# Why the SAN is shining in post

**New developments in network storage are putting the pedal to the metal for the production workflow. They're also piling in the data bytes and changing people's jobs in the process.**

**NIGEL JOPSON**



**P**OSTPRODUCTION STUDIES HAVE ALWAYS been at the cutting edge of networking technology. As distributed corporate data processing reduced the entry cost and upped the data capacity of networks, Ethernet kit was used to send short motion sequences between edit suites over computer networks. As bandwidth demand escalated planned wiring was installed, hubs were replaced with switches and routers were added to segment traffic. SNMP monitoring and diagnostics tools were used to tune systems. RAID (Redundant Array of Independent Disks) systems were introduced: data from a single file is split over several drives, normally in the same rack, with parity information recorded separately. A small number of huge virtual disks could be created from a large number of smaller physical devices, with hot-swapping of disk modules often possible. The terminology of pocket-protector-man was soon being bandied about by arty London Soho types…they learnt that a 'Jaybod'

(JBOD — Just a Bunch Of Disks) is merely a volume concatenation not a RAID…and that redundancy may mean a wait of over 4 hours while a RAID system rebuilds a failed SATA (Serial ATA drive).

The traditional way of deploying all this storage is to attach it directly to network servers on a SCSI bus. This method is scalable to an extent, but has several drawbacks, especially where very large (in traditional IT terms) contiguous files are concerned. The server may be very heavily loaded if multiple clients on the network want to access data simultaneously. This will mean the LAN will have to support a large volume of storage traffic, which will slow other network traffic. The server with direct-attached SCSI storage will constitute a single point of failure, and SCSI cabling is limited to 30m so all storage has to sit by the server. The truth is, even if a Cisco 6500 series switch can support 5.456Gbps, the client-server network model developed for corporate database use is not well suited to the huge files associated with digitised motion pictures.

Fortunately for media boys and girls, some heavyweights with budgets the size of Scrooge McDuck's money bin had already tackled a similar problem. The aerospace and petrochemical industries provided the impetus for new network topologies capable of handling huge contiguous files — seismic data collections run into petabytes (millions of gigabytes). A SAN (Storage Area Network) using Fibre Channel resolves the bottleneck issues of the LAN. The cable backbone is a high speed fibre-optic system intended to support transmission speeds of up to 10Gbits/s. The storage traffic is brought to a separate network, relieving traffic on the LAN, and the data can be shared on an any-server to any-storage basis.

The management of data can also be simplified with software tools that probe individual devices as well as giving an overall view of the SAN traffic. The backbone is scalable depending on requirements; ranging from small SANs consisting of a single switch or hub, to large thousand-port enterprise SANs. Special topologies can be set up that allow higher data rates (using multiple links between devices and switches) or native remote mirroring, since Fibre Channel cabling supports distances to 10km. Not only is the single point of failure, the storage server, removed, but remote mirroring and redundant storage can also be mapped very efficiently using the Fibre Channel protocol. Without SAN shared storage, each server has to be equipped with the maximum amount of storage anticipated plus a buffer for temporary files.

'With disk drive prices being what they are, it's no longer merely a question of capacity, but also reliability, availability and access,' says Steve MacPherson, technical manager at The Moving Picture Company. MPC creates high-end digital visual effects and computer animation for the advertising, television and feature film industries. 'For Harry Potter 3, we needed a high-speed data bridge between our CG and Compositing (2D) departments. During periods of peak activity, we needed a system that could catch a high volume of CG rendering while simultaneously releasing

that material on approval to the next step in our pipeline. This involves a huge amount of writes (from CG) and reads (to 2D). The Sledgehammer is deployed in exactly this capacity and has performed flawlessly.' Sledgehammer is a networked storage solution from US firm Maximum Throughput, optimised for moving digital content at speed onto or off an IP-based network. Technically speaking, Sledgehammer is not a SAN on fibre, it is a super-NAS (Network Attached Storage). As production centres move to fibre, SANs are often being deployed alongside existing networks, with hardware moving between the two backbones.

'The SAN was a more cost-effective way of doing what we needed to do,' Darren Woolfson, technical director of London's Molinare Film and TV facilities house tells me. 'We moved to Fibre channel because we needed to do online work, as opposed to offline work that we use the LANshare for. We have 15 Avid Adrenalines here, nine on the LANshare and six on the TerraBlock SAN. The SAN we use for our DI work has about 12 terabytes, which will get much bigger as time goes on.' As top houses like Molinare set the standard, SANs have become the latest must-have and are racing off the shelves at dealers.



'SANS are currently big business,' advises John Harris of root6, SAN resellers for TerraBlock from Facilis, Apple's XSAN and DVS-SAN. 'TerraBlock is a hugely successful product and we are currently installing it at the rate of one a week. Its key advantage is price/performance. While it certainly does not do everything that Unity can, for example, it's a perfectly adequate solution in many applications,' John informs me. Silverglade, a prominent supplier of postproduction services for the UK's terrestrial and satellite broadcast market, has just taken delivery of a TerraBlock system. Founder Charles Frater explains: 'We currently operate four offline and two online suites and we were looking at a number of options to increase capacity. Ways of working have changed quite a bit over the years and there is now a much greater volume of material available in the offline — consequently these suites have a rapacious appetite for memory. We opted for a 12-bay 4.8Tb system which ensures that projects are never prejudiced through insufficient memory and, to date, the system has proved very reliable.'

In-house facilities are also treading the SAN route, with Parthenon Entertainment, a leading UK supplier of factual programming, recently spending £250,000 on HD production kit. Two new suites based on Sony's XPRI HD finishing system have been added, together with an Avid Xpress Studio HD suite, all connected to a large TerraBlock SAN. Currently the company has almost 70 hours of HD programming in production in its key genres of Nature, Science, History and People.

'HD is obviously the way forward,' asserts MD Carl Hall, 'but to ensure quality we felt it was important to keep material in its native HD format. XPRI enables us to do just that, 6Tb of storage may seem excessive but when you consider a one-hour wildlife programme may have 90 hours of material for editing, you soon come to appreciate it.'

The new SAN networks are not just about storage, they are about increasing workflow. With NAS all work centres have access to the same file, if that file is updated, it is automatically updated for everyone accessing it. If the update changes the asset and the user wants to make all users aware of the change, he can give the file a new revision number. When an editor opens a project that uses that asset, it will be marked offline and the replacement will be identified. Having an industrial-strength network is one way to enable collaborative workflow. Users working on a project can save their output in a universal format such as Targa or TIFF. The next person in line can import that image or sequence and take things from there. But there is a limit to how much this improves workflow. Metadata about the project generally does not flow with the image file and if you have two people working in different areas of the same project at the same time, this model does not help.

'The networks have got quicker, the drives have got cheaper and smaller, you can write and read to them quicker, and it's more cost-effective. You're using a bit of fibre instead of copper, it's pretty dull stuff, really!'



summarises Molinare's Woolfson. 'It only becomes interesting when you look at what people can do with it all. We had an Apple Xsan system here, 20 terabytes across 4 RAIDS, we did the Tour de France off it for four and a half weeks. It allowed us to record our three line feeds live onto the SAN which we could then edit, play out and so forth — all while we were still recording.'

Molinare's crew have become Apple poster-boys as they pushed the boundaries of production. Editor Peter Wiggins adds: 'Fast turnaround sports is the last bastion of tape editing — other non-linear solutions have not been able to stand up to the pressures of such an operation. Traditionally, the Tour de France has been edited with two tape suites, but this year it was decided to use a combination of Apple's FCP and Xsan storage to improve the coverage. Visitors who came to look at our system couldn't believe I could play a clip on the timeline to within five seconds of it still recording — I had to show them to prove it! With over 450 hours of storage on Xsan, we didn't need to delete anything, ever. Every frame of every part of the race could be accessed instantly by anyone. We also had seven years' worth of pre-digitised archive for all those Lance Armstrong packages we knew we were going to edit.'

As audio facilities find their storage requirements expanding, and work closer with their vision counterparts, similar solutions are being deployed. Canal Plus in Paris has installed three Pro Tools D-Control systems on two Unity systems (one for adverts, one for the sports channel). Avid sequences are imported to Pro Tools, extra recording and editing is done, the mix is rendered and taken back to the Avid, which in turn sends everything to the playout servers. Swedish TV in Gothenburg also has a large installation of three Pro Control-based B-10 systems. Audio and picture on Unity still need to be segregated to different drives, so the network is not quite as transparent as a SAN theoretically should be.

Most Pro Tools on Unity installations have been for broadcast, as there is a 48-track limit when PT uses Unity rather than local storage. Third-party storage network solutions for audio are also becoming available. Studio Network Solutions (SNS) unveiled the newest product in its globalSAN family, the X-4, at the IBC show. 'We've built the X-4 to be within reach of every multiroom audio studio. Price, performance, capacity — all factors were taken into consideration to make this the best choice for Pro Tools facilities,' says Gary Holladay, president of SNS. It uses iSCSI over gigabit Ethernet (not Fibre) to keep the price down to just US$6,999, and includes 1.6 Terabytes of SATA RAID storage in a 1U enclosure plus two client licenses of SAN software. Of course, any network arrangement for Pro Tools requires careful integration with the Digidesign Workspace window, which controls whether drives are available for recording, playback or transfer: network drives generally register for transfer only.

New technologies like SANs are flavour of the month because they help top creative people in the production industry work the way they want to. George Lucas re-equipped his Skywalker facility for Star Wars Episode III to use Pro Tools throughout the production, erasing the distinction between editing and mixing for picture. Sound designer Ben Burtt was quoted as saying he and Lucas 'have always wanted to have one integrated system for all editing and mixing, including picture…have it all behave as if it were Pro Tools…do a picture change at any moment and ripple that change through all the soundtracks.' Lucas just wants to sit on the couch, watch and listen, and put it all together simultaneously. To a music production person, accustomed to interrupting a mix to replace a vocal or solo, this approach makes perfect sense. In the more hierarchical world of film and TV production it's really quite revolutionary. But, provided the results are up to standard, postproduction professionals are increasingly finding it makes better use of resources to blur some of the boundaries in what was previously a very sequential process.

MPC colourist Max Horton was not apprehensive about editing on a Quantel iQ system: 'It was a great experience to do a bit of editing on the iQ. You don't want to book an online suite just to drop in a couple of shots, so it makes great sense to me.' Most technicians have a keen respect for the skills of their colleagues in other disciplines, but also appreciate that it can often be workflow time, as well as skill, that influences the overall quality of productions. As Darren Woolfson summarises: 'My life is about making the work, from a technical point of view, move through our facility as smoothly as possible. In a perfect world we'd never buy anything, our expertise would be in the people we employ, we'd use cheap equipment and just charge a premium for our services because of the skills of our people!' SANs are part of a new wave of technology ripping up boundaries and extending those skills beyond their original disciplines. It's a data technology that will eventually extend the production process right out of the studio, to production people working at home or in remote locations and finally, whether we like it or not, to the client's desk. ■