

How Cisco IT Implemented Cisco Virtual Office in India

The Cisco Virtual Office-India solution addresses local challenges to provide reliable remote access for home workers.

Background

Early in 2008 the Cisco Virtual Office remote-access solution was deployed in a pilot comprising approximately 150 select employees working at the Cisco Globalisation Centre in Bangalore, India.

“Cisco Virtual Office gives me the flexibility to stay fully connected from home, while managing a global portfolio. With Cisco Virtual Office, I can access all of the collaborative tools that I normally use in the office, which otherwise would not be available via a regular VPN.”

**Sameer Padhye, Senior Vice President,
Advanced Services, Cisco India**

A home-office solution in India was welcomed.

Like many other companies in the region with global presence, Cisco employees regularly need to collaborate across time zones and continents.

Remote network access from home eases the burden on employees who must attend meetings outside of regular business hours. What’s more, employees often use the time saved by not driving to the office for productive work. This is an especially appealing

benefit in India where commuters typically can spend upwards of three hours a day traveling to and from the corporate office.

The Cisco Virtual Office solution combines a Cisco 800 Series Integrated Services Router with a high-speed broadband connection (usually DSL or cable), a 7900 Series Cisco Unified IP Phone, and Cisco Unified Video Advantage software and a Cisco VT Camera at the employee’s home. The Cisco IOS Software-based router provides hardware IP Security (IPSec), Triple Data Encryption Standard (3DES) encryption, and enhanced security features. “Zero-touch” provisioning automates the configuration process, eliminating virtually all the time and effort previously spent by technicians and simplifying the installation process for users.

Not long into the Cisco Virtual Office-India deployment, however, Cisco realized the impact that service availability and other technical issues prevalent in India were having on the employees’

experience. The remote-access solution was available to users only about 20 to 30 percent of the time. Employees, for the most part, were plagued by intermittent service quality and unstable ISP connectivity (“flapping links”).

The Cisco Virtual Office global team and Cisco’s Access Routing Technology Group worked fast to develop a solution that would overcome the local technical challenges. In the process, Cisco developed best practices that can be applied to Cisco Virtual Office deployments in other emerging markets.

Business Drivers

Employee work habits greatly affect the requirements that drive usability and make solution deployments successful. Several working conditions drive the need for a remote-access home solution in India.

Many meetings held outside normal working hours. Working for a US-based, global company such as Cisco means that employees in India must hold many critical meetings in the early morning or evening hours, to simultaneously accommodate daylight hours in multiple time zones. This nearly 24-hour working schedule can upset the balance between an employee’s work and home life, and thus impact employee satisfaction and productivity.

Employees “on call” or working night shifts. Many support employees are either on call or will work night shifts to accommodate new product releases and like events. Besides being inconvenient for employees, night-time office hours raise safety concerns and yield building inefficiencies. Heating, cooling, and power usage is turned on for an entire building to support a handful of workers.

Onerous commute times and limited schedule flexibility in urban areas. A 90-minute commute both to and from work in a commercial center such as Bangalore is typical. Many employees will seek an experienced driver or take an autorickshaw cab, which is expensive on a daily basis. Alternatively, some employees use company-provided buses, but their rigid travel schedules often conflict with early or late business meetings.

Impact of pollution on the environment. Vehicle emissions contribute significantly to the growing pollution problem in India’s big cities. Providing employees with home working

solutions can have a meaningful, positive impact on the environment, especially in densely populated, high-growth urban areas. In the U.S., for example, Cisco estimates that users of the Cisco Virtual Office solution are reducing CO2 emissions by an average of 2.5 tons per employee per year.

High real estate costs and uncontrolled growth of urbanization. Real estate in India is quite expensive; and the rental costs of property can be as high as in Tokyo or New York.

Challenges

To assist in developing a workable home office solution for deployment in India, Cisco IT assembled a user pilot comprising approximately 150 executives, IT engineers, development engineers, and others who actively use Cisco Virtual Office. Pilot participants supplied important feedback that has shaped deployment and usage of the Cisco Virtual Office-India solution.

Cisco IT identified telecommunication service quality, proper software configuration, and power reliability as the top criteria required to deploy a successful remote-access home solution on a widespread scale with high user satisfaction.

Technical Issues

More than 85 percent of the technical difficulty encountered by users in the India pilot was associated with intermittent service availability, or flapping links (links that oscillate quickly between the down and up states). Compounding this problem is unstable power to India homes, especially in urban areas. Regular power outages, sometimes lasting two hours or longer, are common.

Personal home equipment is generally unreliable as well. Mobile phones, analog home phones, and dialup connections tend to have poor connection quality, and are often dropped because of flapping links, nonexistent service-level agreements, and power interruptions.

Localized Solution

First and foremost Cisco had to address the issue of flapping links, which accounted for more than 85 percent of deployment issues with the Cisco Virtual Office-India solution. In early 2009 Cisco IT engaged developers in the Access Routing Technology Group, who formed a SWAT

team to ascertain the cause of the flapping links and troubleshoot other issues that impacted the user experience during the Cisco Virtual Office-India deployment. Table 1 describes the main deployment issues and Cisco's diagnosis and resolution. Chief among them:

- **Embedded Event Manager (EEM) eliminates flapping.** After intensive troubleshooting, the SWAT team discovered that the IOS Software was not identifying flapping links. This caused the router to lose connectivity, which triggered the gear behind the ISP device to drop connectivity to corporate.

A feature of IOS, EEM allows network administrators to automate tasks such as troubleshooting and fault detection within Cisco devices. EEM can be used to create and run policies or scripts directly on the Cisco Virtual Office router, without upgrading to a new version of IOS. These policies are programmed using either a simple command line interface (CLI) or a scripting language called Tool Command Language (TCL). The EEM script developed by the SWAT team recognizes flapping links and preempts connection loss. The required EEM script is available from Cisco.

- **IP Service-Level Agreements (IP SLAs) measure network health.** With Cisco IOS IP SLAs, network administrators can verify service guarantees, validate network performance, and proactively identify network issues. IP SLAs use active monitoring to generate traffic in a continuous, reliable, predictable manner for measuring network performance. The Cisco India team used IP SLAs to monitor latency, jitter levels, packet loss, Round Trip Time (RTT), and Mean Opinion Score (MOS) for voice calls during the user pilot.

Cisco IOS IP SLA is included in the standard router configuration within the Cisco Virtual Office solution.

Cisco IT also learned that better training and documentation was needed for the local staff that would support the solution. Today Cisco India has a team dedicated to helping employees resolve deployment and technical issues with Cisco Virtual Office.

Assisting the India support team is a piece of code based on IOS EEM and developed by Cisco IT. Incorporated into the Cisco Virtual Office home router, this feature alerts the India team of

trouble with a particular link before the user is even aware of the problem. The capability has greatly enhanced the support level and reaction time of the India team. The required EEM script is available from Cisco.

Table 1. Cisco Virtual Office-India Issues and Cisco Resolution

Problem Area	Investigation	Diagnosis	Resolution
ISP Intermittent Service Availability (Flapping Links)	Frequent oscillating links Inadequate bandwidth	ISP uncontrollable factor IOS Software not detecting flapping links Recommended minimum bandwidth for all users	IOS Software EEM script End users update bandwidth to at least 512 Kbps
Headend IOS	Nonstandard IOS code deployed	Contributed to service stability	Headend IOS upgrade to global standards
Cisco Virtual Office IOS	Incompatible IOS code	Standard T8 code being deployed Service stable through T8 till date	IOS was not a critical factor. Test revealed that standard IOS T8 bin is delivering optimal service through router
Voice	Manual configuration Human configuration error	Insufficient process and procedural documentation and training of Tier 1 support	Configuration standards set Qualify all users' bandwidth and encourage them to apply for 256 Kbps minimum upload speed with their ISP Convert all IP telephony users to G.711 codec Configure the CCM parameter Detect Unified CM Connection Failure to Delayed
Cisco Unified Communications Manager (formerly CallManager) Tooling	Bangalore CCM cluster not supporting automation	Contributed to IP phone configuration and provisioning problems	Upgrade to auto provisioning tool for IP Phone 7961
Power Supply	Frequent power fluctuations and outages	Loss of connectivity or discrepancy in configuration due to fluctuating power	UPS mandatory for new solution requisitions End users recommended to have UPS in the home
Training and Documentation	Partial availability	Training and knowledge sharing for Tier 1 and 2 support	Trained Tier 1 and 2 voice team on configuration Manual provisioning for short-term voice fix

As shown in Table 1, Cisco Virtual Office users are advised to help minimize the effects of

power outages and insufficient bandwidth levels from their ISP. Because the infrastructure in India experiences frequent power fluctuations, it is recommended that users have an uninterruptible power supply (UPS) at home to back up the Cisco Virtual Office equipment in an outage.

Cisco IT found that an important success factor was educating employees on the importance of requesting the proper bandwidth from their ISP, and then verifying the download and upload speeds they have contracted for. Cisco recommends that its employees seek the following minimum bandwidth upload speeds:

Cisco Virtual Office Service	Upload Speed
Encrypted data	Less than 256 Kbps
VoIP	256 Kbps and up
Video	700 Kbps and up

Results

Before Cisco addressed the technical issues described in Table 1, the Cisco Virtual Office-India solution was available to users only about 20 to 30 percent of the time, largely because of intermittent service quality, power fluctuations and outages, and phone line latency. These service interruptions often resulted in users having to reset their system configuration after power to the hardware was dropped.

With the localized India solution, end users are enjoying about 98 percent uptime with their home equipment. Cisco India IT can now benefit from the automation and management simplicity of zero-touch deployment.

“Cisco Virtual Office gives me the flexibility to stay fully connected from home, while managing a global portfolio. With Cisco Virtual Office, I can access all of the collaborative tools that I normally use in the office, which otherwise would not be available via a regular VPN,” says Sameer Padhye, senior vice president for Advanced Services, Cisco India.

Return on Investment

Cisco India is already recording a return on investment (ROI) in the Cisco Virtual Office solution, directly and indirectly. Direct benefits include lower LAN and cell phone costs, and a

projected decrease in expenses associated with real estate. Employees can use WebEx teleconferencing, for example, to join VoIP calls. Indirect benefits include increased employee productivity and more timely followup and communication with Cisco customers and partners. Among the ROI highlights (calculations are made per user):

- Average usage one day/week, eliminating three hours commute time/week
- Cisco Virtual Office hardware cost is US\$856, paid in first year only. First-year ROI slightly lower due to hardware purchase.
- Annual operational cost is US\$624
- Payback period for hardware purchase is slightly more than one month
- Productivity increase per user/year is equivalent to US\$16,000 (savings based on increase in available work time with no commute; commute times in India are normalized for global productivity per Cisco employee)
- Productivity boost approximately 15 percent per user
- Reduction in real estate costs: savings being evaluated

Lessons Learned

Cisco IT offers the following lessons learned from deploying the Cisco Virtual Office-India solution.

- **Provide a reliable VPN service for employees working from home.** Maintain preemptive capacity planning and control the IP SLAs for every end device and service. Service availability, one-way latency, jitter, and the Mean Opinion Score for voice calls are the main parameters that should be measured for determining overall quality of the remote-access service.
- **Consider forming a temporary, virtual “ISP issues” troubleshooting team early in the deployment,** to help end users resolve ISP issues and work with the ISPs to improve their service. The ISP issues team should collaborate closely with the staff directly involved in procuring and provisioning telco circuits to the corporate premises.
- **Educate employees on the importance of requesting the proper bandwidth from their ISP.** IT should revalidate entitlement and service commitments for all employees using the Cisco Virtual Office solution, to ensure that user expectations are met and that requested services receive sufficient bandwidth.

- **Investigate peering relationships between service providers.** An ISP that can carry all of a company's traffic end to end, including the last mile to the employee's home, is preferable to having traffic sent to an ISP peer who will not terminate circuits on the company's premises.

Next Steps

- Keep tabs on customer deployments in progress; pilots with a few customers completed successfully
- Continue to work with service providers on defining service-level agreements
- The Cisco IT India team is expanding; determine the impact, if any, this expansion will have on the Cisco Virtual Office-India solution
- Generate greater awareness of the Cisco Virtual Office-India solution among sales teams.

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