


F. No. 16-70/2009-DL
Government of India
Ministry of Human Resource Development
Department of Higher Education

New Delhi, the 10th June, 2009

Subject: Minutes of the **Sixth Meeting** of the Empowered Committee of Experts (Project Approval Board) of the National Mission on Education through Information and Communication Technology (ICT) – regarding.

A copy of the Minutes of the **Sixth Meeting** of the Empowered Committee of Experts (Project Approval Board) of the National Mission on Education through Information and Communication Technology (ICT), a Centrally Sponsored Scheme, held on 29th May, 2009 at 12.00 Noon under the Chairpersonship of Secretary, Department of Higher Education, Ministry of Human Resource Development, in Conference Room No.112-C Wing, Shastri Bhawan, New Delhi is sent herewith for information and necessary action.


(Dr. D.K. Paliwal)
Deputy Educational Adviser (DL)
Tele: 23385489

All members of the Project Approval Board of National Mission on Education through Information and Communication Technology (ICT) [As per list enclosed].

Copy to: Sr. PPS to Secretary (HE) & Chairperson, PAB/JS(DL)

Copy also to:

1. Shri Amitabh Bhattacharya,
Principal Adviser (Education),
Planning Commission,
New Delhi. **(Fax No.23096623)**
2. Shri Furqan Qamar,
Adviser (Education),
Planning Commission,
New Delhi. **(Fax No.23096548)**

3. Shri R. Chandrashekhar,
Special Secretary,
Department of Information Technology,
Electronics Niketan,
CGO Complex, Lodhi Road,
New Delhi **(Fax No.24363079)**
4. Shri N. Ravi Shanker,
Joint Secretary,
Department of Information Technology,
Electronics Niketan,
CGO Complex, Lodhi Road,
New Delhi. **(Fax No.24363099)**
5. Shri Subodh Kumar,
Additional Secretary,
Department of Telecommunications,
Sanchar Bhawan,
New Delhi. **(Fax No.23350495)**
6. Prof. Ajay Chakraborty,
Dean (CE),
Indian Institute of Technology,
Kharagpur. **(Fax No.91-3222-82000)**
7. Shri R.K. Shevgaonkar,
Dy. Director,
Indian Institute of Technology,
Bombay. **(FaxNo.91-22-5723546)**
8. Prof. K. Mangala Sunder,
Professor, Chemistry and
NPTEL Coordinator,
Indian Institute of Technology, Madras,
Chennai **(Fax No.91-44-225780)**
9. Shri A. Bhaskaranarayana,
Scientific Secretary,
Indian Space Research Organization (ISRO),
Antariksh Bhawan,
New BEL Road,
Bangalore - 560094. **(FAX No.080-23415229)**
10. Shri S.K. Saxena,
Director/T,
Department of Telecommunications,
Sanchar Bhawan, New Delhi

11. Ms. Shakila T. Shamsu,
Joint Adviser (Edn.),
Planning Commission,
Yojana Bhawan, New Delhi.

12. Shri Mithun Dutta,
System Administrator,
E-Gyankosh,
Indira Gandhi National Open University (IGNOU),
Maidan Garh, New Delhi. **He is requested to upload the
Minutes sent herewith on the SAKSHAT Portal immediately.**

.....

Project Approval Board of National Mission on Education through Information and Communication Technology (ICT)

List of Members

1. Secretary,
Department of Higher Education,
Chairperson
Ministry of Human Resource Development
Shastri Bhawan, New Delhi. Chairperson
2. Additional Secretary, & Financial Adviser,
Department of Higher Education.
Ministry of Human Resource Development,
Shastri Bhawan, New Delhi
3. Secretary,
Planning Commission
Yojana Bhawan,
New Delhi. Fax No : 23096575)
4. Secretary,
Department of Telecommunications
Sanchar Bhawan,
New Delhi. (Fax No.23711514)
5. Secretary,
Department of Information Technology
Ministry of Communication and Information Technology,
CGO Complex, Lodhi Road,
New Delhi. (Fax No.24363134)
6. Secretary,
Department of Space,
Lok Nayak Bhawan,
New Delhi. (Fax No. 080-2345328)
7. Dr. A. Mukhopadhyay
Adviser/Scientist 'G', SERC Division,
M/o Science & Technology, D/o Science & Technology,
Technology Bhawan,
New Delhi - 110 016. (Fax No.26602193)
8. Director,
Indian Institute of Technology,
Powai
Mumbai-400076 (Fax No. 91-22-25723546)

9. Director,
Indian Institute of Technology,
Roorkee-247667
Uttarakhand) (Fax No.91-1332-273560)
10. Director,
Indian Institute of Technology,
North Guwahati (Fax No.91-361-2690762)
Guwahati-781039(Assam) (Fax No.91-361-2692321)
11. Director,
Indian Institute of Technology,
P O Kharagpur-721302 (Fax No.91-3222-282000)
12. Director,
Indian Institute of Technology,
PO IIT,
Chennai -600036 (Fax No.91-44-22578003)
13. Director,
Indian Institute of Technology (Fax No.91-512-2597790)
Kanpur-208016 (U.P) (Fax No.91-512-2590260)
14. Director,
Indian Institute of Science,
Bangalore-560 012
Karnataka (Fax No.91-80-23600936)
15. Director,
Indian Institute of Technology,
Hauz Khas,
New Delhi-110 016 (Fax No.91-11-26582659)
16. Prof. V.N. Rajashekhar Pillai,
Vice-Chancellor,
Indira Gandhi National Open University (IGNOU),
Maidan Garhi, New Delhi
17. Prof. Pramod Tandon,
Vice-Chancellor,
North Eastern Hill University (NEHU),
Shillong
18. Prof. H.P. Kincha,
Vice-Chancellor,
Visvesvaraya Technological University,
Belgaum

.....

MINUTES OF THE SIXTH MEETING OF THE EMPOWERED COMMITTEE OF EXPERTS (PROJECT APPROVAL BOARD) OF THE NATIONAL MISSION ON EDUCATION THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) HELD ON 29TH MAY, 2009 AT 12.00 NOON. IN CONFERENCE ROOM NO. 112-C WING, SHASTRI BHAWAN, NEW DELHI UNDER THE CHAIRPERSONSHIP OF SECRETARY, DEPARTMENT OF HIGHER EDUCATION

The sixth meeting of the Empowered Committee of Experts (Project Approval Board) (PAB) of National Mission on Education through Information and Communication Technology (ICT) was held at 12.00 Noon on 29th May, 2009 in the Conference Room No. 112-C Wing, Shastri Bhawan, New Delhi, under the Chairpersonship of Secretary, Department of Higher Education.

2. The list of participants is at Annex-I.
3. Shri R.P. Agrawal, Secretary, Higher Education, welcomed all the members. Thereafter, agenda items were discussed and the following decisions were taken:

Item No. 1

Director (Finance) sought some clarification regarding payment of honorarium. The chairman of PAB clarified that in lieu of IPR transfer to MHRD, the contributors/Project investigators/Co-Investigators should be paid honorarium as decided in the fifth meeting of the PAB. It was also emphasized that in the past NPTEL norms were evolved after long deliberations by the ministry. If necessary, Ministry of Finance would be consulted. It was clarified that the honorarium to the faculty members / experts would be payable only on submission of outcome of the project allotted. **The minutes of the fifth meeting of the PAB were confirmed.** PAB also noted the Action Taken.

Item No. 2

The due diligence committee for connectivity presented its Report before the PAB. A copy of the report is enclosed as Annex-2. The report was circulated to all members in the fifth meeting of the PAB. The report was discussed in detail. Position with regard to questions raised by the members of PAB were clarified. Thereafter, the following decisions were taken:

- a. In view of the seamless integration with NKN, NMEICT network needs to be built by public sector undertakings. This would take care of the security issues and ensure synergy between the two projects.

- b. Keeping in view the comparative chart of the capabilities of the 3 PSUs and the fact that the university network would get subsumed by the NKN as and when NKN comes up, it would be prudent to entrust the creation of NMEICT to BSNL-MTNL combine. They should be given the flexibility to rope in RailTel and PowerGrid as per local needs, as is the case in NKN where BSNL-led Consortium of abovementioned PSUs is getting the work executed.
- c. It would be prudent if NKN connects all the universities in the first instance itself so that rental for leased line and port charges to be provided to BSNL-MTNL combine for connecting the universities and their Departments could be minimized.
- d. It would also be prudent to connect with those colleges to NKN MPLS port wherever economically feasible, so that increasing number of colleges could economically shift to OFC and NKN.
- e. It would be prudent to constitute an Implementation-cum-Monitoring Committee for ensuring proper implementation and roll-out of the NMEICT network by MTNL-BSNL combine under the aegis of DOT. It would be prudent to get from the Due Diligence Committee and MTNL/BSNL combine, a draft MoU to be entered between MHRD, DOT and MTNL-BSNL combine so that detailed modalities of roll out, quality of service parameters and service level agreements are diligently interwoven to facilitate quality, synergy and time bound roll out of the NMEICT network. Inputs from the IFD would be taken for finalizing the MoU.
- f. IGNOU will collect information and conduct a baseline study of the colleges/ universities within one month and apprise the PAB.
- g. A meeting of the Secretaries of Higher Education and Technical Education of the States and Union Territories should be held in the fourth week of June to apprise them about the scheme for connectivity of colleges. They should be requested to bring details of colleges/ universities for the meeting.
- h. The Implementation-cum- Monitoring Committee would examine and make recommendations so as to ensure that connectivity is provided to the educational institutions so as to serve the best interests of the mission
- i. PAB decided that DOT would release money to connectivity^{provider} only after Implementation-cum-Monitoring Committee recommendations are received.
- j. The Implementation cum Monitoring Committee will monitor the progress in expanding the connectivity and submit periodical progress reports to the PAB.

Item No. 3

PAB deliberated on the issue of setting up of a Technical Committee to recommend the plan for realizing the goal of ultra low cost access cum computing devices, their field trials, testing and validity of devices brought forward, after due selection processes and approved constitution of a Technical Committee comprising (i) Prof. P.P. Chakravarty, IIT, Kharagpur (ii) Shri Kashi Viswanath, IGCAR, Kalpakkam (iii) Shri G. P. Srivastava, BARC, C-DAC (iv) Prof. S. Qureshi, IIT, Kanpur (v) Dr. K.R. Srivatsan, Pro-VC, IGNOU (vi) Prof G. Vishveshwaran, IIT, Delhi (vii) Prof. Andrew Tangaraj, IIT, Madras (viii) Prof. Prem Chand Pandey, IIT, Bombay (ix) Prof. H.P. Kincha, Vice Chancellor, Visvesvaraya Technological University, Belgaum (x) Prof. Prem K. Kalra, Director, IIT, Rajasthan (xi) Prof. S. Mohan, Indian Institute of Science, Bangalore (xii) Prof. Padam Kumar, IIT, Roorkee, and (xiii) Mr S Mohan, Director finance, MHRD. It was also decided that Terms of Reference of the Technical Committee would be to go through the various developments that have taken place in the area, research areas where the programme could begin, set specifications, usability in adverse conditions like moisture in the air, extreme temperature, power problems in areas without reliable electricity and use of open source softwares, etc.

Agenda Item No. 4

Prof. K. Mangala Sunder, Professor, IIT, Madras requested PAB for consideration and approval of four proposals recommended by the Standing Committee in its meeting held on 20th April, 2009. He also apprised PAB of the objectives to be achieved through these proposals. Ms. Shakila T. Shamsu, Joint Adviser, Planning Commission reiterated the stand of Planning Commission that proposals be considered by PAB only after comprehensive guidelines, for which a Committee has already been constituted, are finally put in place. The member Secretary pointed out that PAB had not accepted the suggestion during the last PAB meeting, and that a Committee under the convenorship of prof. Furkan Qamar, Advisor, Planning Commission had already been constituted to further evolve those guidelines. He mentioned that if the Committee could complete its work within 2 weeks, in the next PAB meeting decisions could be taken on them. During deliberations, it transpired that the Mission activity being a National programme and aimed at bridging the ever-widening digital divide, must act sooner and must adopt the two-step approach of considering a pilot process for any project under the mission as soon as possible and then request a comprehensive evaluation of the full proposal within a few months to sanction the full project by the time the pilot process can be reviewed and assessed as successful by many domain experts. Without this strategic difference between time bound National Missions and developments of intellectual property over decades through a continuous supply of research funds by dedicated departments will disappear and it will be a great loss if the Mission does not launch its activities sooner. After deliberations, PAB decided to defer consideration of these 4 proposals to the next PAB meeting.

Agenda Item No. 5

Proposal submitted by IGNOU for supporting Sakshat was discussed at length by the members of the PAB. Considering all aspects of the project and the fact that the need for Mission to have a national repository of all the e-contents getting generated under it were being met by the Sakshat team, it was decided that full manpower support as envisaged in the proposal of IGNOU plus one Server would be provided. The specifications of video streaming server would be arrived at by Sakshat team in consultation with the Mission Director.

Item No. 6

Additional Item

PAB considered the additional agenda item circulated during its meeting on 29.5.2009 and while renewing its initial approval of Rs.211.20 lakh given in its meeting held on 25.3.2009 for establishment of Mission Secretariat of the National Mission on Education through Information and Communication Technology, approved the proposal to hire the space in IGNOU and hire the service of Ed.CIL for all kinds of technical and logistic support indicated in the proposal circulated during the meeting. Director(Finance), MHRD mentioned that the quantities for procuring various items should be as per immediate requirements which could be worked out by the Mission Director in consultation with IFD. In order to ensure that EdCIL hires persons most suited for the roles, Chairperson, PAB directed that the Selection Committee constituted by the PAB for recruitment of personnel for the project, inter-alia, should also comprise (i) VC, IGNOU (ii) Joint Secretary (DL), MHRD (iii) Prof. Prem K. Kalra, Director, IIT, Rajasthan (iv) Ms. Shakila T. Shamsu, Joint Adviser, Planning Commission (v) Prof. S.C. Saxena, Director, IIT, Roorkee (vi) AS&FA of MHRD or his nominee.

Summing up the discussion, Chairperson, PAB requested the Standing Committee to work out a mechanism to ensure that there would be no duplication of projects being considered by it.

The meeting ended with a vote of thanks to the Chair.

.....

List of Participants

1. Secretary,
Department of Higher Education
Ministry of Human Resource Development
New Delhi (in Chair)
2. Prof. V.N. Rajasekharan Pillai,
Vice Chancellor,
Indira Gandhi National Open University,
New Delhi
3. Shri S. Mohan,
Director (Finance),
Ministry of Human Resource Development,
New Delhi
4. Ms. Shakila Shamsu,
Joint Adviser (Edn),
Planning Commission, New Delhi
5. Shri S.K. Saxena,
Director/T,
Department of Telecommunications,
Sanchar Bhawan, New Delhi
6. Dr. Prem K. Kalra,
Director, IIT, Rajasthan,
C/O, Indian Institute of Technology,
Kanpur
7. Shri S.C. Saxena,
Director,
Indian Institute of Technology,
Roorkee

8. Prof. K. Mangala Sunder,
Professor, Chemistry and
NPTEL Coordinator,
Indian Institute of Technology,
Madras, Chennai.
9. Prof. Ajay Chakraborty,
Dean (CE),
Indian Institute of Technology,
Bombay.
10. Shri N.K. Sinha,
Joint Secretary (DL) and
Member Secretary, PAB,
Department of Higher Education,
Ministry of Human Resource Development,
New Delhi
11. Dr. D.K. Paliwal,
Deputy Educational Adviser (DL),
Department of Higher Education, MHRD,
New Delhi
12. Shri Raj Kumar,
Under Secretary (DI),
Department of Higher Education, MHRD, New Delhi

....

Discussion Note for due diligence.
Last modified on 20 May 2009 07:33hrs.

Meeting 1 on 20th April 2009 at 1100hrs in chamber of Mr.N.K.Sinha, JS (DL), MHRD and mission director, NMEICT; Persons present: Mr. N.K.Sinha, Ms.Shakila T. Shamsu, Dr.B.K.Murthy, Dr.Y.N.Singh.

Meeting 2 (meeting 1 after formal formation of due diligence committee) on 08th May 2009 at 1100hrs in the chamber of Mr.N.K.Sinha, JS (DL), MHRD and mission director, NMEICT; Persons present: Dr.H.M.Gupta, Mr.N.K.Sinha, Dr.P.K.Kalra, Ms.Shakila T.Shamsu, Mr.R.S.Mani.

Meeting 3 on 14th May 2009 at 1500hrs in conference room, 2nd floor, Shastri Bhawan; Persons present: Dr.B.K.Murthy, Ms.Shakila T.Shamsu, Mr.N.K.Sinha, Mr.Lav Gupta, Mr.Navpreet Singh (IIT Kanpur), Mr.Naresh C. Kalra (IIT Delhi), Rep of FA – MHRD, Dr.Y.N.Singh, Mr.Sudhir Saxena (DoT), Railtel representatives (Mr.Bahuguna, ????)

Meeting 4 on 18th May 2009 at 1200hrs in chamber of Mr.N.K.Sinha, JS (DL), MHRD and mission director, NMEICT; Persons present: Dr.K.S.Ragahvan, Dr.B.K.Murthy, Dr.Huzur Saran, Dr.P.K.Kalra, Mr.R.S.Mani, Mr.Lav Gupta, Mr.Harvinder Singli, Mr.Sudhir Saxena (DoT), Mr.J.S.Deepak (DoT), Mr.Anil Jain (BSNL), Mr.R. Sajikumar (BSNL), Mr.Vishwa Mohan (BSNL), Mr. Anil Jain (Powergrid Corporation of India Limited), Mr.Babu Verghese (PGCIL), Mr.P.K.De (PGCIL).

1.0 Background

In the National Mission on Education through Information and Communication Technology (NMEICT), all the educational institutes, universities, and all degree (art, science, engineering, commerce etc.) colleges at higher education level are to be connected with each other as well as with the Internet [1,2]. It is envisaged that this connectivity will be provided using NMEICT network hereinafter referred to as the 'mission network'. This network would have interoperability with NKN¹ and as well as connectivity with Internet. The basic ideas behind the network conceptualization, which has evolved with time, considering the avoidance of overlap with NKN, are as follows.

¹ National Knowledge Network

1. No equipment required for deployment of the mission network has to be owned by the educational institutes, except LAN and other infrastructure which is required to connect NKN as well as to make institute (university) NKN ready. The connectivity to all the institutes is taken as service for which due charges shall be paid to a selected operator. The payment would be on the basis of annual rental or on the basis of indefeasible usage right of all or part of the infrastructure needs. This would involve one time fee and a much lower recurring O&M² charges for a very long period.
2. The connectivity will be in form of MPLS³ VPN⁴, which will preferably be over wireline Broadband. (IP/MPLS and wireless/wireline broadband work at different levels. While IP/MPLS would be a transport technology at the core level, wireless/wireline broadband would be for access. Wireless broadband is not widely available as BWA spectrum is yet to be auctioned. Also the 3G spectrum has not been auctioned yet. Thus for the Virtual Private Network below the PE⁵ router level the options would be FE⁶/GE⁷ or TDM leased network based on fiber or VPN over DSL on copper between PE and the CE⁸ routers. In any case this could be left to the agency once the bandwidth requirement has been frozen)
3. The universities and institutes which will also be connected to NKN later (preferably with 1 Gbps), will be provided with larger bit rate (at least 155 Mbps). The operator should ensure that the migration to 1 Gbps happens without any cost to mission or NKN.
4. The universities will have 400 node LANs (averaged for all the universities). This will also be installed, managed and maintained by the same operator who will provide the VPN services. These LANs can be switched over to NKN whenever it comes up. The seamless transfer of connectivity of LAN infrastructure to NKN is to be done without any additional cost and equipment. The ownership of LAN infrastructure will remain with MHRD and institute/university jointly.

2 Operations and management
3 Multiprotocol label switching
4 Virtual private network
5 Provider Edge
6 Fast ethernet
7 Gigabit ethernet
8 Customer edge

5. NMEICT VPN will be connected at four places to begin with, using at least 1 Gbps bandwidth with NKN for facilitating the connectivity between the institutes in mission network to the institutes to be served by NKN. (Here if the resources are obtained from the same service provider who is providing NKN backbone then this will make management of connectivity easier.)
6. NMEICT VPN will be connected to Internet at 5 Gbps rate. All the colleges and institutes in the mission network will share this Internet connection for accessing the Internet. Initially, we can use 1:4 guaranteed bandwidth. The same shall be upgraded to 1:1 guaranteed bandwidth with increase in usage.

2.0 Objectives of this committee

MHRD has already transferred Rs.300 Crores to DOT/BSNL for setting up of this network after due diligence. In order to do the due diligence on behalf of NMEICT and DOT, this committee has been constituted. The objectives of this committee are

1. To decide on the procedure for due diligence.
2. To decide on the facts to be considered for due diligence.
3. After the deliberation determining if there are more than one operators who can do this network setup.
 - (a) In case we have more than one operators - to prepare EOI, Bid documents, evaluate the technical bids, all other document.

3.0 Criteria for selection of network operator

- 3.1 The first step would be to establish the type of connectivity and the implementation alternatives available. The type of connectivity is to be described in terms of:
 - Bandwidth per user and possible number of simultaneous users. Also the aggregate bandwidth required at each location. Based on what has been said above a large university may have upto 2000 simultaneous users. What kind of applications would these 2000 users be using? Say 200 accessing research papers, 300 e-learning programmes, 100 performing video downloads or video conferencing and the rest Internet browsing and file downloads.

Now one needs to see the requirement of domestic bandwidth for content available within the country and international bandwidth for Internet access.

- **Connectivity** with the provider's network: This could be based on the customer edge router directly connected with fiber to the provider's edge router. Depending on the bandwidth required and the budget it could also be through the Ethernet/RPR multi-layer aggregation network for FE/GE connectivity or it could be through broadband VPN and Metro Ethernet.
- **Architecture of the core:** based on IP/MPLS for benefits like traffic engineering, connection oriented network, creation of VPNs and CUG, inherent security, catering to varying bandwidth demands, IPV6 compliant, content agnostic, protocol agnosticity and SLAs
- **Security**
- **Diversity**
- **Operation Administration and Management functionality**
- **Service Level Agreements**

1.2 The committee considered the following options:

- (i) NMEICT to own routers, NOC⁹ set up, software to set up MPLS based VPNs and the entire educational entity setup. Lease only dark fibers from service providers to connect these routers and transmission equipment. This would entail huge capex and opex in creation of almost a service provider like network. An agency would have to be set up to execute the project and carry out O&M activities. This would require hiring of trained manpower all over the country. Cost of setting of NOC, main and DR, and staffing it would have to be borne. This option envisages setting up a core network with ownership of all the infrastructure except fiber. As this would not be used for commercial operations and also the traffic would be not be anywhere close to a commercial network of a service provider, the cost would be high and the equipment would not be carrier grade. It will also be duplication of NKN efforts.
- (ii) NMEICT owns the routing equipment and NOC and leases bandwidth on fiber. NOC will have to be set up. This option also has the same drawbacks as the option at (i).

⁹ Network Operations Center

- (iii) Make use of the carrier grade infrastructure available from the service providers. In this method emphasis is on outsourcing. Installation, ownership, operations and maintenance responsibility is with the service provider. The service provider's NOC can be used to monitor the VPN from a central place. Here only the Opex is involved with no staffing and O&M liabilities.

The committee is aware that for creation of private networks like NMEICT, currently the best way is to go for VPNs established over IP/MPLS networks. These networks provide great flexibility to the users in terms of bandwidth they pay for and the set up they want to create besides maintaining total security and confidentiality. It is further noted that cost optimization is possible with outsourcing. Service quality can be ensured through expertise of operator, which can be bound by service level agreements (SLAs).

Based on the above analysis and considering the factors like cost, ease of deployment, speed of deployment and the basic ideology mentioned above, Option (iii) is considered most appropriate for NMEICT network.

3.3 Requirement to be met by the selected service providers

- (i) The service provider should have a multi-layer IP/MPLS backbone network. It should have fully mesh connected core of Gigabit routers with DWDM connectivity. The second layer should also have gigabit routers in the important cities/towns connected to the core with route diversity. The outer layer should be well spread with each router connected to multiple routers in the inner layers. This would provide the benefit of scalability, traffic engineering, high availability, introduction of content feed at various levels, class of service, flexible provisioning of VPNs, security etc.
- (ii) The service provider should have at least 100 MPLS PoPs (points of presence) spread across the country. The larger the number, the better for mission network, as flexibility and reliability will be more
- (iii) The network operator shall have capability to create more than 15000 MPLS links inside their core network. More the better for reliability of mission network

- (iv) The service provider should have a well developed aggregation network with a large number of Ethernet POPs.
- (v) The service provider should have a well developed optical fiber infrastructure spread all across the country and covering more than 500 district headquarters/important towns and be ready to lay fiber wherever required for NMEICT if not already available
- (vi) The service provider should have appropriate licences and legal permission to set up such network. It is presumed that the service provider would be able to coordinate with state governments for right of way for laying additional optical fiber cables.
- (vii) The operator shall have an established broadband network capable of providing speeds upto 2 Mbps with PoPs spread all over the country. The operator shall have the capacity as well as capability to offer VPN service over Broadband and should be able to cover more than 90% Universities & colleges of India within first three to four months.
- (viii) The network operator shall already have international Internet Bandwidth of minimum 100 Gbps or have plans to expand to this level in near future, as the mission network will require initially 5 Gbps and will increment it 20 Gbps as the utilization grows.
- (ix) The service provider should be able to provide Internet connectivity at minimum of two locations in the country.
- (x) The network operator shall have capability to provide managed network services for whole of the mission network. It includes all the monitoring, management of faults, generating report for presentation to MHRD or any agency/committee authorized by it. The operator shall be able to provide centralized billing for entire mission network.
- (xi) The network operator shall have experience in provisioning and maintenance of managed VPNs, Internet connectivity, and Intranet network infrastructure.
- (xii) The network operator shall have a turnover of minimum Rs.1000 Crores from managed network services business. It should also have an experience as managed network service provider and managed Broadband service provider for at least 3 years.

3.4 The committee took note of the following stipulation in the mission document:

“Notwithstanding anything mentioned above, the approach would be to seamlessly integrate with the National Knowledge Network (NKN) in order to avoid duplication and attain synergy.”

The following important points due to interoperability to be maintained between mission network and NKN need careful consideration.

- (a) There cannot be any duplication with NKN. The service provider would get payment either from NKN or from NMEICT funds and not both. This requires that NMEICT gets connectivity from the service provider that is carrying out such work for NKN so that administrative transfer between NKN and NMEICT is smooth.
- (b) Seamless interconnectivity with NKN in such a large network would require use of backbone of a single large service provider
- (c) As NKN is planned as critical infrastructure for the country [3], it is important to have security of network connecting to it, of the similar level. This will allow for simpler and easier interconnectivity with NKN.
- (d) Immunity against market variations, merger and acquisitions. This is important as the whole mission heavily depends on this VPN, vulnerability against financial crunches and market slowdown should be minimized.
- (e) We need a single operator who will provide connectivity to all of our end points. Splitting them in separate block will hamper proper operation of VPNs, as the interconnects between different VPN clouds will become major bottlenecks. Handing over of QoS guarantees between different VPN will also be an important issue.

Recommendations

- Considering the point 1. we should restrict our search to public sector undertakings or the network services providers where majority stake is with Government of India or any of the State Governments. This restricts our choice to BSNL-MTNL combine (erstwhile Department of Telecom), GAILTEL, RAILTEL, and Power Grid Corporation of India.

Additional Recommendations

(to be followed by network operators)

When the mission is over, the funding for the mission network will cease. In such scenario, if the colleges and institutes desire, the operator should continue providing the services with the same pricing conditions, and is expected to keep the same discounts in tariff.

Followup

In the followup actions, the committee had asked for presentations from the three PSUs i.e., Railtel, Powergrid corporation of India Limited (PGCIL), and Bharat Sanchar Nigam Limited (BSNL). Railtel sent a document regarding their proposal to Sh.N.K.Sinha which was circulated to all committee members. They made a presentation before the committee on 14th May 2009. BSNL and PGCIL made their presentations before the committee on 18th May 2009. Summary of the these meeting is as follows.

14th May 2009. Railtel presentation.

The following observations were made about the Railtel presentation.

1. Inadequate appreciation of the Mission.
2. University segment left out.
3. VPN at 1:5 share as against user requirement of 1:1 share.
4. Geographical location of Colleges not studied in detail
5. Lot of heuristics
6. OFC laying cost per Km @ Rs. 5 lac is much higher compared to BSNL's Rs. 2 lac / Km
7. Maintenance agency required
8. Long drawn out time for implementation (at least three years).
9. Cost of LAN for Colleges not included
10. Thin network presence in Rajasthan and Gujarat belt and in the North East
11. Loop concept would be more advantageous with BSNL exchanges which are better geographically dispersed compared to Rail tracks
12. Organization has only 500 staff
13. Ownership model versus rental model
14. Wrong comparison with the Mission's connectivity strategy 1750 vs 1699 crore

15. Leasing the infrastructure from other network providers could have legal implications
16. Test case for UPTech University requires 202 crore for 400 colleges i.e., @ Rs. 50 lac per college. Even if it is presumed that all 2000 colleges would get covered within the same amount, the cost turns out to be Rs. 10 lac per college for a 4 year period. This is much beyond the approved allocation for the activity.

18th May 2009 BSNL and FGCIL presentations.

Following salient observations were made.

BSNL

1. BSNL has detailed plan for execution for the project.
2. It is biggest capability telecommunication infrastructure company.
3. 95% of the institutes are already covered by fiber due to presence of BTS or exchanges in the campus.
4. They can rollout the network within six months. Remaining 5% locations can be upgraded to fiber withing 9 months.
5. BSNL has capability to provided VPNoBB on copper on exising telephone lines making faster rollout feasible.
6. BSNL has proposed to put in 10% of the total cost on its own and become stakeholder on the mission network. BSNL has in-principal approval for the same. BSNL would like to have the following in lieu of its parternship.
 - a. BSNL would like to host all the IPTV and other contents on its own servers also. This will enable the BSNL users to access them free of charge thus increasing the value of BSNL connecions for their customers.
 - b. BSNL would like to put up their logo at all the mission network infrastructure. They want to use the parternship in mission network in their brand advertisement. This will also indirectly advertise the mission activities.
7. BSNL has provided availability SLA which has been circuiated to the committee members.

Power Grid Corporation of India Limited

1. They have strength in the core network.
2. Their reach is limited. They have told they required support of BSNL for providing such kind of

network.

3. Their MPLS network is yet to come up.

Final recommendation

The committee after evaluating the requirements, rollout time, support and capabilities has unanimously agreed that BSNL should implement the mission network. The MHRD-BSNL should sign an MOU for the partnership stating all terms and conditions. The partnership of BSNL will provide BSNL a sense of ownership and will enable them to contribute to the project. PAB is requested to resolve appropriately.

References

1. NMEICT Mission document – available at <http://www.education.nic.in/dl/MissionDocument.pdf>
2. Report of Technical committee presented in PAB of NMEICT on 17th March 2009.
3. Minutes of first meeting of High Level Committee (HLC) for NKN, 12th May 2008.

Draft MOU

between

a) MHRD, b) State Government, and c) Network Operator

It is agreed by the above parties on _____ (Date) at _____ (Place) that

1. MHRD has entrusted on the network operator to establish twenty VPN end point with at least 512 Kbps in both direction as dedicated bandwidth on each port through appropriate means, at each institute, degree/diploma college in the state of _____.
2. To begin with ten VPN end-points will be provided in the first year (2009-2010). Remaining VPN end-points will be provided in the second year (2010-2011).
3. These VPN end points will connect the institutes to NMEICT virtual private network. The institutes will be able to access the various academic resources, learning content, internet through this VPN.
4. MHRD will be paying directly to network operator through DOT, for 75% of share of charges to be incurred for Internet connectivity through common gateway for NMEICT network and 75% recurring charges for the VPN endpoint provisioning. The network operator shall not charge any non-recurring charges for the above from anyone.
5. The balance 25% of the share of charges for internet connectivity, and 25% of recurring charges for VPN endpoint provisioning will be paid by the state government to the network operator..
6. This MOU will remain in effect from its date of signing and till the National Mission is operational.

Bond to be furnished by the educational institute to MHRD through the network operator.

We _____ [head of institute] for and on behalf of the
_____ [name of Institute] shall agree to abide by the
following terms and conditions for using the NMEICT connectivity.

1. We shall designate a person in our institute/college who can be contacted by network operator, various committees formed by MHRD to monitor the network. He shall respond to all the queries with either the answers, or the status of the progress made to determine the answers on daily basis.
2. We shall permit the use of existing telephone lines from the network operator to be used for providing NMEICT connectivity.
3. We agree that the telephony charges if the telephony is subscribed by the institute over same cable, shall be responsibility of institute and MHRD does not hold any liability towards it.
4. We shall allow the use of this connectivity by all faculty, students and staff of our institute/college. For this purpose, either the shared facility will be setup.
5. [in case of private college/institute] We shall pay the 25% of the expenses as notified by the MHRD to the network operator. The 25% of our liability will be paid in advance. We shall pay the 25% advance after every quarter year.
6. We agree that connectivity will be discontinued in case of payment on part of institute/college is delayed by more than three month.

Draft SLA

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

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 rebate.
2. Causes of downtime of circuits/links include but are not limited to:
 1. Leased Circuit equipment (i.e. NTU) failures, supplied by BSNL to CUSTOMER
 2. Circuit Outage (at BSNL end only)
 3. Leased Circuit device hardware failure/malfunction
 4. Power outages (in BSNL)
 5. Human error (in BSNL)
 6. Process failure (in BSNL)
 7. Local Loop failure between the BSNL MPLS node and Customer's premises.

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

Customer's Responsibility

1. Any fault duration (i.e. downtime) shall be calculated from the time the fault is reported.
2. The CUSTOMER will ensure round the clock availability of staff (especially during the service window) who are capable of dealing with the MPLS Circuit equipment/ Router.
3. 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.
4. The CUSTOMER shall provide all necessary assistance and access to its facilities for preventive and corrective maintenance to BSNL staff all the time.

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. BSNL shall also try to 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 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.

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.

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 in 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. **Broadband over VPN**

1. A download speed of 512kbps would be assured.
2. Upload of 512Kbps also would be provided.
3. The above mentioned bandwidth would be maintained for at least eighteen hours in a day.
4. 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**

- **Throughput:** The BSNL shall guarantee a throughput of an uncontended bandwidth (1:1) as measured on physical layer **Starting from 1Gbps , it would reach up to 20 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 upto nearest BSNL server is available for 99% of the time.

- **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.		From BSNL Gateway Router International Internet Bandwidth
[1]	USA (Trans Atlantic)	350 msec
[2]	USA (Trans Pacific)	400 msec
[3]	Europe (UK)	275 msec
[4]	Europe (France)	275 msec
[5]	Asia Pacific (Hong Kong)	175 msec
[6]	Asia Pacific (Singapore)	150 msec
[7]	Asia Pacific (Japan)	250 msec

- **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 of one month 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 will not exceed twice in a month and 0.5% of total hours in any month. Any excess outage beyond 0.5% 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

2. Connectivity to National Knowledge Network(NKN)

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

3. 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.
- Any new provisioning requirement would be completed within 3 days.
- Spares: A spare percentage of 2% for switches would be maintained for any emergency / maintenance requirements in each location.

PROCESS TO BE CARRIED OUT BY BSNL

Restoration of Fault

- 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.
- 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 be accounted accordingly.
- 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.