

# Cisco's role in broadcast

September 2008

A Supplement produced by **IBE**

## Inside:

IBE looks in detail at the impact Cisco is having in transforming the global broadcast industry.

It considers the importance of Cisco's IP NGN and discovers a platform that can transform 'service providers' into 'experience providers'.



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# Introduction

**L**ike so many technology-based enterprises, Cisco can trace its roots to the actions of a handful of people who had an idea, found a way to convert the idea into a product, and created a company that has evolved into an industry giant. The Cisco story mirrors this path - but it is the scale of achievement that sets it apart from the rest.

With a background in telecoms and network provision, Cisco is making a global impact on the digital broadcast landscape. Cisco's vision of 'changing the way we work, live, play, and learn' sits very comfortably with today's desire to watch what we want, when we want, where we want. But rather than merely being 'services', Cisco sees video, voice and data as entertainment, communications, and information experiences - rich and rewarding for those who deliver them and participate in them. These are delivered over Cisco intelligent networks, which become the platform for these life experiences.

Cisco's IP Next-Generation Network (IP NGN) architecture, which offers service providers an open platform for service differentiation, is the key. This allows service providers to move beyond digital video and IPTV to develop and deliver a variety of integrated media services to the connected home - and this Supplement will explore the opportunities this offers.

And Cisco is taking the video element of this offering very seriously. During my discussion with Ross Fowler (Page 5), he explained why: "Cisco is a business that generates growth through innovation. Broadcast is still relatively untouched by IP but has massive, global potential. We can bring together all elements of the broadcast chain on a wired or wireless network - content creation, ingest, production, newsroom, repurposing, storage, playout, VoD - and we are confident that there isn't a company better placed to achieve this. And it's no easy task - to deliver HD video and enhanced audio over one network takes real IP expertise."

Cisco has this expertise, and is pushing the technological boundaries, pioneering new methods to meet the demands of consumers and service providers. In a world where converged video, voice, and data services are required on a single network, Cisco continues to be a leading proponent of the value of the IP NGN - further developing this flexible, economical platform to allow broadcasters to move video rapidly from production to contribution to distribution. The Cisco IP NGN is the intelligent platform that can transform service providers into experience providers - and this Supplement will help you understand why.

Neil Nixon,  
Editor

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© 2008 BPL Business Media Ltd

Printed in England by Williams Press

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# The expanding world of entertainment delivery

## Broadcasters must address rapid changes to the traditional media value chain

**The classic simple linear media value chain is fast becoming a thing of the past. The rapid expansion of delivery mediums is placing increased pressure on content producers and broadcasters to adapt their business models.**

The familiar broadcast distribution chain of content production to content aggregation to content packaging and, ultimately, content distribution (either direct to home or to service providers) is under transition as:

- advertisers and agencies seek more targeted venues for their advertising dollars (90-95% of current TV broadcasting is ad funded);
- consumers go online for entertainment as they watch viral video or interact via social networking; and
- mobile video grows in availability and popularity.

Both the speed of these changes and the way they have impacted the delivery chain at virtually every level create challenges, but Cisco's solutions can help broadcasters and operators profitably compete for customers and revenues. Content is now being created by consumers and consumed everywhere - on the PC at home, on the laptop or mobile while travelling, as well as on conventional TV.

Perhaps the biggest area for transition is the advertising environment. For decades advertisers and agencies have relied upon linear video distribution as the vehicle for disseminating their advertising messages. But things have changed.

The advertisers and agencies no longer spend the bulk of their revenue with the content producers or broadcasters. Now they spend money on over-the-top players within Web applications, like Google, and more targeted video applications found on the Internet. This dramatic shift in revenue toward non-linear video and away from the broadcasters has created a lot of concern in

Europe amongst advertising-funded broadcasters.

Consumers creating content produces another transition. This trend is especially clear among younger people, both in terms of creating and viewing this new content. And, as these younger viewers migrate toward disruptive sources of video, they fail to establish the habit of watching linear video as their parents did, reducing the likelihood that they will be avid viewers of the broadcasters' content later. This loss of 'eyeballs', now and in the future, is another troubling characteristic of the disrupted media value chain.



As with many challenges facing broadcasters today, technology, innovative solutions, and the ability to take a 'big picture' view of the disrupted media value chain can provide the solutions needed.

One way to capitalise on the explosion of interest in video that this transition has caused is to open the huge archives of video that broadcasters already have. Distribution of these

vast resources can benefit from a digital media workflow platform using an IP Next-Generation Network (IP NGN) created by Cisco. By converting tape-based content to digital formats, broadcasters can use IP-based networks to share and distribute content rapidly and efficiently, whether it is within their own facilities or to locations where it can be readily accessed. It is not unusual for European broadcasters to use couriers, mail, and other delivery services to distribute thousands of video tapes very day. Imagine the efficiency and response-to-market benefits a digital archive and digital media workflow solution could provide in this environment as broadcasters extract more and more value from their archive.

Moving this multi-format, multi-sized content between the broadcaster's facilities or to other broadcasters is a further challenge that can be best addressed by the inherent flexibility of an IP-based network. Only IP can provide a truly open-standards-based network for the future providing operational savings and rapid adaptation to new requirements.

Furthermore, broadcasters need to contain their operational costs and Cisco can help by enabling new business models and providing solutions for distribution of the content to the end viewers - whether this is over conventional digital terrestrial infrastructure, directly over satellite, or via cable and IPTV service providers.

Media and broadcast companies can indeed compete and prosper in the face of a market in rapid transition by:

- adopting IP-based business and technology architectures for Digital Media Workflows;
- actively engaging in delivering content over new mediums;
- using new targeted advertising programs to win back ad revenue; and
- using their networks as the platform for transformation as they deliver an enhanced, expanded consumer experience.

# Cisco - innovation to change the way we live, work, play & learn

**Like many technology companies, Cisco can trace its roots to the actions of a handful of people who had an idea, found a way to convert the idea into a product, and created a company that has evolved into an industry giant.**

**L**en Bosack and Sandy Lerner, a husband and wife team who ran portions of Stanford University's computer operations in California, developed a multiprotocol router in the mid 1980s to send each other e.mail across the campus, even though each used a different computer system. By enabling previously incompatible computers to communicate using different network protocols, the now famous Cisco router paved the way for the Internet Protocol (IP) revolution.

Today, Cisco is making IP networks capable of moving much more sophisticated forms of human expression as the convergence of video, voice, and data services over a single network are dominating the telecommunications landscape. Rather than seeing its role as the creator of the 'plumbing' that helps to rapidly and efficiently move massive amounts of IP traffic around the world, Cisco is helping today's broadcasters, content developers, and service providers take their business to a new level.

Cisco's vision of 'Changing the way we work, live, play, and learn' meshes with the video service providers' desire to enable people to watch what they want, when they want, where they want. Rather than merely being 'services', Cisco sees video, voice and data as entertainment, communications, and information experiences - rich and rewarding for those who deliver them and participate in them. These are delivered over Cisco intelligent networks, which become the platform for these life experiences.

To deliver these breakthrough capabilities for service providers, Cisco has employed a far-reaching acquisition program, especially in the video transport and 'Connected Life' marketplace, in recent years. The addition of

Cisco's strategy is a story based on change - the market transitions that affect our customers. Through multiple transitions in the last decade and over the next 3-5 years, the network will evolve from the plumbing of the Internet - providing connectivity - to the platform that enables people to experience life.

John Chambers, president and CEO, Cisco Systems.

Scientific Atlanta products, systems, services, and video delivery expertise complements the Cisco IP Next-Generation Network (IP NGN) architecture, which offers service providers an open platform for service differentiation. This allows them to move beyond digital video and IPTV to develop and deliver a variety of integrated media services to the connected home. Tony Bates, senior vice president/general manager, Service Provider Group at Cisco, repeatedly says 'video changes everything'. This underscores the importance of video delivery technology and the expertise that enables Cisco to emerge as one of the best companies for service providers to team with to deliver the 'Connected Life' to consumers.

As new players enter the video content development and delivery marketplace, Cisco is poised to help a wide range of current and future service providers deliver content to multiple screens. Consumers are the driving force, with a seemingly insatiable demand for innovative new services and immediate

gratification. They want access anytime, anywhere, through any device, and they want it personalised. And often, to get it that way, they create content themselves. The users of technology have more power than they have ever had before. At the heart of all this change is the virtual, all-enabling Cisco IP NGN.

Cisco's strategic value to service providers around the world is increasing from both a technology and a business architecture perspective. The proliferation of video and accelerating deployment of new services are influencing service providers to seek out innovative architectures that provide network capacity to deliver rich, personalised user experiences. Cisco's architectural approach is designed to enable higher network capacity, intelligence, and resiliency to deliver video and integrate video/IP in a range of consumer and business services to offer compelling customer experiences. These 'Connected Life' experiences provide value throughout a consumer's daily life at home, at work, or on the move and provide far reaching opportunities for companies that team with Cisco to make this vision become a reality.

## Cisco Fact Sheet

- The company was founded in 1984 by computer scientists from Stanford University.
- It has 65,000 employees in 70 countries.
- It has 300+ office locations.
- The company invests over \$4.5 billion in R&D each year.
- Over 16,000 engineers are working in more than 30 labs worldwide.
- It has completed 120+ acquisitions to quickly enter new markets and add talent.
- It achieves US\$24.8 billion revenue each year.
- 21% of its revenue is generated by Cisco Europe.
- There are approximately 10,000 Cisco Networking Academies in 165 countries serving over 450,000 students per year.

# Living a connected life

**Neil Nixon speaks with Ross Fowler, head of Cisco's Service Provider business in Europe, about the importance of the Network and Data Centres in the provision of a life connected via IP.**

**R**oss Fowler is one of the new breed of broadcast professionals. He has a strong engineering background, but he cut his teeth in the world of telecommunications, spending several years with Alcatel before moving to Cisco, initially running the company's business in Australia and New Zealand. He is now responsible for Cisco's Service Provider business in Europe, and is key to ensuring the successful convergence of the broadcast and IP sectors - leading the global revolution from Europe.

"Media and broadcast companies are now reaching the same conclusions that telcos reached a few years ago - that everything, literally everything, will happen via an IP network," said Fowler. "The IP network will not just facilitate the convergence of data, video, audio and voice, but also the convergence of industries. Financial institutions, broadcasters, retailers - in fact any sector that could benefit from being part of this new connected life - will communicate, collaborate, share and interact via IP."

IP enables the broadcast and media industries to boost efficiencies and improve business agility across a range of activities from media commission to media delivery. "This transformation - and that is what it amounts to - requires the implementation of non-linear collaborative workflows and enables the transition from analogue/tape-based systems to all digital/IP-based environments," said Fowler. "Service Orientated Architectures - SOAs - are key to this transition as media companies look to couple broadcast applications with business processes in order to establish enterprise-wide transparency and management, and seamlessly link to independent producers and third party distribution platforms."

Cisco has pioneered a Service Orientated

Infrastructure supporting the essential SOA solutions to assist content providers and broadcasters in meeting this challenge. Fowler continued: "These service-based solutions are designed to break down application silos, eliminate unnecessary asset duplication, and provide the flexibility, efficiency and performance required in the modern business environment."

Through its acquisition of Scientific Atlanta - now part of Cisco's Service Provider division - Cisco showed real intent to be the lead player as the global broadcast IP revolution rolls out across the globe. "The acquisition enables Cisco to use Scientific Atlanta's heritage within the broadcast market to strengthen its own heritage in IP Next-Generation Networks (IP NGN) and Data Centres," said Fowler. "I believe the importance and significance of the broadcast market to Cisco continues to increase and, conversely, Cisco's importance to the global broadcast market increases as IP becomes the framework of the future."

But what was the initial appeal of the diverse broadcast sector? Fowler said: "Cisco is a business that generates growth through innovation. Broadcast is still relatively untouched by IP but has massive, global potential. We can bring together all elements of the broadcast chain on a wired or wireless network - content creation, ingest, production, newsroom, repurposing, storage, playout, VoD



- and we are confident that there isn't a company better placed to achieve this. And it's no easy task - to deliver HD video and enhanced audio over one network takes real IP expertise."

Fowler also believes that the convergence of IP and broadcast technologies will increasingly break down national boundaries, removing existing barriers to cooperation. IP is a global standard, without national variations, and will provide the network to ultimately enable all parties to work together unhindered.

The IP network and the efficient management of data are at the heart of Cisco's vision for the connected life - any content, anywhere, at any time and on any device: "Data Centres will become increasingly important to broadcasters and Cisco has unrivalled expertise in this area. A typical Data Centre operates at 10-20% efficiency, and there is enormous pressure to improve on this figure and to realise the full potential of resources. Virtualisation techniques are facilitating this, and Cisco is building networks to ensure that maximum efficiency is achieved from both server and storage infrastructures."

There is undoubtedly an element of tension between telcos and broadcasters at the moment, fuelled by products such as the BBC's iPlayer that are placing a strain on the networks operated by ISPs. Fowler predicts that this model will change in time, being replaced by a more revenue-centric Internet experience where differing levels of subscription will determine what content can be viewed. This will create a model whereby content providers and ISPs can share revenues, smoothing the way for greater cooperation.

Fowler concludes: "Any conflict or tension that currently exists between broadcasters and telcos will turn to cooperation. The most adaptable companies - broadcasters and network providers - will be the ones that succeed. We are determined to continue to innovate and emerge as the major player in the brave new broadcast world."

# Shaping new media opportunities

**There is currently a major disruption occurring in the media and entertainment market, driven by content digitisation, the Internet and the Web 2.0 social networking experience. As a result, there is a potential for the erosion of distribution windows, a shift in advertising capture and a change in funding models.**

**T**raditional broadcast (satellite and terrestrial) delivery are growing at a good rate. ABI Research forecasts that the number of households using DTT as a primary means of receiving TV within the big five western European countries is expected to nearly double during the next five years, moving from 29.7 million in 2007 to 54 million in 2012.

Meanwhile, in recent years some media companies have experienced a decrease in consumer spending on entertainment. While they have observed growth in revenues coming from digitally delivered segments, it is not yet at a rate sustainable to compensate for the decline in the more traditional segments.

Analysts and investors ask the following questions: 'Is the media industry growing? At what rate? Are these new modes of IP distribution cannibalising the traditional forms of media? Where is the new media industry heading in the next 5-10 years?'

Historically, the development of entertainment media in the US and Western Europe has proven that every single time a new distribution platform is introduced, the revenues it generated became incremental to the incumbents as opposed to replacing them. Internet video, while becoming a major distribution channel, will be no different: the media market is growing overall, but it requires the new media company to sell, partner and collaborate with customers in entirely new ways to reap the benefits of technology evolution and changes in consumers' habits.

There has been tremendous innovation in new Web 2.0 applications and on-line services, resulting in large end-user adoption. Running over the broadband Internet and proprietary walled-garden IP networks, these services deliver a new experience for consumers to access content. End-users have a participative role, adhering to notions of

scenarios for the media industry that could be drawn from the major on-going disruptions (technology, consumer habits, regulation, macro-economics). Some of these scenarios can have a dramatic affect in term of direct revenues (subscription, DVD sales, rental) and advertisement revenues.

Meanwhile, there are a number of key positive trends. Consumers are ready to pay a premium for a unique experience, be it through high definition, unique interactivity, integration with a social networking experience (communities, ratings, recommendations), with a next generation programming guide, a sophisticated context-based video content search and new content notification. With the capabilities to better target consumers' personal interests, on-line advertising

becomes more relevant, with higher CPM rates. Consumers will self-promote services where they can share their experiences and interests with their personal communities in a seamless manner.

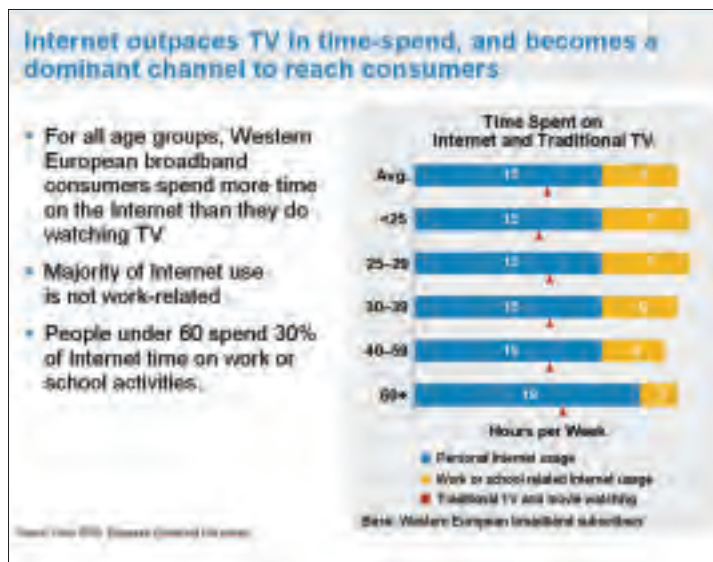
HD-enabled homes continue to grow, stimulating the development of HD programmes worldwide (by early 2008, there were about 100 HD channels in Europe and in the US). Screen and display technology will continue to improve and deliver new consumer experiences (ultra-high definition, 3D etc).

With high speed broadband Internet becoming more prevalent, media firms can collaborate with service providers,

building on new video content and application distribution platforms to deliver a premium end-to-end experience over fixed and mobile broadband infrastructures.

**The consumer appetite for on-line content is accelerating**

In October 2007, Cisco Internet Business Solution Group (Cisco IBSG) undertook a Western Europe 'Connected Consumer Survey'. One of the major conclusions from the survey was that the Internet outpaces TV in time-



communities, and relying on recommendations from friends and social networking (collaborative content classification and tagging).

User Generated Content (UGC) has major social, economic, technological and legal implications, such as the rise of more flexible content licensing schemes.

**Traditional players are forced to reposition to capture the value**

There are a number of potential future

spend. The survey also highlighted some differences amongst the various European countries.

An extension of this survey on TV and video consumption, undertaken in March 2008, also revealed that broadband consumers are interested in 'Connected Home TV' for increased control: the experience goes beyond time-shifting to enabling consumers to watch what they want when they want to - they want their media to travel with them and to consume it on their own terms. "It's TV à la carte. It's me selecting what I want when I want versus the cable industry dictating I can watch XYZ at seven," concluded a Cisco IBSG Connected Home Video Study Focus Group participant in March 2008.

As an illustration, DIRECTV developed the DIRECTV DVR scheduler, a free application to allow customers to set recordings of their favourite programmes on their digital video recorder (DVR) remotely, either via a PC connected via the Internet or via their mobile phone. This application proved to be very popular, reaching more than one million recordings scheduled remotely. It also enabled DIRECTV to identify what shows customers are programming remotely through the DIRECTV DVR scheduler, and ultimately offer better programmes that match their targeted audiences.

**New content offered from multiple sources improve the consumer's experience**

Over the last 12 to 18 months, there have also been dramatic changes in the traditional low quality associated with Internet-based video delivery. The BBC iPlayer in the UK and recently the ABC iView service in Australia are both streaming 'catch-up' TV services in full screen high quality video, comparable to standard definition television. YouTube has also announced plans to increase resolution of its videos and, with YouTube on TiVo, you can access millions of Web videos on your TV, using your TiVo remote and your broadband-connected TiVo. LG announced a deal with Netflix and plans to ship a Blu-ray player that also supports Netflix Internet movie streams, so people can watch Netflix streams on their TV, using a non-PC device.

Traditional telecom operators have been deploying broadband services to compensate for the decline in their legacy voice revenues. They are now moving-up in the content value

chain, acquiring broadcasting rights and delivering on-line broadband and broadcasting services.

The chasm between PC video and TV is disappearing. While broadcast television is occupying the high definition, home theatre experience space, there is overlap or cross-over for general on-demand standard definition video viewing which arguably can be viewed in comparable quality on a television set or a PC. This further supports the consumer paradigm of access to content anytime, anywhere on any device. In either case, this on-demand content is delivery over IP to the PC or set-top, or even a mobile device.

The Cisco Visual Networking Index (VNI) Forecast for 2007-2012, released on 16 June 2008, indicates that IP traffic will increase at a combined annual growth rate (CAGR) of 46% from 2007 to 2012, nearly doubling every two years. A large portion of that growth will be fuelled by Internet video to TV

we have to acknowledge that some of the plausible future scenarios could be dramatic for the media industry.

There is an emergence of multiple communication services, such as instant messaging, Chat, SMS, MMS, Twitter, Facebook, Flickr, ... all expanding to all demographics. As people increasingly value these new video-rich personal communication applications, sharing self-produced content and getting engaged in Internet virtual reality worlds, broadcast TV and video viewing time will be reduced. High CPM advertising could move to those new entertainment platforms, and DVD sales and rental could plateau, if not decrease.

Failing as an industry to deliver that premium experience discussed earlier might turn off customers asked to pay a premium, preferring instead to access 'free-content' based channels and sites, reducing the opportunity to leverage and monetise access to content. The overall market size for the industry will be lower and reduce the attractiveness for potential investors.

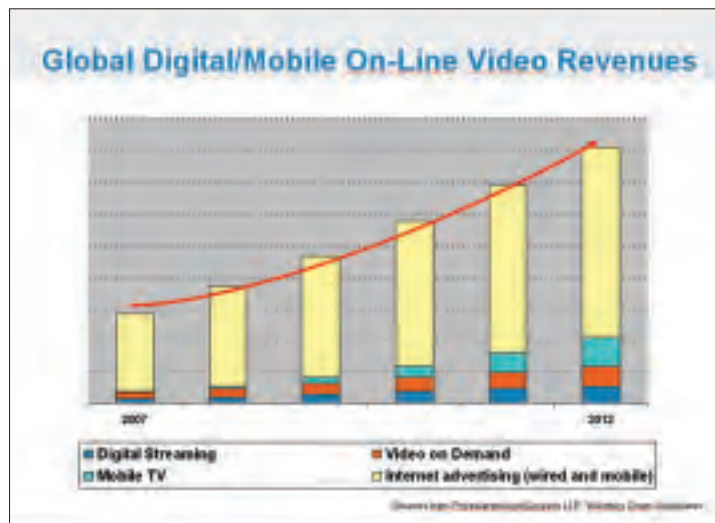
Content rights protection needs to obtain the required focus from an industry and regulation point of view, as content piracy is value destructive and unsustainable.

New media companies need to make the necessary assessment of their business and technology architectures, have a multi-platform, hybrid approach from the very beginning, leverage the operational savings delivered by IP technology, and collaborate with customers in entirely new ways to capture the new value being created. Once they have

developed the right strategy and put in it in place, they must adopt a relentless focus on execution.

Cisco Internet Business Solution Group (IBSG) is the strategic consulting arm of Cisco and collaborates with Global 500 CxOs, service providers and media leaders to help transform their organisations.

IBSG can support you to develop roadmaps to optimise business processes, adopt advanced technologies to reduce costs, improve productivity, and use innovation to maximise new sources of revenues. Drawing on a powerful combination of industry experience, business acumen and technical knowledge, IBSG consultants work as trusted advisers to many of the world's leading organisations.



and PC, as well as peer-to-peer applications. VoD, IPTV, peer-to-peer (P2P) video, and Internet video to the TV and to the PC are forecast to account for nearly 90% of all consumer IP traffic in 2012, moving to a major video content distribution channel. According to analysts, Internet video is expected to increase worldwide from a current run rate of \$6 billion to \$20 billion by 2012, with Internet advertising (wired and mobile) at over \$120 billion.

**The importance of being proactive in the change**

We said earlier that traditional broadcast (satellite and terrestrial) delivery is growing at a good rate. No one can predict the future, but

# Rapid market transition requires a rapid response

**The traditional broadcast landscape, where one channel is transmitted to many viewers, is changing rapidly to provide customers with the content they want to watch, when they want to watch it, where, and on what device.**

**W**ith the massive increase in video content available, broadcasters and programmers focus more and more on creating specific content, enhancing their brands, as well as adding new services.

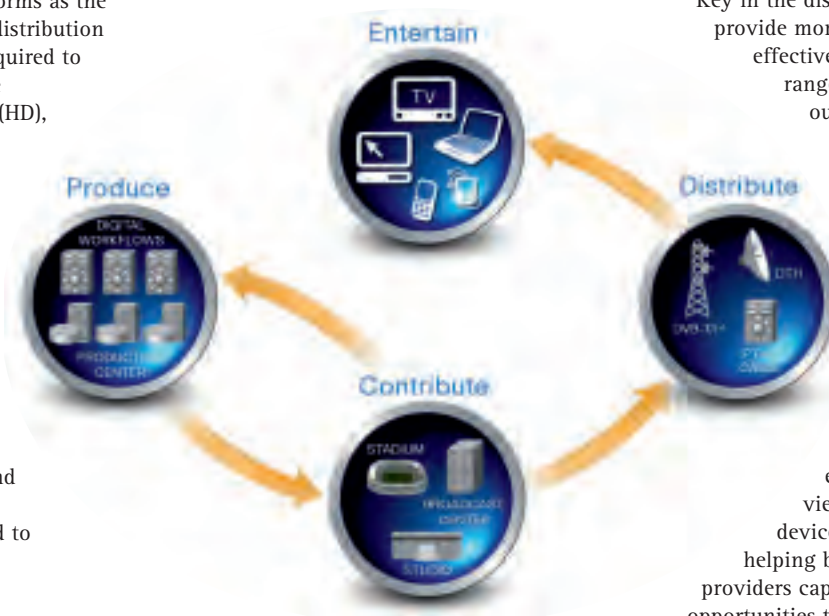
In addition, this new content will be marketed and delivered through and to a much wider range of platforms as the broadcaster shifts to new distribution models. Content is now required to be delivered in many more formats – High Definition (HD), Standard Definition (SD), MPEG-2, MPEG-4 AVC, handheld/mobile/DVB-H, streaming to the Internet and file download.

Recent studies have indicated that these market transitions are driving a rapid move in network technology. A full IP platform will allow the content providers to increase their flexibility and speed, but also deliver the operational savings needed to launch new services.

## Areas of focus

According to Peter Boon, director of Cisco Media and Broadcast in Europe, Cisco is ideally positioned to benefit strongly from this major market transition. "Combining the strong ScientificAtlanta Video and System Integration knowledge, the Cisco IP leadership and market presence, together with the recently acquired Divitech Service Management, puts us in pole position to deliver a broad spectrum of solutions to help broadcasters respond rapidly to these new challenges. Our vision is to be the most trusted business and technology partner of choice for the media and broadcast industry

as it transforms to adopt IP-based business and technology architectures. We will ensure that companies can profitably compete for customers and revenues by adapting Cisco's network as the platform for their transformation in an increasingly disrupted media value chain."



Peter Boon sees four main areas where Cisco can differentiate and provide sustainable differentiation to its customers:

- **Production:** Currently the majority of broadcasters operate using tape-based video resources within their production environment using a network dubbed 'sneaker-net'. Boon said: "New solutions are changing this inflexible approach – a centralised data centre and a video-aware IP-based network form the platform where the new applications reside. Cisco's technology, reputation and market presence position us ideally in providing our network as the platform."

- **Contribution:** The same forward-looking approach is being applied for contribution delivery between studio locations, sport events, or other sites where content is created. "IP Contribution networks are much more flexible, cost-effective, and increasingly more available than traditional technologies," said Boon. Cisco is unique in having an end-to-end solution for IP Contribution including video and network products.

- **Distribution:** Once the content is ready for distribution to households, distribution can go via cable, IPTV, DVB-T, satellite, mobile, or streaming video on the Internet. "Key in the distribution area will be to provide more flexible, innovative or cost-effective solutions using the wide range of technologies available in our company," said Boon. "These may range from satellite or IP based primary distribution, to providing content delivery systems enabling consumers to seamlessly switch content between their three screens (TV, PC, mobile) at the exact point they dropped off before."

- **Entertain:** Ultimately, most of the video content ends up in the home, whether viewed on the TV, PC or mobile device. Cisco has been focusing on helping broadcasters and service providers capitalise on new service opportunities to create enhanced personalisation for the 'connected life' which, in turn, supports expansion into new markets.

## Conclusion

This is a market in transition in all ways – production, contribution, distribution and entertainment delivery – where new technology will enable new processes and business models that will entirely shift the way we work, live, play, and learn.

Cisco clearly has the vision and capability to help shape this new future for entertainment.

# Digital workflows: Using the network to stay ahead

## New market realities present new business opportunities

Everywhere you look, the media industry is in turmoil: changing consumer behaviours, particularly in the younger audience; fast evolving technology, both on the producer and consumer sides; proliferation of broadband; the advent of Web 2.0 platforms; the rising popularity of user generated content...all are contributing to this turmoil.

These new market realities, however disruptive, actually broaden the opportunities for the broadcast industry to acquire incremental revenues from new platforms and create a much more engaging relationship with the audience. This, however, requires a fundamental change in the broadcaster business model, forcing the 'TV Channel' to become a 'Cross-Platform Brand' that is able to exploit these new revenue opportunities and provide the enhanced viewing experience to become the preferred source of entertainment and information experiences.

This will require an increasingly agile organisation able to produce an ever-increasing array of content services and make them available to consumers faster and cheaper. At the same time, it must maintain broadcast quality of the content and contain the costs introduced by the new platforms, the different formats, and the platform specific productions. In other words, an organisation must do more with less and rapidly adapt to the consumer, as well as to technology, regulatory, and market changes.

### Make technology work for the new business models

Technology evolution provides the tools to reduce workflow inefficiencies in the production environment, all the way from

ingest to editing and play-out. Using IT-based architectures, many media companies have managed to 'digitise' a large portion of the production process and move from handling tapes to processing computer files.

Post-production and newsrooms have benefited the most from this technology transition.

Digitising is not an easy task and reaping the benefits of an expensive digitisation effort is a complicated process that requires organisational readiness and new skills. Currently, the implementation of broadcast application standardisation is often launched in a fragmented manner, ie. digitising part of the workflow process or a production island at most. While this brings productivity benefits to parts the organisation, it does not unleash the power of collaborative and dynamic workflow environments. Furthermore, a fragmented approach results in unnecessary infrastructure redundancy and content replication. Essentially all workflow processes, outside the 'digital island', remain the same as is in the analogue world and all storage, transport and copying of content is carried by physically handling tapes.

Reducing inefficiencies due to business and technology silos, providing company-wide business transparency, opening up the production environment to independent producers and even consumers (ie. social



journalism), and enabling new business models and services requires a company-wide deployment based on horizontal workflow architectures that cross business silos.

### The network as the platform to implement digital workflows

A service-oriented architecture (SOA) can help media companies establish company-wide integrated business workflows and processes. It also mandates an open, flexible, and interoperable infrastructure to support these horizontal workflows. Essentially SOA is an Enterprise Architecture framework relying on independent and interoperable processes that allow the creation of complex digital workflows by dynamically invoking the appropriate processes.

SOA can help to:

- Manage the complexity of multi-department tapeless production environments.
- Integrate non-production business processes (from decision making and marketing to resource management, accounting, and legal) with production processes to establish enterprise-wide transparency and management.
- Boost innovation by enabling the rapid introduction of new products and services and facilitate collaboration with the 'ecosystem' - independent producers, third-party distribution platforms, outsourcers, and customers.
- Align production technology and information technology functions and create a converged IT/production technology environment with the obvious cost reductions of a unified infrastructure.

Production, however, sits at the core of the

media business. Implementing an enterprise architecture and adapting IT practices should take into consideration the business criticality of the production domain. Reliability, security, latency, and scalability requirements are much more stringent than the average enterprise IT. SOA approaches do not directly address these implications as they are dealing with (from a technology implementation point of view) the exchange of application 'signaling' to address interoperability rather than the movement of file-based media assets. This is left to the underlying network infrastructure.

Despite the critical role networking plays in a company-wide workflow deployment, in many situations the entire focus is put on media asset management and workflow management applications, leaving network requirements as an afterthought. While proper planning and implementation at the application domain is critical, solving network domain problems at the application level is not viable.

A typical organisation may introduce digital workflows in two distinct and separate business units using different systems from MAM to NLE and storage. An SOA approach

can help assure interoperability between these different applications and the ability to exchange assets appropriately. By using the network as the platform computational, storage & networking resources can be virtualized and shared across these different business units and their applications while appearing as physical separated with a strict service level agreement on their performance and availability. This maximises utilization and increases business efficiency by dynamically providing resources as needed.

**Cisco Media Workflow Platform**

With this in mind, Cisco has introduced the Media Workflow Platform, an SOA infrastructure supporting the solutions required to help content providers and

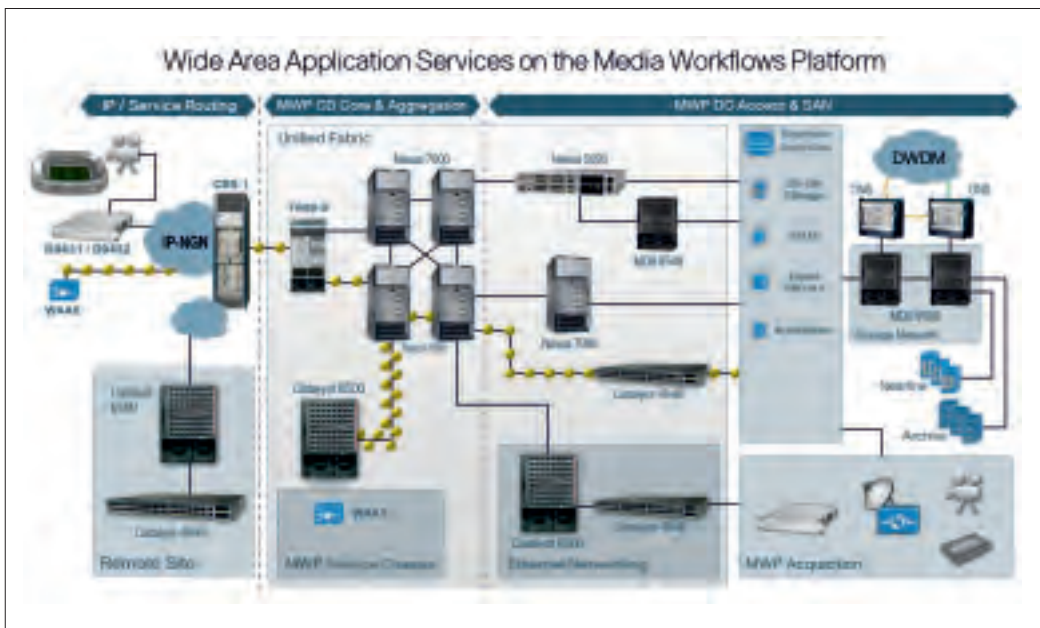
broadcasters in their transition to digital workflow. These service-based solutions are designed to break down application silos, eliminate unnecessary asset duplication, and provide the flexibility, efficiency and performance required in the modern business environment.

Central to these innovations is the Nexus family of products, Cisco's end-to-end Data Centre switching platform providing solutions for 10G, 40G, and 100G for access, aggregation and core. Its innovative unified fabric consolidates IP and storage networks onto a single ethernet fabric to simplify operations and cabling requirements as well as providing the gear for bandwidth-hungry, high-resilience demanding applications like HD production.

In the storage area several tiers of storage

the company campus. To deliver the required high performance resilient networking platform, several media companies around the globe are using the Cisco Virtual Switching System (VSS), a radical innovation to the Catalyst 6500 family of products. It increases the capacity, boosts non-stop communications, and most importantly simplifies operations in the demanding, fast paced production environment.

Access to media assets goes beyond the company campus, where bandwidth can be relatively easily provided, to remote locations, requiring expensive networking services. Maximising use of these expensive resources while optimising network response times brings direct OPEX savings to the organisation while increasing production team productivity. Wide Area Acceleration



innovation from Cisco overcomes application performance problems while significantly reducing the amount of data needed to be actually transferred over a WAN connection. Increasing link utilisation by 4x to 10x does not only save on link rental costs: By using WAAE NBC Olympics managed to

technologies, representing different performance requirements and associated costs, create a challenging operational environment particularly as the storage capacity requirements accelerate. To address these challenges Cisco offers the MDS9000 family of storage area network equipment, a high capacity robust platform that maximises the use of expensive storage resources while minimising the operational cost associated with the provision of these resources.

Moving outside the Data Centre environment where the main broadcasting applications are hosted, access to these applications is required in a real-time environment. The roles of media personnel, production staff and journalists has radically changed and expanded, requiring them to access all media assets from anywhere across

have their Editing People working at US facilities instead of moving them to China in the recent Olympics.

The Media Workflow Platform architecture leverages the power and flexibility of SOA based on an IP Next-Generation Network (IP NGN) to provide greater flexibility, efficiencies, and performance. Encompassing a wealth of technology innovation, it aims to break down application silos, provide a complete IP end-to-end solution, and link production into future media distribution platforms and the media ecosystem. Cisco is working with leading broadcast technology vendors to bring solutions based on the MWP architecture to address individual media customer needs and help them realise the full benefits of a true digital workflow transition.

# The time is right for video contribution over IP

**Broadcasters and content creators today deliver video over a variety of platforms and employ multiple technologies. In spite of the different requirements and architectures or topologies each one uses to meet their specific needs, contribution or primary distribution systems are still broadly based on legacy platforms such as SDH, ATM, or DTM. However, in the last two to three years there has been a trend toward using IP-based networks for contribution and distribution.**

**R**esearch by the Tuck School of Business at Dartmouth University, carried out in December 2006, indicated that 60% of video contribution network investments by 2009 will be spent on IP-based solutions. This growing popularity is based on two primary drivers:

- Flexibility - simplifies the introduction of new services, new formats, and new quality levels.
- OPEX savings - affordable solution to address convergence, deliver multiple services, support low cost links, and use widely available IP equipment.

There is also an increasing use of file-based (non-linear) contribution. This allows sharing of content between editing locations or the distribution of file/VoD assets without the need to move physical media. This

provides significant improvements in time to market, as well cost savings on transport costs, which is also good for the environment.

The accelerating introduction of high definition television (HDTV) in European markets is challenging the capacity of existing contribution infrastructures along with the accompanying burden of maintaining excellent video quality at higher resolutions, resulting in a significant increase in bandwidth demands.



order to ensure that quality of service (QoS) levels are maintained. To achieve the required QoS it is important to start from an architectural stand-point and design a solution top down. This is where Cisco's end-to-end expertise and experience in both networking and video technologies becomes critical.

Here are some of the key issues that need to be considered:

## 1) Quality of Service

- Key performance characteristics - packet loss, latency, and jitter - need to be managed through a combination of network design, configuration, and suitable video adapters.
- Fast and effective redundancy schemes.

## 2) OSS Management Systems

- A critical component of the system to provide visibility of network activity and easy management/scheduling of events.

## 3) Provisioning

- Providing the right bandwidth at the right locations and prioritising the live video traffic will maximise the return on investment (ROI) and help ensure consistent service levels.

## 4) Video Formats

- Different applications have highly varying requirements on video quality, bit-rate and latency. Today this could encompass bit-rates from 200kbit/s up to 3Gbit/s for real-time video feeds.

To support IP contribution initiatives Cisco has created a solutions portfolio that contains:

- A range of video capable routers and switches that provide bandwidth capacity from 10/100 Mb/s through to 40+ Gb/s.
- Video devices, including video adapters, which support MPEG-2, MPEG-4 AVC, JPEG200 and uncompressed video, high- and standard-definition video, and a full choice in the trade-off between picture quality/resolution, latency, and bit-rate.

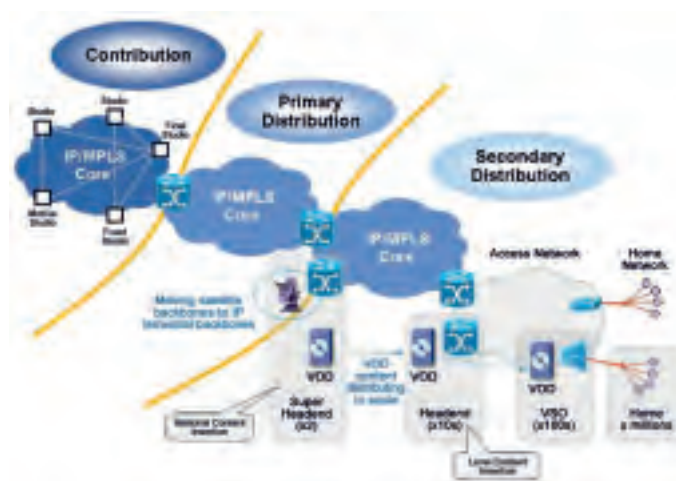
- A wide range of management and control solutions providing simple video device control to full network provisioning and scheduling.

- System Integration service teams that are unique in their depth and range of knowledge and experience.

The use of a packet-based IP networks is critical to provide the bandwidth, connectivity and format flexibility needed in the future.

## Real-world considerations

The use of IP-based technology provides a huge number of business and technical benefits, although it is also true that this flexibility results in additional architectural design requirements in



# Distribution: Reliability and flexibility are key for delivering many services to many screens

**Once the content and channel line ups are ready, the distribution route to get the content to the viewers moves to the forefront. This has to scale, and it has to scale cost-effectively. Because one source can be consumed by millions of viewers, reliability is critical. Content owners or aggregators need solutions, products, and expertise to meet these varied, key requirements.**

**T**here are multiple routes to the home now available to content owners or aggregators:

- Terrestrial (DVB-T)
- Mobile TV broadcast/streaming
- Satellite (primary distribution)
- Satellite (Direct to Home)
- Cable
- IPTV (dedicated network)
- Internet streaming (open Internet)

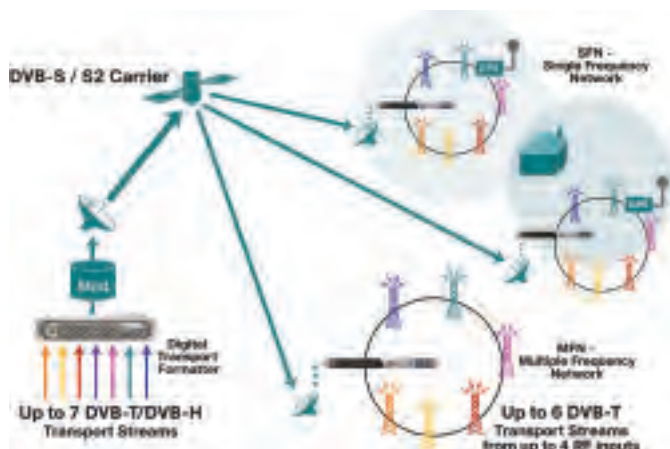
## Terrestrial (DVB-T)

The analogue switch-off has already started in many countries in Europe, and in others DVB-T implementations have started or are being planned. The challenge for broadcasters and service providers is to secure technology that is:

- **Reliable:** to deliver the highest quality without signal interruption or degradation.
  - **Scalable:** to accommodate the growing number of multiplexes and transmitter sites to reach the coverage requirements.
  - **Flexible:** to allow for nationwide as well as regional or local distribution, or to include additional services in the future as DVB-H.
  - **Cost efficient:** to cope with hundreds/thousands of sites.
- To help meet the demands of this evolving marketplace, Cisco has developed and



successfully deployed DVB-T products to meet these needs. These include a range of IP adapters, specifically designed for optimal distribution of SFN DVB-T/H networks and the Multiple Transport Stream Receiver (MTR), an extremely cost efficient product to distribute multiple SFN muxes to hundreds/thousands of transmitter sites over satellite.



## Mobile TV (DVB-H)

Everyone you see on the street seems to have an electronic device in their hand. In Europe, DVB-H is the standard for mobile TV broadcast. Deployments have started, albeit slowly, and Cisco supports this new service launch with an end-to-end DVB-H solution providing a head-end and distribution solution. As distribution costs become increasingly important, Cisco's DVB-T distribution solutions can equally well be used for DVB-H, offering cost-efficiency benefits.

## Satellite - primary distribution

As the move to high definition video continues to grow, programmers and content distributors need an efficient HD distribution platform. Since uncompressed HD content consumes five times the bandwidth of standard definition content, they are turning to DVB-S2 modulation and MPEG-4 AVC compression. By improving satellite bandwidth efficiency by up to 30% and delivering high-quality performance at low bitrates, the technologies provide fantastic improvements in business models for distributing HDTV.

## Satellite - Direct-to-Home (DTH)

Satellite DTH operators are endeavouring to differentiate their service from cable and IPTV. Their initial success at capturing business has come from early rollouts of PVR and HD services and, in some cases, bundling with Internet and phone services. Once again, Cisco's MPEG-4 AVC encoding solution has provided a key technology to help meet the demands of the marketplace. In addition, the Cisco Digital Content Manager, an advanced stream processor, can add SI, scrambling and multiplex a DTH feed. It can also perform many other functions that can be simply enabled by software.

# From service provider to experience provider:

## Enabling the 'connected home'

**The 'connected home' is probably one of the most discussed topics of the moment, even though it means different things to many people.**

In its simplest form, 'connected home' means that various devices, such as PCs, Network Attached Storage (NAS) devices, IP cameras, set-tops, Digital Media Adapters (DMAs) and even TVs, have to interconnect so they can exchange information with one another. This could mean the IP camera's input could be watched on the TV, the PC and the Internet, or that media information stored on the network drive could be viewable on the PC, the set-top and/or the digital media adapter (DMA), etc. This media can be anything - personal video, TV content, photos, music, etc.

To support connected home initiatives for personalised and Video on Demand (VoD) services the Cisco Content Delivery System (CDS) transcends traditional VoD systems and uses a highly scalable and efficient distributed architecture designed for today's services to facilitate moving any stream to any screen.

This Three-Screen Shifting technology allows a person to begin watching a programme on the TV in the main living room, pause the video, and begin watching it again on another TV or PC screen in another room or in another location altogether on, for example, a laptop or even a mobile device.

### Addressing the technical challenges

If knowing what you want to do is half the

battle, how you do it is the other half - an area where technology comes to the forefront.

Many standards have been developed in the recent years to produce IP-based home networks. They range from wireless (802.11 A, B, G, N, etc) to various wired technologies, using either twisted pair (Ethernet on CAT-x), power line or coax. While each has advantages and disadvantages, the unfortunate truth is that today no single technology applies to all homes. If coax is available, it is the best medium, followed by CAT-5. Usually there is a coax connection for the TV that can provide connectivity to a gateway to establish a reliable connection between the gateway and a set-top or DMA.

Without special help, setting up an IP-based home network would be difficult for the average consumer. Fortunately standards were developed to overcome this such as DLNA (Digital Living Network Alliance), which has created design guidelines for a new generation of DLNA-certified products that can work together -

irrespective of the brand. DLNA solutions are aimed at making the set up and interoperability between devices in the home network as transparent to the users as possible.

To support the Quality of Experience (QoE) needed for these innovative in-home capabilities, Cisco has developed the Visual Quality Experience (VQE) system. This system has the capability of error correction, but will only do so when an actual packet loss is detected. In that sense it is quite different from Forward Error Correction (FEC), which is continuously present in the signal, even when there are no errors. This system also supports rapid channel change and can report on the quality of the link.

In traditional interactive networks for triple play services, the connected home is obviously a natural expansion. For traditional one-way broadcast it seems less likely to play a role here. There can be a role in the connected home for the traditional broadcast client devices such as DVB-T set-tops and DVB-S Integrated Receiver Decoders (IRDs). At a minimum these devices can be bridges to a home network so that non-encrypted content can be streamed on the home network. Often these services include popular TV programmes, and having these available on other screens - like the PC screen - would be very popular with consumers. Considering this for the multi-tuner Personal Video Recorder (DVR) would make it possible to use one or more tuners for the video streaming function and to replay content stored on the DVR in the home.



# Cisco facilitates unprecedented NBC Olympics coverage

**F**rom 8-24 August 2008 NBC Universal produced an unprecedented 3600 hours of coverage from Beijing, China, surpassing the combined total of all previous summer Olympics Games. Even more coverage was available online, and people on the go could watch video and view results on their smartphones.

## Bridging Beijing and New York

The network is the platform. For the first time in Olympics history, shot selectors in the US used a long-distance, file-based workflow. To transfer video the 6000 miles between Beijing and New York, NBC used a Cisco 12004/4 Router to combine three 150 Mbps OC-3 connections into one gigantic virtual pipe.

By only transferring the high-resolution footage that it actually intended to air, NBC freed up bandwidth to cover more events. An application server in China digitised and ingested high-definition and standard-definition feeds and simultaneously created full-resolution HD files and low-res proxy files of all recordings. While still being recorded, the files were actively transferred to a storage system in Beijing. From there, a file transport engine transmitted only the low-res proxy files over the Cisco network to another active storage system in New York, 6000 miles away. There, shot selectors edited the low-res files. The resulting Edit Decision Lists (small files that do not contain actual

video) were sent back to Beijing to request the desired SD and HD high-resolution footage for final production editing.

To ensure that editors and shot selectors in the United States could access video files as fast as if they were in China, the NBC Olympics IT group used Cisco Wide-Area Application Services (WAAS) for WAN optimisation and application acceleration. "With Cisco WAAS, our film-editing software has 140 Mbps throughput compared to 35 Mbps without WAAS," said Harry Ryan, network architect, NBC Olympics. "That's what makes it feasible for our editing people to work in our US facility instead of in China."

## First-time coverage of more events

The Cisco network was also instrumental in delivering Olympics footage to viewers using online, on-demand, and mobile services. "NBC is aiming to provide the Olympic experience anywhere, anyplace, anytime, using any delivery platform," said Craig Lau, vice president of IT at NBC Olympics. MPEG-4 encoders encoded and compressed content captured in Beijing for low-bandwidth transmission to New York. Using less bandwidth meant that NBC could transmit more Olympic content, including coverage of events that have never before been broadcast, such as table tennis, badminton, and sailing. "This is the first time we've combined low-res and high-res video to deliver to cable, broadband, and broadcast

networks," said Lau. "Using the IP networks to transport video files eliminates the tape bottleneck."

## Richer viewing experience, reduced costs

The Cisco network and video solutions enhanced the viewer experience even as they reduced costs and environmental impact:

- **Faster shot selection:** For the first time this year, the network could select shots and distribute them to affiliates even before the event was finished. "The Cisco network solution accelerates our ability to make good decisions in terms of content and quality," said Lau. "We've achieved the Holy Grail of digital video, which is the ability to perform shot selections on low-res files and extract high-res material from those files even as they are being recorded. That's a huge accomplishment."

- **Searchable video:** Viewers who visited NBCOlympics.com using their PCs or mobile devices could search for video based on an athlete's name, hometown, or emotional content. The reason is that NBC added keywords describing the content to all shots, which the crew used to select content, such as 'tears of joy' or 'frustration' or 'a happy family in the stands'.

- **Reduced costs and a smaller carbon footprint:** With the ability to access the video content as if they were in Beijing, 300 to 400 shot selectors and editors did not need to relocate for the Olympic Games. By efficiently transferring video files across international links, NBC reduced travel and housing costs and avoided 800 airplane trips, supporting its green initiatives for the Olympics.

Lau concluded: "Cisco is a trusted partner, and in the demanding IT environment for the Olympic Games, we depend on trusted relationships. We have absolute deadlines for when Olympics coverage begins and ends. Cisco technologies help us exceed expectations and meet our timetables in an unforgiving environment."

"The Cisco network solution accelerates our ability to make good decisions in terms of content and quality. We've achieved the Holy Grail of digital video, which is the ability to perform shot selections on low-res files and extract high-res material from those files even as they are being recorded. That's a huge accomplishment."

Craig Lau, vice president of IT at NBC Olympics

# Face to Face

## Neil Nixon interviews Dean Rockwell, vice president and general manager, Digital Media Networks, SPVTG.

### Why are media and broadcast companies important to Cisco, and how has this importance changed over recent years?

New media means new sources of content and new ways of accessing and consuming that content. Cisco can help service providers deliver any content, anywhere, anytime to any device. This concept of new media is an important element of Cisco's vision. Digital media and broadcast companies are obviously critical players in the world of new media, not only as a source of content, but as part of the delivery mechanism. Cisco's IP heritage, along with the video expertise added to the Cisco portfolio with the acquisition of Scientific Atlanta, brings Cisco closer to these companies than ever before.

### Why does Cisco believe it is relevant to media and broadcast companies?

Cisco's key differentiator is our end-to-end technology architecture and our ability to be a trusted solution partner to media and broadcast companies. From the encoding and formatting of the source content to its secure and reliable transport across any medium to any device, Cisco has the expertise in products, solutions and services to do it all.

### In what product areas will the company be strongest, and what emerging technologies do you intend taking a lead in?

Cisco will continue to be strong in the areas of headend, transport and in-home consumer premises equipment (CPE) and consumer facing applications. Where Cisco really shows its strength is in our ability to provide end-to-end network and video solutions to our customers. This requires not only best-in-class products, but also the ability to partner with third parties and provide the services needed to design and build out the network.

### Will your defined product areas - content distribution, broadband access and subscriber - remain central to your R&D programme or will new core competencies emerge?

While the traditional businesses will remain central to what we develop, new core



competencies are emerging such as the use of IP-based networks for content contribution applications, as well as 'connected life' applications.

### How important a role do your customers play in directing your R&D initiatives?

We spend time with our customers in order to understand their business imperatives and network requirements. We constantly strive to understand where they want to take their businesses in the future, and help them to understand what is possible from a network perspective. This interplay drives our portfolio strategy and defines our roadmaps. In addition, we work directly with our customers to define requirements for individual projects and tailor our products to suit the customer's business models.

### How do you believe that Cisco will remain competitive in the future?

Cisco has the knowhow, technology, scalability, products and resources. We invest heavily in internal developments and partner or acquire to provide world class solutions to our customers. This three pronged approach to product strategy and development, combined with intimate customer interaction, will continue to enable Cisco to maintain its competitive position.





# Video Changes Everything.

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Video plays an important role in Cisco's portfolio:

- Digital Workflows • IP Contribution • DVB-T • Mobile TV (DVB-H) • Satellite Distribution
- Satellite DTH • Content Delivery Systems • IPTV End-to-End Solutions • Cable TV
- Digital Signage & Enterprise TV • IP Video Surveillance • Home Networking • TelePresence
- Video Communications and Conferencing • Network Monitoring & Management

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