway email servers. This has resulted in reduction of spam emails received by a factor of five.

The network switches at all the three firewall levels are upgraded to support high speed internet links. Provisions in the form of adding extra network ports and carrying out necessary configuration changes are made on the network link concentrators to support more Internet links of high bandwidth.

D) Commissioning of 34 Mbps (1:4) Internet Link:

Internet leased link of 2 Mbps (1:4) capacity is upgraded to 34 Mbps (1:4) capacity. The new link has been commissioned using high speed routers and added to the already existing pool of Internet links. With this addition, the aggregated Internet bandwidth available at our center is 11 Mbps. Following are typical per day usage of the three links:
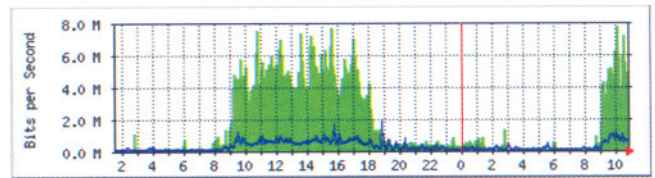

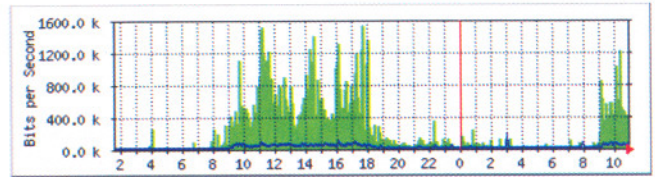Fig. I.3.1: Usage pattern for 34 Mbps (1:4) link.
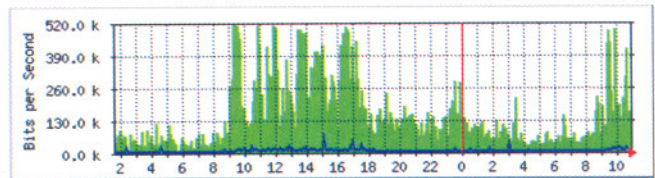

Fig. I.3.2: Usage pattern for 2 Mbps (1:1) link.

Fig. I.3.3: Usage pattern for 512 Kbps (1:1) link.

E) Commissioning of Sharable Data Repository (Z):

A Linux based NAS (Network Attached Storage) system with high speed network access and RAID (Redundant Array of Inexpensive Disks) configured storage has been commissioned, to provide a sharable data repository for facilitating file based collaboration among various groups and committees at our centre.

The sharable data repository incorporates necessary access control features to protect data from unwanted access. The relevant portions of the data repository are accessible to the authorized users as Z drive from any PC on RRCATNet running Windows. Following major goals of an organization wide, sharable data repository are achieved in this setup - Windows like drive and folder access, Authenticated write and read access, huge storage with Quota enforced access and Virus protected data.

F) Video Conferencing Setup Utilization:

Twenty promotion interviews were successfully conducted in RRCAT, using the Inter DAE video conferencing setup, of which RRCAT is one of the nodes. Large number of video conferences have been successfully conducted with various international research centres like CERN and FNAL. Now the video conferencing setups are in regular use.

G) Expansion of Telecommunication Network:

Telecommunication facilities were extended to the Laser R&D block H, Laser R&D block A-annexe, and RF Lab buildings. Mobile facilities were enabled on 24 extensions and 132 new telephone connections were installed in RRCAT campus. Revamping of 27 TDPs has been carried out to strengthen the telephone cabling network in the campus.

H) User Training - Z Drive Access:

A brief training session was conducted to familiarize the users working for International Linear Collider (ILC) collaboration at RRCAT, about the usage and various other security aspects of the new Z drive facility, which can be used for file sharing and other collaboration activities.

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T.1 : A study of diode pumped solid state lasers

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Technological advances in the recent years have resulted in the development of reliable laser diodes. Solid-state gain mediums doped with Nd^{3+} active ions can be pumped by laser diodes operating at 809 nm. Due to the excellent spectral overlap between the emission spectrum of the laser diode and the absorption spectrum of the gain medium at the pump wavelength, diode pumped systems have high overall efficiency. Moreover, these diode lasers have more than 10,000 hr lifetime in CW mode of operation. Diode laser pumping gives rise to a reduced heat load in the gain medium and there is no risk of UV radiation induced damage as compared to flash lamp pump systems.

There are two types of pumping schemes widely used in practice: 1) side pumping, and 2) end pumping. The end pumped systems have lower value of absorbed pump power at laser threshold, better beam quality, and higher efficiency than the side pumped versions. Moreover, it is the preferred pumping scheme when $Nd:YVO_4$ type of gain medium is used, due to the limited size of the laser crystal. As a result of the strong pump absorption coefficient at 809 nm, more than 95% pump absorption take place in a crystal as small as 0.3 mm thick.

A diode end pumped $Nd:YVO_4$ laser typically oscillates in multi-longitudinal modes, but with special techniques, it can be forced to operate as a Single Longitudinal Mode (SLM) laser. SLM lasers operate only in one of the allowed cavity modes. They are used in : wind velocity measurement, LIDAR, high-resolution spectroscopy, coherent optical communications, resonant cavity doubling etc. A compact and efficient SLM laser at 1064 nm may be realized in a diode end pumped $Nd:YVO_4$ laser based on a semi-monolithic type of gain medium in a standing wave cavity. However, certain applications demand single frequency operation of the laser output. A single frequency laser operating at a given wavelength demands that it should oscillate in SLM, single transverse mode (STM), and single polarization mode (SPM). A linearly polarized mode with diffraction limited transverse beam profile ($M^2 \sim 1$) would be preferred due its wider spectrum of application than the other modes of operation. This article presents our studies on the diode pumped single frequency laser generation in semi-monolithic $Nd:YVO_4$ gain medium and the technique adopted to extend its usefulness to other wavelengths by harmonic generation (1064 nm / 532 nm / 266 nm).