The National Knowledge Network
Connecting Students to Learning Resources

The Union Budget of the year 2011-12 specified the intention of the Government to connect major educational institutions across India with a high speed network that will enable the transmission and sharing of knowledge resources. The National Knowledge Network (NKN) will play a major role in taking quality education to distant and remote areas. The article highlights some key elements of NKN and its role in creating a knowledge society

By Sheena Joseph

Higher education in India has figured in the priority list of the Government's development agenda over the last few years. The ever increasing demand for quality education and the burgeoning youth population has necessitated the need to make educational resources available and accessible to all learners, irrespective of geographical barriers. Here is where the National Knowledge Network (NKN) will act as a major factor in dissemination of education to the masses.

The efforts progressively highlights the considerable measures being taken by the government to integrate technology into education and the acceptance of ICT as a tool for change. The technology enhanced network is envisaged as a channel that will take knowledge resource to all, thereby breaking the barriers in education outreach. N K Sinha, Additional Secretary (TEL), Ministry of Human Resource Development, Department of Higher Education, Government of India is emphatic in pointing out the importance of technology, and says, "Technology is playing a very major role in providing the multiplier effect and in improving the Gross Enrollment Ratio (GER) in education. It has helped in quality enhancement efforts, ameliorating teacher shortage, taking care of the needs of the working population by providing access to education anytime, anywhere and teacher empowerment." The NKN project will see massive use of technology to connect institutions of learning across India, and thereby putting to use the immense potential of ICT in education.

THE NATIONAL KNOWLEDGE NETWORK

The main purpose of the National Knowledge Network is to encourage intensive research in higher education and to create institutions with high standards of quality, provide necessary research infrastructure and to encourage due training and development of faculty. The National Knowledge Network (NKN) has been envisioned as a state-of-the-art multi-gigabit pan-India network that will facilitate the provision of a common high speed network to higher education institutions of India. "The prime objective of NKN is to inter-connect all institutions of higher learning and research, for knowledge sharing and collaborative learning across the country, with a high speed network backbone. Each and every university, all national labs, CSR labs, and premier institutions like IITs and
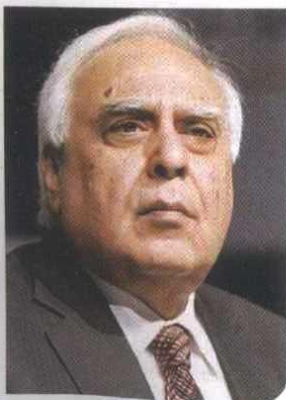
> "...We are going to connect 26,000 colleges and 700 universities in the next two years... This also means that we need open source material... this poses a great opportunity for the IT industry."
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> Minister of Human Resource Development, Government of India

medical colleges will be connected with high speed network," says Dr B K Murthy, Director and Head of the National Knowledge Network Division of the Ministry of Communications and IT, Government of India

All over the world, activities relating to research and development have involved a multi disciplinary approach, extensive collaboration and varied activities related to computation. In order for any research activity to succeed, sharing of data and resources is imperative. Consequently, in order to most favorably exploit the latent potential of institutions employed in creation and distribution of knowledge in diverse areas, it is vital to connect them through a high speed broadband network. The proposal of setting up a National Knowledge Network first gained momentum through discussions between the office of the Principal Scientific Advisor to the Government of India and the National Knowledge Commission. Crucial stakeholders including experts, users, service providers and educational institutions, came together and finally devised upon the concept of NKN.

HOW IT WORKS

Elaborating on the actual operational activities in NKN, Dr Murthy adds that each connected campus will get a speed of 1 GBPS. "To build a scalable network, which can expand both in geographical coverage and speed, the NKN will be created as a common network like a national highway. It will consist of ultra speed high core network with a speed of 10 MBPS." The network will consist of an ultra high speed core backbone with 10 GBPS speed and 1500 nodes, with each node being connected by around 1 GBPS. There will be a distribution node layer at appropriate speeds. The participating institutions will be able to directly connect to the NKN at speeds from 100 MBPS to 1 GBPS depending on the requirements. Currently the project is being implemented by NIC and is being executed by Department of Information Technology (DIT).

NKN DESIGN OVERVIEW

The chief consideration for the overall design of NKN has been to construct an infrastructure that can extend and become accustomed to upcoming needs in education. The philosophy for the NKN design is to Encourage, Enable, Enrich and Empower the user community to experiment and put into practice ground-breaking ideas without any constraint from the network technology and its governance. On the basis of this philosophy, as the future generation network, NKN will accommodate the following features:

Network Design: NKN blueprint is created in line with all the present standards to allow faultless inter-operability amongst technologies and seamless

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Subramanian N
Managing Director, TRS, Chennai

amalgamation amongst diverse unique equipment manufacturers.

Security Requirements: Very strict safety measures are required to be drawn, executed and installed in order to keep the network alive, in wake of the increasing amount of security concerns reported by CERT and the rising problems faced by innovations in convergence. Any particular requisite for restricting right to use services should be deliverable as part of a security policy. The Central Command Control created to react to such situations should address till-date and anticipated attacks.

Service Requirements: This requirements may vary between diverse service providers, and also between different tiers of a similar service. Service needs are essential for transparent delivery based on either heritage (as in telephony) or the general requirements for a particular service.

Network requirements: These requirements are network-specific and can be tied to specific services, delivery mechanism (client could be variety of devices like PC/ PDA/ any other device) and access mechanisms like Intranet / Internet. The design will cater to the overall performance goal of the NKN infrastructure.

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Director-Special Projects, Edutech India Pvt Ltd

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Ashwin Desai
Managing Director, A & T Network Systems Pvt. Ltd.

for generation of open source content. It should also have international participation in order to ensure diversity in content," says Sinha.

Kapil Sibal, Minister of Human Resource Development, Government of India reiterates, "We in India are concentrating on delivery and not on content. So we may have another 500 million mobile phones and broadband in place which connects every village and district but if we do not have the content, then it's of no use. We must shift our emphasis towards creating IT solutions. It is much beyond just cyber security or disaster management…the entire developmental process is baseless without content. We are going to connect 26,000 colleges and 700 universities in the next two years through the National Knowledge Network. This also means that we need open source material and content to actually empower the students…this poses a great opportunity for the IT industry."

ROLE OF THE PRIVATE SECTOR

The NMEICT and NKN projects are looking towards strong public private partnerships for creation of quality content and network for education. A lot of content generating activities are already happening in the private sector. Content development is a specialized area and requires certain intricate skill sets. While academic institutions may have the requisite subject matter experts, they will not have ready access to skilled instructional designers, visual designers, technical designers, and usability experts. This is crucial to create content that is uniform, re-usable and is of international standards.

"NKN is an ambitious project and a good one also. Private companies will be required for providing the required technology platform and the content for such a massive project," says Subramanian N, Managing Director of TRS, Chennai, emphasizing on the role of the private sector in the NKN project. Quality and innovative solutions will have good demand in this market. He highlights that online products like e-Assessment with provision for objective and subjective testing along with a comprehensive question bank software will be 'the Solution or Platform' for such a project. Also products in video interaction, video conferencing, live classes and live interaction will be in demand, he adds.

"Private companies could also provide operational, maintenance and portal management support apart from working on linking content providers and users", says Ashwin Desai, Managing Director, A & T Network Systems Pvt. Ltd.

Sajeev Karuthody, Director-Special Projects, Edutech India Private Ltd is of the opinion that private companies that specialize in providing e-learning

Learning (NPTEL). Sinha points out that apart from the supply side for creation of content, there is also a strong demand factor that is creating a massive need for creation and sharing of common educational content. The content so created should not just be that of scanning lecture notes, but also should include animations and simulations which will be created by the community of experts. "eContent needs to be free for every learner, not just in India but also, across the globe. This means that efforts have to be intensified

NKN to Promote Foreign Collaborations

Dr Ekta Singla
Assistant Professor, Department of
Mechanical Engineering &
Nodal Officer, NKN, IIT Ropar

Could you elaborate on the NKN activities undertaken at IIT Ropar so far?
The network has proven as a great facility in bridging the gap between our students-requirements and the knowledge providers, which was very important during the first couple of years of establishing a new institute. Experienced professors from old-IITs are contacted through NKN for expert lectures. The network is usually used for receiving educational and inspirational talks from eminent personalities both from Indian and foreign universities. It is planned to broadcast workshops on specialized and advanced topics for the interested teachers and industrial people, through NKN. You need not fix particular number of seats for the recipients!

What have been the key achievements of the project?
Besides the routine use of NKN in knowledge-sharing, it is used as a great tool in establishing foreign collaborations. The high-definition VC systems and data-sharing facilities are expected to catalyze the important processes of establishing and executing common research platforms.

How is NKN going to promote research in education?
Education - right from the elementary school level to higher levels - shapes a human being and the quality of the tools used during this process is reflected in the final outcome. NKN may be considered as one exclusive tool which is required the most in integrating experts from different fields and in providing a platform for the best education in interdisciplinary fields. Secondly, NKN is a solution for effective distance learning for people residing in remote locations.

What is the potential impact of NKN on education across India?
India is a land of enormous variety and talents. NKN, a bonding between all the premier institutes across the country, provides a platform to share/avail knowledge in medical, agriculture, engineering and other fields. In a way, it is difficult to make an excuse of how to reach and how to teach. All one needs is his will to educate. We can use the network to connect the sources and the needy.

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solutions have a definitive role in this initiative. The government needs to understand that e-learning is a specialized sector and that the government only stands to benefit by leveraging on the expertise of private companies. "Instead of re-inventing the wheel, the government can partner with private players who specialize in providing world-class, time-tested, robust and scalable enterprise-class systems that can assist in reaching the project objectives." There are numerous players in this sector who have invested thousands of man-years and millions of dollars in Research & Development of e-learning solutions. Partnering with such global leaders can only be termed as a win-win situation, he says.

Subramanian adds, "New companies are also gearing up for content creation. The requirement is of quality content and quality presentation. It is only a matter of time that such products will be available."

Rahul Sharma, Head-System Integration Business, of Sterlite Technologies says, "The effective use of ICT will play an increasingly important role in bridging the digital divide between urban and rural India. The propagation of education through leveraging ICT would empower and equip our young generation of Indians. This would help in the enhancement and overall sustainability of the Indian economy." Sterlite, a global provider of connectivity solutions for the power and telecom industries, was recently roped in by Bharat Sanchar Nigam Limited (BSNL) to enhance its network for promotion of higher education in India. In an effort to connect 120 universities, Sterlite plans to connect 30 universities during FY12, and would connect the remaining 90 universities by FY14. The company would manage the network for