

207  
File No.NMEICT (MS)/PAB/13

Government of India  
Ministry of HRD  
Department of Higher Education

National Mission on Education through Information & Communication Technology  
(NMEICT) New Delhi

(Mission Secretariat)

\*\*\*\*\*

24<sup>th</sup> February, 2010

To

All Members of Empowered Committee of Experts  
(Project Approval Board) of National Mission on  
Education through Information and Communication  
Technology (As per list enclosed)

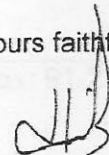
**Sub: Agenda papers for 13<sup>th</sup> Meeting of the Empowered Committee of Experts  
(Project Approval Board) of National Mission on Education through  
Information and Communication Technology (NMEICT) to be held on  
25<sup>th</sup> February, 2010 at 4.30 p.m.**

Sir/Madam,

Enclosed please find Agenda papers for 13<sup>th</sup> Meeting of the Empowered  
Committee of Experts (Project Approval Board) of National Mission on Education  
through Information and Communication Technology (NMEICT) scheduled to be held  
on 25<sup>th</sup> February, 2010 at 4.30 p.m. under the Chairpersonship of Secretary,  
Department of Higher Education, Ministry of Human Resource Development at the  
Institute of Town Planners India (ITPI) (First floor - Conference Room), 4-A, I.P.  
Estate, Ring Road [Near ITO], New Delhi - 110002

2. Kindly make it convenient to attend the meeting.

Yours faithfully,



(Harvinder Singh)  
Deputy Secretary (PAE) &  
Nodal Officer (NMEICT)  
Tel: 011-23382604

Encl: As above.

Copy to: PSO to Secretary (HE), PS to AS&FA, PS to JS(DL) and DEA(DL).

**Agenda for the 13<sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and Communication Technology to be held on 25<sup>th</sup> February, 2010 at 4.30 p.m. at Institute of Town Planners India (ITPI) [ First Floor-Conference Room ] , 4-A, I. P. Estate, Ring Road, New Delhi.**

<b>Item No.</b>	<b>Subject</b>
Item No.1	To confirm the Minutes of the 12 <sup>th</sup> meeting of the Project Approval Board held on 3 <sup>rd</sup> February, 2010 sent vide letter No. NMEICT (MS)/PAB/12 dated 22 <sup>nd</sup> February, 2010.
Item No.2	Action Taken Report on the Minutes of the 12 <sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and Communication Technology held on 3 <sup>rd</sup> February, 2010.
Item No.3	Approval for project - Virtual Labs Coordinated by IIT Delhi (10 partner institutions for the pilot and 12 for the main project).
Item No.4	Approval for project - Educational Resource Planning.
Item No.5	Approval for project - Teachers Empowerment, Students Empowerment and Integration tools for Empowerment (Synchronous Delivery) AKA Talk to a Teacher.
Item No.6	Approval for project - Quantum Nano-computing Virtual Centre
Item No.7	Approval for project - The Village Community Network - Technology Development and Pilot Roll Out Plan for Low Cost Opportunistic Communication Networks for Rural Areas of India
Item No.8	Approval for project - Synchronous Live Lecture Delivery System - BrihaspatiSync, Electrical Engineering Department, Indian Institute of Technology, Kanpur.
Item No.9	Status Report - Signing of Memorandum of Understanding (MoU) by Department of Higher Education with Department of Telecommunications, Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL) on connectivity matters under the National Mission on Education through Information and Communication Technology.
Item No.10	Approval for Manpower Strength of the Technical Support Group/Mission Secretariat of NMEICT.
Item No.11	Approval for pilot project - Technology for Analysis of Rare Knowledge Systems for Harmonious Youth Advancement (TARKSHYA).
Item No.12	Any other item with the permission of the Chair.

### **Agenda Item No.1**

The Minutes of the 12<sup>th</sup> meeting of the Project Approval Board held on 3<sup>rd</sup> February, 2010 sent vide letter No. NMEICT (MS)/PAB/12 dated 22<sup>nd</sup> February, 2010, are placed below (**Appendix-I**) for kind perusal and confirmation please.

## **Agenda Item No.2**

The Action Taken Report on the Minutes of the 12<sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and Communication Technology held on 3<sup>rd</sup> February, 2010 is given at **Appendix-II**.

A meeting of Peer Review was held on 23<sup>rd</sup> and 24<sup>th</sup> January, 2010 at Bharti School of Telecommunication, IIT Delhi, New Delhi for review of Pilot Projects/Main DPR under the National Mission on Education through Information Communication Technology (NMEICT)

The following project presentations (Agenda Item No.3 to 7) were made by various investigators to the National Mission on Education through ICT. They are summarized vide Agenda Item No.3 to 7 and the recommendations of the SC are given accordingly.

### **Agenda Item No.3**

**Virtual Labs Coordinated by IIT Delhi (10 partner institutions for the pilot and 12 for the main project)**

**Chief Investigators: Professor Surendra Prasad, Director, IIT Delhi with Prof. Ranjan Bose as the Principal Investigator from IIT Delhi.**

**Total Funding Required : 25825.3 lakhs**

### **Observations /Deliberations & Comments of the Review Committee:**

The project proposal was presented by Professor Ranjan Bose, Principal Coordinator, IIT Delhi and several other partner institutions presented supporting information and types of experiments developed in the pilot phase and those which are to be developed in the project period. Overall about 10 pilot experiments were proposed to be developed during the nine months of the pilot phase (April 2009-December 2009) but the coordinator listed 23 experiments with five of them being developed in IIT Delhi. A tour around the labs was also organized for all the members and the Chairperson of the review committee at the end of the presentations. The review committee members unanimously stated that this would be a commendable effort even in the lack of clarity on some of the issues which were later discussed in detail by the members. They felt that as a project the activity should be carried out without any delay while the following issues should be resolved during the project period through intense deliberations between members and the academic community as a whole. The following were raised as open issues that need to be resolved in the immediate future. However, the project

activities would be carried out at the same time. The most important pointers to the development of virtual labs are scalability, maintenance, technical support, quality control, educational viability/ acceptability towards widely varied University curricula and sufficiency of experiments for the entire science and engineering curricula. Professor Surendra Prasad, Director of IIT Delhi and also Director of the Virtual labs project joined with the Mission director, Shri. N. K. Sinha and elucidated the following points:

- Commitment to the project and sanction of funds must be initially restricted to the development of as many new virtual labs as possible by keeping in mind the models and the delivery mechanism. The operation of labs requires enormous bandwidths which are not included in the project cost as one of the major mandates of the mission is to provide high speed connectivity to academic institutions at low cost through programmes set up by an independent technical implementation committee.
- Scaling up of the labs in terms of the number of labs as well as number of repeat labs for a large enough population to access the same experiment at one and the same time. Cost per experiment per institute to be carefully considered.
- Sufficiency of coverage of experiments in all major disciplines and continuous additions of new experiments. 150 experiments may not be enough but the Mission Director agreed that the Ministry will give utmost priority the labs if the cost per every experiment to be clearly outlined for every new experiment not included in the main proposal.
- More work needs to be done during the execution of the project to bring the experts and peers in the country together.
- Associated with labs there should be structures for implementation of the virtual labs in colleges which want to do them in-house. Professor Ranjan assured the committee that complete and open documentation of the labs and the software codes would be provided wherever possible and if commercial codes were to be used the number and the cost of such codes would be kept to an absolute minimum. It was strongly felt and echoed by all members that the students should not be charged for accessing the lab.

- There should be reasonable mechanisms to bring new institutions as partners as well as new ideas.
- Evaluation and grading mechanisms for students who perform the experiments remotely should be thought out carefully and provided wherever possible.
- Creating sufficient number of open source tools for virtualization of real experiments should be given high priority.
- IPR issues should be considered carefully when outsourcing of the experiments or processes or development of mass-produced kits to run virtual labs is considered.
- All the lab classes should be provided with a videos of experiments associated with the labs. Professor Ranjan Bose and Professor Kannan demonstrated a few samples which provide instructional aids to students and teachers who access the experiments through the web.
- A centralized experimental facility to minimize repetitive hardware purchase is desirable.
- Optimization of costs associated with software / hardware / network bandwidth must be taken up.
- Due diligence to Government procedures (a number of partners are self-financing / fully privately funded institutes) and the quality of website implementation must be attended to.

Professor Surendra Prasad and Professor Balakrishnan. Department of Computer Science, IIT Delhi suggested the Mission Director, Standing Committee members and other academics to provide valuable inputs on:

Maintenance of the virtual labs

Continuity of financial support / sustainability of the project in the project mode itself

Open source issues related to the software and hardware aspects of the project

How to handle both progress and complexity of more elaborate experiments

How to ensure that the labs are complete and there are no important gaps left in the learning/training process of the technical student

The production and delivery models for experiments

The difference between software project versus software product for virtual labs

The roll-out service model involving private partners who will have to generate development, support and maintenance costs for multiplying labs developed under the project. The free access to students may become questionable.

The committee requested Professor Ranjan Bose to include all of the above as well as other relevant considerations in a section as an appendix to the main proposal and also nominated a few members as part of a technical committee to continuously contact other academic and industrial community members in the next few months for resolution of specific issues in line with the Mission objectives. Professor Ranjan Bose, Professor Balakrishnan, Professor C. G. Mahajan and Professor Pradeep Verma were invited to be part of the community and were requested to induct more members as is found necessary.

**Recommendation of the Committee:** Sanction the project in full without any time delay as the pilot phase is completed satisfactorily and has led to far more successful implementation than was originally envisaged by the team itself.

The project was evaluated by various experts with ranking of the project from 0-10, i.e. 10 is the best, 0 is worst. The project was evaluated by 23 experts and the minimum and maximum scores given by experts are 6 and 10 respectively with average score of 8.18.

The summary of the project is at **Appendix-III**.

PAB is requested to consider the above proposal for approval.



#### **Agenda Item No.4**

#### **Educational (enterprise) Resource Planning**

**Chief Investigator: Professor Yatindra Nath Singh, IIT Kanpur**

**Total budget: Rs. 1936 lakhs**

#### **Deliberations by the review committee:**

The PI presented the details of the project in which he described how ERP modules could be adopted by the various academic institutions. For higher education system in India with multilingual background of the communities in which colleges are situated, ERP had to be developed in English and be made available in the local languages through a translation scheme. Also a project as large as this required open documentation of all source code, its bug fixing through an open source bugzilla like software, peer-to-peer shared network and a user community willing to share its resources. Current implementation of the pilot through a library module, a time table module, project management module, and grant management module was demonstrated by some of the partner institutes. Some of these modules are not merely code-writing based but also involve research components and therefore graduate students in those areas where short-term, goal-oriented research projects based on the ERP exercise needed to be employed and encouraged.

The review committee members wanted to know the rollout plan of the ERP modules. Specifically questions were raised by the panel of experts on how these modules would be tested with a few institutions, how they would be compared with existing professional software which is tailor-made for specific institutions and which involve an enormous degree of testing and perfecting and therefore incurring huge costs. What the PI and CO-PI proposed should be measured against equivalent commercial modules and the robustness measured since project cost is also very high. They requested the PI to have specific milestones for each and every module and release them incrementally so that Universities can profit from this massive exercise of academic enterprise management software creation in the public domain.

**Recommendation:** Sanction the project but monitor programme development with specific milestones embedded in the project proposal.

The project was evaluated by various experts with ranking of the project from 0-10, i.e. 10 is the best, 0 is worst. The project was evaluated by 15 experts and the minimum and maximum scores given by experts are 6 and 8.5 respectively with average score of 7.73.

The summary of the project is at **Appendix-IV**.

PAB is requested to consider the above proposal for approval.

## **Agenda Item No.5**

### **Teachers Empowerment, Students Empowerment and Integration tools for Empowerment (Synchronous Delivery) AKA Talk to a Teacher**

**Chief Investigator: Professor Kannan Moudgalya**

**Co-Investigator: Professor D. B. Phatak, IIT Bombay, Professor Kamal Bijlani, Amrita University, Ettimadai, Tamil Nadu and Professor Satish Kumar, Dayalbagh Educational Institute, Agra**

**Total Budget: Rs. 7915 lakhs**

**Deliberations of the committee:** The PI and the Co-PI presented a summary of activities carried out under the pilot scheme so far. Recording of 50 courses have been completed so far. All of them were webcast live and later converted to videos-on-demand. One of the main questions of the committee was how this would be distinct from the NPTEL project which also proposed to create contents in four quadrants. In particular, it was observed that the video recordings of NPTEL courses for more that 100 courses have been done in phases I and more than 500 courses are in the process of development. NPTEL also proposed to provide Wiki contents and discussion forums and make all the lvideo lectures online. On Professor Phatak's presentation of teacher training through extended periods, the Joint Secretary (JS) Shri. Sinha pointed out that workshop for 1000 teachers in a pilot project would have to be scaled up to tens of thousands of teachers and that such workshops should be held throughout the country.

**Recommendations:** Recommended to PAB for sanction. The similarities and differences between this and the already sanctioned NPTEL project should be presented in detail to the PAB.

The project was evaluated by various experts with ranking of the project from 0-10, i.e. 10 is the best, 0 is worst. The project was evaluated by 10 experts and the minimum and maximum scores given by experts are 7 and 10 respectively with average score of 8.10.

PAB is requested to consider the above proposal for approval.

## **Agenda Item No.6**

### **Quantum Nano-computing Virtual Centre:**

**Chief Investigator: Dr. Vishal Sahni, Dayalbagh Educational Institute, Agra.**

**Total Budget:** Rs. 40 crores

#### **Deliberations of the Committee:**

Quantum computing being a special topic in a focused area of research, the PI introduced some of the basic developments to the SC members and the review panel. He then explained all the activities being carried out by the Centre in DEI so far and the extent of collaborations realized with many premier research groups in India and abroad. Several workshops have been conducted on quantum and nano computing with participation by experts from all over the world and many students and faculty from India who were new to the area were the beneficiaries. The presentation was followed by a technical presentation entitled: Backend Experimental Efforts: by Prof. Debabrato Goswami of IIT Kanpur, one of the collaborators in this project. The committee and the panel appreciated the efforts of the PI very much and also commended the PI for focusing his efforts with both short term and long term objectives for building a truly world-class interdisciplinary centre in an academic institute and bringing the best of the scientists to interact with students and teachers in this country for the benefit of one and all.

**Recommendations:** Sanction the project.

The project was evaluated by various experts with ranking of the project from 0-10, i.e. 10 is the best, 0 is worst. The project was evaluated by 11 experts and the minimum and maximum scores given by experts are 6 and 10 respectively with average score of 8.5.

The summary of the project is at **Appendix-V**.

PAB is requested to consider the above proposal for approval.

## **Agenda Item No.7**

### **Development of Low-Cost synchronization oscillators for stand-alone communication networks for efficient information broadcasting in geographically challenging locations**

The Project has been re-named as

### **A Technology Development and Pilot Roll Out Plan for Low Cost Opportunistic Communication Networks for Rural Areas of India**

**Village CoMmunity Network, Dayalbagh Educational Institute (Deemed University) Dayalbagh, Agra**

Control Number: SRe21100910359

**Chief Investigator:** Dr. Somi Daya, Dayalbagh Educational Institute, Agra.

**Co-Investigator:**

Prof. G. S. Tyagi, also from DEI, Agra.

Prof. M. T. Sebastian, National Institute of Inter-disciplinary Science and Technology, Trivandrum

Prof. Norbert Klein, Imperial College of London, London

**Total Budget:** Rs. 3339 lakhs.

### **Deliberations of the Committee:**

The Committee listened to the PI's presentation on the development of the oscillator resonator. Existing oscillators that can be used in the standalone network broadcast are very expensive and hence this project to generate a new product must be explored thoroughly. However the committee raised concerns over the issue of foreign participation and the ensuing issues of intellectual property rights for the discovery and the ownership as well as the copyrights for distributing/marketing the product. These things needed to be ironed out clearly before the start. In addition, the committee and the JS reiterated the need to test this in regions before the product could be incorporated in the mainstream networking protocols for standalone broadcasts with sufficiently large number of streams in each such network. The other allied costs in setting up towers for wireless communication have not been indicated in the proposal. Therefore the committee recommended that the pilot project continue till March 31, 2010 and that expenditure that occurred till then be refunded to the Institute to keep the activities of the project focused. The DPR be revised with all these plans and then resubmitted

immediately so that a committee of network experts called to the PAB can assess the project for sanction by the PAB

**Recommendations:** The proposal be written by considering all the issues above and submitted to the JS for him to arrange for a review in the PAB meeting.

**Accordingly, a Revised Project Proposal was presented by the PI to the Standing Committee in its meeting held on 6<sup>th</sup> February, 2010 and the SC made the following observations:**

Total Project Cost. Rs.42.12 crores

Duration: 2 years

**Comments and observations of SC**

- The SC observed the cost for the development of technology is on the higher side.
- The equipment required for the development may be ascertained in detail and the availability of the same from the open market may be checked. Also the option of outsourcing may be looked into.
- The technology once developed has to be proven and the proof of concept has to be established before rolling out.
- The DPR to be developed for the first phase should be demonstrative.
- The oscillators so developed is being created from the scratch and as such the SC was of the opinion that risk cannot be taken by investing huge capital in the beginning before the technology is being tested.
- The possibilities of fabricating the circuit from outside by providing the design has also been advised.
- The budget may also be worked out for the team visiting the Imperial College, London.

**Recommendations:**

A Committee has been formed to help work out a detailed strategy about this project. The committee members are Prof Y N Singh of IITK, Prof Hazur Saran of IITD and Prof. Pradeep Varma of TERI. The project team could prepare a new scheme of rolling out the first phase and to work out the budget accordingly. The PI would upload the modified version of the project by including the suggestions of committee. There is no need for PI to present this project to the standing committee again as they have already presented this project proposal more than once. The committee, in consultation with Mr. Sinha, can suggest the next course of action, including recommending it to the PAB.

Views of 3 members of the Expert Committee recommending the project are enclosed along with the summary of the project at **Appendix-VI**.

PAB is requested to consider the above proposal.

## **Agenda Item No.8**

The Standing Committee in their meeting held on 9<sup>th</sup> January, 2010 has recommended the following proposal:

**Synchronous Live Lecture Delivery System – BrihaspatiSync  
Electrical Engineering Department, Indian Institute of Technology, Kanpur.**

Control number YRe08011010501

### **Investigators**

Dr. Yatindra Nath Singh, Associate Professor; Amitabha Roy, PRE; Neeru Chhabra, SRE

**Total Funding Required: Rs.1 crore 2 lakhs**

**Duration of the Project:** 2 years

### **Observations & Comments of the Standing Committee**

The SC members appreciated the project and expressed that the project is of interest and shall be beneficial to the Mission.

### **Recommendation of the Committee:**

The project proposal BrihaspatiSync was already reviewed and recommended by the DIT. Moreover, the PI already demonstrated the viability of this concept through Brihaspati. The PI presented this proposal to the SC and the SC found the project suitable for funding under NMEICT. In view of the above reasons, this project is recommended.

PAB is requested to consider the above proposal for approval.



## Agenda Item No.9

### **Status Report - Signing of Memorandum of Understanding (MoU) by Department of Higher Education with Department of Telecommunications, Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL) on connectivity matters under the National Mission on Education through Information and Communication Technology**

BSNL has, vide its letter No. 72-03/09-BP (Pt.I) dated 01.02.2010 has sent approved MoU document finalized by BSNL and MTNL to this Department for processing.

In this regard, it is submitted that this Department has already paid a sum of Rs.300.00 crore during 2008-09 to Department of Telecommunications for providing broadband connectivity to educational institutions of higher education throughout the country, as per decisions taken by the Project Approval Board of NMEICT. Name of the Department of Telecommunications (DOT) has also been included by Department of Higher Education as one of the parties of the proposed MoU.

Some modifications in the said MoU have been made and the modified MoU is attached. These modifications were discussed with DGM, BSNL. Apparently, the minor modifications would be acceptable to BSNL. As indicated by DGM, BSNL, the following two modifications would not be acceptable to BSNL:

- (1) modification suggested, i.e., "BSNL/MTNL will ensure that 32 static IP addresses are available for each University for access from outside the network" mentioned under "**Responsibilities – Network Specs**"; and
- (2) BSNL would like to retain the "penalty clause" as it is, in the Service Level Agreement (SLA).

Regarding rebate indicated as 0.2% in SLA under the headings **MPLS-VPN/Internet Bandwidth, VPN over Broadband and LAN Maintenance** of SLA, DS(PAE) indicated to DGM, BSNL that it should be 0.33% instead of 0.2%. DGM, BSNL said that he would get back to this Department on this matter. The sentence, "BSNL would not be under any obligation to refund the money incurred for investment for establishing the NMEICT network" under Termination Clause and "via vendors employed for maintenance of LAN

network” under LAN setup in Universities and Colleges in SLA have been added as per discussion with DGM, BSNL.

A copy of the draft MoU to be signed by Department of Higher Education with Department of Telecommunications, Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL) on connectivity matters under NMEICT is enclosed (**Appendix-VII**) for information of PAB at this stage.

## **Agenda Item No.10**

### **Approval for Manpower Strength of the Technical Support Group/Mission Secretariat of NMEICT**

The Department of Higher Education, Ministry of HRD had signed a Service Agreement with EdCIL (India) Limited for establishing a Technical Support Group (TSG) for the National Mission on Education through Information & Communication Technology (NMEICT). The Mission Secretariat consists of the TSG, Consultants and the Support Staff dedicated to the Scheme.

TSG/Mission Secretariat is providing support in organizing various meetings like Standing Committee, Implementation-cum-monitoring Committee, Project Approval Board, etc. Further, to evaluate various projects of e-content creation technically in different fields of education, monitor the progress of the projects and to see the overall outcome of the pilot projects for sanctioning the main DPRs, regular services of experts to provide their inputs are required for the NMEICT Project. Further, the consultants are to be hired due to the expanding role of NMEICT in all fields of education across the country. These consultants are to be assigned the thrust areas so that the overall objectives of e-content creation and connectivity are taken care of by pro-active follow-up of different projects. Therefore, it is initially proposed to engage senior consultants in the following main areas:-

- Engineering
- Social Sciences
- Biological Sciences
- Science
- Economics/Commerce
- Management

The advertisement for first four senior consultants have already been released. However, the strength of these may be increased to a minimum of 6 Senior Consultants and 4 Consultants so as to timely monitor the projects already sanctioned by MHRD

during the year 2008-09 and 2009-10. This is desired to speed up the monitoring process of the different projects sanctioned under the Mission, evaluate fresh proposals being received for e-content creation and achieve the connectivity objectives of the Mission in time.

In addition to above, the Mission Secretariat is also to be strengthened by providing more support-staff so as to assist the above consultants in performance of their duties. As per the Service Agreement, a total of 13 support staff were provided during the year 2009-10. However, keeping in view the further expansion of the Mission activities, the same is proposed to be increased to 20 numbers.

## **Agenda Item No.11**

**Approval for Pilot Project - Technology for Analysis of Rare Knowledge Systems for Harmonious Youth Advancement (TARKSHYA). By Dr. P. Ramanujan, Head, C-DAC, (KP), Bangalore**  
(Control Number No. – De 29090910310)

As recommended by the Standing Committee in its Meeting held on 7<sup>th</sup> November, 2009, Dr. P. Ramanujan made detailed presentation on the said project in the 11<sup>th</sup> meeting of PAB held on 4<sup>th</sup> December, 2009. The PAB taken the following decisions:

1. The project proposal to be re-oriented by adopting 4-quadrant approach.
2. A large fraction of the cost of the pilot involves connectivity which has been separately accounted for by the NMEICT. Therefore all such costs can be deleted from the project. The PI was requested to specify an absolute minimum. PI would specify all activities that could be carried out in three to six months and prioritize them.

On the basis of the advice of the PAB, the PI has uploaded the revised Pilot project by reducing the total cost to Rs.50 lakhs.

The Summary of proposal is attached at **Appendix-VIII**

The PAB is requested to consider the above for approval.

**Minutes of the 12<sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and Communication Technology held on 3<sup>rd</sup> February, 2010 at 4.00 p.m. in Conference Room No.112-C Wing, Shastri Bhavan, New Delhi.**

The 12<sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and Communication Technology held on 3<sup>rd</sup> February, 2010 at 4.00 p.m. in Conference Room No.112-C Wing, Shastri Bhavan, New Delhi under the Chairpersonship of Secretary, Department of Higher Education.

The list of members who participated in the meeting is at Annexure-I.

Mrs.Vibha Puri Das, Secretary, Department of Higher Education welcomed all the members. Thereafter, agenda items were discussed and the following decisions were taken:

**Item No. 1:**

Chairperson requested all the members to give their comments, if any, on the Minutes of the 11<sup>th</sup> PAB Meeting. Since no comments were received, the Minutes of the 11<sup>th</sup> PAB Meeting held on 4<sup>th</sup> December, 2009 were then confirmed.

**Item No. 2:**

Project Approval Board approved payment of sitting fee of Rs.1000/- (Rupees one thousand only) to the non-official members of Project Approval Board of NMEICT for their participation in each of the meetings of the PAB. The sitting fee shall be paid by the Mission Secretariat of the NMEICT.

**Item No.3:**

The Item was discussed in detail. PAB decided that the information uploaded on the electronics media is a foolproof system of transparency. Hence, there is no need to obtain public opinion before release of grant. However, the PAB has advised to systematically upkeep all the records and documents of the projects proposal to fulfill the requirement of transparency.

**Item No.4:**

The PAB has approved to include the name of Indian Institute of Advance Studies, Shimla (IIAS) under Indian National Library and Information Services Infrastructure for Scholarly Content (N-LIST) Programme and extend the access facility of all the resources which are being proposed under NLIST Project.

Further, the INFLIBNET be separately advised to include IIAS as member of the Consortium and extend the free access facility of e-resources in Social Sciences and Humanities.

**Item No.5**

The PAB has presently approved 10Mbps Internet connectivity to each universities and colleges all over the States in India. However, the connectivity to certain institutes which do not fall under universities/colleges, for those institutes the connectivity is not provided under the mission.

Considering the importance of INFLIBNET in driving the Mission's Objectives, PAB approved to provide 10Mbps Internet connectivity to Information and Library Network Centre (INFLIBNET).

**Item No.6**

The Item was discussed in detail. The PAB decided that the premises at Delhi University, JNU and AIU may be explored for hiring of office space for Mission Secretariat of NMEICT. Further, the PAB requested Dr.M.D.Tiwari, Director, IIIT, Allahabad to personally explore the possibilities of providing space for Mission Secretariat at AIU.

**Item No.7**

The PAB has considered to include new IITs, NITs and IISERs in providing 1Gbps internet connectivity in view of the requirement and also to invite more number of institutions in participation of the Mission Objective.

**General Comments of PAB**

1. The BSNL to ensure that all Central Colleges/Universities to receive internet connectivity by 31<sup>st</sup> March, 2010.
2. A stringent time-frame has to be drawn for implementation of the connectivity.
3. Frequent review of the progress made towards internet connectivity by BSNL has to be undertaken at MHRD during PAB meetings.
4. The internet connectivity through optical fibre may be initiated immediately by BSNL so as to cover the maximum number of connections within this financial year.
5. The PAB has also advised BSNL to inform MHRD on the issue of transfer of grant through 'Letter of Credit' (LOC) so that funds from the Mission may be provided to BSNL in a short period for their maximum utilization before 31<sup>st</sup> March, 2010.

**Item No.8****Matters for Reporting to PAB****(A). Technical Support Group (TSG) activities of EdCIL**

All the issues detailed under the item were noted by PAB.



**(B). Steps to get Consultants under the Mission Secretariat**

The PAB was informed that the process of recruitment of Sr. consultants, as per the requirements of the Mission within parameters of the PAB decision has been initiated.

**Item No.9**

Dr. Rajanish Dass and Dr. Pradeep Verma made the presentation on “Awareness Building & Publicity Strategy Formulation”.

After discussion, the PI committed the following outcomes:

- The strategy for diffusion and deliverables such as advertisements, etc for each of the 5 regions.
- Five products of advertisement etc will be provided in each of the 5 Regions.
- The strategy cutting across all the States bringing out mechanisms and products, subject-wise, for diffusion in the States, who are not coming up with the projects.
- Running tickers in Mission’s website ([www.sakshat.ac.in](http://www.sakshat.ac.in)) and other important government websites.

Thereafter, the PAB approved the proposal worth Rs.63 lakhs, as recommended by the Standing Committee in its meeting held on 22<sup>nd</sup> August, 2009, with the condition that the above committed outcomes should be accomplished within two months of receipt of funds.

**The following presentations were made before the PAB:**

**1. Virtual Lab**

The virtual lab project status was presented before the PAB. The PI has come up with the “open issues” before the PAB. These were discussed in detail.

The PAB has suggested the following:

- Apart from IITs & premier institutes, other institutes should also be covered under the said project.
- PAB noted that, since the i-lab is available for free, proposal should involve the strategy of i-lab for marketing and popularization of these labs.
- The project should indicate clearly how many experiments are going to come-up, how many are not covered, what subjects are covered, what is the load required, cost, etc in their proposal. Also indicated to be more focused in their proposal.
- PAB advised to put up the proposal in next 10 days after catering to this.

The proposal was appreciated by PAB.

## **2. Village Community Network**

The PI had presented the proposal before the PAB and explained that the main features of the project are as follows:

- This is a low cost networking system suitable to all the needs of NMEICT and is a standalone network system.
- This networking system shall be a next mile to NMEICT in regard to the overall economics of the project.
- The Issue regarding the spectrum allocation for e-education is a matter which will be looked into.

PAB advised PI to convert proposal in phases so that learning for each phase can be incorporated in next phase. The technology has to be demonstrated and shown as to how this can be implemented to the users and public at large.

The PAB has appreciated the proposal.

## **3. Teacher empowerment, Student empowerment and Integration tools for empowerment (Synchronous delivery) (AKA) Talk to a teacher**

The PI had presented the proposal before the PAB and the following was discussed:

- The training center should be blended with Edusat & Network through cables
- The scaling should be done in respect to the training of teachers so as to popularize the scheme.

The PAB has appreciated the proposal.

#### **4. Brihaspathi-2**

The PI had presented the proposal before the PAB and highlighted the following:

- This is a peer to peer attempt and is done for the first time in the world.
- The servers are not required here and each computer shall act as an individual server.

The PAB has appreciated the proposal.

#### **5. Education Resources Planning (ERP)**

The PI had presented the proposal before the PAB and highlighted that the ERP system shall be donated to the country. The cost of the proposal is Rs. 20.46 crores.

The PAB on hearing the project proposal has made the following comments:

- The software to be used should be of open source and much more adaptable & practical.
- An independent group / user group is to be formed to look into each area / segment of ERP and give a feed-back for its optimization. Also the group should be in a position to assess the compatibility of the software.

The PAB has appreciated the proposal.

#### **Any other Item**

##### **1. Creating Accessible study material for print impaired students by Nirmita Narasimhan, Centre for Internet and Society, Bangalore.**

The PI had presented the proposal before the Standing Committee Meeting held on 18<sup>th</sup> and 19<sup>th</sup> July 2009. The SC in their recommendation had proposed for sanction of Pilot.

The PAB after hearing the views of the SC members, noted that it is the fundamental prerogative of National Missions such as NMEICT to provide funds for ensuring education independent of geography, economical and social status and above all physical disabilities of citizens of India. Hence, PAB has accepted to sanction the project for pilot for an amount Rs.53.00 lakhs (Rupees Fifty three lakhs) and IIT Kharagpur is identified as a nodal center for release of grant.

### **General Points Discussed**

1. The SC Members requested PAB to continue to provide Rs.2 lakhs for each IITs and other premier institutes for undertaking workshop, seminars etc at their respective institutes for propagation of NMEICT.

The PAB agreed to provide Rs.2.00 lakhs for each IITs and other premier institutes for undertaking workshop, seminars etc at their respective institutes for propagation of NMEICT, on receipt of such proposals.

2. The PAB suggested that the important projects may be captured at the pilot stage itself and may be put up in website and made available in the form of CDs etc so as to disseminate the importance of NMEICT at initial stage rather than waiting till the main project is completed.
3. The PAB advised that all the e-content should be checked thoroughly for their existence which is already available in the open domain. For this purpose, the colleges may be contacted and feedback may be obtained on the various subject materials. To have a control on the e-content materials being generated through mission, a centralized monitoring has to be undertaken to avoid any duplication.

For the above said purpose, PAB has approved to constitute team/consultants, project-wise, for monitoring the same.

4. PAB advised that on frequent intervals a status note document has to be prepared and distributed across the States preferably half-yearly for effective propagation of the Mission.

5. The Standing Committee Members should pro-actively propagate the Mission objectives and identify groups for coming up with write-up in newsletters, dailies, etc to popularize the scheme.
6. The PIs had requested the PAB to accord approval for continuation of their staff/ manpower presently engaged for the pilot project in view of the fact that the Main DPR is still under consideration by the Mission. The PAB has approved that in the pilot projects, PIs may hold the manpower under their projects until 31<sup>st</sup> March, 2010.
7. The PAB has suggested that looking into the technical details by the PAB is very difficult and as such advised to create a forum where domain experts should evaluate the projects and give their inputs & recommendations in the form of summary for each project for PAB to take decisions.
8. DPR should include requirement of extension services and recommendation should be made in this regard by Standing Committee.
9. Independent Group of Reviewers should evaluate the product in a project.

**The meeting ended with thanks to the Chair.**

## Annexure-I

**Attendance of the 12<sup>th</sup> Meeting of the Project Approval Board (PAB) of the National Mission on Education through Information & Communication Technology held on 3<sup>rd</sup> February, 2010 at 4.00 p.m. at Conference Room No. 112, 'C' Wing, Shastri Bhawan, New Delhi – 110001.**

S.No.	Name, Designation and Address	Phone No., Fax and Email
1	Ms. Vibha Puri Das Secretary (HE) MHRD, Shastri Bhawan, New Delhi <b>Chairperson</b>	
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**Action Taken Report on the  
Minutes of the 12<sup>th</sup> Meeting of the Project Approval Board of National Mission on Education through Information and  
Communication Technology held on 3<sup>rd</sup> February, 2010**

Decision Taken by PAB	Action Taken
<p><b>Item No. 1:</b></p> <p>Chairperson requested all the members to give their comments, if any, on the Minutes of the 11<sup>th</sup> PAB Meeting. Since no comments were received, the Minutes of the 11<sup>th</sup> PAB Meeting held on 4<sup>th</sup> December, 2009 were then confirmed.</p>	<p>Minutes confirmed</p>
<p><b>Item No. 2:</b></p> <p>Project Approval Board approved payment of sitting fee of Rs.1000/- (Rupees one thousand only) to the non-official members of Project Approval Board of NMEICT for their participation in each of the meetings of the PAB. The sitting fee shall be paid by the Mission Secretariat of the NMEICT.</p>	<p>Noted for action by the Mission Secretariat</p>
<p><b>Item No.3:</b></p> <p>The Item was discussed in detail. PAB decided that the information uploaded on the electronics media is a foolproof system of transparency. Hence, there is no need to obtain public opinion before release of grant. However, the PAB has advised to systematically upkeep all the records and documents of the projects proposal to fulfill the requirement of transparency.</p>	<p>Noted for action by the Mission Secretariat</p>

<p><b>Item No.4:</b></p> <p>The PAB has approved to include the name of Indian Institute of Advance Studies, Shimla (IIAS) under Indian National Library and Information Services Infrastructure for Scholarly Content (N-LIST) Programme and extend the access facility of all the resources which are being proposed under NLIST Project.</p> <p>Further, the INFLIBNET be separately advised to include IIAS as member of the Consortium and extend the free access facility of e-resources in Social Sciences and Humanities.</p>	<p>INFLIBNET being advised accordingly.</p>
<p><b>Item No.5</b></p> <p>The PAB has presently approved 10Mbps Internet connectivity to each universities and colleges all over the States in India. However, the connectivity to certain institutes which do not fall under universities/colleges, for those institutes the connectivity is not provided under the mission.</p> <p>Considering the importance of INFLIBNET in driving the Mission's Objectives, PAB approved to provide 10Mbps Internet connectivity to Information and Library Network Centre (INFLIBNET).</p>	<p>INFLIBNET being informed accordingly.</p>
<p><b>Item No.6</b></p> <p>The Item was discussed in detail. The PAB decided that the premises at Delhi University, JNU and AIU may be explored for hiring of office space for Mission Secretariat of NMEICT. Further, the PAB requested Dr.M.D.Tiwari, Director, IIIT, Allahabad to personally explore the possibilities of providing space for Mission Secretariat at AIU.</p>	<p>AIU has expressed its inability to provide space for the Mission Secretariat</p>

<p><b>Item No.7</b></p> <p>The PAB has considered to include new IITs, NITs and IISERs in providing 1Gbps internet connectivity in view of the requirement and also to invite more number of institutions in participation of the Mission Objective.</p>	<p>Noted for necessary action.</p>
<p><b>General Comments of PAB</b></p> <ol style="list-style-type: none"> <li>1. The BSNL to ensure that all Central Colleges/Universities to receive internet connectivity by 31<sup>st</sup> March, 2010.</li> <li>2. A stringent time-frame has to be drawn for implementation of the connectivity.</li> <li>3. Frequent review of the progress made towards internet connectivity by BSNL has to be undertaken at MHRD during PAB meetings.</li> <li>4. The internet connectivity through optical fibre may be initiated immediately by BSNL so as to cover the maximum number of connections within this financial year.</li> <li>5. The PAB has also advised BSNL to inform MHRD on the issue of transfer of grant through 'Letter of Credit' (LOC) so that funds from the Mission may be provided to BSNL in a short period for their maximum utilization before 31<sup>st</sup> March, 2010.</li> </ol>	<p>Letter to BSNL is being issued.</p>
<p><b>Item No.8</b></p> <p><b>Matters for Reporting to PAB</b></p> <p><b>(A). Technical Support Group (TSG) activities of EdCIL</b></p> <p>All the issues detailed under the item were noted by PAB.</p> <p><b>(B). Steps to get Consultants under the Mission Secretariat</b></p> <p>The PAB was informed that the process of recruitment of Sr. consultants, as per the requirements of the Mission within parameters of the PAB decision has been initiated.</p>	<p>-</p> <p>-</p>

**Item No.9**

Dr. Rajanish Dass and Dr. Pradeep Verma made the presentation on "Awareness Building & Publicity Strategy Formulation".

After discussion, the PI committed the following outcomes:

- The strategy for diffusion and deliverables such as advertisements, etc for each of the 5 regions.
- Five products of advertisement etc will be provided in each of the 5 Regions.
- The strategy cutting across all the States bringing out mechanisms and products, subject-wise, for diffusion in the States, who are not coming up with the projects.
- Running tickers in Mission's website ([www.sakshat.ac.in](http://www.sakshat.ac.in)) and other important government websites.

Thereafter, the PAB approved the proposal worth Rs.63 lakhs, as recommended by the Standing Committee in its meeting held on 22<sup>nd</sup> August, 2009, with the condition that the above committed outcomes should be accomplished within two months of receipt of funds.

Proposal has been processed by the concerned Division.

<p><b>The following presentations were made before the PAB:</b></p> <p><b>1. Virtual Lab</b></p> <p>The virtual lab project status was presented before the PAB. The PI has come up with the “open issues” before the PAB. These were discussed in detail.</p> <p>The PAB has suggested the following:</p> <ul style="list-style-type: none"> <li>• Apart from IITs &amp; premier institutes, other institutes should also be covered under the said project.</li> <li>• PAB noted that, since the i-lab is available for free, proposal should involve the strategy of i-lab for marketing and popularization of these labs.</li> <li>• The project should indicate clearly how many experiments are going to come-up, how many are not covered, what subjects are covered, what is the load required, cost, etc in their proposal. Also indicated to be more focused in their proposal.</li> <li>• PAB advised to put up the proposal in next 10 days after catering to this.</li> </ul> <p>The proposal was appreciated by PAB.</p>	<p>Proposal is being placed before PAB as Agenda Item No.3</p>
<p><b>2. Village Community Network</b></p> <p>The PI had presented the proposal before the PAB and explained that the main features of the project are as follows:</p> <ul style="list-style-type: none"> <li>• This is a low cost networking system suitable to all the needs of NMEICT and is a standalone network system.</li> <li>• This networking system shall be a next mile to NMEICT in regard to the overall economics of the project.</li> <li>• The Issue regarding the spectrum allocation for e-education is a matter which will be looked into.</li> </ul> <p>PAB advised PI to convert proposal in phases so that learning for each phase can be incorporated in next phase. The technology has to be demonstrated and shown as to how this can be implemented to the users and public at large.</p> <p>The PAB has appreciated the proposal.</p>	<p>Proposal is being placed before PAB as Agenda Item No.7</p>

<p><b>3. Teacher empowerment, Student empowerment and Integration tools for empowerment (Synchronous delivery) (AKA) Talk to a teacher</b></p> <p>The PI had presented the proposal before the PAB and the following was discussed:</p> <ul style="list-style-type: none"> <li>• The training center should be blended with Edusat &amp; Network through cables</li> <li>• The scaling should be done in respect to the training of teachers so as to popularize the scheme.</li> </ul> <p>The PAB has appreciated the proposal.</p>	<p>Proposal is being placed before PAB as Agenda Item No.5</p>
<p><b>4. Brihaspathi-2</b></p> <p>The PI had presented the proposal before the PAB and highlighted the following:</p> <ul style="list-style-type: none"> <li>• This is a peer to peer attempt and is done for the first time in the world.</li> <li>• The servers are not required here and each computer shall act as an individual server.</li> </ul> <p>The PAB has appreciated the proposal.</p>	<p>Proposal is being placed before PAB as Agenda Item No.8</p>
<p><b>5. Education Resources Planning (ERP)</b></p> <p>The PI had presented the proposal before the PAB and highlighted that the ERP system shall be donated to the country. The cost of the proposal is Rs. 20.46 crores.</p> <p>The PAB on hearing the project proposal has made the following comments:</p> <ul style="list-style-type: none"> <li>• The software to be used should be of open source and much more adaptable &amp; practical.</li> <li>• An independent group / user group is to be formed to look into each area / segment of ERP and give a feed-back for its optimization. Also the group should be in a position to assess the compatibility of the software.</li> </ul>	<p>Proposal is being placed before PAB as Agenda Item No.4</p>

The PAB has appreciated the proposal.	
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<b>Any other Item</b>	
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<b>1. Creating Accessible study material for print impaired students by Nirmita Narasimhan, Centre for Internet and Society, Bangalore.</b>	
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The PI had presented the proposal before the Standing Committee Meeting held on 18 <sup>th</sup> and 19 <sup>th</sup> July 2009. The SC in their recommendation had proposed for sanction of Pilot.	
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The PAB after hearing the views of the SC members, noted that it is the fundamental prerogative of National Missions such as NMEICT to provide funds for ensuring education independent of geography, economical and social status and above all physical disabilities of citizens of India. Hence, PAB has accepted to sanction the project for pilot for an amount Rs.53.00 lakhs (Rupees Fifty three lakhs) and IIT Kharagpur is identified as a nodal center for release of grant.	
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Proposal has been processed by the concerned Division
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### General Points Discussed

1. The SC Members requested PAB to continue to provide Rs.2 lakhs for each IITs and other premier institutes for undertaking workshop, seminars etc at their respective institutes for propagation of NMEICT.

The PAB agreed to provide Rs.2.00 lakhs for each IITs and other premier institutes for undertaking workshop, seminars etc at their respective institutes for propagation of NMEICT, on receipt of such proposals.

2. The PAB suggested that the important projects may be captured at the pilot stage itself and may be put up in website and made available in the form of CDs etc so as to disseminate the importance of NMEICT at initial stage rather than waiting till the main project is completed.

3. The PAB advised that all the e-content should be checked thoroughly for their existence which is already available in the open domain. For this purpose, the colleges may be contacted and feedback may be obtained on the various subject materials. To have a control on the e-content materials being generated through mission, a centralized monitoring has to be undertaken to avoid any duplication.

For the above said purpose, PAB has approved to constitute team/consultants, project-wise, for monitoring the same.

4. PAB advised that on frequent intervals a status note document has to be prepared and distributed across the States preferably half-yearly for effective propagation of the Mission.

5. The Standing Committee Members should pro-actively propagate the Mission objectives and identify groups for coming up with write-up in newsletters, dailies, etc to popularize the scheme.

Noted. Additional format has been circulated for summary of DPR

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|---|--|
| <ol style="list-style-type: none"><li>6. The PIs had requested the PAB to accord approval for continuation of their staff/ manpower presently engaged for the pilot project in view of the fact that the Main DPR is still under consideration by the Mission. The PAB has approved that in the pilot projects, PIs may hold the manpower under their projects until 31st March, 2010.</li><li>7. The PAB has suggested that looking into the technical details by the PAB is very difficult and as such advised to create a forum where domain experts should evaluate the projects and give their inputs &amp; recommendations in the form of summary for each project for PAB to take decisions.</li><li>8. DPR should include requirement of extension services and recommendation should be made in this regard by Standing Committee.</li><li>9. Independent Group of Reviewers should evaluate the product in a project.</li></ol> |  |
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## APPRAISAL OF DPR FOR VIRTUAL LABS BY STANDING COMMITTEE

### 1. Objectives

- a. To identify suitable topics where Virtual Labs will provide maximum benefit to a large number of students using them.
- b. To design these Virtual Lab which will essentially comprise of a user-friendly graphical front-end, working in synchronization with a backend, possibly consisting of a simulation-engine running on a server or actual measurement data or a remotely-triggered experiment.
- c. To develop approximately one hundred and fifty Virtual Labs in various areas of Science and Engineering. These labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.

### 2. Deliverables

The end deliverable is to develop approximately **one hundred and fifty Virtual Labs** in various areas of Science and Engineering.

The deliverables for individual Virtual Lab and the release of funds are linked as follows:

- i) 1st Installment 40% - Released upfront so that the initial purchases and development can begin.

**Target output:** Successful demonstration of **3 Experiments**.

**Time frame:** 6 months, ending with the 1st review by an expert panel.

- ii) 2nd Installment 30% - For the development of the next 3 experiments. A deployment plan should be in hand.

**Target output:** **1st review** comments being satisfied + Successful demonstration of **6 Experiments** + Initiation of **Field trials**.

**Time frame:** 12 months, ending with the 2nd review by an expert panel.

- iii) 3rd installment 30% - For completing all other experiments and deployment plan initiation.

**Target output:** **2nd review** comments being satisfied + Successful demonstration of **all proposed Experiments** + **Field trial data**.

**Time frame to complete:** Last 9 months, ending with the 3rd review.

### 3. Recommendation

- i) Arrangement for quality control
  - a. Periodic reviews
- ii) Accuracy
  - a. Technical Review by experts in the area
- iii) Coverage
  - a. Each proposer of the Virtual Lab has identified a plan for coverage.
- iv) Updation mechanism
  - a. Technical Review and Feedback by experts in the area
- v) Testing by users
  - a. Field trials are an integral part of the proposal
- vi) Testing by peer group
  - a. Testing will be carried out within the institute as well as across institutes.

### 4. Scaling up

#### a) Plan

For Scaling up of the Virtual Labs beyond the lifetime of the project, there are at-least three possible avenues:

- **Start-up companies / Incubation Units** at the Participating Institutes, and elsewhere.
- The **Public Private Partnership (PPP)** model (in accordance with Government Rules & Procedures)
- Using **Government/Private Colleges** as nodal centers

Each proposer of the Virtual Lab has identified and given a **possible plan** to explore one or more of the above-mentioned avenues for Scaling up.

### 5. Popularizing and extension activities and plans.

#### a. Strategy for popularization

One or more strategies mentioned below will be followed:

- i) Local / National Workshops
- ii) Website
- iii) Print Media

**b. Extension activities and plans**

- i) Maintenance mechanism
- ii) User feedback mechanism, its execution procedure and corrective measures.

b. Each proposer of the Virtual Lab has identified and given a **possible plan** for extension, maintenance and feedback mechanism. Field trials are an integral part of the proposal. Periodic peer reviews are also planned.

**6. Review Mechanism**

Periodic reviews are a part of this project. The release of payment is linked to deliverables and their reviews.

- i) 1st review by an expert panel: Time frame: 6 months
- ii) 2nd review by an expert panel: Time frame: 12 months
- iii) 3rd review by an expert panel: Time frame: To be decided

**a. Frequency of reviews**

- 6 Months or as decided by the Steering Committee

**b. List at least 10 Reviewers, who are eminent in fields of the project.**

**Table 1. List of Reviewers**

Prof M.S Ananth	IITM	22578001	ananth@iitm.ac.in
Prof. S.c Saxena	IITR	91-1332-285500	Director@iitr.ernet.in
Prof S.G Dhande	IITK	91-512-2590763	sgd@iitk.ac.in
Prof. Sukhatme	IITB	022-25767508	
Prof Gautam Viswas	IITK		gtm@iitk.ac.in
Prof S.C sahasrabudhe	IICT	079-3051-0572	scs@daiict.ac.in
Prof. Ashok jhunjunwala	IITM	4408	Ashok @iitm.ac.in

Prof. B.Ramamurti	IITM	91-44- 22574674	ramoo@iitm.ac.in
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## 7. Budget

### a. Capital Expenditure

**Table 2. Year wise break-up for the Disciplines**

	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	Total
Electronics & Communications	2291	1174	828.2	4292.8
Civil Engineering	696	519.2	354.9	1570.11
Electrical Engineering	841.7	959.5	611.4	2412.55
Biotechnology & Biomedical Sciences	417.1	379.4	281.1	1077.62
Physical Sciences	786.6	531.3	247.1	1564.99
Chemical Engineering	407.9	224	191	822.89
Chemical Sciences	335.2	309.9	110	755.15
Computer Sciences	919.28	638.4	435.82	1993.5
Mechanical Engineering	1657	1265	713.8	3636.49
Others	1219	568.6	414.1	2201.21
<b>Total</b>	<b>9570.78</b>	<b>6569.3</b>	<b>4187.42</b>	<b>20327.41</b>

**b. Revenue Expenditure**

**Table 3. Item-wise budget break-up for Three Years**

<b>SN</b>	<b>Equipment/Activity</b>	<b>Budget (Apr '09 – Mar '10)</b>	<b>Budget (Apr '10 – Mar '11)</b>	<b>Budget (Apr '11 – Mar '12)</b>	<b>Total (in Lakhs)</b>
1	Total Budget including hardware, manpower, etc. of all labs	9570.78	6569.3	4187.42	20327.41
2	Budget for new Institutes / new labs joining this Mission Project	300	300	300	900
3	Honoraria	400	400	400	1200
4	Coordination Budget for Participating Institutes	15	15	15	45
5	Deployment & Maintenance	1000	2000	2000	5000
	<b>TOTAL</b>	<b>11285.78</b>	<b>9284.3</b>	<b>6902.42</b>	<b>27472.41</b>

Honoraria for the faculty developing the labs will be released in two phases: 50%+50% each year

**c. Please indicate the Anchor Institution for disbursement of funds.**

➤ IIT DELHI

**8. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives.**

Virtual Labs have the potential to cater to many more students as opposed to a physical lab, besides being more cost effective. We present here a cost-benefit analysis for Virtual Labs. Virtual Labs provide the cost advantage due to the following reasons:

1. Virtual Labs can be used outside the regular lab hours.
2. Virtual Labs can be used every day, including the weekend.

The cost analysis for an actual equipment-based physical lab is given in Table 4. The cost analysis for the corresponding remote-triggered Virtual Lab is presented in Table 5. The cost analysis for an actual simulation-based physical lab is given in Table 6 while the analysis for the corresponding simulation-based Virtual Labs is presented in Table 7.

Table 8 gives the Student Gain Factor (SGF) and the Economic Gain Factor (EGF). The average SGF greater than unity implies that the same equipment in a Virtual Lab can support more number of students per year. Our approximate calculation suggests that the average SGF equals 19.3. Thus Virtual Labs can support almost twenty times the number of students. The initial calculations suggest the EGF equal to 12.8. This implies that the average cost per student is almost 13 times cheaper in the case of Virtual Labs.

Table 9 gives a list of equipment-intensive labs within the umbrella of the Virtual Labs project. All these labs require one or more equipment of value greater than 50 Lakhs. Thus these labs can serve as National Resource Centres and can provide lab facilities centrally.

**Other intangible benefits of Virtual Labs that cannot be measured in Rupee terms:**

- a. Many colleges, who may be able to afford some of the equipment, probably do not know how to design experiments around them or even to run an experimental lab. Virtual Labs will be an asset in such cases.
- b. New experiments can be added at the central location, and all users of Virtual Labs can benefit from the up-gradation. Similarly, removal of obsolete experiments can be done centrally.
- c. Using this remote infrastructure, several colleges can try out the experiments and decide whether or not to include it in their curriculum. If found suitable, the colleges can replicate them in large numbers, say thousands, thereby promoting actual, hands-on experimentation, as well.
- d. Apart from sharing of equipment, Virtual Labs provide additional resources, laboratory manuals, pre- and post experiment quizzes for self-evaluation.
- e. Virtual labs provides them an opportunity for people in non-formal sectors, including, industry.



**Table 4. Cost analysis for an actual Equipment-based physical Laboratory**

<b>Parameter</b>	<b>Estimate</b>	<b>Remarks / Justification</b>
Cost a traditional lab setup to be used by a student group	Rs. 3,00,000	A typical number
No of students in a group	2	Typically 2 – 3 students per group
Duration of a typical experiment (hours)	2	Typically 2 – 3 Hours
No. of experiments performed by one student-group per week	1	Typically we have 1 lab class per week for a particular lab course
Number of experiments that can be supported by the laboratory per day (8 hour working day)	3	Assuming 2 Hour lab-class, with break
Number of working days per week	5	Assuming 5 day week
Number of weeks per year of lab classes	24	Assuming 2 semesters per year, 14 weeks per semester, out of which 12 weeks of labs classes
Total number of experiments that can be conducted in a year	360	$(\text{Experiments / day}) \times (\text{days / week}) \times (\text{weeks / year})$
No. of experiments that can be performed by a student-group per year	24	$(\text{Lab class / week}) \times (\text{weeks / year})$
No. of student groups who use this setup per year	15	$(\text{Experiments / Year}) / (\text{Experiments / Student Group})$
No. of students who use this setup per year	30	$(\text{Student Group / Year}) \times (\text{Students / Student Group})$
Cost per student per year	Rs. 10000	$(\text{Cost of equipment}) \times (\text{Student / Year})$

**Table 5. Cost analysis for a Remotely Triggered Virtual Laboratory**

<b>Parameter</b>	<b>Estimate</b>	<b>Remarks / Justification</b>
Cost a Virtual lab setup to be used by a student	Rs. 4,50,000	This is 1.5 times the cost for the equipment of a traditional lab since it includes the cost of bandwidth, server, website and other software.
No of students in a group	1	Typically each student will access the Virtual Lab alone
Duration of a typical experiment (hours)	2	Typically 2 – 3 Hours
Duration of a typical experiment while being done virtually (hours)	0.5	Assuming software front end will permit dry run and setup of experimental parameters
No. of hours the Virtual Lab will operate per day	18	Assuming 6 hours of dead time / maintenance time
No. of days the Virtual Lab will operate per week	7	By design
No. of weeks the Virtual Lab will operate per year	50	Assuming 2 weeks for maintenance per year
No. of hours for which lab is available per year	6300	$(\text{Hours / day}) \times (\text{days / week}) \times (\text{weeks / year})$
No. of students who can use this setup per year	525	$(\text{Hours Available/ Year}) / (\text{Hours /Experiments}) / (\text{Experiments / Year / Student})$
Cost per student per year	Rs. 857	$(\text{Cost of equipment}) \times (\text{Student / Year})$

**Table 6. Cost analysis for an Actual Simulations Laboratory**

<b>Parameter</b>	<b>Estimate</b>	<b>Remarks / Justification</b>
Cost a traditional lab setup to be used by a student group	Rs. 50,000	Basic cost of a PC
No of students in a group	1	Typically 1 – 2 students per group
Duration of a typical experiment (hours)	1	Typically 1 Hour long simulation experiments
No. of experiments performed by one student-group per week	1	Typically we have 1 lab class per week for a particular lab course
Number of experiments that can be supported by the laboratory per day (8 hour working day)	5	Assuming 1 Hour lab-class, with break
Number of working days per week	5	Assuming 5 day week
Number of weeks per year of lab classes	24	Assuming 2 semesters per year, 14 weeks per semester, out of which 12 weeks of labs classes
Total number of experiments that can be conducted in a year	600	$(\text{Experiments / day}) \times (\text{days / week}) \times (\text{weeks / year})$
No. of experiments that can be performed by a student-group per year	24	$(\text{Lab class / week}) \times (\text{weeks / year})$
No. of student groups who use this setup per year	25	$(\text{Experiments / Year}) / (\text{Experiments / Student Group})$
No. of students who use this setup per year	25	$(\text{Student Group / Year}) \times (\text{Students / Student Group})$
Cost per student per year	Rs. 2000	$(\text{Cost of equipment}) \times (\text{Student / Year})$

**Table 7. Cost analysis for a Simulations-based Virtual Laboratory**

<b>Parameter</b>	<b>Estimate</b>	<b>Remarks / Justification</b>
Cost a Virtual lab simulation-setup to be used by a student	Rs. 75,000	This is 1.5 times the cost of the traditional simulations lab since it includes the cost of bandwidth, server, website and other software.
No of students in a group	1	Typically each student will access the Virtual Lab alone
Duration of a typical experiment (hours)	1	Typically 1 Hour long simulation experiments
Duration of a typical experiment while being done virtually (hours)	0.5	Assuming software front end will permit dry run and setup of experimental parameters
No. of hours the Virtual Lab will operate per day	18	Assuming 6 hours of dead time / maintenance time
No. of days the Virtual Lab will operate per week	7	By design
No. of weeks the Virtual Lab will operate per year	50	Assuming 2 weeks for maintenance per year
No. of hours for which lab is available per year	6300	$(\text{Hours / day}) \times (\text{days / week}) \times (\text{weeks / year})$
No. of students who can use this setup per year	525	$(\text{Hours Available/ Year}) / (\text{Hours /Experiments}) / (\text{Experiments / Year / Student})$
Cost per student per year	Rs. 143	$(\text{Cost of equipment}) \times (\text{Student / Year})$

**Table 8. Cost benefit analysis – Physical Lab versus Virtual Lab**

Physical Lab		Virtual Lab		Remarks	
	Equipment Based	Simulation Based	Remote Triggered	Simulation Based	
No. of students who can use this setup per year	30	25	525	525	<b>Average Student Gain Factor = 19.3</b>
Cost per student per year	10000	2000	857	143	<b>Average student Gain Factor = 12.8</b>

**Table 9. Equipment-intensive Virtual Laboratories**

Name of the Lab / Facility	Name of Institute
Scanning Electron Microscope Lab Facility	IIT Delhi
Virtual Combustion Lab	IIT Kanpur
Virtual Material Processing Lab	IIT Kanpur
Low Temperature Magnetic Property Lab	IIT Kanpur
Microelectronics and VLSI Lab	IIT Kharagpur
Virtual Earthquake Simulation Lab	IIT Kharagpur
Virtual Mechanical Vibration Lab	IIT Guwahati
Virtual Advanced Lab for Interactive Design Analysis and Test in Electronics	Dayalbagh University
Biotechnology Lab	Amrita University
Nanotechnology Lab	Amrita University

## 9. Social impact

Physical distances, costly equipment and limited expertise often put constraints on performing experiments. However, it is possible to develop web enabled experiments for remote operation so as to enthuse the curiosity and innovation of students. Recently, a pilot project on Virtual Labs was sanctioned by MHRD in order to develop a proof of concept. During the pilot phase, more than fifteen Virtual Labs were successfully developed and demonstrated.

The basic aim of this main project on Virtual Labs is to design and develop Virtual Lab in various areas of Science and Engineering in order to benefit **maximum number of students**. The Virtual Labs will essentially comprise of a user-friendly graphical front-end, working in synchronization with a backend, possibly consisting of a simulation-engine running on a server or actual measurement data or a remotely-triggered experiment. The Virtual Labs would cater to students at the **undergraduate level, post graduate level as well as to research scholars**. These Virtual Labs can be centrally maintained and upgraded as and when required. It is expected that an outcomes of the project would be **human resource development**. The Virtual Labs are expected to enthuse students about performing 'experiments' and thereby getting them interested in their respective disciplines in a meaningful way. This is a joint project proposal by twelve participating institutes, being nationally coordinated by IIT Delhi.

## 10. Outcome – Extent to which the project will realize the objectives of the Mission may be given explicitly.

- Objectives of the mission will be satisfied.

# ERP mission

## Appraisal of DPR by standing committee

### 1. Objectives

The objectives of this mission is to develop software system as loosely coupled software modules with single authentication to provide for online functionalities useful for academic institutes. Typical of these functionalities are learning management, sharing content, student tracking and visualization for interpreting student related data, optimal time-table management for academic activities, curriculum and course planning system, online examination, online admission management, salary management, account management and audit, grant management for the grants provided by various funding agency, e-portfolio management system for students, teacher performance tracking system, interface to virtual laboratories, NMEICT network related information interface, scholarship management system. All these functionalities need to be provided over multilingual framework. The software so development has to be made available as opensource for anyone to further modify, reuse and redistribute. The team will also provide services using this software which will form the testing ground for this software system. For these services, we will form a distributed cluster of servers (one at each institute) which is joined using distributed mysql and gluster for distributed file system.

### 2. Deliverables

Attached as annexure -1.

There will be a web portal for this project that will have online training materials, user guides and we will follow the train-the-trainer model to scale this to thousands of colleges.

Please note that timeline is a projection. We will try to adhere to it.

### 3. Recommendations

#### 3.1. Arrangement for quality control

The developed system will be deployed as soon as it is build in on-the-edge installation in the selected institutes (currently all the institutes partnering for development of this system). This will enable testing and early feedback for improving design and maintaining quality of software. It may be noted that software products usually becomes more stable with time as bugs get fixed, the bad parts are rewritten after feedback. Using this strategy will ensure that we will build first those parts which will be used to maximum.

The stable build will be released for mass scale deployment.

#### 3.2. Accuracy

This is not valid for software development but more relevant in case of content. The user and developer documentation will be constantly developed and updated for maintaining accuracy.

#### 3.3. Coverage

Through distributed cluster, the service will cover all institutes connected by mission network and NKN.

### 3.4. Updation mechanism

All sites will synchronize and update thier code from subversion (SVN) repository.

### 3.5. Testing by users

As on-the-edge builds will be deployed in participating institutes, the testing will be done there. For mass consumption stable builds will only be released.

### 3.6. Testing by peer group

All interested opensource volunteers will be invited to use and test the system. On-the-edge installation in institutes shall be serving as testing by peer group.

## 4. Scaling up

### 4.1. Plan

Deployment will be done over cluster of servers. These can be augmented alongwith storage. As we are planning p2p framework, the scalability is automatically taken care of.

### 4.2. Strategy

In house – all the partner institutes will deploy the servers in distributed cluster form. The system will designed to be redundant and reliable by replication of content in servers. This will make the whole system very rugged and fault-tolerant. As no outsourcing is done, no further comments regarding government procedures are needed.

## 5. Popularizing and extention activity plans

### 5.1. Strategy for popularization

Through training programmes and workshops done periodically for the targetted audience, the system will be popularized. The fliers as well as emails will be used to create awareness. Also, in various conferences, the lectures, exhibition booths will be used for further propagating the awareness.

### 5.2. Extension activities

#### 5.2.1. Maintenance mechanism

The devloped code shall be committed to SVN repository after testing. The same shall be then tested on on-the-edge installations. Thereafter it will be released on main cluster servers.

#### 5.2.2. User feedback mechanism, its execution procedure and corrective measures.

The users can report bugs, new feature request on bugzilla, yahoogroup or google-groups as well as on email. These feedbacks will be documented and assigned to developers for fixing and development. The same shall be incorporated in the main build on commit. This will keep on enhancing the quality of software system over the time.



## 6. Review mechanism

### 6.1. Frequency of review

The review committee can do the review every quarter or on six monthly basis. Further, the comments of users, bugzilla database can be used to keep track of progress of the system. Further, we shall be using our own Project management system for keeping track of progress of this project. The same can be used to keep track of progress. Each team will be making a presentation in round-robin fashion every week to remaining teams to facilitate coordination.

### 6.2. List of suggested 10 reviewers.

1. Dr.Hari Mohan Gupta, Professor, EE, IIT Delhi.
2. Dr.Y C Kim, Professor, CSE, Chonbuk National University, Jeonju, South Korea.
3. Dr.Virander Kumar Jain, Professor, EE, IIT Delhi.
4. Dr. Shekhar Verma, Professor, IIIT Allahabad.
5. Dr.Anurag Kumar, Professor, ECE, IISc Bangalore.
6. Dr.C Sivaramamurthy, Professor, CSE, IIT Madras.
7. Dr.Brejesh Lall, Associate Professor, EE, IIT Delhi.
8. Dr.Anoop Ray, Professor, EC, IIT Kharagpur.
9. Dr.D B Phatak, Professor, CSE, IIT Bombay.
10. Mr.R S Mani, NIC, DIT Delhi.

## 7. Budget

### 7.1. Capital expenditure

Annexure-II give details of equipments. None of the equipments are having worth more than 10 lakhs.

### 7.2. Recurring expenditure

Annexure-III gives details of recurring cost. There is no honorarium to be paid in the project to any existing employees of any of the institute who are partner in this project. No PI will take his salary or honorarium from this project budget.

### 7.3. Anchor institute for disbursement of funds

IIT Kanpur

## 8. Cost benefit analysis including cost effectiveness of approach viz-a-viz other alternatives.

The project is unique in the sense that this is the first time an open source initiative of this scale and on an important area like ERP is being attempted in India. Besides the very obvious cost advantages the project has this priceless outcome – brings together people from multiple institutes to work collaboratively. 150 to 200 developers will be collaborating and working together on this project. Such an work experience for the engineers is priceless.

As this approach is based on opensource and GNU-GPL licencing conditions, we can reuse lot of other opensource work done thus reducing the cost drastically. But we also need to do lot of patch work, new development to build what is missing. But this turns out to be far more cost effective, as the motivation behind this development is not to generate the profit. Further the manpower which gets trained in this project will be additional asset for nation. Further, as this whole codebase will be available as opensource, even if someone ask some commercial vendor for support, he will charge for only support thus making it much cheaper product.

We are targetting the new architecture of this whole solution as p2p in time to come. This will reduce the requirements of high end servers. The computing and storage power of user machine will get contributed to community. This will save lot of energy and will result in more greener solution in time to come.

The other alternative is to buy high-end data servers and create data centers. They will be very costly and also energy intensive. Then commercial softwares like SAP etc can be deployed through outsourcing. This will mandate many changes in the process flows at all institute. The acceptance and training cost will also be huge. While the currently taken approach will lead to build up of solution which is as per the local requirements thus minimizing the change-management cost.

Even if you were to make a reasonable estimate of say 50 lacs per year for a license for this kind of a software – assuming 30,000 colleges and say 25% of the colleges fully implement this solution, this project has unimaginable cost benefits vs the investment mission is making

## 9. Social impact

The ERP will be available as webservice (similar to google providing your email services, groups, gtalk etc.) No one need to maintain servers for google. That is taken care of distributed architecture. The operations and management of institute will become more effective and transparent. Various official in the different stage of management will be able to see the live statistics and make appropriate decisions. This transparency and easy access to information will have tremendous impact due to more accountability.

we can also do a certification in our ERP (many graduating students will be interested in this) and those certified ERP folks can further take this to other colleges for implementation. So this way we create a huge talent pool for our ERP. This will help with scaling up.

## 10. Outcome

The outcome will be software source code, documentation available to anyone under opensource GNU-GPL compatible licence. Also the services to academic community at large will be outcome at the end of the project. Even if support is stopped after three years, the source code can be used by commercial vendors to provision for commercially supported services. Thus the work done in the project will not die even if the support is not available after three years.

Once the colleges start using this new system – the system will sort of ensure consistency in key processes across colleges and this will further help in data analysis and comparison among the colleges. Today this kind of comparison is impossible to make.

## Quantum and Nano Computing Systems Centre (QANCENTRE)

### FORMAT FOR APPRAISAL OF DPR BY STANDING COMMITTEE

#### 1. Objectives

1. To bring together through ICT complementary research strengths of the partnering groups spread all over the country for rapid and effective growth of research in Quantum Information / Computation in the first such attempt in the country.
2. To utilize the latest distance learning technologies such as videoconferencing, webcasts, e-lectures, online courses for promoting quantum-nano education and provide opportunities to young scientists and researchers at any place and time for inclusive growth.
3. Dissemination of knowledge through ICT in Quantum-Nano Computing to Industries / Research and Development Organizations and academia through Workshops, Joint Seminars, Courses, Webcasts and research contacts and an Annual Winter School on Quantum and Nano Computing Systems.
4. To promote collaboration between theoretical physicists and theoretical computer scientists and explore possible applications of the technical tools of quantum field theory and string theory to problems in condensed matter theory, which is the theoretical framework underlying experimental research in nanotechnology and quantum computing.

#### 2. Deliverables

##### QUANTUM INFORMATION / COMPUTATION ROADMAP (3 YEAR GOALS)

##### Deliver

- SQUID based Quantum Computing device prototypes
- Conceptual framework for remote communication using Quantum Teleportation
- Unified Modelling Theory for Information Processing Circuits
- Web-based interfaces for using these devices at the national hub from remote locations
- National Teleportation Experiment Demonstration

##### 2009 (Year 1)

Augmentation of distance learning infrastructure and single qubit computing devices  
Organization of e-lectures / seminars / webcasts on regular basis between partner institutes  
Organization of First International Winter School on Quantum-Nano Computing

##### 2010 (Year 2)

Development of web-based courses, virtual labs enabling experimentations in distance mode  
Organization of e-lectures / seminars / webcasts on regular basis between partner institutes  
Organization of Second International Winter School on Quantum-Nano Computing

##### 2011 (Year 3)

Augmentation of e-facilities as National / International Hub in the field  
Organization of e-lectures / seminars / webcasts on regular basis between partner institutes  
Organization of Third International Winter School on Quantum-Nano Computing

##### Time schedule (year wise)

##### Year 1

##### 0-12 months

Augmentation of distance learning infrastructure and installation of SQUID devices

##### Subgoals :

**0-6 months**

Organization of e-lectures / seminars / webcasts on regular basis between partner institutes

**7-12 months**

Organization of First International Winter School on Quantum-Nano Computing

**Year 2****13-24 months**

Development of web-based courses, virtual labs enabling experimentations in distance mode

**Subgoals :****13-18 months**

Organization of e-lectures / seminars / webcasts on regular basis between partner institutes

**19-24 months**

Organization of Second International Winter School on Quantum-Nano Computing

**Year 3****25-36 months**

Augmentation of e-facilities as National / International Hub in the field

**Subgoals :****25-30 months**

Organization of e-lectures / seminars / webcasts on regular basis between partner institutes

**31-36 months**

Organization of Third International Winter School on Quantum-Nano Computing

**3. Recommendation****i) Arrangement for quality control**

Quality Control will be maintained through a Standing Review Committee comprising experts from Electrical Engineering, Electronics, Physics, Chemistry, Mathematics which will examine the ICT material developed under the project .

**ii) Accuracy**

The accuracy of the ICT material will be ensured. As a major portion of it will be generated during the Annual Winter School / Content Generation Workshop and presented before an audience of experts in the field, its accuracy will be ensured.

**iii) Coverage**

The coverage of topics in the field is quite extensive as it is an interdisciplinary area and experts from all fields, many of whom are already involved in the pilot phase will be made a part of the Content Generation Team.

**iv) Updation mechanism**

As Quantum-Nano Computing Systems is a rapidly evolving area, it is extremely important to update the material being developed. Some features can be drawn from the arXiv model used by physicists to publish material online before print.

**v) Testing by users**

The tools and facilities developed under the project will be provided online for a wider audience and their feedback obtained from time to time will be used to improve the end product.

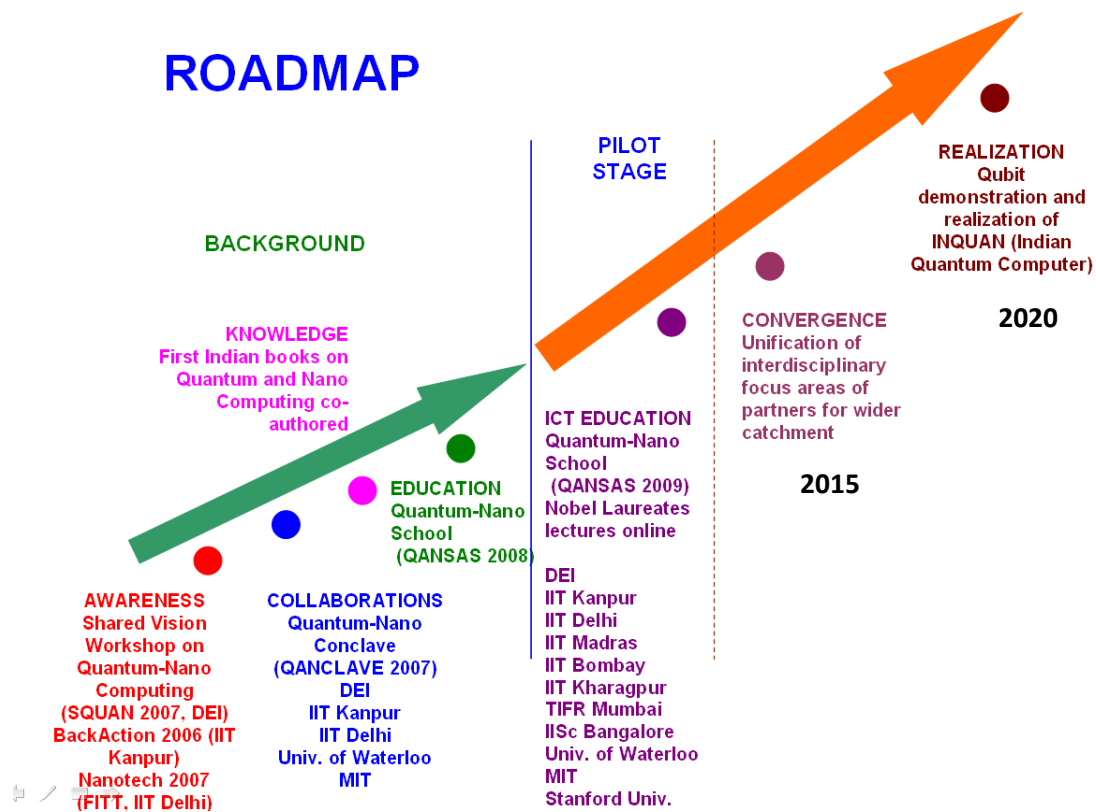
**vi) Testing by peer group**

The ICT material developed will be available online for peer group testing. It will be specifically tested, scrutinized and specifications discussed in detail during the Annual Winter School / Content Generation Workshop.

#### 4. Scaling up

##### a) Plan

The project aims to develop the Indian roadmap for Quantum Computation / Information similar to the ones already prepared in the United States, Europe and Canada.



##### b) Strategy

###### (i) In-house

Close research collaborations exist among Indian, American and Canadian researchers at the partner institutes and industries who have jointly organized workshops, winter schools, conclaves and video-conferenced lectures on these frontier research areas and visits or sabbaticals by researchers and students alike. It was strongly felt at these fora that a Joint Centre on Quantum and Nano Computing Systems should be planned as it is a very good idea to bring together different groups to work in synergy. The proposed Joint Centre will provide them a formal platform to jointly present the exciting opportunities in these fields to budding young quantum and nano scientists in both countries. Among the notable outcomes of the Joint Centre will be a fillip to quantum and nano computing awareness, education and research among young groups in India, Canada and United States. One of the activities at the Joint Centre will be an annual Winter School where young scientists and researchers will get an opportunity to rub shoulders with leading scientists from around the world.

###### (ii) Out sourcing

The work will be carried out at educational and research institutions in India and at collaborating partner institutes in USA and Canada.

## 5. Popularizing and extension activities and plans.

### a. Strategy for popularization.

The videos of lectures in the field, some of which are already online, will be uploaded on the Project website so that they are available to a much wider audience through ICT. Some of the activities taken up to popularize the field are :

#### ➤ **International School on Quantum and Nano Computing Systems and Applications (QANSAS 2009), December 15-18, 2009**

The first content generation workshop was held at the centre from December 15-18, 2009 with the following speakers :

- Prof. Douglas Osheroff, Dept. of Physics, Stanford University (*Nobel Laureate 1996*)
- Prof. Subhash Kak, Chair, Dept. of Comp. Sci., Oklahoma State Univ.
- Prof. Wolfgang Bauer, Chair, Dept. of Physics, Michigan State Univ.
- Dr. Stefano Pirandola, Massachusetts Institute of Technology
- Dr. Graeme Smith, IBM Research
- Prof. Jonathan Z. Simon, University of Maryland College Park
- Prof. Mangal Sunder, IIT Madras
- Prof. Arul Lakshminarayan, IIT Madras
- Prof. Debabrata Goswami, IIT Kanpur
- Dr. V. Ravi Shankar, IIT Kanpur
- Prof. B.R. Mehta, IIT Delhi
- Prof. Ashok Ganguli, IIT Delhi
- Prof. V. Ramgopal Rao, IIT Bombay
- Prof. Naresh Sharma, TIFR
- Prof. Sibasish Ghosh, IMSc Chennai

This is now an annual feature at DEI and the other workshops held earlier in the series and other activities to popularize the field are :

- Indo-US Shared Vision Workshop on Soft, Quantum and Nano Computing (SQUAN 2007): February 22-25, 2007
- Indo-Canadian-American Quantum and Nano Computing Conclave (QANCLAVE 2007) : December 22, 2007
- Indo-US Advanced School on Quantum and Nano Computing Systems and Applications (QANSAS 2008) : December 11-14, 2008
- Special Lectures on Quantum and Nano Computing from American Campuses through Videoconferencing
- Graduate Course Lectures on on Quantum and Nano Computing between DEI and IIT Kanpur through Videoconferencing
- Memorandum of Understanding between partner Institutes

### b. Extension activities and plans

#### i) Maintenance mechanism

The momentum generated in the field through ICT will be maintained and sustained to attempt the following goals beyond the project duration :

#### **QUANTUM INFORMATION / COMPUTATION ROADMAP (5 YEARS GOALS)**

##### **Demonstrate**

- Devices realizing quantum algorithms with up to 10 qubits

- Fault tolerant computing and error correction on small scale systems
- Distributed quantum algorithm
- Tools for unified representation in quantum information / computation, quantum field theory and string theory
- Quantum simulations that cannot be simulated classically

## **QUANTUM INFORMATION / COMPUTATION ROADMAP (10 YEARS GOALS)**

### **Achieve**

- Large dimension quantum memory
- Quantum algorithm with upto 50 qubits
- Quantum simulation of a key problem in science
- Quantum algorithm with fault tolerant error correction
- Convergence / Unification attempts for Theory of Everything

### **ii) User feedback mechanism, its execution procedure and corrective measures.**

Feedback obtained from the various stakeholders in the field such as students, scientists, researchers and web users will be incorporated and used to streamline the action from time to time. Feedback forms will be provided on the project website, as well as got filled up during the

## **6. Review Mechanism**

### **a. Frequency of review**

A review meeting will be held every 3 months and an International Review will be held during the Annual Winter School with experts drawn from all interdisciplinary areas.

### **b. List at least 10 Reviewers, who are eminent in fields of the projects.**

1. Prof. B.R. Mehta  
Department of Physics  
Indian Institute of Technology Delhi  
email : brmehta@physics.iitd.ac.in

2. Prof. Ashok K Ganguli  
Department of Chemistry  
Indian Institute of Technology Delhi  
email : ashok@chemistry.iitd.ac.in

3. Prof. Apoorva Patel  
Centre for High Energy Physics  
Indian Institute of Science Bangalore  
e-mail : adpatel@cst.iisc.ernet.in

4. Prof. Venu Gopal Achanta  
Dept. of Condensed Matter Physics & Material Sciences  
Tata Institute of Fundamental Research  
Homi Bhabha Road, Mumbai 400 005, India  
e-mail : achanta@tifr.res.in

5. Prof. Anil Kumar (Emeritus Professor)  
Dept. of Physics and NMR Research Centre  
Indian Institute of Science Bangalore.  
e-mail : anilnmr@physics.iisc.ernet.in

6. Prof. S.P. Pal

Department of Computer Science  
IIT Kharagpur,  
West Bengal.  
e-mail : spp@cse.iitkgp.ernet.in

7. Prof. Laxmidhar Behera  
Department of Electrical Engineering  
I.I.T. Kanpur, Kanpur 208 016  
e-mail : lbehera@iitk.ac.in

8. Prof. Sibasish Ghosh  
Institute of Mathematical Sciences Chennai  
email : sibasish@imsc.res.in

9. Prof. Naresh Sharma  
Tata Institute of Fundamental Research  
Homi Bhabha Road, Mumbai 400 005, India  
email : naresh.sharma.tifr@gmail.com

10. Prof. Arun Kumar Pati  
Institute of Physics Bhubaneswar  
email : akpati@iopb.res.in

7. **Budget**

a. **Capital Expenditure**

i) **Details to be captured**

S. No.	Item / Deliverable	Amount (lacs)
1.	National Teleportation Experiment Demonstration (first intra-institute and then inter-institute as has been demonstrated in Switzerland over record of 144 km)  4 major hubs (DEI, IIT Kanpur, IIT Delhi, IIT Madras) (Rs. 3.0 cr * 4 hubs)  8 nodes (IIT Roorkee, IIT Bombay, ISI Kolkata, HRCI Allahabad, IOP Bhubaneswar, IMSc Chennai, TIFR Mumbai, IISc Bangalore) (Rs. 1.0 cr * 8 nodes)	   Rs. 12.0 crores   Rs. 8.0 crores
2.	Physical Realization of Quantum Computers  SQUID based approach (DEI) (Rs. 2.0 cr * 3 yrs )  Ultrafast Laser approach (IIT Kanpur) (Rs. 2.0 cr * 3 yrs)  Nanoelectronics (IIT Delhi) (Rs. 0.83 cr * 3 yrs)	  Rs. 6.0 crores  Rs. 6.0 crores  Rs. 2.0 crores

ii) **Focused comments on high cost equipment**

(More than Rs. 10 lakhs worth of items)

(Specifications, reasonability of estimated cost)

At present, there are a number of technologies under investigation for their suitability to implement a quantum computer. No single technology meets currently all of these requirements in a completely



satisfactory way. Therefore, the ongoing research on quantum information processing is highly interdisciplinary, diverse and requires a coordinated effort to create synergies while the common goal is the implementation of a working quantum processor. While at present, several approaches have demonstrated basic gate operations and are even able to prove that quantum computing has become reality with few qubits, large scale quantum computation is still a vision which requires ongoing research for many years to come. The long-term goal in quantum computation is, of course, a large-scale quantum computer which will be able to efficiently solve some of the most difficult problems in computational science, such as integer factorization, quantum simulation and modeling, intractable on any present or conceivable future classical computer. The project proposal discusses the DiVincenzo criteria and several promising technologies. The summary of the promise criteria is given below.

QC Approach	DiVincenzo Criteria						
	Quantum Computation					QC Networkability	
	#1	#2	#3	#4	#5	#6	#7
Trapped Ion	B	A	B	A	A	B	B
NMR	C	B	B	A	B	C	C
Neutral Atom	B	A	B	B	B	B	B
Cavity QED	B	A	B	B	A	B	B
Optical	B	B	A	B	B	B	A
Solid State	B	B	B	B	B	C	C
Superconducting	B	A	B	B	B	C	C

### Legend

A = A potentially viable approach as achieved sufficient proof of principle

B = A potentially viable approach has been proposed, but there has not been sufficient proof of principle

C = No viable approach is known

The column numbers correspond to the following QC criteria:

- #1 A scalable physical system with well-characterized qubits.
- #2 The ability to initialize the state of the qubits to a simple fiducial state.
- #3 Long (relative) decoherence times, much longer than the gate-operation time.
- #4 A universal set of quantum gates.
- #5 A qubit-specific measurement capability.
- #6 The ability to interconvert stationary and flying qubits.
- #7 The ability to faithfully transmit flying qubits between specified locations.

### b. Revenue Expenditure

#### i) Details to be captured

S. No.	Item	Amount Lakhs per year	Duration	Total Amount
1.	Research Assistant (50 nos.)	50.0	3 years	150.0 lacs
2.	Contingency	50.0	3 years	150.0 lacs
3.	Travel	50.0	3 years	150.0 lacs
4	Miscellaneous (Consumables, Database Preparation, Dissemination, Workshop Organization etc.)	50.0	3 years	150.0 lacs

#### ii) Focused comments on:

- total honorarium to be paid in the project and
- total consultancy fee during the project.

### c. Please indicate the Anchor Institution for disbursement of funds.

## **8. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives.**

In principle, a large scale quantum computer can be built using these primitives which must be realized by a controllable quantum system, provided the physical system meets the following requirements, spelled out by DiVincenzo (DiVincenzo criteria):

1. A scalable physics system with well characterized qubits
2. The ability to initialize the state of the qubits to a simple fiducial state, such as  $|00\dots0\rangle$
3. Long decoherence times, much longer than the gate operation time
4. A universal set of gates is experimentally feasible
5. A Qubit specific measurement capability
6. The ability to interconvert stationary and flying qubits
7. The ability to faithfully transmit flying qubits between specified locations

## **9. Social impact**

Quantum information science has arisen in response to a variety of converging scientific challenges. At present, quantum computers and quantum information technology remain in their pioneering stage. Potentially quantum computers are likely to emerge as the superior computational devices at the very least, and perhaps one day make today's modern computer obsolete. Quantum information / computation processing system has its origins in highly specialized fields of theoretical physics, but its future is brightened by its promising potential for impacting human resource development vastly. It may be conjectured that a modelling theory founded on linear graph theory and quantum force-fields should indeed be capable of modelling a large variety of Quantum Information / Computation processing circuits and systems and will thus impact the development of the budding field.

The Quantum-Nano Centre is a multidisciplinary centre at Dayalbagh Educational Institute, Agra set up under MHRD National Mission on Education through ICT, with partners as IIT Kanpur, IIT Delhi and IIT Madras, besides several national and international collaborators. With a focus on the rapidly growing area of quantum-nano computing and quantum information sciences, the Quantum-Nano Centre provides an environment for scientists and mathematicians to explore the fundamental physical characteristics of quantum systems, to devise and implement prototype quantum computers, and to develop quantum algorithms and novel applications. Through a vigorous program of lectures, seminars, and workshops, the Centre stimulates intellectual exchange among students, faculty, and academic partners.

The mission is to aggressively explore and advance the application of quantum-nano systems to a vast array of relevant information processing techniques. This will be accomplished by creating a truly unique environment that fosters cutting-edge research and collaboration between researchers in the areas of computer science, engineering, mathematical, chemical and physical sciences.

## **10. Outcome – Extent to which the project will realize the objectives of the Mission may be given explicitly.**

Quantum Theory and Nano Technology are natural partners with great potential applications in the context of Computing Systems. Ironically, although the quantum theory is almost emerging as the most successful theory ever proposed in the scientific literature (often accurate to within one part in 10

billion), it can give only probabilities of any object, existing as the superposition of many possible states, rather than definite hard answers to problems as expected from Newtonian theory of “objective reality” in which each object existed in a definite state. However, we have nanotechnology and can manipulate individual atoms, so atoms that pop in and out of existence can be manipulated at will, using scanning tunneling microscope. Accordingly, there should be no invisible “wall” separating the microscopic and macroscopic world but rather a continuum.

The general problems to be solved for physical realization of Quantum Information Processing are in particular :

- Identification of the best suitable physical system which allows for scalability, coherence and fast implementation of QIP.
- Engineering and control of quantum mechanical systems far beyond anything achieved so far, in particular concerning reliability, fault tolerance and using error correction.
- Development of a computer architecture taking into account quantum mechanical features.
- Development of interfacing and networking techniques for quantum computers.
- Investigation and development of quantum algorithms and protocols.
- Transfer of academic knowledge about the control and measurement of quantum systems to industry and thus, acquisition of industrial support and interest for developing and providing quantum systems.

The project aims to develop the Indian roadmap for Quantum Computation / Information similar to the ones already prepared in the United States, Europe and Canada.

As experts in the field are from various disciplines such as Physics, Chemistry, Mathematics, Electrical Engineering, Electronics and spread all over the country, it is only through ICT that the field can develop further. Besides, if we want a quantum jump in ICT through the technique of Quantum Teleportation which combines classical ICT with quantum entanglement, this is the way forward and the project is thus completely in line with the ICT Mission Objectives.

FORMAT FOR APPRAISAL OF DPR BY STANDING COMMITTEE

***The Village Community Network: Technology Development and Pilot Roll Out Plan for Low Cost Opportunistic Communication Networks for Rural Areas of India***  
PI: Dr. K. S. Daya

PROJECT CONTROL NUMBER: SRe21100910359

1. Objectives  
**Village Community Network: Technology Development and Pilot Roll Out Plan for Low Cost Opportunistic Communication Networks for Rural Areas of India**
2. Deliverables  
(Please give milestones with timelines linking with payments)  
**Phase-1:**
  - **Develop low cost network synchronization oscillators at international facility for voice-data networks to bring down the cost of network installation, operation and services dramatically.**
  - **Roll out technology for ubiquitous connectivity in 2 villages in remote areas.****Phase-2:**
  - **Developing the device development facility and producing in house synchronization devices.**
  - **Scaling up the roll out in 20 villages**
3. Recommendation
  - i) Arrangement for quality control  
**Two track approach: Use commercial products for proof of concept; sample development at international facility which may be replicated in India , once proven.**
  - ii) Accuracy  
**Use of proven measurement methodology and analysers to match to the existing standards**
  - iii) Coverage  
**Rural outreach in education.**
  - iv) Updation mechanism  
**Use of latest technology and partnerships with premier institutions**
  - v) Testing by users  
**Test beds on campus and at two remote villages in Madhya Prdesh in Harda Districts.**
  - vi) Testing by peer group  
**Yes. Will be available for campus students and faculty**

4. Scaling up

- a) Plan for Phase-2
  - **Indegenous development of synchronization devices**
  - **To scale roll out to 20 villages in phase-2**
- b) Strategy
  - (i) In-house  
**Device design, measurement, network design, wireless backhaul, opportunistic protocols,**
  - (ii) Out sourcing  
**Installation, OEM equipment, fabrication**

In case of outsourcing, please comment with regard to its acceptability with reference to Government Rules & Procedures.

**Yes. As per government rules and procedures (tender)**

5. Popularizing and extension activities and plans.

- a. Strategy for popularization.  
**Promotional film broadcast on EDUSAT/media, along with printed pamphlets**
- b. Extension activities and plans  
**Opening up e-learning resources in pilot villages**
  - i) Maintenance mechanism  
**Equipment: AMC local support in villages, power, security. Entrepreneur ship model is proposed in phase-2 where villagers can be trained and made responsible to maintain the network on payment basis.**
  - ii) User feedback mechanism, its execution procedure and corrective measures.  
**Testing the stability and serviceability of the network on Lab test beds by giving access to the on campus students. Taking corrective measured from the feedbacks and drawbacks during the testing on the campus test beds.**

**Pilot deployment in two rural villages and testing the system for interference, stability and serviceability. Continuing steps to provide stable connectivity and corrective measures will be taken depending upon the specific feed backs from the users on live test beds.**

6. Review Mechanism

- a. Frequency of review  
**Biannual review in front of Standing Committee; Annual Review in from of PAB.**

- b. List at least 10 Reviewers, who are eminent in fields of the projects.
1. Prof. Pami Dua Delhi School of Economics
  2. Prof. B. N. Jain IIT Delhi
  3. Prof. Bob Clark, National Physics Laboratory, Teddinton, London
  4. Dr. Hugo Bibby, Link Microtek, Germany
  5. Prof. S. K. Koul, CARE IIT Delhi
  6. Prof. Ashok Agarwala, University of Maryland College Park, USA
  7. Mr. Rajiv Sinha, Managing Director, SRF Ltd
  8. Prof. Prem Kalra, IIT Delhi
  9. Prof. Guha, Institute of Radio Physics, Kolkata.
  10. Mr Pradeep Verma TERI, Delhi

## 7. Budget

### Proposed Budget for Phase-1:

- a. Capital Expenditure  
Details to be captured

<b>(A) Non-Recurring: Development</b>	<b>Details</b>	<b>INR Crores</b>
Equipment	VSWR Meter Spectrum Analyser GSM analyser RF Band Solve Suite Microwave studio Genesis Cable connectors and launchers Equipment for machining Exposure unit Site preparation Signal Generator GLP Equipment	4.0
Funds for partners (NIIST, Imperial College and IIT Delhi)		2.0
<b>Sub-Total (A) in Crores</b>		<b>6.0</b>

### **(B) Non-Recurring: Deployment**

Core Network	IP Backbone, BTS, BSC+MSC+Packet core combo, User Equipment, Streaming server, SIM programmer	1.7
Power		0.75
Site preparation and security (solar fence)		0.25
Freight, AMC, insurance, installation		0.9
Oscillators		2.0
<b>Sub-Total (B) in crores</b>		<b>5.6</b>

**Total Non-Recurring (A+B) INR Crores 11.6**

**(C) Recurring**

Manpower	Project Manager, Research Staff, Lab technicians, Assistants	1.0
Subcontracting		0.6
Travel and contingency		0.4
Sub-Total in crores		2.0

**Total Budget for phase-1: A+B+C INR Crores 13.6**

**Deliverables at the end of Phase-1:**

- ★ Synchronization device developed at international facility
- ★ Pilot network roll out in 2 villages

<b>The Village Community Network: Technology Development and Pilot Rollout Plan for Low Cost Communication Networks for Rural Areas of India</b>				
Development Phase	3rd month	6th month	9th month	12th month
<b>Clock Development</b>				
Material Synthesis for stable and High Q resonators				
Basic planar prototype				
Testing on Lab test beds				
Trouble shooting and optimisation				
<b>Field Roll Out of Network with Developed Oscillator</b>				
Lab Test beds with complete functionality with commercially available clock				
Roll out in 2 villages in MP with commercial clock				
Servicability & Sustainability Testing				
<b>Roll out in 2 villages in Madhya Pradesh a with stable oscillator</b>				
Load Testing and optimization				

## Proposed Budget for phase-2

### **Proposed Budget for Development**

Expense heads in crores	DEI	IITD	NIIST	Imperial
Hardware/Software	15.21	0.5	1.2	2
Manpower	0.7236	0.042	0.04176	1
Travel	0.08	0.02	0.015	0.05
Contingency	0.05	0.01	0.015	0.05
Consumable	0.15	0.01	0.04	0.025
Miscellaneous	0.2	0.01	0.05	0.05
Total Cost per Institute	16.4136	0.592	1.36176	3.175
Development cost for phase - in crores	21.54			

### **Non-Recurring: Deployment**

Core Network	IP Backbone, BTS, BSC+MSC+Packet core combo, User Equipment, Streaming server, SIM programmer	5.0
Power		5.5
Site preparation and security (solar fence)		0.5
Freight, AMC, insurance, installation		2.0
Manpower		1.0
Sub-Total (B)		14.0

**Total Budget for Phase 2: INR 35.54 Crores**

### **Deliverables at the end of Phase-2:**

- ★ Fully equipped facility at the anchor Institute for the development of synchronization device. It is proposed that this facility will be made available to the students and teachers of the country.
- ★ Network roll out in 20 villages of India
- ★ A ubiquitous education network technology connecting every student of India at a buy back cost of Rs 60/- per month over two years!



- i) Focused comments on high cost equipment (More than Rs. 10 lakhs worth of items) (Specifications, reasonability of estimated cost) **Test lab equipment necessary for characterization, measurement, performance evaluation and tuning. The equipment is to be deployed with power, and is specialized high performance equipment for serving a large rural area with high bandwidth.**
  - b. Revenue Expenditure
    - i) Details to be captured
    - ii) Focused comments on:
      - total honorarium to be paid in the project and **As per NMEICT norms**
      - total consultancy fee during the project-
  - c. Please indicate the Anchor Institution for disbursement of funds. **Dayalbagh Educational Institute  
Dayalbagh, Agra – 282 110**
9. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives.
1. ***Enabling GSM Base stations to be backhauled over an IP Network by providing a distributed clock at very low cost. Oscillators costing as much as Euro 10000, will be available for USD 300 using this research.***
  2. ***Standalone network costs will be dramatically less.***
  3. ***This technology will enable the next mile for NMEICT: To provide low-cost connectivity to all students within a few kilometers radius of each college.***
  4. ***Easy buy back of project cost through PPP.***

The straightforward way to achieve this will be to add one IP Flexi-Base Transceiver Station (BTS) with standalone synchronizer per college. This will provide 256 Kbps data rate dynamically shareable between voice and data to 50 students at any point of time. The Table below shows a simple calculation that brings out a startling statistic: We can roll out this entire network across the nation for a mere Rs. 61/- payment per student per month for 24 months.

	Item	Figures (Estimated)
1.	Number of colleges	20000
2.	Estimated number of students	100 lakhs
3.	Cost of deployment	Rs. 1461cr

4.	Cost per student per month (over 2 years)	Rs. 61*
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Social impact

**We can roll out this entire network across the nation for a mere Rs. 60/- payment per student per month for 24 months. THIS IS A ONE-TIME RECOVERY COST FOR DEPLOYMENT OF THE TECHNOLOGY. The only charges after this buy-back will be the maintenance cost of the network. Under a PPP recovery model, cost can be made even cheaper if the GSM operator in the region imposes a minimal charge for voice calls in the region.**

10. Outcome – Extent to which the project will realize the objectives of the Mission may be given explicitly.

***The end-point deliverable of this project is a Mission Objective: to provide virtually free access to e-Education for every Indian College student.***

**MEMORANDUM OF UNDERSTANDING (“MOU”)**

The MOU is made and entered into on this the ----- *day* of -----(*month*) 2010.

Between

The President of India acting through the Joint Secretary to Government of India, Department of Higher Education, Ministry of Human Resource Development having office at Shastri Bhavan, New Delhi -110 003, (hereinafter referred to as “MHRD”, which expression shall, unless repugnant to the context, include its successors, administrators, executors, Legal Representatives and assignees; and at present represented by its Joint Secretary (Distance Learning), of the First Part

AND

The Bharat Sanchar Nigam Ltd. a Government Company under the Companies Act, 1956 and having its corporate office at BSNL Bhavan, Harish Chandra Mathur Lane, Janpath, New Delhi 110001 (hereinafter referred to as “BSNL”, which expression, unless repugnant to the context or meaning hereof, shall include its successors, administrators, executors, legal representatives, or permitted assignees) and represented by its Chairman & Managing Director, of the Second Part

AND

The Mahanagar Telephone Nigam Ltd, a Government Company under the Companies Act, 1956 and having its registered office at Jeevan Bharti, Tower-I, 124,Indira Chowk, New Delhi-110001 (hereinafter referred to as “MTNL” which expression, unless repugnant to the context or meaning hereof, shall include its successors, administrators executors, legal representatives or permitted assignees) and represented by its Chairman & Managing Director, of the Third Part,

AND

The President of India acting through the Joint Secretary to the Government of India, Department of Telecommunications, Ministry of Communications and Information Technology having office at Sanchar Bhawan, New Delhi – 110001 (hereinafter referred to as “DOT” which expression shall, unless repugnant to the context, include its successors, administrators, executors, Legal Representatives and assignees; and at present represented by its Joint Secretary (Telecom), of the Fourth Part

BSNL, MTNL, DOT and MHRD are hereinafter individually referred to as 'Party' and collectively as 'Parties'.

**Whereas:**

A) BSNL is engaged in providing all types of telecom services all over the country (except Mumbai & Delhi) and MTNL is engaged in providing telecom services in the cities of Mumbai and Delhi.

B) Ministry of HRD is engaged in the formulation of government policies, their implementation and overseeing the effects of those implemented policies related to whole spectrum of human resource throughout the country.

C) BSNL, MTNL, DOT and MHRD have mutually agreed to enter into a special relationship for the purpose of providing comprehensive connectivity to 419 Universities and 20,000 colleges all across the country by DOT, BSNL and MTNL to MHRD on mutually agreed terms and conditions mentioned herein under.

**NOW THIS INDENTURE WITNESSTH AS FOLLOWS:**

In consideration of the mutual covenants set out in this MOU, the Parties hereby agree as follows:

**1. Purpose of the MOU**

This MOU is intended to recognize the general basis for a co-operative and collaborative working relationship between the three Parties & intended to develop a special relationship to cater to MHRD's connectivity requirements across the country for the institutes- both universities and colleges coming under National Mission on Education through Information and Communication Technology(hereafter referred to as NMEICT)

The objective of the proposed relationship is to enable BSNL and MTNL to provide MHRD fulfill the connectivity requirement to 419 Universities and 20,000 colleges under NMEICT which includes providing these institutes with connectivity solutions that enable them to get connected on a Virtual Private Network (Hereinafter referred to as VPN), access internet and also download/upload educational content from any of the servers in the network .It enables them to have their requirement of bandwidth fulfilled with an option for an upward scaling. MHRD in turn, gets these services from BSNL and MTNL on the most preferred vendor (service provider) basis.

Each party, by mutual consent of other Parties may involve in the cooperative and collaborative actions, any of its controlled affiliates competent in the concerned action.

**2. Nature of MOU**

Through this MOU, BSNL, MTNL, DOT and MHRD intend to develop a special relationship, whereby effective connectivity solution is intended to be provided to different universities and colleges coming under NMEICT by BSNL and MTNL at special concessionary rates mutually agreed upon and also that this connectivity is provided within the timeline specified.

**3. Responsibilities**

**i. Network Specs**

- 20,000 colleges including polytechnics to be provided with 20 VPN over Broadband (hereafter referred to as VPNoBB) connections @ 512 Kbps speed. The connectivity will be in phases with 10 such connections in Year 1, 15 in Year 2 and 20 in Year 3.
- Extending 1 Gbps link from each of 419 Universities to the nearest National Knowledge Network (NKN) point of presence (POP) for 10 years. The work is to be carried out in a single phase in first year.
- Setting up of university LAN of 400 nodes per university for 419 Universities
- Facility Management of this LAN network for five years
- At least 1 Gbps interconnection between NMEICT network and NKN at 4 locations
- International bandwidth for internet connectivity to NMEICT network beginning with 5 Gbps in the first year, 10 Gbps in 2<sup>nd</sup> year and 30 Gbps in 3<sup>rd</sup> year
- BSNL/MTNL will ensure that 32 static IP addresses are available for each University for access from outside the network

- Note:**
1. List of the universities and colleges to be covered under this project will be provided by MHRD
  2. Variation in the no. of institutes to the tune of 10% is allowed. Even a further increase is allowed based on the mutual agreement.

**ii. Benefits to various stake-holders**

- In connection with the above services, MTNL and BSNL shall offer them as per the quotation submitted and approved vide letter no. F.16-28/2009 dated 12<sup>th</sup> August, 2009.
- All the institutes and MHRD would get the services at the discounted rates as above and the objective of connectivity in NMEICT would be achieved.
- BSNL, on its part, if it requires, would get free space for installation of its mobile/WLL tower and its equipment in the individual institutes/universities being provided connectivity under this project.
- BSNL can use their logo on all network components and use NMEICT in their advertisement campaign.
- BSNL would be the preferred service provider for hosting of content. The content and material generated cannot be sold, however, BSNL can charge their customers (not on the NMEICT network) for the bandwidth they utilize for accessing such content.
- BSNL would get free Right of Way access for laying of Optical Fibre Cable (OFC) from their nearest nodes to the institutes being provided connectivity under this project. MHRD will formally request all state governments for this.

**iii. Financial Obligations**

- 75% (90% in the case of North Eastern Region) of the cost of the project will be borne by the MHRD and the money will be transferred to BSNL via its parent ministry i.e. Department of Telecommunications, or directly if needed.
- 25% (10% in the case of North Eastern Region) of the project cost will be charged from educational institutes by BSNL directly. However, for Internet link and Interconnection with National Knowledge Network (NKN), 100% of cost will come from the ministry of HRD via Department of Telecom.
- 10% of the cost has to be borne by BSNL, being a stakeholder and this would be practically implemented by raising a bill of 90% of the total amount.10% will be passed on as trade-discount.

The rates and the billing schedule for various services are as under:

S.No.	Service Name	Rates (Annual)*	Billing Schedule
1	VPN over Broadband	Rs 5000 per 512Kbps connection	1 <sup>st</sup> December every year
2	Internet bandwidth	Rs 3 Crores per Gbps	Same as above
3	Interconnectivity with NKN	Rs 2 Crores per 1Gbps MPLS “Best Effort” link**	-----Do-----
4	1 Gbps link to each university	One-time charges of Rs 2 Crores upto 150 KM for each university	-----Do-----
5	LAN setting up charges	Actuals+15%	As and when given by the vendor
6	LAN Maintenance charges	Actuals+15 % subject to a minimum 10 % of LAN CAPEX	Quarterly

**\*Service Tax, as applicable, shall be charged extra.**

**\*\*The rates will be restricted to as applicable to NKN.**

- BSNL will raise bills as per its billing cycle as follows:
  - Annually for VPN over BB as per above schedule
  - One time full payment for 1Gbps fibre link between NKN and universities, Yearly payment for interconnectivity with NKN and for internet bandwidth. For both interconnectivity links between BSNL

VPNoBB in colleges with NKN, and internet bandwidth, 100% amount would be paid by the MHRD.

- For LAN setup charges, as and when the bill is charged from BSNL by the LAN vendor. For LAN set-up charges, payment will be made back-to-back on receipt of payment i.e. bill is to be raised by the vendor first. BSNL will add its commission of 15% on it. Then a trade discount of 10% on the BSNL's share would be given..

**For example**

If the vendor has raised a bill of Rs.40 lakhs,

BSNL's 15% commission=  $0.15 \times 40 =$  Rs. 6 Lakhs

10% discount=  $0.1 \times 6 \text{ lakh} =$  Rs. 60,000

Hence the total bill to be raised= Rs. 40 lakhs+Rs.6 Lakhs- Rs. 60,000= Rs. 45.4 Lakhs

Bill for individual university= 25% of Rs.45.4 Lakhs= Rs. 11.35 Lakhs

Bill for Ministry of HRD = 75% of Rs. 42 Lakhs= Rs. 34.05 Lakhs

- For facility management, quarterly billing will be done. Bill will be raised at the end of each quarter.

If the bill is not paid after one quarter, BSNL would be allowed to disconnect the services to individual institute. However, MHRD will be the final deciding authority in such cases and services can continue if the MHRD decides to bear the cost of these services.

**iv. Payment Schedule**

1. Pay-by-date for 25% payment for VPNoBB connections will be as given by BSNL billing system in the same way as is done for normal broadband connections .The institutes shall make their payments as per the scheduled pay-by-date on the bill.
2. On written request of the institute(s), disconnection won't be effected for a period of 60 days. Even if the number gets disconnected, the same shall be reconnected for a period of 60 days.
3. If the payment is not received within designated time as above, connectivity to particular college will be cut. However, if it is decided centrally by the MHRD to foot the bill, the disconnection would not be effected.

**v. Right Of Way**

MHRD will write to individual state governments for giving free Right of Way permission to BSNL for whatever optical fibre cable (OFC) work is required from nearest node of network to the college/institute/university being connected in NMEICT mission. It is desired that no payment for road reinstatement and other such charges are levied on BSNL for OF work under NMEICT. However, if any state government does not agree to free ROW to BSNL, MHRD will decide whether to keep the particular institute falling in the particular state under this project. BSNL will invariably bring all such cases to the notice of MHRD.

**vi. Service Level Agreement (SLA)**

BSNL would offer SLA for its services under the scope of this agreement. SLA terms and conditions are attached in Annexure.

**vii. Implementation and Monitoring Committee**

To oversee the progress of connectivity, an implementation and monitoring committee has been formed which has members belonging to all stakeholders. This committee has been formed by the MHRD and on the recommendations of this committee, funds will be transferred to BSNL. If required, small sub-committees at zonal levels would also be formed.

**4. Status of MOU**

This MOU is intended to record mutual understandings of the Parties hereto, as of the date hereof. This MOU would be subject to laws (and such rules & regulations) of India as may be applicable during the tenure of this MOU. To discharge the responsibilities of each party and/or when specific obligations or financial commitments appear necessary to the Parties, the Parties by mutual consent shall enter directly (or through the concerned affiliate), into specific agreement(s) defining in detail the respective obligations and commitments of each Party, and in particular the programme of work and the financial conditions of its execution. If any such specific agreement is signed between the Parties, the same will prevail over this MOU.

**5. Validity**

The MOU will be valid for an initial period upto end of XI Plan from the date of signing or whenever the project is completed, whichever is later. This does not prevent the parties to sign a specific addendum, if the situation so warrants during the course of operation of this MOU. However, BSNL and MTNL will remain responsible for the following: (a) LAN Maintenance would be for five years, (b) connectivity to NKN node will be ensured for ten years; and (c): the validity of the MOU can be further extended based on mutually agreed terms and conditions.

**6. Amendment**

This MOU may be amended upon the mutual consent of all Parties; but such amendment shall have no impact on any specific agreement then in force.

**7. Termination**

This MOU may be terminated by any Party upon providing a written notice of three months to the other Parties of its intention to do so provided the parties provide for discharging the duties and responsibilities which have accrued because of the operation of this MOU. BSNL would not be under any obligation to refund the money incurred for investment for establishing the NMEICT network.

**8. Arbitration**



In the event of any disputes, controversies or claims arising out of or in connection with this Agreement/ MOU or the breach, termination or invalidity thereof the parties shall at first instance endeavor to amicably resolve/reconcile by mutual discussion/ reconciliation in good faith. If the dispute, difference, controversies/differences of opinion, breaches and violation arising from or related to the agreement cannot be resolved within 60(sixty) days of commencement of reconciliations/discussions, in such case, the same shall be finally referred by either party to the arbitration to one of the Arbitrators in the Department of Public Enterprises to be nominated by the Secretary to the Government of India, in charge of Bureau of Public Enterprises. The Arbitration & Conciliation Act 1996 shall not be applicable to the Arbitration under this clause. The award of the Arbitrator shall be binding upon both the Parties, provided, however, any party aggrieved by such award may make a further reference for setting aside on revision of award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference, the dispute shall be decided by the Law Secretary, whose decision shall bind the parties finally and conclusively. The Parties in the dispute will share equally the cost of arbitration as intimated by the Arbitrator.

#### **JURISDICTION OF COURT**

This MOU shall be subject to exclusive jurisdiction of Delhi courts.

#### **9. Confidentiality**

All Parties acknowledge the confidentiality of the information, which may be transferred between the Parties from time to time as being essential to this MOU and specifically agree not to disclose the same to any third party during the currency of this MOU and for a period of two years after expiry or sooner termination of this MOU. However each party shall be free to disclose such information as is:

- Part of the public domain at the time of disclosure, or
- Required to be disclosed by official authorities in accordance with the applicable laws and the court orders.

IN WITNESS whereof the Parties by the hand of duly authorized representative signed

– These presents of on the day month and year mentioned above.

(Kuldeep Goyal)  
Chairman&ManagingDirector

BSNL

(Kuldeep Singh)  
Chairman&ManagingDirector

MTNL

(Vibha Puri Das)  
Secretary(Higher  
Education)  
MHRD, GOI

(P. Thomas)

Secretary (Department of Telecommunications)  
GOI

Witness:

G.M.(NWP-BB)  
BSNL

Sr. V.P. (B.D)  
MTNL

Jt. Secretary( DL)  
MHRD

BSNL Bhawan,  
H.C. Mathur Lane,  
New Delhi-110001

Jeevan Bharti Tower  
124, Indira Chowk 7,  
New Delhi 110001

Shastri Bhavan  
New Delhi 110001

Jt. Secretary  
Department of Telecommunications  
Sanchar Bhawan,  
New Delhi

## **Service Level Agreement**

To ensure an acceptable level of quality of service, BSNL proposes to offer following terms in service level agreement.

### **A. General Conditions**

1. The service window is from 1000hrs to 1800 hrs on all working days (i.e. except Sundays and Gazetted holidays). Best efforts would be made for booking /fault rectification outside the service window also but the period will not be considered for calculation of rebate.
2. Causes of downtime of circuits/links include but are not limited to:
  - a) Leased Circuit equipment (i.e. NTU) failures, supplied by BSNL to CUSTOMER
  - b) Circuit Outage (at BSNL end only)
  - c) Leased Circuit device hardware failure/malfunction
  - d) Power outages (in BSNL)
  - e) Human error (in BSNL)
  - f) Process failure (in BSNL)
  - g) Local Loop failure between the BSNL MPLS node and Customer's premises, wherever applicable

Downtime ends upon the successful transmission of data to and from such site or Circuit.

### **B. Customer's Responsibility**

1. Any fault duration (i.e. downtime) shall be calculated from the time the fault is reported and a fault docket number is issued to customer.
2. The institute will ensure availability of staff (especially during the service window) who are capable of dealing with the MPLS Circuit equipment/ Router. The period in which CUSTOMER premises is found closed or no staff is available when BSNL staff visits the premises for testing or want to test the circuit from BSNL location, will be excluded from fault duration.
3. The CUSTOMER shall provide all necessary assistance and access to its facilities for preventive and corrective maintenance to BSNL staff all the time.
4. In addition to the above following shall be **excluded** from fault duration:
  - I. Unavailability of circuit due to power failure at CUSTOMER end.
  - II. Unavailability of circuit due to mishandling of BSNL equipment (NTU) or any cables attached to such equipment at CUSTOMER end.

- III. Unavailability of circuit due to fault in CUSTOMER Premise equipment (CPE)/ network.
- IV. Unavailability of circuit due to the faults in the outdoor network of BSNL by third parties.
- V. Unavailability of circuit due to the force majeure.
- VI. Fault duration outside service window, if fault is booked after service window period.
- VII. Unavailability of circuit due to Planned Service Outages or Routine Maintenance not more than 4 hours in a month. BSNL shall provide advance notice prior to conducting any scheduled maintenance.
- VIII. Interruptions during any period when the Customer chooses / elects not to release the Service for testing or repair and continues to use the Service on an impaired basis.
- IX. Interruptions not more than 4 hours in a month during any period when the customer has not released the Service to BSNL for maintenance or for the implementation of a Customer Service Request.
- X. Interruptions caused by the Negligence of the customer including the provision of inaccurate information.

**C. PROCEDURE OF FAULT BOOKING**

- 1. CUSTOMER shall book the fault on assigned number of MPLS NOC viz., '1800-425-1957' (prescribed number for MPLS faults/complaints). (Date and time of booking of fault shall be taken as reference for the purpose of calculation of duration of non-availability of circuit).
- 2. Where the CUSTOMER is unable to find a BSNL representative on the number assigned above, the fault can be booked on 080- 2580 4444/2580 7777, which will work as alternate number in such emergency. Status/fault report generated by BSNL MPLS network (to the extent provided by the system) shall be taken, as reference if situations where there is ambiguity about the timing and nature of fault.
- 3. Normally a fault docket number will be provided to the CUSTOMER from BSNL on booking of fault.
- 4. Call centre number 1500 shall be utilized for booking of faults pertaining to VPNoBB or internet.
- 5. For faults pertaining to campus LAN in the universities, separate contact nos. of the LAN vendor will be provided to the individual coordinators.

**D. SLA Conditions**

**1. SLA for MPLS VPN**

- 1 BSNL shall ensure proper functioning of MPLS VPN circuits for an uptime of 99% on per link per year basis.
- 2 Uptime is defined as below:

$$\text{Uptime (in\%)} = \frac{(\text{Total no. of Hours in the year} - \text{Total Downtime (in hours)}) * 100}{\text{Total No. of Hours in the year}}$$

- 3 The **Latency** measured as the Round Trip Time from anywhere to anywhere within the BSNL MPLS core network shall be within **150 ms**.
- 4 The **Packet Loss** within the BSNL MPLS Core network shall be **<= 1%**.
- 5 The **Jitter** within the BSNL MPLS Core Network shall be **<= 50ms**.

For the purpose of measurement, “downtime” or “fault duration” constitutes any period of time during which the MPLS Circuit is unavailable for the utilization of the customer due to the reasons assignable to BSNL MPLS network.

## 2. VPN over Broadband

A download speed of 512kbps would be assured.

- Upload of 512Kbps also would be provided.
- The above-mentioned bandwidth would be maintained for at least eighteen hours in a day.
- The above bandwidth would be assured up to BSNL server only and it will not be binding on the BSNL to provide the same bandwidth from servers outside the network. This means that the customer would not insist on the speed mentioned above for the downloads from the servers located outside BSNL’s network-whose performance BSNL has no control over.

## 3. Internet Bandwidth

1. **Throughput:** The BSNL shall guarantee a throughput of an uncontended bandwidth (1:1) as measured on physical layer. **Starting from 5Gbps , it would reach up to 30 Gbps progressively.** A throughput of bandwidth on 1:1 Full Duplex (both ways) on 24 hours x 7 Days basis would be provided by BSNL. BSNL would ensure that the defined bandwidth to nearest BSNL server is available for 95% of the time.
2. **Round Trip Delay (RTD):** shall be measured by computing the average RTD for one thousand (1000) pings (with acknowledge for each previous packet received) of sixty –four (64) bytes each. In case of International Internet Bandwidth, this will be measured from BSNL gateway router to the Tier-1 ISP in USA, Europe or Asia Pacific where the BSNL link will be terminated.

## RTD Summary

S. No.	Location	From BSNL Gateway Router International Internet Bandwidth
[1]	USA	350 msec
[2]	Europe (UK)	275 msec
[3]	Asia Pacific (Hong Kong)	200 msec
[4]	Asia Pacific (Singapore)	150 msec
[5]	Asia Pacific (Japan)	250 msec

3. **Packet Loss:** shall be measured by computing the percent packet loss of one thousand (1000) pings (with acknowledge for each previous packet received) of sixty four (64) bytes each. At any point of time during the contract period, the packet loss shall be less than 1%. In case of International Internet Bandwidth, this will be measured from BSNL gateway router to the Tier 1 ISP in USA, Europe, Asia Pacific where the BSNL link will be terminated.

The service shall be assumed to be unavailable or down for – with the occurrence of first Severely Errored Second (SES) of 10 consecutive SES.

- Internet Bandwidth/ IP Port in India, if any or a combination of the three parameters namely **throughput, RTD and packet loss** is not met continuously for a period of thirty minutes, Each slab of down time or unavailability of thirty minutes or part thereof observed over a period shall be taken into account for calculating the liquidated damages for service degradation.

#### **Planned Outage**

The planned outages will be aimed only to maintain and/ or to improve the network performance and/ or to enhance and/ or to upgrade the network as a whole or any part of it.

The planned outages per site will not exceed four hours in any month. Any excess outage beyond 4 hours shall be included in service unavailability for the purpose of calculating liquidated damages.

The outages due to planned engineering works shall be excluded from the scope of penalties

#### **4. Connectivity to National Knowledge Network(NKN)**

- As the connectivity is proposed via 1Gbps MPLS links, SLA terms of MPLS links would be applicable here.

#### **5. LAN setup in Universities and colleges**

- **Uptime:** The uptime for active components would be 95% for the LAN network provided in colleges & universities.

- Faults in the wiring etc. would be attended within 48 hours of reporting.
- The life span of routers, switches etc. would be 5 years & for passive components in the network, lifespan would be 12 years. BSNL/MTNL shall ensure these lifespans, via vendors employed for maintenance of LAN network.
- Any new provisioning requirement would be completed within *five* working days.
- **Spares:** Adequate spares for switches (not less than one) would be maintained for any emergency /maintenance requirements in each location.

#### **E. PROCESS TO BE CARRIED OUT BY BSNL**

##### ***Restoration of Fault***

- i) On receipt of complaint, BSNL shall make its best efforts to localize the fault and restore the same at the earliest. The CUSTOMER shall provide all necessary support for enabling testing of the circuit at any hour of the day.
- ii) In case the CUSTOMER is unable to provide necessary facilities to BSNL, BSNL will test the circuit on its network to the last point feasible and clear the fault docket after rectification of the fault. Circuit shall be presumed to be restored when BSNL has tested the circuit and cleared the fault docket after finding that the circuit is capable of working properly. The fault duration shall accounted accordingly.
- iii) Faults should be booked within the ‘**Service Window**’. Faults booked within the Service Window shall normally be attended on the same day. However, for faults booked beyond the Service window, BSNL will make all efforts (from the NOC / Node, other field units) to restore the circuit during the night, to the extent feasible, the fault restoration work shall in any case be resumed during the ‘Service window’ on the next day.
- iv) **Escalation matrix** for the faults would be as follows:
  - a) Level 1: Call centre nos. as provided above
  - b) Level 2: Account Manager in each SSA under overall charge of SSA Head
  - c) Level 3: GM In charge of Broadband at each Circle headquarter.

#### **F. Penalty**

- The maximum rebate shall be limited to **annual** rental payable of each service for the lowest of the bandwidths availed during the period of SLA. **If the bandwidth changes during the year, rebate will be as per lowest bandwidth subscribed during the year.**

#### **MPLS-VPN/Internet Bandwidth**

- If the service uptime for the applicable year is below the uptime guaranteed, then a rebate of 0.33% of the rental of the service per month shall be given for every 10 hours or part thereof downtime in excess of 88 hours in one year. For this purpose the number of days in a year is taken as 365 leading to a total duration of 8760 hours per year.

#### **VPN over Broadband**

- Faults for the purpose of penalty calculation would be counted if the same are not attended within 3 days; beyond this period, a rebate of 0.33% per day shall be applicable.

#### **LAN Maintenance**

- For active components, per day rebate of 0.33% of the AMC charge beyond guaranteed uptime will be provided.
- For wiring faults extending beyond 2 days and affecting more than 10% of the nodes in a particular site, per day rebate of 0.33% of the AMC charge will be provided.

#### **FORCE MAJEURE**

Neither BSNL nor the CUSTOMER shall be liable to each other for any delay in or failure of performance of their respective obligation under the agreement caused by occurrences beyond the control of BSNL or the CUSTOMER including but not limited to fire (including failure or reductions), acts of God, acts of the public enemy, war, insurrections, riots, strikes, lockouts, sabotage, any law, statute or ordinance, thereof of any other local authority, or any compliance therewith or any other causes, contingencies of circumstances similar to the above. Either party shall promptly but not later than thirty days thereafter notify the other of the commencement, and cessation of such contingencies, and if such contingencies continue beyond three months, both parties agree upon the equitable solution for termination of this agreement or otherwise decide regarding course of action to be adopted.



**FORMAT FOR APPRAISAL OF DPR BY STANDING COMMITTEE**

**1. Objectives :**

- Create technological support for computerized Vedic knowledgebase creation, utilizing it for manuscript processing (transcription) and offer interdisciplinary academic programs for Sanskrit/Vedic scholars and computer scientists on Sanskrit informatics, computational linguistics, Manuscriptology (advanced) etc., at undergraduate and postgraduate levels.
- Important but rare areas of traditional knowledge and wisdom contained in the ancient texts, to prepare an authentic content for use on web with retrieval features.
- Deriving the benefits of treasure of information hidden in the vast repositories of manuscripts by properly identifying and verifying manuscript contents subjectwise.
- To train teachers, researchers, and students and lay public on the way to preserve, study, propagate, and benefit from these invaluable treasures.

**2. Deliverables**

(Please give milestones with timelines linking with payments)

Project Go ahead	T0
Procurements/recruitments of project requirements	1-2 months
Site preparation/training/signing of MoU's etc.	1-2 months
Creating infrastructure, networking and testing connectivity	2-3 months
Technical content creation and proofing/web application development, testing and deployment	1-6 months
Commissioning, trials and sample output	3-4 months
Project monitoring, report and documentation	4-5 months
Plan for Deployment, Maintenance and Feedback	5-6 months
Conclusion of pilot phase	Tn

50% payment may be made at the beginning and the rest after half-duration, i.e, 3 months.

**3. Recommendation**

- i) Arrangement for quality control
- ii) Accuracy
- iii) Coverage
- iv) Updation mechanism
- v) Testing by users
- vi) Testing by peer group

4. **Scaling up**
  - a) Plan
  - b) Strategy
  - (i) In-house
  - (ii) Out sourcing

In case of outsourcing, please comment with regard to its acceptability with reference to Government Rules & Procedures.

5. **Popularizing and extension activities and plans.**

- a. Strategy for popularization. - Seminars, workshops, web etc.
- b. Extension activities and plans - Training programmes

- i) Maintenance mechanism
- ii) User feedback mechanism, its execution procedure and corrective measures.

6. **Review Mechanism**

- a. Frequency of review : Tri-monthly
- b. List at least 10 Reviewers, who are eminent in fields of the projects.

Slno	Name	Designation	Institution	Address	Contact details
1	Prof. VVS. Sarma	Honorary Professor	Dept. of CSA	IISc Bangalore	<a href="mailto:vvs@csa.iisc.ernet.in">vvs@csa.iisc.ernet.in</a> 22932238 (off) 23321876 (res)
2	Prof KVRK Acharyulu	Ex VC JRRSU, Jaipur & HOD, Vyakarana	Rashtriya Samskrita vidyapeetham, Tirupati	Tirupati 517064	<a href="mailto:kvrkus@yahoo.com">kvrkus@yahoo.com</a> 9441864491
3	Prof. Krishna Murthy Shastri	Retd. Principal, Mylapore Sanskrit College, Chennai	Sri Kanchi Kamakoti Matam	Chennai	044-24984698 044-42074402
4	Dr. S. Padmanabhan	Professor	Dept. of Sanskrit	University of Madras <a href="mailto:padmahe@rediffmail.com">padmahe@rediffmail.com</a>	9444381537

5	Prof. R. Devanathan	Principal & Registrar	Rashtriya Samskrita Samsthan	Sringeri Campus	9449290188 <a href="mailto:iksusara@hotmail.com">iksusara@hotmail.com</a>
6	Prof. K.E. Govindan	Dean (academic affairs) & HOD, Nyaya	Rashtriya Samskrita Vidyapeetham	Tirupati 517064	0877-2286600 <a href="mailto:nyaya23sri@yahoo.co.in">nyaya23sri@yahoo.co.in</a>
7	Prof. K.E. Devanathan	Director, Center of Excellence & HoD Vishishtadvaita	Rashtriya Samskrita Vidyapeetham	Tirupati 517064	9490108928
8	Prof. VV Reddy	Director, SVUORI	SVUniversity Oriental Research Institute	Tirupati 517502	9849121316 <a href="mailto:srivishnu_ori@yahoo.co.in">srivishnu_ori@yahoo.co.in</a>
9	Prof. G.N.S. Prasanna	Prof. of Computer Science	IIIT	Bangalore	9844226959 <a href="mailto:gnsprasanna@iiitb.ac.in">gnsprasanna@iiitb.ac.in</a>
10	Prof. NSR Tatacharya	Ex-VC, Rashtriya Samskrita Vidyapeetha, Tirupati & President Awardee	Authoring, writing, discoursing	Bangalore	<a href="mailto:nsanusha2007@gmail.com">nsanusha2007@gmail.com</a> 080-41125354
11	Prof. V. Kannan	Pro Vice-Chancellor	University of Hyderabad	Hyderabad	<a href="mailto:pvc@uohyd.ernet.in">pvc@uohyd.ernet.in</a> 9949193737

## 7. Budget

### The budgetary details are as follows:

Equipments	Rs. 5.0 lakhs
Course material preparation	Rs. 5.0 lakhs
Travel	Rs. 5.0 lakhs
Honorarium	Rs. 5.0 lakhs
Textual Content creation	Rs. 1.0 lakhs
Contingency	Rs. 4.0 lakhs
Manpower & Overheads (incl. consultancy)	Rs. 25.0 lakhs
<b>Total Budget</b>	<b>Rs. 50.0 Lakhs</b>

### a. Capital Expenditure –

- i) Details to be captured  
ii) Focused comments on high cost equipment  
(More than Rs. 10 lakhs worth of items) **n/a**  
(Specifications, reasonability of estimated cost)

b. Revenue Expenditure

- i) Details to be captured  
ii) Focused comments on:
- total honorarium to be paid in the project and – 5 lakhs
  - total consultancy fee during the project - 5 lakhs

- c. Please indicate the Anchor Institution for disbursement of funds.  
**Indian Heritage Group, C-DAC, Bangalore (KP)**

8. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives. **TBD**

9. **Social impact** : This would enable us to take pride in our historic, mammoth task carried out selflessly for centuries, for harmonious co-existence of all living beings. Inclusivity is the hallmark of this exercise since all regions, scripts, cultures, languages, customs, arts, humanities, sciences, skills etc. get represented fully.

10. **Outcome** – Extent to which the project will realize the objectives of the Mission may be given explicitly.

- Provision of e-books and e-journals free to the learners
- Conversion of available content in all Indian languages
- Publicity and training of motivators and teacher Empowerment
- Concerned with post higher secondary education –up to PHD level course contents.
- Pure research related to education or ICT tool development for dissemination of contents in the open domain.
- It is inter-institutional.
- Evolution of a national consortium is envisaged.
- All material developed under the programme will be free and open to all citizens of India through Internet / India VPN.
- Is a novel application of ICT to traditional knowledge systems

## TABLE AGENDA.

**Subject : Minutes of the first meeting of the Working Group on e-Learning R&D projects held on 22.9.2009 at Department of Information Technology (DIT), New Delhi**

The above meeting was held on 22.9.2009 at DIT, New Delhi to consider and recommend the project proposals for financial support received in the area of e-Learning. The following attended the meeting:

- (i) Sh. N.Ravi Shanker : Chairman  
Joint Secretary, DIT  
New Delhi
- (ii) Dr. K. Mangla Sunder : Member  
Professor, IIT Madras  
Chennai
- (iii) Prof. M.U.Deshpande : Member  
(Formerly Professor,  
IIT Bombay), Consultant  
(E. gg. Education), Nagpur
- (iv) Dr. N. Mohan Ram : Member  
Executive Director  
ERNET India, New Delhi
- (v) Shri Ganesh Krishnamurthy : Representative, NIIT  
Vice President, NIIT  
New Delhi
- (vi) Shri Madan Mohan Tripathi : Representative of ED,  
Joint Director, DOEACC Society  
New Delhi
- (vii) Sh. A.K. Arora : Member – Secretary  
Scientist F., E-Learning Divn.  
DIT, New Delhi

In addition to the above Sh. G.V.Raghunathan, Scientist 'G' & HOD (HRD), Dr. B. S. Murthy, Scientist 'F' & HOD (NKN), Smt. Swaran Lata, Scientist 'F' & HoD, Human-Centred Computing Division, Shri S.K. Aggarwal, Scientist 'F', E-Infrastructure Divn, Smt Tulika Pandey, Scientist 'E', Internet Governance Division; Sh. Mukesh Kumar, Scientist 'C', DIT; Sh. A.C.George, Scientist 'D', DIT; Sh. D.K.Kalra, Scientist 'D', E-Learning Divn. DIT, also attended the meeting.

Shri N.K. Sinha, Joint Secretary, MHRD, Dr. M. Sasikumar, Associate Director (Research) C-DAC Mumbai, Prof. Dr. Samar Bhattacharya, Jadavpur University Kolkata, Prof. A.K. Ray, IIT Kharagpur, Dr. S.Birendra Singh, ED, DOEACC & representative of Integrated Finance Division, DIT could not attend the meeting due to pre-occupation.

In the opening remarks, Chairman welcomed the members and informed that the E-Learning Division of DIT has been engaged in the development of tools and technologies for the promotion of E-Learning in the country. He remarked that the technologies developed would be utilized for delivery of education through ICT in

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school, higher and technical education besides corporate training. He also informed the Working Group that DIT has already commenced initial phase of National Knowledge Network (NKN), which would bring together all the stakeholders in Science, Technology, Higher Education, Research & Development etc with speeds of the order of gigabits per second coupled with extremely low latencies, through PoP in the respective institution /organization. NKN will interconnect all institutions engaged in research, higher education and scientific development in the country, over a period of time. The final phase of NKN is at an advanced stage of planning. The NKN platform could also be used for e-Learning applications. Chairman also appraised the committee that Dr. K. Mangla Sunder, Professor IIT, Chennai is associated with DIT projects as well as NPTEL and various committees/Boards relating to NMEICT, which are MHRD programmes, and hence his association with this 'Working Group' would be quite useful. Chairman indicated that budget available with the DIT in overall kitty for the E-Learning Programme is quite low. During discussions MHRD officials indicated that if there are budget constraints with DIT, then, MHRD under NMEICT would support all those proposals which are recommended by the Working Group on E-Learning, which would be useful for ICT in primary, secondary and higher education. Chairman also indicated that in the present competitive environment, the project needs to be recommended for completion in minimum time frame and also the projected hardware requirements needs to be optimized while keeping in view the capital equipment already available with the organizations.

Dr. K. Mangla Sunder indicated that DIT's E-Learning Programme is quite useful from the point of view of online education, as many of the useful tools and technologies for promotion of E-Learning have been developed under the programme. He further indicated that the proposal with regard to further work in the area of quality assurance for content has already been presented in MHRD by C-DAC Hyderabad. The relevant proposals as recommended by this Working Group in the area of e-Learning could also be supported under NMEICT as he has already discussed this aspect with Sh. N.K.Sinha, Joint Secretary, MHRD. The recommendations of this Working Group may please be sent to 'Project Approval Board' under NMEICT for acceptance. He indicated that funds under NMEICT could be released directly to the organizations by MHRD for the projects which are recommended by this Working Group in the area of e-Learning. These projects would be monitored by a Committee set up by DIT i.e. by PRSG (Project Review & Steering Group).

The representatives/proposed Chief Investigations of all 12 proposals made a presentation before the Working Group. All the proposals were deliberated in details. The deliberations/decisions are summarized below:

1. **Indian Language Content Authoring System - Hindi- C-DAC, Pune**

Outlay : Rs. 667.22 lakhs  
Duration : 3 Years

The objective of the project is to develop an Indian Language Authoring System for development of teaching modules in hard and soft sciences at different levels. Domain experts would get an easy to use and ergonomic set of tools to develop learning modules in multimedia mode. The tool would initially cater to the school education. The project proposal was recommended for financial support under NMEICT. The component towards overhead expenditure would not be supported by MHRD under the proposal. The proposal should be revised and the outlay should be brought down to less than Rs. 5.0 crores. The project was recommended to be implemented in consortium mode through C-DAC Pune (Project Leader), IIT Kanpur, IIT Delhi, NMRC C-DAC Pune,

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Bharteeya Open Office Group, C-DAC Bangalore & Jadavpur University, Kolkata as proposed. Revised proposal may be submitted at the earliest.

2. **Project proposal on "Authoring Support for Indian Language Content through Translation" - C-DAC, Mumbai**

Outlay : Rs.79.61 lakhs  
Duration : 2 Years

The anticipated project outcomes would not be much useful for e-Learning applications in the proposed form. After detailed deliberations the proposal could not be recommended for financial support.

3. **R&D Project Proposal on 'Real Time Video Compression and Decompression techniques - C-DAC, Mumbai**

Outlay : Rs.108.65 lakhs  
Duration : 2 Years

The objective is to improve latency and performance of video compression and decompression techniques based on H.264 for lower bandwidths (below 128 Kbps). It was informed that the project would be useful to institutions providing distance learning and e-learning courses. Working Group desired to know the actual end user for the project. C-DAC, Mumbai was advised to revise the proposal in consultation with IIT Bombay (Prof. D.B.Phatak) so that the deliverables are utilized by the end user (i.e. IIT Bombay). The duration should be reduced to 18 months and the outlay should be brought down to less than Rs. 1.0 crores. The proposal was recommended for financial support by E-Learning Division, DIT.

4. **R&D Project Proposal on "Framework, for Developing Content Independent of Platform and environment" - C-DAC, Mumbai**

Outlay : Rs. 72.70 lakhs  
Duration : 2 Years

The proposed framework will develop content independent of the platform (hardware and software) as well as the specific LMS environment. The proposed project outcomes would help in overcoming technological barriers. Unless the subject experts (i.e. teachers) are keen/associated to use the proposed outcome, it will not serve much purpose. After detailed deliberations, the proposal could not be recommended for financial support.

5. **R&D Project Proposal "Personalized Learning and Content Management System" - C-DAC, Bangalore**

Outlay : Rs. 65.00 lakhs  
Duration : 18 months

The Working Group felt that the various issues relating to personalized learning were not appropriately identified and addressed in the proposal. Accordingly, after detailed deliberations the proposal could not be recommended for financial support.

6. **Development of a semi automated authoring tool for building a Multilingual Open Learning Object Repository consisting of metadata annotated Learning materials in languages Hindi, Bengali and English and a Personalized E-Learning System - IIT, Kharagpur**

Outlay : Rs. 38.40 lakhs  
Duration : 2 Years

An e-Learning system would be developed which will provide learning materials according to the requirement of learner. It is proposed to develop a system which can contain annotated learning contents as well as test material in a multilingual setting with facilities for advance retrieval. As an example, the institute would develop an ontology for high school physics in English, Bengali and Hindi with illustrative content and test material. The end users would be school students. The institutional overheads would not be funded under the proposal. The project was recommended for financial support under NMEICT.

7. **A Faster Implementation of Video Compression/Decompression on Multi-core Architectures - IIT, Roorkee**

Outlay : Rs.69.60 lakhs  
Duration : 2 Years

It was felt that the project would be quite useful for ICT in Education and was recommended for financial support under NMEICT. It was informed that one of the proposed Co-investigation in the project, Dr. Ankush Mittal, who was earlier working as Associate Professor in IIT Roorkee has joined a private engineering college viz College of Engineering, Roorkee. Accordingly, it was proposed by Dr. Mittal that the project would be jointly implemented by IIT Roorkee & College of Engineering, Roorkee (private institution). It was informed by Dr. Mangla Sunder that providing financial support to a private institution was possible under NMEICT, however, he would check the same again with MHRD. A revised proposal need to be submitted. Cost towards the institutional overheads would not be supported under NMEICT.

8. **Study, development and integration of Reflector technology with reliability mechanism in synchronous e-learning environment and feature enhancement in Brihaspati-2 learning management system - IIT, Kanpur**

Outlay : Rs.168.60 lakhs  
{ Grant - in-aid : Rs. 93.60 lakhs }  
[ from Ministry ]  
[ IIT Kanpur : Rs.75.00 lakhs ]  
[ contribution ]

Duration : 3 Years

The objective of the project is to enable access and use of Brihaspati sync for people working behind NAT (Network Address Translation) in reliable and fault tolerant way. More features would be added to the existing Brihasptai - 2 Learning Management system and it would also be maintained. After deliberations it was decided



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that the duration would be reduced to 2 years and accordingly budget requirements would be revised. The institutional overheads would not be funded under the proposal. Revised proposal will be submitted by IIT, Kanpur. The proposal was recommended for funding under NMEICT.

**9. Design and Development of a framework for Adaptive Instruction – C-DAC Mumbai**

Outlay : 186.30 lakhs  
Duration : 2 Years

An open source Framework would be developed for Adaptive Instruction (FAI) to deliver instructions in a personalized manner. Adaptive instructions would be developed for two sixth standard subjects and three IT courses using the framework. The instruction framework server will be hosted on which educational intuitions and academicians across the country can design, create and host courses. It was felt that cost being on the higher side needs to be brought down to about Rs.1.0 crore. The proposal was recommended for financial support by DIT.

**10. Advanced e-Learning techniques for teaching C-programming and selected features of Java and C++ - IIT, Kharagpur**

Outlay : Rs.29.10 lakhs  
Duration : 3 Years

The aim of the project is to consolidate techniques for teaching programming to a large and geographically diverse gathering of students. The techniques developed for C are to be extended to handle selected features of Java and C++. Final outcome would be an e-Learning system supporting program animation and automatic program evaluation that can be deployed wherever required. The proposal was recommended for financial support under NMEICT. The budget on overhead expenditure would not be supported under the proposal.

**11. A Framework for community based distributed and semantically annotated courseware development, sharing and quality assessment for higher technical education over publish/subscribe P2P overlay - C-DAC, Pune & Motilal Nehru National Institute of Technology, Allahabad**

Outlay : Rs.1424.85 lakhs  
Duration : 3 Years

The project aims to provide an enabling technology and services so that the learning resources can be developed, annotated, shared and delivered based on the personal preferences of learners. It is proposed to develop an implementation of publish / subscribe based P2P overlay. This framework provides dynamic community formation to facilitate co-operative enactment of above activities. It also takes care of the preferences of an individual learner by annotating the resources semantically and by creating domain ontology for them in distributed fashion. After detailed deliberations, the following decisions were taken:

- (1) Demonstrate the proof of concept of the proposed implementation of the existing Garuda Grid computing infrastructure of C-DAC with the participation of few select nodes of the Garuda Grid.
- (2) It was also decided that C-DAC should reframe the proposal for pilot implementation to be funded under NMEICT. The budget head on

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overheads would not be supported as per NMEICT norms. Duration of the pilot project should be between 6 to 9 months and the overall budget needs to be less than Rs. 5.0 crores.

**12. Design and Development of Service Oriented Architecture based Standards Compliant e- Learning Framework with Personalized learning Features - C-DAC, Hyderabad**

Outlay : Rs.247.25 lakhs

Duration : 2 Years

The objective of the project is to conceive a service oriented architecture for standard compliant e-Learning framework complemented with web mining and Rich internet application technologies. E-Learning standard compliant tool supporting personalized learning would be developed. System would have features like conversion tool for creating SCORM compliant content and also the integrated video streaming capability. It was felt that teaching community should also be associated during the developmental phase of the project. The project was recommended for financial support by DIT as proposed.

**Summary of Recommendations :**

**1. Following 3 proposals, as recommended above, would be financially supported by DIT :**

- (i) R&D Project Proposal on 'Real Time Video Compression and Decompression techniques - C-DAC, Mumbai
- (ii) Design and Development of a framework for Adaptive Instruction - C-DAC Mumbai
- (iii) Design and Development of Service Oriented Architecture based Standards Compliant e- Learning Framework with Personalized learning Features - C- DAC, Hyderabad

**2. Following 6 proposals as recommended above would be financially supported by MHRD under NMEICT :**

- (i) Indian Language Content Authoring System - Hindi- C-DAC, Pune
- (ii) Development of a semi automated authoring tool for building a Multilingual Open Learning Object Repository consisting of metadata annotated Learning materials in languages Hindi, Bengali and English and a Personalized E-Learning System - IIT, Kharagpur
- (iii) A Faster Implementation of Video Compression/Decompression on Multi-core Architectures - IIT, Roorkee
- (iv) Study, development and integration of Reflector technology with reliability mechanism in synchronous e-learning environment and feature enhancement in Brihaspati-2 learning management system - IIT, Kanpur
- (v) Advanced e-Learning techniques for teaching C-programming and selected features of Java and C++ - IIT, Kharagpur
- (vi) A Framework for community based distributed and semantically annotated courseware development, sharing and quality assessment for higher technical education over publish/subscribe P2P overlay - C-DAC, Pune & Motilal Nehru National Institute of Technology, Allahabad

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The recommendations of this Working Group will be sent to 'Project Approval Board' under NMEICT (MHRD) for acceptance and necessary financial support. It was felt that another presentation may not be required in MHRD as these proposals have already been deliberated in details by a group of experts in this Working Group meeting in DIT. The funds under NMEICT could be released directly by MHRD to the organization for the projects which are recommended by this Working Group in the area of e-Learning. These projects would be monitored by a Committee set up by DIT i.e. by PRSG (Project Review & Steering Group).

Meeting ended with a vote of thanks to the Chair