

PLANNING THE NETWORKING OF ODL INSTITUTIONS FOR ESTABLISHING INTEGRATED DISTANCE EDUCATION SYSTEM IN INDIA

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ABSTRACT

It is proposed to establish an Integrated Distance Education System in India by designing modern technology based information communication network, connecting all its ODL (Open and Distance Learning) institutions to the headquarters of the ODL system in India. The principle roles to be performed by such a system have been discussed; according to which it would enable, educate and empower every member of the academic community including distance learners so as to provide them quality distance education. The connectivity between the ODL institutions would be achieved through the use of VPN (Virtual Private Network) involving wireless networking and optical networking. Various benefits of providing VPN connectivity to the ODL institutions in India, such as cost effectiveness, security, and shared applications/services have also been discussed. Thus, the networking of all the ODL institutions in India would provide a national framework so as to build an excellent Integrated Distance Education System necessary for providing equity and quality distance education at national level.

Keywords: Open and Distance Learning, Virtual Private Network, Web Based Information System, Distance Education, Integrated Distance Education System.

INTRODUCTION

The Distance Education System in India serves to the educational needs of millions of its students and is one of the largest educational systems in the world. Presently it comprises 14 Open Universities and about 200 DDE (Directorates of Distance Education)/CCIs (Correspondence Course Institutes) and government managed institutes that are providing education through distance mode. At the apex of the ODL system in the country, the DEC (Distance Education Council) has been constituted which is responsible for promotion, coordination and maintenance of standards of ODL (Open and Distance Learning) in the country.

In pursuance of its objectives, DEC has taken a number of initiatives for the coordinated development and expansion of ODL institutions in the country. As such the council is providing support to these institutions for the development of their infrastructure, quality course materials, proper learner support services, staff development and training, while also adopting modern technology including computerization and above all encouraging them to use ICT in their various operations. However considerations of efficiency and effectiveness demand that all the ODL institutions must mutually share on national basis their physical and intellectual resources rather than each one reinventing the wheel.

The DEC efforts in creating common pool of programmes and standards-setting are the major steps being taken in this direction. However to achieve such types of objectives in totality and systematically it is proposed to establish a modern technology based information communication network connecting all the ODL institutions to its headquarter (DEC). Such a system would help for expeditiously communicating information and for providing IT solutions for academic as well as administrative services involved. More explicitly it may be mentioned that the main objectives to establish this network (of all ODL institutions in India) would be:

- Sharing of resources required for efficient operation of ODL institutions and for the delivery of various academic and administrative services to the students.
- Pooling the courses offered by all OUs (Open Universities) to provide students with a wide range of options in respect of courses and programmes.
- Evolving a common pattern and structure for distance learning programmes throughout the country;
- Avoidance of duplication in production of course materials.

It may also be mentioned that the extension of quality distance education to remote and rural regions has become a Herculean task for a large country like India with multi-lingual and multi-cultural population separated by vast geographical distances and in many instance, inaccessible terrains. In order to meet this multifarious challenge, it is proposed to establish an integrated system at national level which would supplement curriculum based teaching, provide effective teacher training, greater community participation, strengthen educational efforts and provide access to new technologies through a well thought out network of all ODL institutions in the country. Such a network would also establish the connectivity between urban educational institutions with adequate infrastructure imparting quality education and the large number of rural and semi-urban educational institutions that lack the necessary infrastructure. Thus, in spite of limited trained and skilled teachers, the aspirations of the growing student population can be met through the concept of national framework for distance education. As such it may be mentioned that the networking of all ODL institutions in India would pave the road to build an IDES (Integrated Distance Education System). However the proposed IDES would be working to enhance quality distance education in India through the development of e-contents, capacity building, ODL databases, quality instructional processes, quality courses programme content development, IT (information technology) infrastructure and services.

The main purpose of the establishment of IDES would be to encourage regional and cross-sector development of the ODL system on national basis by sharing resources, knowledge and technologies of learning. Such a framework would also have the objective of ensuring connectivity of the learners to the DE network so as to enhance their self-learning skills and develop their capabilities for on-line problem solving.

This network shall work for creation of knowledge modules with right contents to address to the personalized needs of learners, certification of competencies of the learners acquired through formal or non-formal means. It will also develop and maintain the database having profiles of human resources, learning materials, programmes schedules and education delivery systems. Thus establishing the network of all ODL institutions in India would provide the national framework for the distance education in India, which would work for;

- Promotion of ODL System in the country,
- Maintenance of associated educational standards,
- Development of quality assurance framework, and
- Coordination of various activities pertaining to the ODL institutes in India.

In this paper an option for VPN solution has been presented and the proposed IDES VPN network connecting all the ODL institutions for establishing the IDES in India has been discussed. As such the principle roles to be performed by such a system have also been discussed with a view to provide equity and quality in distance education on national basis in India.

NETWORK DESIGN/IT INFRASTRUCTURE

As mentioned above, the networking connectivity of all ODL institutions in India is becoming increasingly important for the purpose of establishing integrated distance education system in the country. As such an overview of general needs and main requirements of IT infrastructure/network design for such a system have been presented from the perspective of planning the networking of ODL institutions in India.

Needs Overview

For satisfactory and efficient operation of distance education system within the available resources in the country, a cost effective distance learning IT solution is needed which can help to control costs and provide an appropriate IT infrastructure and services on national basis to all the ODL institutions in India. It is believed that the solution would be achieved by providing low cost connectivity along with development of valuable distance learning IT solutions.

However there is an urgent need for improved IT infrastructure in ODL institutions as it is observed that in most of the ODL institutes, IT infrastructure facilities for distance learning do not exist to a satisfactory level.

The different ODL institutions in India are at different levels of IT infrastructure need. Some have fairly developed IT capabilities while others are far less developed. In order to fill up such a gap, it is very much needed to provide access to proper inexpensive modern technology based telecommunication services to as many ODL institutions in the country as possible.

As such with a view to provide recently developed IT based distance learning solutions to academic community on national basis, a the modern technology based methodology is needed to be developed, which would subsequently be made available to them over the Internet.

Main Requirements for Network Design Parameters

The main requirements as well as resources are ought to be identified for implementing appropriate IT infrastructure facility for the proposed IDES in India.

This would also include streamlining of the IT networking activities within the member organisations (i.e. all ODL institutions in India) and developing most appropriate network design alongwith the associated IT network solutions so as to obtain the most cost effective and highly secured system for distance education at the national level. The overall connectivity requirements for the key network design parameters include wide and scalable bandwidth which must also be fully utilized. In addition the networking connectivity is required to be cost effective so that low cost per transaction may be realised.

Proposed Network Design

After considering various network designs such as LAN (Local Area Network), WAN (Wide Area Network), VPN etc., it is decided to select VPN architecture as the proposed network model for IDES, since it is the most cost effective network design, with the best probability of long-term sustainability. VPN have also been reviewed in the past by various people working in this area [King, (2000), Malik, (2002), Pooree, (1999), Tiller, (2001)]. In case of adopting VPN networking; the IT infrastructure components such as communication lines, hardware/software; and associated applications and services development including the technical expertise; can be shared among the member organizations of IDES. As such the IT infrastructure capitalization and maintenance cost including the cost per transaction would decrease significantly. Also it would reduce operational cost as compared to traditional WAN and LAN network systems. It would also provide faster ROI (return on investment) than such systems. It may also be mentioned that in addition to providing security, broadband networking capabilities and global networking opportunities, it (VPN) would improve productivity, extend geographical connectivity, and reduce transit time and transportation costs for end users. As such the increase in user satisfaction from the added reliability and convenience, by employing the VPN approach would be achieved.

Virtual Private Network

The VPN would link two or more computers through an underlying local or wide-area network while encapsulating the data and keeping it private and secured. Such a network in the organization uses advanced encryption and tunnelling to permit computers to establish secure, end-to-end, private network connections.

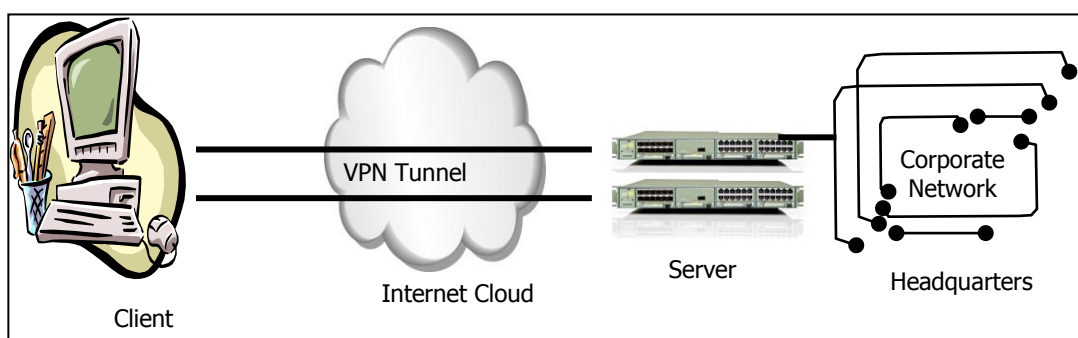


Figure: 1
A schematic view showing the VPN Tunnel established over Internet cloud

A client computer would connect to its local ISP (Internet Service Provider) while providing connection to the Internet. Special client software is provided so as to recognize a specified destination and that would negotiate an encrypted VPN session. Subsequently the encrypted packets wrapped in IP (Internet Protocol) packets would tunnel their way through the Internet (see Figure: 1).

IDES VPN

The VPN network may utilize an Internet connection from each member's organization. All communication would travel through the Internet and the IDES VPN server. As such joint applications and shared access to direct lines to other organisations through the IDES VPN would be obtained.

The following figure illustrates multiple members and remote users connecting to the IDES VPN through the Internet. Access is then provided to multiple IDES VPN applications and services (see Figure 2).

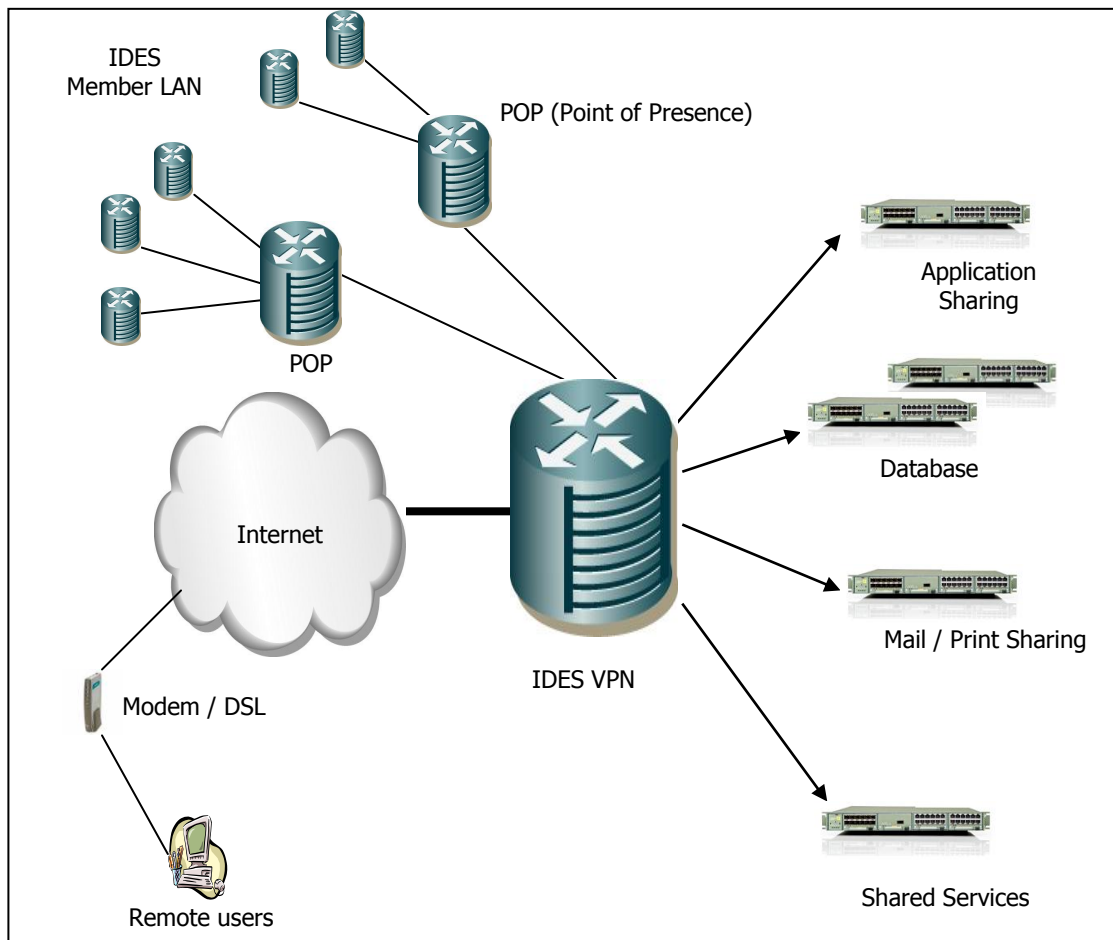


Figure 2: IDES VPN with multiple members

Solution Design and Implementation of IDES-VPN

The solution design and implementation would follow a systematic planning and implementation methodology. The methodology would seek to enable IT (information technology) systems implementation that are simple and deliver excellent results on time and within budget. The main goal would be to implement a fast, secure, cost-effective means for site-to-site and remote access connectivity among all the ODL institutions so as to gain access to e-mail and file server etc located at the organisation's headquarters. The various efforts and the major steps to be undertaken by the ODL system for VPN implementation have been described and shown schematically in Figure 3 as follows:

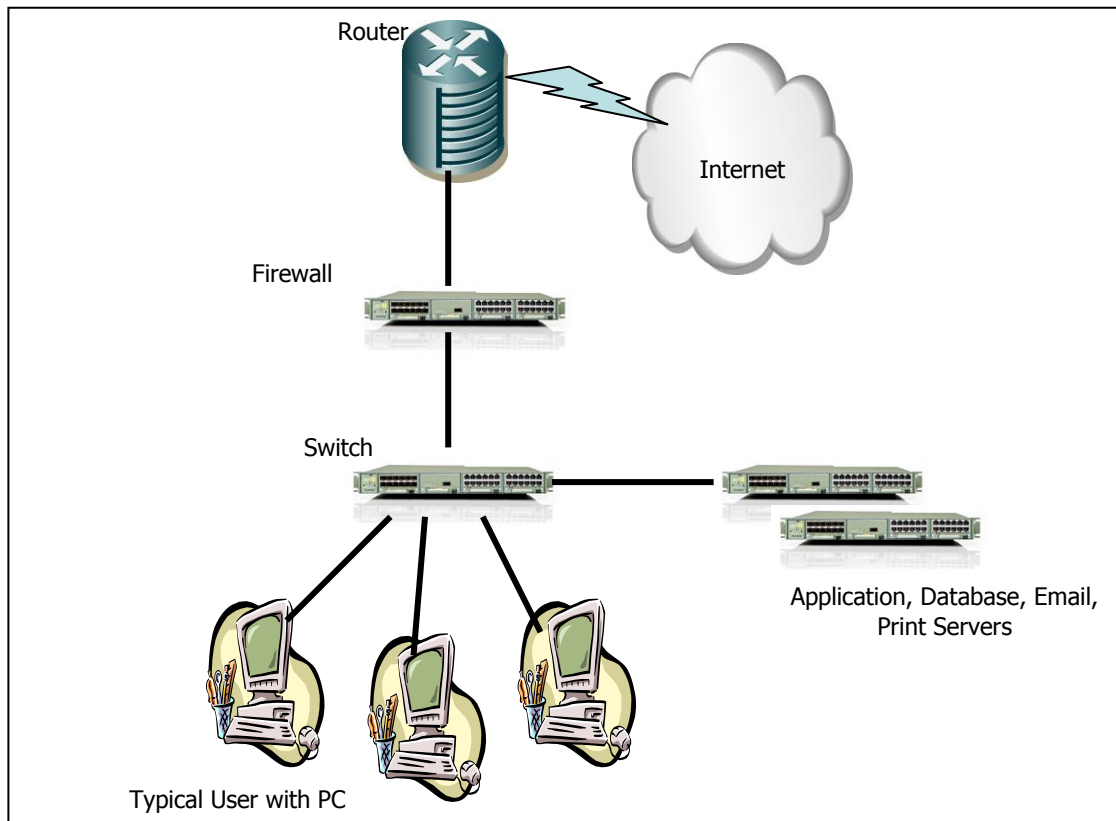


Figure: 3
Implementation of IDES VPN

The proposed network should be able to support about 200 member organisations at any given time. Along with this about 10-15 users must also be able to have remote access connectivity simultaneously. The network may be monitored and supported by the help desk team who would also field trouble tickets.

NETWORKING OF ODL INSTITUTIONS IN INDIA

The networking connectivity of all ODL institutions in India is becoming increasingly important for the purpose of establishing Integrated Distance Education System in the country.

An overview of the system employing VPN has been presented (see Figure: 4) from the perspective of planning the networking of ODL institutions in India.

The main objective would be to realise cost effective and secured network connectivity solutions along with providing optimum level of operational satisfaction for end-users of such a system.

The capabilities and limitations of various configuration options have been studied and accordingly the most suitable among them has been chosen for implementation. The national network of the IDES VPN architecture (see Figure: 4) with connectivity from the IDES members to the IDES VPN applications and services would be provided through the single scalable Internet access.

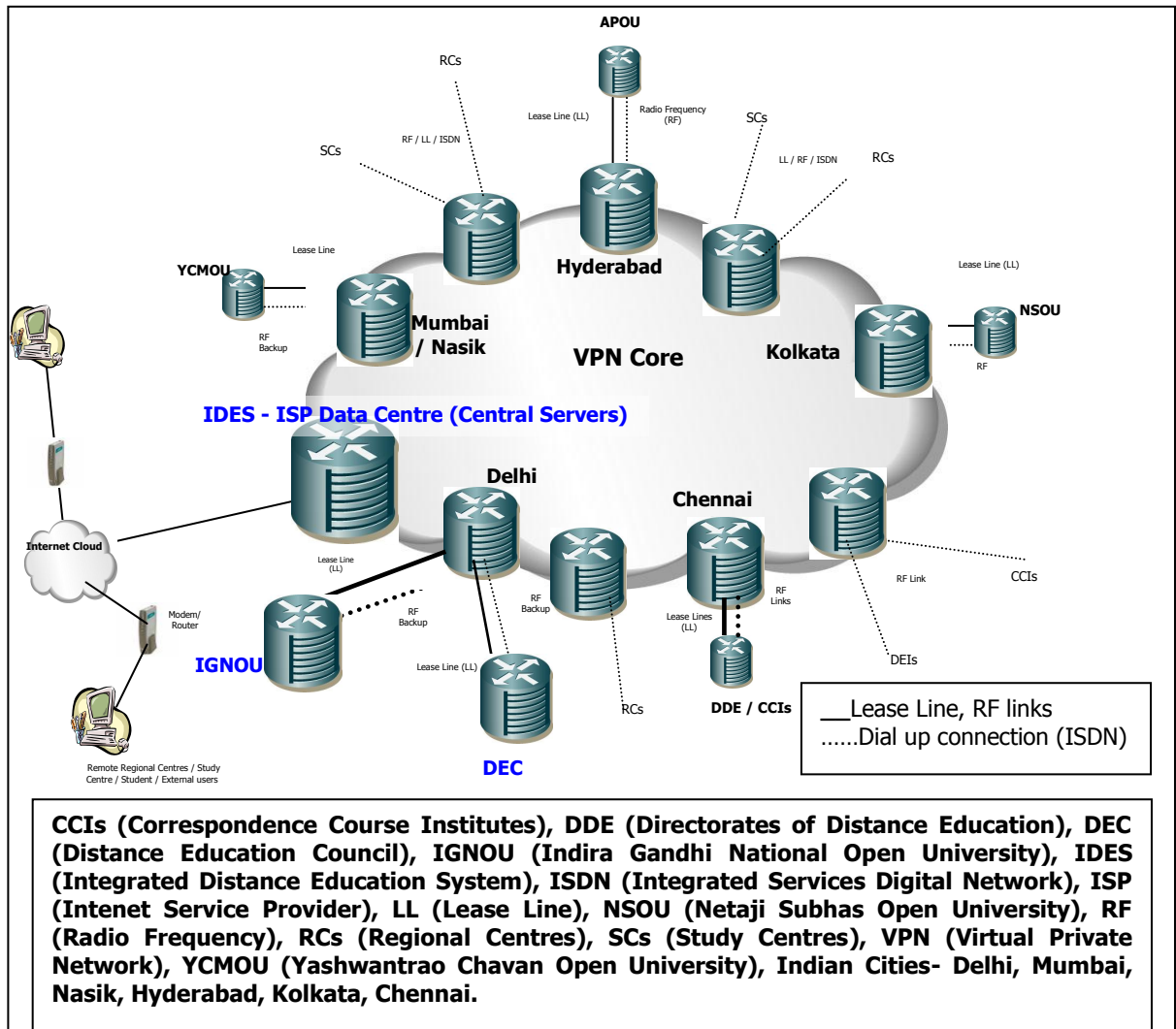


Figure: 4
National Networking Architecture of the IDES VPN

As such the member connections with ODL institutes will be accomplished with secure Internet connections through the IDES VPN. The unified connection will allow for IDES members (i.e. ODL institutes) to share resources thus creating the basis for cost savings of the VPN architecture. All members will be able to maximize communication line bandwidth. The IDES VPN server located in the data centre would work as portal to the affiliated and associated organizations, thus eliminating the need for duplicated and under utilized telecommunication lines at each of the ODL institute sites. The IDES portal at headquarters (DEC) would be a central point to the specialised ODL databases and a home for jointly licensed and fully developed distance learning IT solutions.

Thus in all it may be mentioned that the IDES-VPN would provide sharing of direct lines and associated application, services, capital resources and technical expertise among ODL institutions with the head quarters, which is the main underlying factor giving rise to tremendously large amount of advantages and benefits that are obtained with the implementation of such a system as well as during the operation of the Integrated Distance Education System in India.

BENEFITS OF IDES VPN

The original objectives of VPN network is to implement a fast, reliable and cost effective nationwide mean for all ODL institutions of India so as to have easy and convenient access round the clock, to various academic and administrative service including e-mail and file servers etc. located at the IDES headquarters. These ODL institutes also include those located in the remote and rural areas which are not easy to reach physically. Due to sharing of resources, the ODL institutions need not have to make individually much investment in hardware and software, such that the IDES would be able to recoup its project investment in due course of time.

As such more explicitly the general benefits of the IDES-VPN obtained by networking all the ODL institutions in India with VPN (Virtual Private Network) are as follows:

Cost Effective

VPN would provide Cost effective connectivity method for the member organisations. Wide bandwidth connections would be available to all member organization through one Internet connection. As such it would eliminate the need for multiple direct communication lines. Additionally, monthly communication costs would be significantly reduced with increased bandwidth and more efficient bandwidth utilization.

Security

Internet Security capabilities would be provided as mentioned below:

- **Authentication:** It is the process by which a party exhibits its identity to another. As such it would allow us to verify a user identity, as well as, verify that data is coming from trusted source. This would also include authenticating an individual user, as well as, including authentication of the host from where the information has originated.
- **Integrity:** Integrity would ensure that the data has not been modified during transmission.
- **Privacy:** It would protect private information from eavesdropping. Encryption would provide privacy by modifying data; so any other person excepting the intended recipient, cannot view it. The sender and the recipient each would have keys that are used to encrypt and decrypt the information that is being shared.
- **Auditing:** It would involve the single best methodology for identifying network system failures, mis-configurations or internal/external attacks.

Shared Capital Cost

The IDES VPN implementation would allow for development of one system that can be shared by all members. The alternative is that each individual member would make the same capital investment and acquisition of duplicate resources to implement the same level of networking capability, which obviously is highly undesirable and cannot be recommended at all.

Scalability

It would allow for and can provide the necessary facilities needed for the growing provide number of sites and remote users.

Shared Applications/Services

IT solutions can be jointly purchased and developed by IDES and its members and can be subsequently used/shared by all stakeholders.

Shared Technical Support

A group of shared technical IDES staff can be formed which would maintain shared systems, application and associated Web Page projects.

Remote Access VPN

It would provide a more reliable and faster connection than dial-up.

Site-to-Site VPN

It would allow for connection of headquarter (DEC) to ODL institutes and to associated study centres/branch offices/the concerned stakeholders and end-users. It may thus be mentioned that the IDES VPN is innovative in nature and offers tremendous benefits to distance learners and the academic community at national level.

GOALS ACHIEVED WITH THE ESTABLISHMENT OF IDES

With the establishment of IDES, the ODL system would be able to provide significant help required to fulfil the training and development needs of every member of the academic community in India. In terms of the need for openness and flexibility, this would achieve the highly needed developmental goals as mentioned below:

- To provide information that will help policy makers and decision makers formulate policies, develop strategies and plans to efficiently manage ODL programmes.
- To offer current and state of the art information on implementing ODL with reference to teaching-learning methodology, modes of delivery, media for learning, learning technologies and trends in research.
- To serve as a network for collaboration at national and international level by providing a platform for the exchange of information, ideas, experiences, lessons learned, and best practices.
- To provide a gateway for free and fair access to ODL databases and knowledge resources on ODL for the purpose of enhancing educational training and development.

In addition to above it can be said that such a framework would aim for building connectivity and knowledge network pertaining to the activities of teaching-learning; students assessment, evaluation, certification and term-end exams etc. Also it would aim for development of efficient learning modules and knowledge modules for various courses/programmes having the right content to take care of the aspirations and personalized needs of academic community including learners. As such the standardization and quality assurance of e-contents would also be undertaken so as to make them world class as well as cost effective. Support would also be provided for the creation of virtual campus for distance education in the country. In addition the associated databases including the profiles of the associated human resources and other things would be developed and maintained. As a result digital literacy would be achieved for various educational activities of the ODL institutions.

CONCLUDING REMARKS

An IDES (integrated distance education system) in India would be established by employing VPN (Virtual Private Networking) of all ODL institutions in the country. Since VPN model has been adopted, so IT infrastructure components such as communication lines, hardware/software and associated applications and services could be mutually shared among the member organisations of IDES.

In addition such a system while providing excellent security features, broadband networking capability and global networking opportunities, would also improve productivity, extend geographical connectivity, reduce transit time and transportation costs for end users. As such the increase in user satisfaction from the added reliability and convenience of employing the VPN approach would be achieved. The IDES thus established would be involved in enhancing the quality of distance learning through the development of high quality e-contents, instructional process, course / programme content development, IT infrastructure and network systems. In addition to this all the associated ODL institutions would be able to share mutually on national basis the available physical and intellectual resources, evolving a common pattern and structure for high quality distance learning programmes all over the country. Thus, it is concluded that the networking of all the ODL institutions would pave the road to build an excellent Integrated Distance Education System in India which would provide equity and quality in distance education at national level.

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