



CASE STUDY: NHAI DEPLOYS AN IT HIGHWAY AN IT HIGHWAY FOR INDIAN ROADS



“In the age of convergence, the obvious choice is to drive voice, video, and data through a single network. We knew VoIP would have a good future” - Atul Kumar, General Manager, NHAI

A look at how National Highways Authority of India (NHAI) is leveraging the use of IT to make its mammoth road development project a success.

The National Highways Authority of India (NHAI) is responsible for the development, maintenance, and management of National highways in India. Its mandate is to construct 13,146 Km of 4/6 lane superior highways in India. This is a part of the largest highway project ever in independent India called the National Highway Development Project (NHDP).

NHAI has turned to IT to make operations and management easier and keep regular communications with all project sites. It has deployed a robust LAN in its Head Office (HO), IT Telephony services, and plans to deploy a nationwide WAN, to facilitate workflow in its offices and project sites.

An ambitious project

NHAI is headquartered in New Delhi and began operations in February 1995. The NHDP is a dream project of the Prime Minister, and is implemented under the able guidance of B.C. Khanduri, Union Minister for Road Transport and Highways.

The NHDP has two components, the Golden Quadrilateral (GQ) and the North-South-East-West (NSEW) corridor. The GQ component is about building a high-density corridor of 5,846 Km, which connects Delhi, Mumbai, Chennai, and Kolkata. NHAI targets to complete it by December 2004.

The NSEW component is about building 7,300 Km in the related region, to be completed by 2007. In addition to this, NHAI will also build stretches of roads totaling to around 1,000 Km. This will allow connectivity of hinterland to 10 major ports. Around 1,327 Km of road for GQ and around 558Km for NSEW is already complete.

IT - The big facilitator

"I can't dream of executing a project of this size without the support of technology and connectivity. The idea is to create an 'IT highway' that will support and benefit the operations and workflow of the project. IT is a big facilitator there," said Atul Kumar, General Manager, Information Technology and Planning, NHAI. Kumar is responsible for the integration of the LAN and the future WAN for NHAI.

NHAI plans to deploy a WAN to improve communication between construction activities going on simultaneously in different parts of the country.

The organization looked forward to the following benefits of building an information highway of this kind. Some of them were:

- It will help plan and execute construction activities at various nationwide sites.
- Vital information that can support efficient implementation of the project can be shared quickly.
- It will reduce the cost of communication since telephones and faxes, which are currently used to communicate, run high bills.
- Information from toll booths set up along the highway, regarding toll collection and traffic statistics can be delivered to the NHAI head office easily. Toll booths have already started operating in certain stretches of roads which have been completed.
- Citizens can receive real-time information about the completion of roads and plan their travel routes.

Unlike other Government works departments, NHAI has a thin staff. In such a situation, it's useful to deploy IT and share information that will help manage a project of this size.

The company LAN and the applications

NHAI's Head Office LAN in New Delhi has around 1,400 nodes comprising voice and data points, and uses optic fiber.

The LAN has spare capacity for connecting printers, phones, and other devices in future. "This will take care of our requirement at the HO for several years. An external auditor has certified that the quality of work is of international standard," explained Kumar. Atul Kumar, who is a Civil Engineer and M.Tech from IIT Delhi, has over 25 years of experience in national and overseas assignments. He thought it wise to use the services of an external auditor to ensure high performance levels from the network.

Applications like VoIP, financial and HR databases, GIS (Geographic Information System), and drawing & document management systems run on the LAN. When the WAN is fully functional, it will be integrated with the LAN and allow more applications to be run on it.

These applications will provide information like:

- The pattern of vehicles running on the roads
- Peak and off-peak traffic load.
- Toll collection information.

The information is currently received through e-mail in the form of daily, weekly, and monthly reports. "In future we hope to receive real-time information online," said Kumar.

Nine Cisco Catalyst switches manage the LAN backbone. Out of these, eight are Layer 2 switches and one is a Layer 3 switch. A server farm, which houses 10 servers run applications like databases, printing, GIS, and financial applications.

The systems are capable of supporting 1,000 VLANs. Twenty-five VLANs are in use now. The facility management contract has been outsourced to an ISO 9002 company.

LAN/WAN integration

When NHAI's LAN will be integrated with its WAN, the company hopes to receive more information like:

Pre-construction feasibility studies: These include reports like land acquisition status; and information about removing/shifting of utilities like pipelines, electric polls, and high-tension wires.

Construction activities: Reports like current status of construction, difficulties, and other information like material, and equipment.

Post-construction activities: Reports like maintenance, operations, and management of completed stretches.

This information is currently received through e-mail, faxes, and telephones. Since there isn't an advanced connectivity option like VPN, the field offices are not linked to the HO.

The IP Telephony Buzz

NHAI was already using EPABX systems for telephone calls and faxes. It wanted to explore options that would help the company save communication expenses. It decided to use VoIP technology and offer IP telephony services on the network.

"The purpose was to achieve maximum with minimum infrastructure. In the age of convergence, the obvious choice is to drive voice, video, and data through a single network," says Kumar. "We knew that the use of VoIP would be deregulated and the technology would have a good future."

NHAI looked for the following benefits from using VoIP:

- Save communication costs.
- Free from hassles of maintaining legacy EPABX equipment.
- The ability to hear the e-mail (Since IP phone can playback text e-mail messages).
- Use XML applications and visit select Websites on the IP phone screen.
- The ability to make overseas calls.

Cisco Systems was chosen as the VoIP technology solutions provider and Professor B.S. Jaju, Head of the Computer Network Society, The Indian Institute of Management, Ahmedabad, was appointed as the consultant.

An ISDN link of 60 channels at the VoIP gateway router provides the connectivity. The network has the capacity to support around 1,000 IP phones. NHAI currently uses 50-odd, and these are provided to top management executives.

Back-up for IP Telephony

An analog EPABX from Siemens is used as a backup in case the IP Telephony infrastructure fails. This EPABX can support around 300 users.

"But ever since we have installed IP Telephony, we have not experienced any performance outages," informs Kumar.

IP Telephony benefits

NHAI feels that the solution is easy to manage since it's supported by software. "We want to develop XML applications on the IP Telephony platform. These applications will include accessing websites, and collecting information about toll collections," said Kumar. As we develop more applications, it will add more value, and help us achieve the ROI. And as we add more users, it will provide true economy of scale."

The Proposed WAN

The proposed WAN will connect around 60 construction sites and a number of tolling locations nationwide. Most locations will have optical fiber backbone connectivity for which NHAI plans to tie-up with an ISP. "Deploying our own WAN requires a lot of human resource, time, and revenue.

So it's a better idea to ride the existing infrastructure of an established ISP," said Kumar.

For areas where there is no optical fiber connectivity, NHAI plans to use VSATs and radio links. This will make it a 'hybrid' WAN.

Bandwidth on the WAN

The organization wants to enable 2 Mbps bandwidth on the WAN. In the beginning, the links will have less capacity, depending on the need. "We do not want to run bandwidth-intensive applications like video conferencing. So we plan to deploy low bandwidth in the beginning. But the WAN should be built to support growth and scalability," said Kumar.

NHAI is certain that all the activities of IT-enabling itself will keep providing the planned benefits, and hopes that the scale of benefits keeps increasing as months go by.

In a Nutshell

The company

The National Highways Authority of India (NHAI) is responsible for the development, maintenance, and management of National highways in India. It's mandate is to construct 13,146 Km of 4/6 lane superior highway in India. This is a part of the largest highway project in independent India called the National Highway Development Project (NHDP).

The need

The company needed a fast and reliable communications infrastructure at a low cost, to enable coordination between its Head Office (HO), nationwide road construction sites, and poll booths.

The solution

NHAI deployed a robust LAN at its HO, VoIP solutions to facilitate communication at the LAN, and plans to deploy a nationwide WAN.

The benefits

The WAN helps to transfer information quickly and reliably between the HO and the construction offices and polling booths. VoIP at the HO LAN helps reduce communication costs, reduce management hassles, and introduce new applications on the IP Phones.