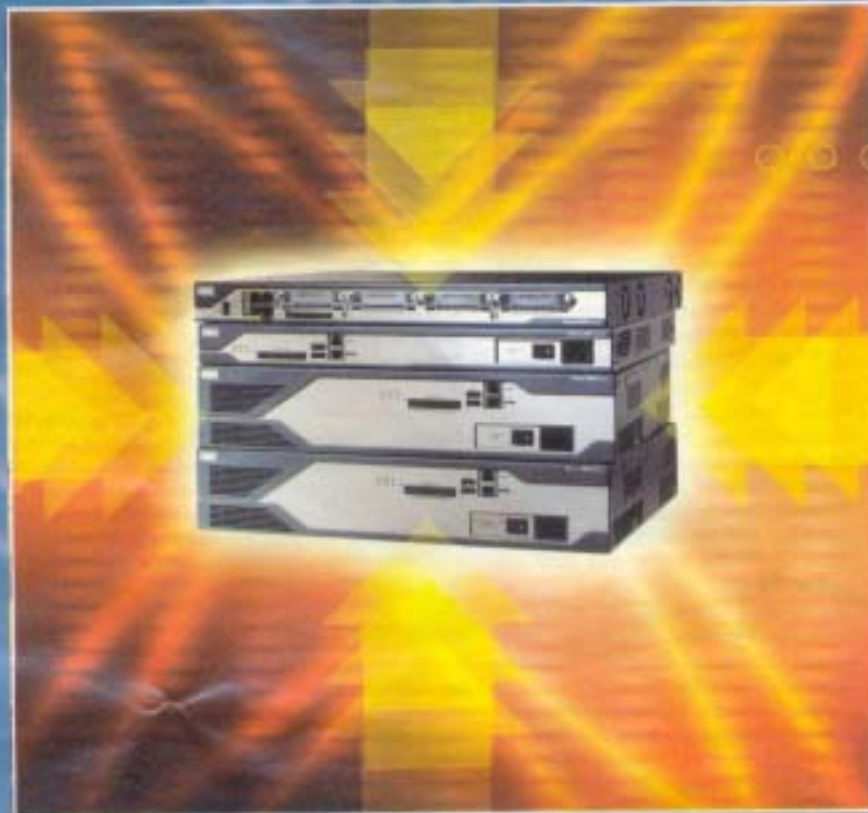
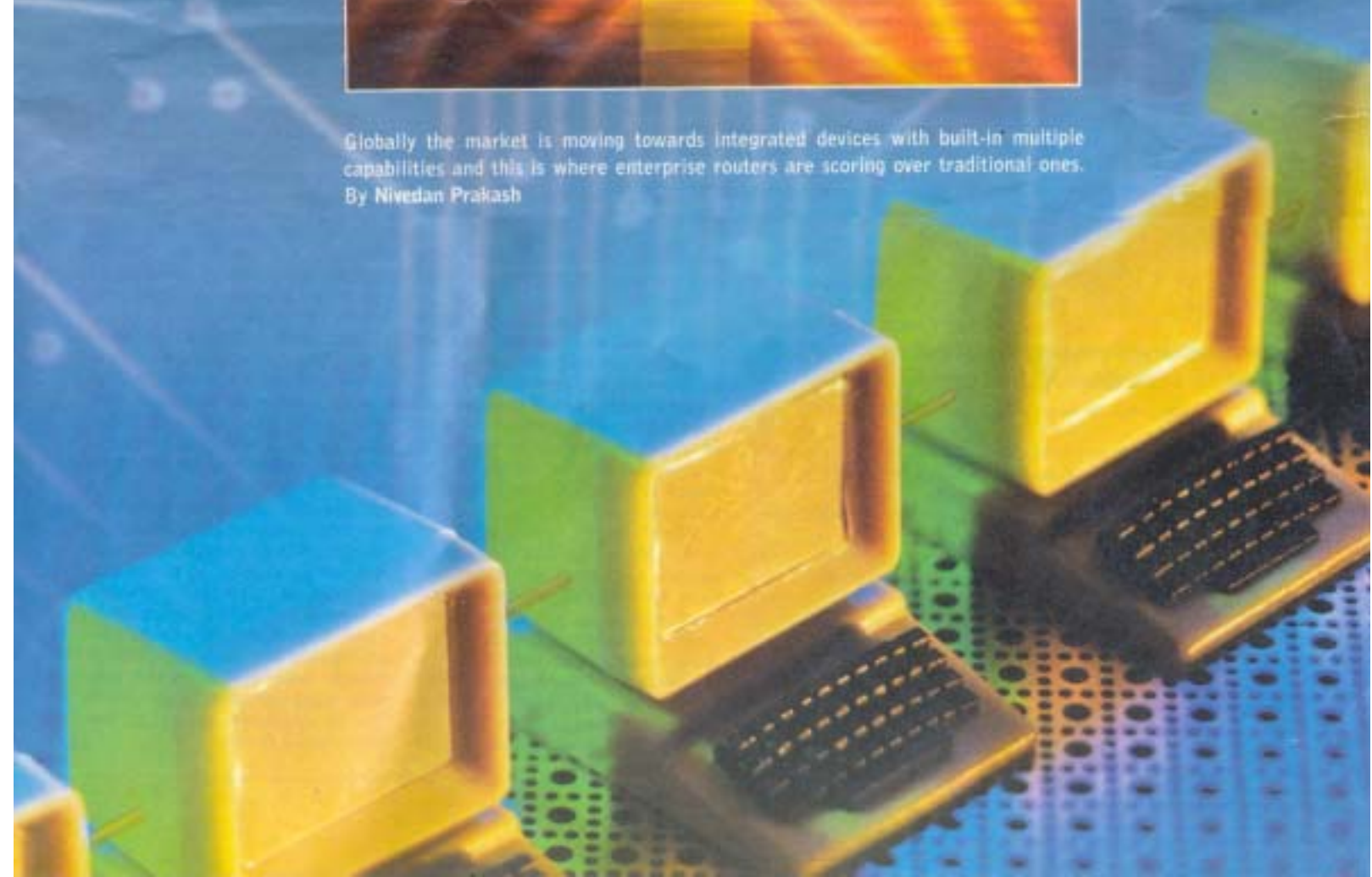


Enterprise routers becoming smarter



Globally the market is moving towards integrated devices with built-in multiple capabilities and this is where enterprise routers are scoring over traditional ones.
By Nivedan Prakash



Service providers and companies both love enterprise routers. The role of the enterprise routers has become increasingly complicated with the need to support a greater variety of complex services.

In large and diversified networks, routers play a significant role in adapting many different connections, locations, and protocols to communicate to one another. In addition, it has become necessary to support a large amount of network intelligence as well as new and changing access policies.

Meanwhile, enterprise routers come in many different forms. A fixed configuration is typical for small offices. Larger modular routers that allow for the addition of new interfaces and services add to a system's complexity. The need for high performance, increased integration of common peripherals, small footprint, and lower power consumption are all important design considerations.

A variety of functions needs to be performed including routing, forwarding and servicing. These functions often are segregated into different devices often called control plane, and data plane, although both can be done in a highly integrated device for smaller fixed configuration devices.

The control plane usually performs functions such as running the routing protocols, system management, and system control function. The data plane is more focused on doing protocol recognition, and in many cases conversion, while keeping the different interfaces running at wire speed.

Over the years, the role of the network has evolved. Initially networks provided basic connectivity amongst users, bandwidth, and access to applications that supported business processes, and the intelligence existed outside the network.

However today, networks are expected to offer increased and diverse functionality as organizations face the demand for increasing scalability of the infrastructure, the need to integrate new complex technologies and support new business applications, challenges of new and daily threats from hackers and viruses, and the escalating cost of systems integration.

Adding intelligence to the network has enabled applications and services to be delivered in a more effective manner. As convergence brings voice, data and video onto the same network, new technologies are rewriting the rules. Networks are now expected to offer increased and diverse functionality as organizations face the demand for increasing scalability of the infrastructure, the need to integrate new complex technologies and support new business applications.

Factors fuelling demand

Networking remains one of the pillars of IT. Voice, video and data are baseline expectations. Historically, adding a new application, such as wireless networking, IP voice, or IP video with end-to-end security meant adding more devices, greater cost and complexity to the network. Vendors have responded by constructing integrated services routers that combine data, security, wireless networking, and voice and video services into a single, resilient platform that delivers secure, concurrent applications. With an integrated network system, customers can reduce costs, improve operational efficiency, safeguard information assets, and respond more rapidly to their customers. By providing multiple services with a single platform, integrated services routers provide a one-stop solution for small offices, branch offices, and teleworkers.

In terms of the market in India, a sizeable number of business sites are IT-enabled and they need connectivity. However, in a country like India, where IT usage is still growing and there is a huge latent demand still to be tapped, the demand for enterprise routers will still be driven by the overall IT growth that is happening in the country.

Moreover, the Indian enterprise networking market has witnessed a number of changes in the last few years. Enterprises have begun to look at networking as a strategic investment, hence networking and communications now appear on many a CEO's agenda. This is also reflected in the increasing size and complexity of the networking deals. In the enterprise segment, consolidation of

servers and applications, the need to build better and bigger WAN infrastructures, convergence of applications and expansion of verticals like BFSI, retail, and IT and ITES amongst others are the growth drivers.

Highlighting the factors fuelling the demand for enterprise routers, Subashini Prabhakar, Chief Technology Manager, Dax Networks, said, "Broadband rollout, increased penetration of wireless last mile providers for IP VPN at class B and C cities, increased ERP implementation in SMB market, State WAN network roll out are some of the major growth drivers."

Jayesh H Kotak, Vice President-Product Management, D-Link India, said, "One of the key factors fuelling demand for enterprise routers are the need for branch connectivity. As organizations opt for centralized hosting of customer supporting applications like CRM, the need for branch connectivity is increasing. Most organizations are in the next phase of connectivity, which is connecting the extended enterprises like their channel partners and in some cases their suppliers."

Indian scenario

Enterprise routers are widely accepted in India and one of the key reasons for this acceptance is the growing support for open standards. Nareshchandra Singh, Principal Research Analyst, Gartner, asserted, "Enterprise routers are quite widely accepted in the Indian market, especially among the large users. Today, the Indian users understand the need for reliable and secure connectivity and that is why they go for enterprise routers. Although there are companies that are using simple routing enabled CPEs (Customer Premise Equipments) like DSL Modems, the need for having secured and reliable connectivity will drive the demand for enterprise routers here in India."

Businesses today demand more from their networks than ever before, and this is true even in markets such as India. Networks now need to support all forms of media, including data, voice, and video—to enhance business communications and lower operating costs. Access has also changed, as thousands of new devices connect to the network via wireless and wired connections. To solve these pressing challenges, organizations need their networks to contain intelligence and play an active role in securely integrating applications in a way that is easy to manage. Intelligent networks integrate many advanced applications into an adaptable, pervasive, and collaborative system.

Because of the falling prices manufacturers are expected to shift their attention to the more lucrative secure router market—currently this sector is worth 13% of the total router revenues

Advantages of enterprise routers

- High performance, modular architecture, multiple protocol support
- Traditional routers are moving from routing to comprehensive branch requirements like security, remote access and bandwidth management
- Support a large amount of network intelligence as well as new and changing access policies and service quality
- Higher reliability in terms of equipment and much more scalable in terms of providing higher speed connectivity and redundancy
- Can be integrated into the same device in a secured manner with proper management
- Have the manageability features wherein the router can be managed even from a remote location
- Have the converged kind of features wherein wired routers can provide wireless connectivity



Jayesh H Kotak
VICE PRESIDENT-PRODUCT MANAGEMENT,
D-LINK INDIA

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SENIOR VICE PRESIDENT-SYSTEMS ENGINEERING,
CISCO INDIA AND SAARC

Enterprise routers in the future will have the capability to integrate key features such as content processing, VPN, firewall and load balancing. Wireless capabilities will also be popular, replacing the need for separate wireless access points for small office networks

There are several market developments taking place, which are driving service providers towards high capacity and high availability platforms to support their IT infrastructure

► "Yes, I do believe that enterprise routers are widely accepted in India. Routers are one of the fastest growing segments in the networking sector. Considering that networks and enterprises nationwide are moving towards increased connectivity, this segment is likely to witness a healthy growth within the LAN equipment segment. The market is moving toward integrated devices with multiple capabilities. Security is also a big focus area and it is evident from new products being introduced by vendors and boom in the Indian telecom and BFSI space has pushed enterprise sales in India," added Chandra Kopparapu, Vice President-Asia Pacific, Foundry Networks.

Integrating key features

Today vendors are introducing routers that have the capability to integrate key features such as content processing, VPNs, firewalls, and load balancing. As far as enterprise class routers are concerned, today users want to handle huge amounts of data traffic and they need flexibility to support content processing, VPNs, firewalls, load balancing, VLANs, and other functionality to meet their demands and keep up their network reliable and secure from external threats. Still dedicated devices are deployed to take care of applications such as content processing, firewall, load balancing so that the load is less on the router.

In fact, when the above functions are integrated the traditional "routing" would only be less than 15% to 20% of the function. These new devices are more appropriately called 'business gateways'. The advantage to the customer is that there are fewer devices to manage,

which in turn reduces the complexity in configuration and deployment.

"Content processing and load balancing have been predominantly a niche market and users of these features are usually large companies having this kind of requirement. However, content is becoming abundant and growing rapidly and even smaller companies are feeling the impact. The same goes for security as well. Ultimately, all these aspects add to the cost and manageability. So, in future, we might see a requirement for converged devices, wherein standard features would be integrated into one device that takes care of the requirement of smaller companies as well," added Singh.

Over the years the role of networks has evolved—initially networks provided basic connectivity among users, bandwidth, and access to applications that supported business processes, and the "intelligence" existed outside the network. The focus was on capital and operational cost reduction. However, networks today are expected to offer increased and diverse functionality as organizations face the demands for increasing scalability of the infrastructure; the need to integrate new complex technologies; challenges of new and daily threats from hackers and viruses; and the escalating costs of systems integration. Organizations need to find ways to increasing the agility needed to respond and capitalize on change, while decreasing costs. Meeting these challenges requires sophisticated systems and tools that deliver greater capability with less complexity.

Tata Rao, Senior Vice President-Systems Engineering, Cisco India and SAARC, explained,

"The network plays a crucial role because it touches everything, from end-users to middleware, services, applications, and servers. Adding intelligence to the network will enable applications and services to operate more effectively. Routers have matured to become an integrated security device. In the future, these devices will have the capability to integrate features such as content processing, VPN, firewall and load balancing. Wireless capabilities will too be popular, replacing the need for separate wireless access points for small office networks. For example, Cisco's range of Integrated Services Routers (ISR) offers secured concurrent services, including secure IEEE 802.11 wireless LAN capabilities services in a single system."

Convergence at the core

Service providers are moving toward platforms that support multi-terabit capacity, are highly reliable, support high availability and convergence at the core. There are several market developments taking place, which are driving service providers towards high capacity and high availability platforms to support their IT infrastructure. Some of the key trends that are emerging are:

- Telecommuting and the mobile workforce are on the rise with an increasing number of employees working outside of corporate headquarters. The double-digit growth (11%) of remote branch offices is a pointer in this direction. Everybody needs access to the corporate headquarters from anywhere, at anytime. (Source: IDC Next Generation WAN Headend Router Whitepaper and IDC Enterprise WAN Study, November 30, 2007).

The heart of future networks is currently centered on building blocks for performing transport, switching, routing and conversion function in the transparent, optical domain

- ▶ Global IP bandwidth demand is going to grow from 7 exabytes per month in 2007 to 29 exabytes per month in 2011, fueled by video and Web 2.0. For context, 29 exabytes per month is more than 1,100 times amount of traffic that traversed the US Internet backbone in 2000. (Source: Cisco IP Traffic Survey, 2008).
 - The use of Web 2.0 collaborative tools is rising; shared cooperative applications, telepresence video conferencing, IP voice, IPTV—a key part of employee collaborative tools—create a requirement for consistent and enhanced end-user experience and prioritization of these applications over other network traffic.
 - More services flow over WAN resulting in increased complexity and demand. Over 70% of the IDC survey respondents stated that they expect to increase bandwidth at corporate headquarters with 43% expecting increases of over 20% in the next 24 months. (Source: IDC Enterprise WAN Study, November 30, 2007).
- Rao commented, "Today's edge networks simultaneously host a multitude of resource-intensive business and consumer services combining data, voice and video in increasingly complex varieties. Cisco's ASR 1000 (Aggregated Services Router) helps service providers and enterprises address these issues by featuring service virtualization to enable instant, remote provisioning and simultaneous use of firewall, IPSec VPNs, deep-packet inspection (DPI) and Session Border Controller (SBC) functionality. The ASR 1000 provides the high availability and scalable service intelligence that have become as important to managing advanced service delivery as scalable performance, and its service virtualization capabilities eliminate the need to deploy multiple single-function appliances in addition to a router."

A router was increasingly seen as a device that could support various applications without affecting the performance of the network. "The

main challenge for vendors was to keep the routers from collapsing under the weight of so many responsibilities. So, most vendors started focusing more on factors like performance, integration, cost, etc., which increase their interests over enterprise routers at the core so as to withstand the network pressure," added Prabhakar.

Is MPLS mandatory?

The argument on whether in the enterprise segment, MPLS, MPLS traffic engineering and MPLS VPN are mandatory requirements in RFP/tenders, still remains debatable. There is one section of the industry, which believes that most of the MPLS traffic engineering will be done at the service provider end and that there is no real need for enterprise routers to support MPLS traffic engineering. MPLS traffic engineering will be required at the carrier grade routers.

Kotak added, "It is a myth that MPLS is mandatory for enterprises. Most enterprises do not use their own network but use the service providers' network. The service provider would need to do the MPLS traffic engineering and not the enterprise in most cases."

There is another section of the industry, which thinks that service providers have not invested much in a new capacity over the last four-five years—a situation that given a dramatic increase in IP traffic growth due to video and rich-media services, prompts additional build out now. It is important to have control of that traffic end-to-end. The service providers face the challenge of this massive growth in scale and these requirements for taking service control mean that in many cases their installed legacy routers with a few 10-gigabit interface capabilities are going to need to be replaced over the next one or two years. It's not just about scale, demand for these new services exists but only if they are delivered with a decent QoS and this makes the impact on the network quite different than the growth seen in the past, which was just about being addressed with pure scale on the core routers.

Adding to it, Rao explained, "The Cisco Carrier Routing System CRS-1 allows service providers to deliver profitable new services because it allows them to build IP/MPLS infrastructures with scalability, availability, and flexibility. These IP/MPLS infrastructures can offer integrated voice, video, and data services anywhere that IP can reach." For example, traditional Frame Relay services are limited in bandwidth and reach, and they impose strict restrictions on

network topologies. The equivalent IP/MPLS-based service-Layer 2 VPN can be deployed over any media with no restrictions, allowing customers to build networks that match bandwidth to requirements, and it can use any available access service.

Future gazing

Today networks are expected to offer increased and diverse functionality as organizations face the demands for increasing scalability of the infrastructure, integration of complex technologies, security threats from hackers and viruses, and the escalating cost of system integration. Organizations are looking to find ways to improve agility needed to respond to and capitalize on change, while decreasing costs.

Adapting to the new needs of an organization, routers today have matured to become an integrated device. Today, vendors are introducing routers that have the capability to integrate key features such as content processing, VPNs, firewalls and load balancing. Wireless capabilities are also popular, replacing the need for separate wireless access points for small office networks.

Demand for enterprise routers remains high, particularly for products with built-in security features. Nevertheless, revenues across the sector continue to slip due to ongoing price pressure. Because of the falling prices manufacturers are expected to shift their attention to the more lucrative secure router market—currently this sector is worth 13% of the total router revenues.

Future routers must not only forward packets at high speeds, but also deal with nontrivial issues such as scheduling support for differential services, heterogeneous link technologies, and backward compatibility with a wide range of packet formats and routing protocols.

The heart of future networks is currently centered on building blocks for performing transport, switching, routing and conversion function in the transparent, optical domain. Enhancements and emerging technologies will be applied to redesign today's opaque communications network feasibly to profitable, transparent network of the future. New architectural solutions paired with advanced protocols will provide dynamic bandwidth provisioning, performance monitoring, protection restoration and tracking functionality. The success of that assignment in building future networks will shape both end-user commodity services and service provider profitability. ■

nivedan.prakash@expressindia.com

Benefits for Indian companies

- Enterprise routers can connect across varied WAN interfaces and can fit into any network topologies
- Enterprise routers are equipped to support fail-safe links and necessary protocols to ensure 99.999% of uptime
- Enterprise routers are integrated with VPN so that they can be used in direct point-to-point network or VPN-based network
- Provide a comprehensive, end-to-end IP infrastructure built on a wire-speed, non-blocking architecture that offers reliability, availability and security to India enterprises
- Since enterprise routers use a fraction of the power of competing platforms, they can help reduce operational expenses and ensure that network performance can be upgraded quickly