



SURVEY REPORT:

**CONNECTIVITY
SUPPLY TO
PRODUCTION**



The Context

Five years ago the greatest barrier to end to end digital production was the continued existence of videotape in the content delivery process. The DPP did a huge amount to solve that problem by defining and implementing a file delivery specification.

But now there is a new barrier to overcome: the barrier to universal connected production. And it is not a problem that can be solved by the creation of a common specification.

There is barely a DPP output that doesn't cite the constraining effect of connectivity on the move to online, cloud-based working. Most recently, connectivity emerged in the *DPP 2017 Predictions* as a significant brake on the trend towards cloud that is otherwise predicted to be the most important development of the next two years.

But most graphically the troubled relationship between production and connectivity was laid bare in our 2016 survey report *Connectivity and Production*.

Connectivity and Production revealed:

- Around half of respondents reported that they still spent less than £1,000 per year on their connectivity despite the fact that most have experienced issues with reliability, speed and integrity of service.
- More than 50% of production companies had experienced corrupt, stolen, lost or inaccessible content as a result of issues with their connectivity.
- The typical indie has remained with the same supplier for the last five years, and regards changing supplier as a difficult challenge.
- Paradoxically, while around two thirds of respondents claimed their office-based connectivity provision met most of their needs, almost the same number believe better services would make them more efficient.

So is the problem that production companies lack the understanding and the motivation to improve their connectivity? Or is there a genuine gap in the market: do connectivity options even exist for small to medium sized companies who require periodic access to good value, high speed connectivity of a kind suited to the movement of large video files? What should a well-informed, adaptable production company do in 2017 to become well connected?

The Approach

To answer these questions the DPP engaged with a number of its Members who provide either connectivity or connected services.



BASE MEDIA CLOUD



BROADCAST SIM



BT MEDIA AND BROADCAST



CENTURY LINK



DOCK10



EQUINIX



JISCOM



LIMECRAFT



NET TECHNICS



SIGNIANT



SOHONET



ZAYO

This report draws on those interviews, along with additional research from the DPP.

In the next section of the report we will explore the subject of connectivity for production from the supplier point of view. And then we will address the practical realities of connectivity provision for production companies.

The report will describe a number of connectivity solutions, tailored to the needs of different sizes of production company.

For the purposes of this report we have distinguished between small, medium and large production companies. What do we mean by these categories? There are no hard and fast definitions. One could look at headcount or at turnover; and companies with a particular specialism, such as drama, may have high turnover, but a relatively small headcount.

For the purposes of this analysis we have focused on the following.

First, what is the 'footprint' of the company? How big an office space does it require, and how many people, either permanently or temporarily, require connectivity? All companies flex in headcount; and larger companies may flex dramatically across a wide range of projects. A tiny company of a couple of people will probably only work on one or two projects at a time.

Secondly, how able is the company to make capital investments, or to sign up to contracts of a year or more? A company may be prepared to pay the upfront cost of bringing high quality connectivity into a building if they have sufficient financial security to know they will be in that building for some time. Similarly, the best deals for connectivity often come with the longest commitments, and larger companies may be better placed to take advantage of these.

So, for the purposes of this survey we are defining the size of production companies as follows:

- S SMALL:**
Likely to have fewer than five permanent staff, and a turnover of around £2m or less. The owner or owners of the company are likely also to carry out the production.
- M MEDIUM:**
Likely to have between about five and twenty permanent staff, and a turnover between about £3m and £20m. Probably still a producer/owner model, but likely to have other key roles on staff, such as head of development and head of production.
- L LARGE:**
May be composed of a number of smaller companies in a group. Will have more than twenty permanent staff, in a well established office or offices. Will have a company Board, who are shareholders, and a number of permanent management roles. Turnover above £20m, but may well be over £100m.

It must be stressed that in discussing possible solutions to possible scenarios for different sized companies, the DPP is providing examples and not recommendations. The options discussed are not definitive. The DPP does not endorse any particular company, product or service. It is the responsibility of both customer and supplier to explore all options in detail, and to reach their own decisions.

Connecting production

The supplier perspective

First, the bad news. If production companies perceive the connectivity market not to be particularly geared to them, they would be right. Connectivity is now a utility, much like electricity or gas. The range of types of provision, services, specialisms and providers is vast. And it only takes a moment to consider the media production sector in comparison to the consumer market or to the business and finance sectors, to realise that media production is – relatively speaking – a tiny market. The major movie studios of the west coast of America represent worthwhile customers for any connectivity provider; but a small independent production company rather less so.

Our connectivity suppliers acknowledge that media is a market that has been underserved.

“ I don't personally think production companies are well catered for. I think connectivity providers may try to shoehorn production companies into existing services because they can't cater for what they call 'non-standard': so they'll be looking to provide you with a standard product.

NET TECHNICS

“ The offerings made by most providers are based on what's available in the Telco marketplace at wholesale prices. So everyone is selling to the niche what's ultimately available on the general market. And in that wholesale market there are only a few technologies geared to this market segment.

JISCOM

“ Traditional products have not been made with this segment in mind because investment needs to be made and tenure on those assets is important.

ZAYO

Much of the problem, as these comments suggest, comes from the fact that a production company has needs that may be completely normal to those of us who work in media – but are very unusual in the world of connectivity provision.

First, production requires a type of service that is known as 'symmetric.' (For further detail on the various characteristics of connectivity provision see **The DPP's 10 Things You Need To Know About Connectivity**.) The simplest way to understand symmetric services is to consider the opposite – asymmetric (ADSL, or Asymmetric Digital Subscriber Line), which is the norm. Consumers tend to want to download lots of video, but not to upload very much. To meet this requirement Internet Service Providers (ISPs) typically offer asymmetric broadband speeds, which have a fast download speed (say, 20Mbps) but a much slower upload speed (say, just 1Mbps).

But producers need to upload video just as much as to download it. So they require high speeds in both directions – up and down. This is symmetric connectivity, and it immediately takes media customers into a specialist form of provision.

“ It is not the method of consumption in media, but the requirement on the consumption of the bandwidth itself, that marks it out as different from most other sectors. The only other people that production have anything in common with are backup companies.

JISCOM

Secondly, the size of files (or amount of data) producers want to upload or download is absolutely vast. Anyone who enjoys photography will know how working with RAW (or uncompressed, high resolution) still photographic images will challenge their home broadband. Now turn this into many hours of ultra high definition video, and imagine what would happen.

And thirdly, many producers work in a project-based business model. In other words, they move from one production to the next. It's a feast or famine world, where they have access to significant funds while in production – but almost none when they aren't. Only the larger production companies can carry significant fixed overheads – such as annual (or longer) contracts for high quality connectivity. Most companies need a pay-as-you-go model that reflects the fact that their needs, and their cash flow, may be high for a period of three or four months, and then virtually non-existent for significant periods.

So production companies represent a small, demanding, and not especially lucrative market. That's the downside.

On the upside, video is now powering the Internet – and companies who deal in Internet and connected services have a real interest in finding ways to work with those who deal in video.

“ We have certainly moved our portfolio to meet the requirements of TV production organisations where decisions have to be short term by nature of the fact that a series only runs for twelve weeks or so. We've done a lot to meet that demand because, while it might not be what we have traditionally done with other sectors, media is a sector that's here to stay and it's one that we need to serve as best we can.

ZAYO

“ More and more content is going to be produced. Content that needs higher bandwidth, such as UHD; and that content has to go to more places. It has to reach more eyeballs.

EQUINIX

“ We are seeing more and more channels of media, and we are seeing the increase in video. The potential – in terms of the likely explosion of the development of content – has now been proven.

JISCOM

“Historically television productions didn’t have to worry about connectivity, they worked with tape and delivered those tapes using couriers. But now productions have moved from tape to file. At the same time the cloud has matured, and connectivity has evolved, and all of the different components that exploit the cloud to benefit productions are gradually being released into the market. So the timing is just right.

BASE MEDIA CLOUD

The sheer momentum of the connectivity industry will progressively make life easier for producers. Broadband speeds get faster each year; the prices get lower, and connected services become more mature. The next generation of mobile connectivity – 5G – should arrive around 2020, enabling producers to access high speed connectivity more easily and from a greater range of locations.

Of course the demands of production will go on developing too: picture resolutions only ever get greater, and the ways in which video is manipulated get more and more sophisticated.

“It’s true that connectivity is getting faster and faster, but file formats are growing even faster. Beyond 4K and 8K, we’re going to see light field cameras and potentially other things such as holographic images, so it is unlikely network capacity will ever be good enough as a general purpose solution for transferring any raw material. I believe connectivity will remain an issue for some time yet.

LIMECRAFT

So there is every reason to believe the relationship between production and Internet Service Providers will get better – and they will do more together. But there is also going to be a continuing need for both suppliers and customers to identify pragmatic solutions to real world problems.

“It does require a cultural shift because the fact that productions didn’t used to have to worry about connectivity has meant that it was never built into budgets. Discussions about the benefits and savings that can be achieved over a long term period by better use of connectivity need to be determined and understood by the heads of production and those responsible for the finance. And meanwhile suppliers need to know how to translate production requirements into real services.

BASE MEDIA CLOUD

In the pages that follow we explore some of the kinds of solution approaches that could help shift that culture.

Connectivity supply solutions

Production companies have different connectivity needs depending on their activity. For the purposes of this analysis we have divided these needs into three types:



GENERAL CONNECTIVITY

This is the typical office-based connectivity requirement: the ability to undertake everyday tasks such as email, web-browsing for research, the use of web-based productivity tools, and the viewing of video (recognising that companies who work in media will have greater need to view video than companies in other sectors.)

When most people think of connectivity of this kind, they imagine using the public Internet. This is indeed a perfectly normal way of undertaking general online tasks, although the public Internet is much like the public highway: you will be sharing with others, and it may get congested, or have blockages. The information you send across the Internet will also be mixed with all the information that other people are sending across the Internet, so there are security limitations.

It is possible however to have dedicated connectivity – much like having your own private road between locations. The destination at the other end could be one of your other office premises, a third party such as a facilities house, an Internet Service Provider or a cloud services provider.

ISPs can always offer the public Internet, and sometimes offer dedicated services. Specialist connectivity providers can provide both.



PRODUCTION CONNECTIVITY

The connectivity required for production needs to support the uploading, downloading and streaming of video to and from base; the use of web-based production, post production and media-storage tools; collaboration with craft specialists – such as graphics, visual effects and music; and the delivery of content to broadcasters and online platforms.

The public Internet is likely to be extremely limiting for such tasks. Specialist connectivity will serve the purpose much better.



LOCATION CONNECTIVITY

The connectivity required on location is to deliver rushes via the Internet to the cloud or to base; to use web-based review and approve tools; and to deliver edited packages or complete content to broadcasters and distributors. Shooting of course takes place in a range of environments around the world, many of which will have poor access to the Internet. So the connectivity solutions will often need to be specialist, or require some pre-planned solutions.

(Live production from location has not been included in this survey, since commissions for live output will have appropriate connectivity built into the commission and the budget, and spot-buying of specialist services will take place, if required.)

SHARED WORKSPACES

A small production company might choose to free itself from the worry of finding, setting up and managing its own connectivity provision by simply buying into the provision made by somebody else. The easiest way to do this is by making use of one of the increasingly popular shared working spaces, provided by companies such as WeWork, Soho Works and Innospace.

One work space company, which has nearly twenty locations in London, quoted hot desk space starting from £200 per person per month. This desk space is inclusive of Internet access via Wi-Fi or a physical cable connection. Some work spaces even offer daily pay-as-you-go options at around £35 per day (prices depend on location, and typically a central London desk will be the most expensive).

An arrangement such as this would mean a two-person company would be paying £400 per month for office space with consumer-style broadband thrown in. If a company of this size had been renting an office, this deal might be attractive – especially as they can avoid paying rental on office space while away filming. But it is likely, in practice, that a very small company would prefer to work from home and simply pay for a consumer broadband package.

If you are renting a shared workspace with a greater level of connectivity, such as 100 Mbps, you could in theory undertake basic production work – particularly if you are working with lower resolution proxies. Problems could come however if there are lots of other users trying to use the same connectivity.

The rented work space solution may become more attractive once there is a handful of people working on a production. In this situation it is possible to rent dedicated desks or even a private office from a shared workspace provider. A work space with a shared 1 Gbps link (which is ten times faster than 100 Mbps) will be far better suited to production work (See the Appendix for a guide to the bandwidth requirements of different amounts and types of video.) These types of services exist across the UK, but a typical price for a dedicated one person office with 1 Gbps connection would be from £660 to £1,000 per month in Soho, London.

Any level of connectivity will be more effective if you also buy into a file acceleration service. Various such services exist, with some based on license fees and some on volume. One company for example charges \$0.15 per GB. So a 150 GB file would cost \$22.50 to transfer – and reach its destination in under twenty minutes. That represents good value compared to using a courier.

The one limitation of shared workspaces is in the name: they are shared. If other media companies are working in the same space, they will be competing for the same connectivity as you. Certain times of day will be better than others, with

evening the best time to undertake heavy duty work. But the big plus to shared workspaces is the flexibility: you can choose to only pay for an office or a desk when it is needed.

<p>CONNECTIVITY TYPE:</p>	<p>General, and production if there is access to connectivity of 100Mbps and above</p>	<p>SUITABLE FOR:</p>	<p>Very small production companies, and small production companies that are highly flexible</p>
			

4G TETHERING

For everyday use of the Internet a very small company could even manage without a consumer broadband connection. It is possible to work from home and make use of 4G through a mobile phone network by 'tethering' a computer to it. This will be good enough for uploading and downloading images, reviewing low resolution files, catching up on emails, and research.

The limitation of using a 3G/4G data plan through your mobile phone is that you need to be conscious of the data allowance in your contract: you could soon find it running out.

<p>CONNECTIVITY TYPE:</p>	<p>General</p>	<p>SUITABLE FOR:</p>	<p>Very small production companies in areas with good 4G signals but poor access to consumer broadband</p>
			

BUSINESS GRADE 4G

Some companies, such as Relish Broadband, offer wireless 4G broadband over their own 4G network (in this case in central London and Swindon) The residential package starts at £20 per month and offers relatively short term contracts (one month contracts are available with an upfront fee). Business packages start from £25 per month. If used on its own then such a solution is only really suited to general connectivity. However if paired with a line bonding solution (see page 11) then the quality of connectivity would enable you to upload and download low resolution video proxies and to use Internet-based streaming services to review and comment on content.

<p>CONNECTIVITY TYPE:</p>	<p>General</p>	<p>SUITABLE FOR:</p>	<p>Very small production companies who need a pay-as-you-go service</p>
			

LINE BONDING

Line bonding is a process of connecting together more than one source of bandwidth, so that for a user it seems like it's a single connection. For example it is possible to have two broadband connections, combined with some 4G sim cards from different providers. If all these sources are then put together with a file acceleration service it could all add up to pretty good connectivity.

The trouble is, if used as an office solution, the broadband connections will require separate telephone line rental contracts, and the sim cards will also come with contracts. So the net result is a solution that is likely to be expensive, require some technical know-how to set up and not be very flexible.

Line bonding solutions make more sense for mobile, location working. They are already commonly used in news programming, and will provide enough bandwidth to upload small proxy files or to 'drip feed' content back to base overnight. There will be a one off charge for the equipment, ranging from around £500 to £3,000, and then a subscription charge. Many of these services, such as LiveU, Livewire and Viprinet, are well established, and are specifically tailored to film crews, or small live events, working in remote or difficult locations.

There is a new solution from Broadcast SIM, which, as the name suggests, makes clever use of sim cards to suit programme makers. Broadcast SIM have negotiated with telcos internationally to enable sim cards which, in effect, search out the best connectivity in any location. They are also able to bond a number of these connections to give a combined, aggregated faster connection speed. Currently the service is used mostly by journalists. In one recent deployment a team shot twelve live 'stand ups' across two days for less than €400. The system can equally be used by documentary teams, especially to return proxy quality material to base.

Limecraft observe that this way of working, in which proxies are sent to base and the high resolution content conformed later, is perfectly viable:

“ **Highly compressed video proxies can be used perfectly for editing. While the editor is working from these proxies the high resolution footage is being physically transported to the post production facility. When it's ready the EDL is exported and we automatically replace the links to the proxies with links to the high-resolution content.**

dock10 offers a similar service called Field Dock in which a location laptop is used to ingest camera cards and then automatically generate low resolution proxies which are uploaded via 3G/4G (or any other available connectivity – such as Wi-Fi). The proxy content is then automatically ingested into dock10 systems that enable editors to produce rough cuts or share content for review by producers.

<p>CONNECTIVITY TYPE: Location</p> 	<p>SUITABLE FOR: All production teams that are mobile and/or in remote areas</p> 
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MICROWAVE BROADBAND

In some areas it is possible to receive Microwave broadband. In this solution wireless Internet access is delivered via a small satellite receiver dish mounted on a house or office. (There are also mobile versions of the solution.) An online search for 'fixed wireless Internet access' or 'microwave broadband', followed by a search by postcode, will tell you if such services are available in your area.

Costs are difficult to predict, since it will vary greatly depending on the location. However, as a guide, one provider specialising in rural environments is currently offering business grade links starting from 16 Mbps, symmetric, for £90 per month and 32 Mbps, symmetric, for £144 per month. 32 Mbps would be sufficient to upload 100GB overnight (with file transfer acceleration). An installation fee of £249 is also required, to attach the dish to a building. And of course such installation may require permissions.

It is also possible to get speeds of 100 Mbps, symmetric, for £225 per month, with a setup charge of £175. A 100 Mbps symmetric link will enable you to upload large production files to the Internet for remote editing. This solution should give most of the benefits of cloud-based working – although actual performance will be dependent on the exact location and size of the dish.

<p>CONNECTIVITY TYPE: General, production and long-standing location productions</p> <p>  </p>	<p>SUITABLE FOR: Small and medium companies, and any company with a long-standing location production</p> <p>  </p>
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MANAGED RUSHES MANAGEMENT

If none of the options above quite work for a production working on location, it is also possible to arrange for a post production house or cloud services provider to come and collect your content, take it away and then ingest it using the provider's own connectivity. This can be a reassuring solution, that gives you the benefit of cloud-based editing back at base, without the headache of trying to establish good connectivity on location.

These services do require detailed conversations about your workflow with the service provider or post house, and the service offered will need to be tailored to your exact requirements.

<p>CONNECTIVITY TYPE: Location</p> <p>  </p>	<p>SUITABLE FOR: All companies with location based shoots</p> <p>  </p>
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CONSUMER BROADBAND

As we know from our *Connectivity* and *Production* survey report, many small production companies operate with consumer broadband connections – often referred to as ADSL. This level of connectivity may be fine for very small companies performing general connectivity tasks such as email and web-browsing. But consumer broadband will struggle to cope with significant volumes of video; it will also struggle to support a medium sized company where several people are competing to use the same bandwidth. (Many will be familiar with how their broadband at home takes a dive in the evening when the children, and all the neighbours, have logged on.)

Actual connection speeds for consumer broadband vary significantly between urban and rural areas. A study by Ofcom in 2016 showed that average download speeds were 28.9 Mbps while the average upload speed was just 3.7 Mbps.

If you have a major production in a fixed location, it may be worth installing a new consumer broadband connection. Consumer telephone lines typically cost about £400 per year to run with a broadband connection. This will be good enough for uploading and downloading still images, reviewing low resolution files, catching up on emails, and research. Even if you abandon the service after a few months, the convenience of having your own broadband service while in production could make it worth it.

<p>CONNECTIVITY TYPE: General – including general long-term working on location</p> <p>  </p>	<p>SUITABLE FOR: Small production companies who don't work with media in the office. May work as basic provision for any long term location production.</p> <p>  </p>
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BUSINESS BROADBAND

There is now a blurred line between high speed consumer broadband (often sold as 'fibre broadband') and business broadband. An ordinary business, not engaged in media production, would benefit from the high download speeds of business broadband, and the bandwidth to cope with a number of concurrent users. And such a company would not need high upload speeds or symmetric connectivity.

BT Business for example offers its Infinity product with download speeds of up to 76 Mbps and upload speeds of up to 19 Mbps. This kind of connectivity would be fine for general working, but would struggle once a team started to get into proper production activity. A connection of this kind would mean a 10 GB file – around ten minutes of full resolution HD video, or around thirty minutes of proxy resolution HD video – would take just over two hours to transfer. There are many other broadband providers (such as Plusnet, Talk Talk, XLN, Zen) who provide similar solutions – and, since they are all effectively using the same BT Openreach infrastructure – the upload and download speeds will be similar.

These kind of services are available for around £54 per month inclusive of a telephone line rental.

There are also a number of providers (such as Hyperoptic, Cityfibre and B4RN) specialising in providing 1Gbps fibre connections in different parts of the UK. One provider offers this connectivity at around £70 per month for a residential contract – and £300 for a business connection, which comes with greater support and performance guarantees. Contract terms can be as short as a month. Another company does a small business deal at £60 per month.

If you work in a Virgin Media cabled area then you may be able to get a Virgin Media Business connection. It offers high speed download of up to 300Mbps, but its upload is limited to 15Mbps, making it good for general working, but not for media production. It costs £75 per month plus £15 line per month line rental. Virgin Media Business also offer dedicated leased lines. This provides a company with a private, secure connection of 30Mbps upload and download. Prices start from around £325 per month on a 3 year contract. A 100Mbps connection starts from £510 per month. This kind of provision and cost may tip into the kind of service better suited to a medium sized company.

For most medium sized production companies it may no longer make sense to use consumer ADSL broadband or even superfast consumer broadband (such as those offered with speeds of up to 76Mbps download and 19Mbps upload). The amount of upload bandwidth simply isn't enough to share with everyone in the office, especially if some are sending low resolution proxy video. This is the point at which companies should consider moving to more professional levels of connectivity provided by leased line arrangements.

<p>CONNECTIVITY TYPE: General</p> 	<p>SUITABLE FOR: Small and medium sized production companies who only work with low resolution (proxy) video in the office</p> 
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LEASED LINE SERVICES

A leased line is a dedicated connection between your office and the service provider. Such lines aren't shared with anyone and tend to be symmetric.

When considering this option it is necessary however to be aware of the underlying capacity of your connection. In the world of connectivity this underlying capacity is known as the bearer speed.

Service providers often have capacities, or bearer speeds, that are greater than that being provided to the customer. So, for example, a customer might have a 10Mbps link on a 100Mbps bearer. What this means is that although the speed being offered to you as the customer is 10Mbps there is the capacity for the service to be increased up to a maximum of 100Mbps. But bearers can be even greater than this. The price

difference these days between a 100 Mbps bearer and a 1 Gbps bearer is not that much – and far better suited to a media company working with high resolution files, such as UHD.

The costs for a 100 Mbps on a 1 Gbps bearer range from £455-£600 per month depending on the supplier. A contract term of one year is also likely to bring an initial setup and connection cost of around £2K. But if the contract term is three years the connection charge is commonly waived.

“ To get all of the benefits of the cloud – when it comes to storage, backing up, editing and so on – then you should have a minimum of 100 Mbps connectivity. But frankly if you are making the leap to a leased line, then you’re better off in the long term going for a dedicated gigabit link. The increase in cost isn’t significant, but you get the added benefit of flexible bandwidth now offered by the larger connectivity providers.

BASE MEDIA CLOUD

It may sound expensive to commit to around £600 a month for connectivity. But when set against production budgets this amount may start to look good value: it will remove courier charges, save time, and enable a company to access cloud services, which themselves are often good value. A company will also benefit from being in the hands of a specialist provider, rather than trying to get their business needs met by an operator tailored more to the general consumer.

Exact prices will vary depending on location, but it is important to be aware of lead times. Any prices will be subject to survey – and such a survey could take up to 45 days to complete. Installation may require a further 70 days, depending on the company you choose, and how close you are to their existing fibre networks.

<p>CONNECTIVITY TYPE: General and production</p> 	<p>SUITABLE FOR: Small, medium and large production companies who work with media in the office</p> 
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ENTERPRISE CONNECTIVITY

Even a single 100 Mbps or 1 Gbps leased line may not be sufficient for a large company. If, for example, the company has more than one office, and wishes to connect those offices (perhaps along with other locations, such as post production facilities), it will need more than one link.

The company may also want to build in some resilience: the ability to cope if their connectivity is disrupted. It is common to have a completely separate supply – perhaps even from a different supplier – as a backup.

Companies of this scale may consider a 10 Gbps link. This also opens up some other opportunities.

From a cost point of view the jump from 1Gbps to 10Gbps can be good value. From the DPP’s research, it was possible to negotiate a 10Gbps link for a business located in a major city for as little as £1,000 per month. Alternatively one could have a 1Gbps link on a 10Gbps bearer (enabling a company to scale up during busy periods) for a few hundred pounds less.

Furthermore, it is possible to segment a 10Gbps link. Segmentation can also be applied to smaller bandwidths (such as 1Gbps and 100Mbps). But it’s more practical with larger bandwidths. The segmentation could be used to divide up the available bandwidth into ten 1Gbps chunks. The first chunk could be used for general staff access to the Internet. The next chunk could be used for telephony (a voice over IP service) as a way of reducing telephone costs. A further 1Gbps could be portioned off to carry files to a specific post production facility; and another 1Gbps portioned off to carry files to another production office – and so on.

Network design such as this does have some complexity, and would need to be discussed and planned with a connectivity partner.

For example, a company such as CenturyLink offers a SD WAN service – an appliance connected to your links which offers an easy to use interface through which the customer can increase the bandwidth as and when needed. A production company might only be using a 100Mbps active connection on its 10Gbps bearer – but then at a moment of critical delivery it may need suddenly to ramp up its bandwidth to 10Gbps, before reducing it back down to 100Mbps. The company would only pay for the additional burst for the length of time they used it. The flexibility of a SD WAN service such as this does come at an extra cost – around £200 per month.

Equally, once a company begins to make use of having a number of links, then it may be appropriate to make use of a specialist media service provider such as Sohonet. A company like Sohonet has its own international managed network between a large range of post production and other media facilities. Any Sohonet customer would get access to this network

In short, production companies that commit to high grade, professional connectivity are then able to make use of a huge range of cloud-based services – such as ingest, transcoding, virtualised editing, asset management, cloud storage, high speed transfer and delivery, auto-transcription, auto-subtitling and so on. Such services are often now designed with user-friendly interfaces that enable companies to take an active role in managing those services. It also becomes easier to access and work with international talent – such as special effects companies based in other countries. Connectivity provision such as this equips a company for the future, and has the potential to be transformational.

<p>CONNECTIVITY TYPE: General and production</p> 	<p>SUITABLE FOR: Large production companies who work with media across multiple offices or with partners</p> 
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Conclusions

There may be a day when the whole planet is enmeshed in high speed, low cost connectivity. Until then, connectivity providers are developing an increasing number of pragmatic solutions, some of which can be useful to production companies of certain sizes, or working in certain circumstances.

It will nonetheless be evident from the solutions described in this report that a step change comes at the point at which a company commits to its own dedicated connectivity supply. This comes with a step change in cost also. But the difference isn't simply between an economy and a premium supply. It's the difference between simply being able to get online and being a connected business - and those two things are a world apart.

A connectivity bill of £500-£1,000 a month looks a lot if compared to a domestic broadband bill. But that comparison is much like comparing a snapshot camera with a professional video camera: a production company would never regard a snapshot camera as a suitable device with which to do business. The more realistic cost comparison would be between the cost of dedicated connectivity and the production budgets the connectivity supports. Only by seeing the connectivity spend as an enabler does its value become apparent.

Having said this, the specific needs of a media production company still remain unfamiliar to many connectivity suppliers. It is for this reason that some cloud service providers also now offer to be a broker between the production company and the various connectivity suppliers - ensuring the production gets the best and most appropriate solution for its needs.

Production companies have always looked to the advice of trusted, mediating experts to enable them to achieve what they could never achieve on their own. Connectivity experts are just the latest allies they need to add to their list.

Appendix

How big is a video file - and how long will it take to move it?

The table below shows file sizes for one hour of content in a given file or proxy format. This is indicative and to be used as guidance only. Different cameras, codecs and proxy formats will all have a bearing on final file sizes.

PARAMETER	4K UHD	2K	HD	PROXY FILE
Codec	ProRes 422	ProRes 422	ProRes 422	DNxHD 36 8bit
Resolution	16:9 4K UHD 3840×2160	16:9 2K 2048×1152	16:9 HD 1920×1080	16:9 HD 1920×1080
Frame rate	25p	25p	25p	25p
Storage media	Sony SxS Pro+ 128GB	Sony SxS Pro+ 128GB	Sony SxS Pro+ 128GB	–
Record duration (approx)	30 min	103 min (1 hr 43)	118 min (1 hr 58)	1 hr
File size card/ converted (approx)	125 GB (for half hour) 250 GB (for 1 hour)	71 GB	62 GB	16 GB

The table above can be used in conjunction with the one on page 19 to provide guidance on how long it could take to transfer content.

Column 1 describes some typical file sizes

Column 2 describes the maximum theoretical transfer speed using traditional transfer technology such as File Transfer Protocol (FTP), assuming the destination is somewhere in the UK.

Column 3 shows the theoretical maximum speed using file acceleration technologies. In most cases the difference is marginal when transferring content within the UK (although these services still provide other benefits).

Column 4 shows maximum transfer speeds between the UK and the US (Los Angeles in this instance)

Column 5 shows the speeds to the US using acceleration. The difference using acceleration is much more significant than for UK to UK content.

10 Mbps connection

File size	Max standard transfer speed (UK-UK)	Max accelerated transfer speed (UK-UK)	Max standard transfer speed (US-UK)	Max accelerated transfer speed (US-UK)
1 GB	14 minutes	14 minutes	48 minutes	14 minutes
10 GB	2.4 hours	2.4 hours	8 hours	2.4 hours
100 GB	1 day	1 day	3.3 days	1 day

100 Mbps connection

File size	Max standard transfer speed (UK-UK)	Max accelerated transfer speed (UK-UK)	Max standard transfer speed (US-UK)	Max accelerated transfer speed (US-UK)
1 GB	1.5 minutes	1.4 minutes	48 minutes	1.4 minutes
10 GB	15 minutes	14 minutes	8 hours	14 minutes
100 GB	2.6 hours	2.4 hours	3.3 days	2.4 hours

1 Gbps connection

File size	Max standard transfer speed (UK-UK)	Max accelerated transfer speed (UK-UK)	Max standard transfer speed (US-UK)	Max accelerated transfer speed (US-UK)
1 GB	1.5 minutes	8.7 seconds	48 minutes	8.7 seconds
10 GB	15 minutes	1.4 minutes	8 hours	1.4 minutes
100 GB	2.6 hours	14 minutes	3.3 days	14 minutes

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