

IP Convergence

Industry Overview

The telecom industry is undergoing a difficult period where huge capital investments in 3G licences and infrastructure has given rise to large debts and over capacity, causing falling prices. We have often heard that the slowdown of the economy has affected growth in the technology and telecom areas. On the other hand, it could be said that the telecom sector is a major contributor of this slowdown. They are not just the victims of unrealised expansion; they are a part of the problem.

The benefit of IP convergence (the shoehorning of as many data types as possible into IP packets) and broadband technology has so far failed to meet customer expectation and needs on a global basis. Corporate customers as a whole are still not ready to embrace solutions such as Virtual Private Networks, Integrated Voice, Video and Data infrastructure on a large scale whereas consumers are longing for the day when ordering broadband services is a simple phone call away.

Several sectors are candidates for benefiting from IP convergence. Foremost amongst these are networks based on legacy protocols. Much effort has been put into moving legacy applications to IP. Another growth area that has become feasible is Voice over IP. Creating secure VPN's is a good way of both allowing home users to connect via broadband or from hotels while travelling, and of reducing circuit costs.

Video provided over data networks has a lot of potential but the technology is not quite there yet. Storage is an area that is getting a lot of attention, even when the economy is in a downturn, and data is still accumulated at a frightening rate. Finally, there is the potential for carriers to migrate their Frame Relay circuits to IP.

This article discusses several of the opportunities for IP convergence available today.

Technology in Perspective

Legacy Protocols over IP

There are three or four key protocols forming legacy networks in enterprises today (e.g. IBM's SNA or ESCON, X.25, IPX). These are generally used in mainframe networks running mission critical systems that cannot be modified to run IP natively. There are definite differences in the requirements of legacy protocols and the number of products that

allow legacy protocols to be tunnelled through IP networks. Customers are keen to eliminate these protocols to reduce support headaches and to allow circuit consolidation. Vendors are as keen as ever to supply new networking equipment to replace the 10 to 20 year old equipment currently running these networks. Carriers, however, are generally uninterested in legacy protocols- at a technical level they may be interested in replacing aging systems with DWDM and SDH, but at a business level the revenue from old contracts that may not be renegotiated regularly is always welcome.

Voice Solutions

Voice and data integration is taken as a sure-fire way to reduce costs and is possible as a managed service from some carriers. All major hardware vendors have Voice over IP (VoIP) or Voice over Frame Relay (VoFR) offerings. Voice over ATM (VoATM) is also possible.

Voice over IP started off with a reputation of being low quality and low reliability. Indeed, this was true two to three years ago. Since then improvements in quality and cost of service have made VoIP a more realistic proposition. Voice over ATM is also relatively easy (if anything ATM related can be considered simple) as quality of service has always been integral to the ATM network. Banks are certainly looking at this technology, mainly for smaller offices, but they are considering it for new buildings also.

Virtual Private Networks and Remote Access

VPNs have been a hot topic for over 12 months now. Hardware vendors have produced either software features for existing platforms, or dedicated hardware solutions, to facilitate the deployment of VPNs by enterprise companies. Telcos have engineered solutions around these new products to provide a managed VPN service off the shelf.

With so much choice and flexibility, VPNs will be the option of choice when WAN circuits are renewed and global backbones overhauled. This should lead to a slow but steady deployment of VPNs, possibly with a boom when confidence is gained and the VPN provides an obvious economic or business advantage.

Video and Content Services

It is possible for carriers and hardware vendors to provide solutions that enable video to be used efficiently over IP. However, these sources do not tend to provide content. Dedicated vendors, such as Reuters (Reuters Video Online) and Bloomberg (Bloomberg TV) provide video over IP services aimed at the financial markets. Several other video-over-the-internet projects (such as NetAid) have also been one-off successes.

Customers have definitely identified a need for video to the desktop. Today's high bandwidth, low latency networks have the potential to deliver this content. The challenge is in delivering the content at an acceptable quality without compromising network performance.

Vendors are keen to promote this technology as in the current slowdown they are desperate to shift any new units they can. The combination of customer desire and vendors keen to promote new technology should see video over IP taking off in the near future.

Storage over IP

Storage Area Networks (SANs) over IP really do not work yet. Although iSCSI and similar offerings purport to allow disk IO to be sent over the network, latency is too high and it is difficult to guarantee delivery. Basically, hard drives were designed to be integral to the computer they serve. Companies such as EMC and Hitachi have stretched this by using long (20m) SCSI cables, or fiber channel interfaces, but latency issues cripple performance if distances are extended sufficiently far that IP is the only plausible solution.

SAN over IP should be restricted to specific applications, and definitely not real time ones. For example, backing up data from a server to a tape drive overnight could use iSCSI. However, a dedicated IP to SCSI router (such as one of Cisco's latest offerings) is completely unnecessary.

Frame Relay

Frame Relay over IP is not yet readily available. The draft IETF specification was produced in March 2001. This has not left much time for industry take-up. Frame Relay over IP would probably appeal only to the carrier market in any case.

Carriers may embrace this to reduce their frame relay network costs. It is unlikely to find widespread deployment at all, although it may see limited use towards the end of this year. It should hold little attraction for enterprise companies- where is the benefit of adding another layer of complexity when they can engineer and migrate to an IP VPN instead?

Conclusion

The Internet revolution has driven IP Infrastructure development to the point where there is no other realistic candidate for building a data network. Switching IP traffic at application level is possible, reducing the latency through today's high capacity networks. Link aggregation technology allows 8Gbps channelled links to be deployed now and 10Gbps interfaces are available in carrier class equipment, and are just around the corner for enterprise class kit. This means that there is potentially an excess of bandwidth to be tapped in many companies' networks.

IP convergence is often promoted on the back of promises of reduced infrastructure costs and a reduction in recurring costs for circuits between cities and buildings. However, the rapid pace of development of these new technologies has outstripped demand in several places. IP telephony, for example, is now becoming a mature, reliable technology...five years or so after it was launched.

Moving legacy data protocols to IP is a very good thing. Consolidating voice circuits into IP is now possible, but some of the other options (video over IP, storage over IP) should be treated with extreme caution.

IP Convergence Summary

Service	Technology ready?	Customer ready?	Likely take-up period
Legacy Protocols	Yes	Yes	Has been happening for some years
Voice Solutions	Yes	Yes	6 months
VPNs and RAS	Yes	Yes	12 months
Video and Content Services	No	Yes	12 months
Storage	No	No	2 years
Frame Relay	No	Yes	6 months if it happens, short lifespan

Glossary

ATM	Asynchronous Transfer Mode
DWDM	Dense Wave Division Multiplexer
ESCON	Enterprise Systems Connection
Gbps	Gigabits per second
IETF	Internet Engineering Task Force
IPX	Internet Packet Exchange
iSCSI	Internet small computer systems interface
SAN	Storage Area Networks
SCSI	Small Computer Systems Interface
SDH	Synchronous optical network
VPN	Virtual Private Network
WAN	Wide Area Network
X.25	X.25 A legacy transport protocol