

THE DPP'S

10

things

YOU NEED TO KNOW  
ABOUT CONNECTIVITY

dPP™  
digital production partnership

# INTRODUCTION

Connectivity is integral to our lives and businesses, acting like the blood supply to the vital organs that enable us to do what we do. Without it the broadcast industry couldn't function.

The DPP has undertaken research among its membership into this vitally important subject, and an interesting picture has emerged. Producers, craft contributors, post houses, service providers and broadcasters all have different experiences of connectivity, and there is very little common understanding. We have found that those working in television production tend to view this subject matter with horror – and with good reason. They find connectivity services complex, expensive and insufficiently tailored to their needs.

This guide will try to create some common understanding. It is aimed particularly at the television production sector – though we hope others will benefit from it also. We aim to provide enough information to understand the basics of what we mean when we talk about connectivity by taking you through the questions below; and to show you how the particular requirements of our industry translate into the kinds of connectivity services you are likely to need.

- Why does connectivity matter?
- What is connectivity?
- What types of connectivity are there?
- When and where is connectivity used?
- What connectivity do I need?
- What can affect my connectivity?

# INTRODUCTION

- Managed or unmanaged?
- Is it safe?
- Will it break?
- And how should I plan for the future?

Later in the year the DPP will release a more in-depth report, which will focus on how the particular needs of our industry might be served more effectively.

# Why does connectivity matter?

Connectivity has become so important it can determine the health of your business.

There is huge variety in how media is processed and distributed compared with only five years ago – and that variety requires lots of different technologies. Transferring large files can take a long time and mistakes can be expensive. File transfers and streaming media are becoming the normal way to exchange content; so it is important to understand the perils and pitfalls, as well as the tips and tricks..

The analogy we began with of connectivity acting like the blood supply to the vital organs of our businesses is quite apt. Without appropriate and healthy connectivity, businesses can suffer in the same way that if a body's circulatory system is blocked it can result in damage to your organs. If the circulatory problem becomes acute then organ failure can occur. Similarly, if your connectivity issues become acute then you may not be able to meet that important delivery deadline – enough to give anyone in our business a heart attack!

## WHY DOES CONNECTIVITY MATTER?

This sense that our whole industry has a life and death dependency on connectivity will only intensify. Anyone who attends a broadcast technology trade show will find there is now barely a technology or service that doesn't depend on internet or network connectivity. People used to talk about the move to digital: now they talk about the move to IP (Internet Protocol) – the broad term for the technology that underpins network and internet connectivity.

But in the face of all this change it is difficult for any business in television to understand what precisely constitutes a healthy connectivity service for *them*. As we will see, there are many different types of connectivity, each one appropriate to a different activity. So what does your business need; and how do you know you have the right service at the right price?

In some respects it may be less complicated than you think.

- If you are based in an office, with no editing facilities, and you never handle digital rushes or programme material in your own environment, then a good business broadband service should be sufficient.
- If you have typical office functions and you handle any amount of programme material then you will need to consider specialist services described in this guide. It doesn't matter whether you make and deliver one programme a year or a hundred, the fact is that when you move a video file it will be a big file – and it will be important.
- And if you have a full blown post production facility, then the quality of your connectivity provision is about as important as it gets. You will need something very good – good enough that if your connectivity breaks your provision includes a backup of some kind.

## WHY DOES CONNECTIVITY MATTER?

Then of course there is what you do out of the office. The use of connectivity as part of location and mobile working is relatively new. But the notion that when you leave HQ you go off-line is now as ludicrous as the thought that you can't use a phone when on the move. Transferring digital media whilst on location is the most challenging and complex aspect of connectivity in programme making – not least because you are likely to be trying to move files of a size that almost no one else in any other industry has to bother with. And you are probably trying to do it from the middle of a muddy field in a foreign country at the end of a twelve-hour day. In winter.

# What is connectivity?

In essence, connectivity is the thing that enables data to flow from one place to another.

In the broader context when we refer to connectivity we mean a service provided by a telecommunications company or an internet service provider to allow you to connect devices to each other. You may be connecting your office and staff to each other, to other organisations, or to the internet. Once connected you normally want to exchange something, be it a voice call, a file you want to transfer, a video you want to watch, or a web page you want to browse. One definition of connectivity is therefore the ability to connect and exchange information.

For example you may have connectivity services provided to you by a company such as BT or Sohonet that allows you to connect directly with other offices or partner organisations in a controlled and managed manner. You may also be using the same type of providers for business broadband connectivity services to enable you to connect to the internet (which itself is a collection of connected networks). On an individual level, you may have a smart phone provided by a mobile phone operator, which connects you to the operator's network, which then in turn allows you to connect to the

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internet and other voice or data services. On location, your teams might be relying on something as simple as the hotel wifi, or something as complex as satellite services to connect and send material back to base.

In short, connectivity enables the transfer of information from one place to another. It comes in many flavours, and at many price points. It can be consumed as an always-on service, or as pay-as-you-go. The best choice of connectivity depends on what you need to do. What really matters is understanding how to make the right choices.

# What types of connectivity are there?

Perhaps one of the key reasons for the lack of a common understanding of connectivity is that the very term can be defined both as a service and a function.

The table below does three things: it provides a summary of different types of connectivity and service; it lists the typical terms you will hear when discussing connectivity; and it also lists some of the providers. Even this table doesn't give you every type of connectivity, but it will provide you with a foundation to help you understand the subject.

It should be noted that the table below doesn't represent an either/or description. For example we have listed 'fibre' and 'internet' as two separate categories: your provider might use fibre to connect you to the internet. We have also separated out 'internet' and 'networks' – though the internet itself is a type of network! The aim isn't to provide dictionary definitions, but to help you understand the different categories and layers you may hear discussed when talking about connectivity.

## WHAT TYPES OF CONNECTIVITY ARE THERE?

Connectivity Type and Typical Use	Typical Terms Used	Some Service & Equipment Providers
<b>Mobile</b>  Making of voice calls, video calls, access to the internet and other data services. For Newsgathering, mobiles have become an essential tool for capturing and sending content back from the field.	Edge, GPRS, 3G, 4G, 5G, LTE	EE, O2, Three, Vodafone
<b>Internet</b>  Connections to the internet. Ranging from low rate consumer broadband to 100+ Mbit/s – and higher still! Increasingly used for transfer of media content.	Broadband, Business Broadband, DSL, ADSL, ADSL2+, SDSL, VDSL, WIMAX, Wireless Hotspots	BT, Level 3, Plusnet, Sohonet, Sky, TalkTalk, Virgin
<b>Networks</b>  Usually applicable to how your office is connected within the building or when connecting to other offices or organisations. Networks are used for a whole range of functions from standard office IT/email to transferring video files. The difference between managed networks and the internet is discussed later.	IP network, MPLS ATM, LAN, WAN, VOIP, AOIP, SIP, Ethernet, TCP, UDP, Router, Switch, Server	BT, Cisco, Colt, Hyperoptic, Interoute, Juniper, KCom, Level 3, Sohonet, Venus, Verizon, Vodafone

## WHAT TYPES OF CONNECTIVITY ARE THERE?

Connectivity Type and Typical Use	Typical Terms Used	Some Service & Equipment Providers
<b>Fibre</b>	<p>Used where you want to have a high speed connection to a service provider's network. Think of it like connecting your house via a new road to the road network. Usually an organisation like Colt or Sohonet has built their own network, through which they allow you to transfer your data. They will often have interconnects with other providers so that you can enter the network from where you are and exit at someone else's premises – for example a post house to a broadcaster.</p>	Dark Fibre, Ethernet, Wavelengths
<b>Fixed Lines/Leased Lines</b>	<p>Used where you need a direct connection with a guaranteed quality. This can range from small capacity (64 Kb/s Phone line) to large capacity 10 Gbit/s, 40 Gbit/s, 100 Gbit/s and higher. Has typically been used to play content 'down the line'. Leased lines are losing favour over other types of connectivity that are cheaper (but not necessarily as guaranteed in terms of the capacity).</p>	Dial Up, DEL, ISDN, B-ISDN, E1, E3, T1, Point 2 Point, Ethernet, Wavelengths

## WHAT TYPES OF CONNECTIVITY ARE THERE?

Connectivity Type and Typical Use	Typical Terms Used	Some Service & Equipment Providers
<b>Satellite</b> Used where ground-based connectivity is either not available or more expensive than satellite. Can include sending live audio and video as well as files or other data. Typically used for location work to send back content (live or non live).	OBs, SNG, Ku Band, C Band, Satellite Broadband, Bgan	Inmarsat, Intelsat, Eutelsat, Telstra, Arqiva

It's a fair guess that 90% of people who work in television would struggle to define most of the terms used in this table. And that means the other 10% - most of whom are likely to be people trying to sell you these services - have an obligation to be clear with you about what kind of connectivity you need for what you do; which parts of the service they are accountable for; and how they are going to ensure you get the outcome you need.

It is best to have a single point of contact for your connectivity discussions - either an expert in your company, or a consultant from outside. Make no mistake you'll need expert advice!

# *When and where is connectivity used?*

Connectivity plays a part in the whole production workflow. The best way to understand what connectivity you will need is to think about what it is you typically do.

Broadly speaking our industry does four things: it creates content; it transforms that raw content into something you would want to watch; it supplies it to broadcasters; and they in turn make sure it's watchable by the audience. Those four activities correspond to the four broad stages of production:

## **Gathering content**

The big connectivity need here is to send rushes back to base. Here is a summary of the options available to you:

- On location you will typically be relying on mobile phones to connect you with other members of your team, and the office. Although News and Radio have for some time used mobile phones to send content back, the connectivity needed to send large volumes of rushes back by mobile isn't really good enough. Even when we're beyond 3G and 4G services

## WHEN AND WHERE IS CONNECTIVITY USED?

to 5G, typical video files will have increased in resolution to 4K/UHD quality, so getting rushes back from the field via mobile looks set to be difficult for some time yet.

- You may rely instead on hotel wifi connections to send content back – especially if you are sending it in proxy rather than full resolution. While you may find that the connection is OK for downloading content, it is likely the capacity to upload will be much lower. So if you do a recce and the local hotel says it has a high speed connection, don't bank on that being good enough: you need to ask them what their upload capacity is.
- Instead of using wifi you may connect to the internet by using an ethernet cable. You may find this gives you a better and more stable connection than wifi. As broadband speeds get better, this may start to serve you quite well – but note that the same issues about upload and download capacities apply as when relying on wifi.
- If you can't get appropriate wired or wifi connectivity you will need to use satellite connectivity. This can be used for both live transmission and if you require the urgent transfer of material back from remote locations. Some providers also use clever 'bonding' of different types of signal: they take a couple of 3G signals from different providers, a bit of weak wi-fi from someone else, and put them together to create one half-decent connection. News operations already use these services. But they can work for longer-form productions too.
- In some areas – especially larger towns, or where there is a studio or media campus – you may be able to get managed connectivity back to base. For example if you have a major drama shoot and you know you

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will be at a location for a long time you can have some fibre installed by a managed service provider, and ask them to connect it to your own office or a post house. This will enable you to take advantage of the greater speeds of fibre connectivity for submitting your rushes, even while on location. Equally, you may be doing a live show from a location which has existing fibre infrastructure and may present an alternative to booking satellite connectivity.

### Shaping content

Production companies without their own facilities may turn to post houses, who often offer connectivity-based services for editing and review, grading and dubbing, storage and file transfer. As well as providing high-speed connectivity their services may be supplemented by additional features to speed things up:

- You can have a managed connection between your production company or location and a post house to guarantee a certain level of bandwidth and performance.
- You can get software tools that manage and optimise the transfer of media across these managed connections, or more widely. We will discuss these more in section 7.

### Delivering content

You can either send a programme or other material directly to a broadcaster from a production company or post house, or to a specialist intermediary, such as Ericsson or Deluxe:

## WHEN AND WHERE IS CONNECTIVITY USED?

- The connection between a production company or post house and the broadcaster usually involves each side having their own connection to the internet or to a private network. The sender then sends the programme file to a media repository, or server, where it is picked up by the broadcaster or their service provider. Think of it like sending a letter: the receiver will tell you their postcode so you can address the letter to them. Your job is to connect to the nearest post box, and get the letter on its way. It then works its way through the postal system, and finally (because you knew the postcode) it is delivered to the recipient.
- If you are getting very close to transmission you may decide you need to send your programme 'down the line.' This in essence means playing your content from your side while it is being recorded by the receiver. You need to book special lines to do this. Some providers will now let you use their own private networks or, in some special cases, the internet to do this.

## Consuming Content

While this report is concerned more with connectivity to the point of delivery to the broadcaster, it may be helpful to understand some of the terminology used for connectivity in distribution to the audience. Most of us still watch television using an aerial or satellite dish, but increasingly content is being provided over the internet.

- OTT, which means Over The Top, describes how services such as Netflix, All4 and iPlayer allow customers to either stream or download content over the internet to watch on various devices.

## WHEN AND WHERE IS CONNECTIVITY USED?

- Social Media platforms such as Facebook, Snapchat, Twitter and YouTube now carry significant video content. It is worth reflecting that as a media company it is very likely your staff will need to access these platforms – as well perhaps as the OTT services – as part of their job. This can make a significant demand on your internet connection. It may be enough in itself for you to consider upgrading your service. Ask yourself this: do your staff have a better experience accessing content at home compared to work? If so then do you really think your connectivity at work is adequate?

# What connectivity do I need?

It's important to focus on selecting the 'right' connectivity, rather than the 'best' connectivity.

The transmission of large files can take an incredibly long time if you don't have the right connectivity. And that perhaps is the biggest factor for the TV industry. Our industry works with large files and large volumes. It doesn't matter if you are a big or small company, a one-hour high definition documentary is going to be the same size. And if you have a deadline to meet then you will still need enough connectivity of the right capacity to ensure your file arrives at the right time.

We all know from personal experience how frustrating it can be at home when you are waiting for a video to download, or when a file you are sending is taking forever. Consider what that frustration is really all about. Was it down to the **urgency** of needing to send the file? Was it the **importance** of the video you needed to watch? Or was it because it was just **inconvenient** to wait for the file to send before you could move onto something else?

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If you have a gold-plated connectivity service (super fast dedicated network) you are not going to have to worry about the video downloading, or having to wait for the file to upload; but it will cost you money. What you get will be so great that you'll probably become very reliant upon it. So you will also find yourself paying extra to have a backup in case your connection goes down. But if all that is unaffordable then you will have to think about your choices.

If most of your connectivity needs are for normal office activity (email, document sharing) then that's not too different from your home activity (downloading and streaming videos and sharing documents), and you may find that a high-speed consumer or business broadband connection is fine.

However when you want to send your programme to a broadcaster for transmission, then it is likely to be both important and urgent – and suddenly you require a level of performance you don't need for 99% of the time. You must ask yourself the question: is this urgent need frequent enough to warrant the investment in the connectivity needed to guarantee delivery to the broadcaster, or is it so infrequent that you could look to outsource it as a function (to a post production facility for example)?

In summary, the connectivity you need isn't just about a fast connection and more about an appropriate connection. You will need to consider if your connectivity needs to serve the average (i.e. your day-to-day normal use) or the peak demand – those occasions when you need to send important, big files that have to arrive in a guaranteed fashion.

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# What can affect my connectivity?

Guaranteeing connectivity performance is very difficult.

There are lots of factors that can affect the transfer of large files. This can make it very difficult to generalise about how long it will take to transfer a file of a certain size or video of a certain length. That won't stop you asking though! So the table below shows how long it would take, in theory, to transfer some typical types of content if you had a rather so-so connection of 10 Mbit/second and nothing else got in the way.

File Size	Upload Data Rate	Time it will take
A typical Word document is about 1MB (Megabyte)	10 Mbit/s	Just under 1 second
A 10 slide PowerPoint with images is about 5 MB	10 Mbit/s	4 seconds
A one minute iPhone MPEG 4 movie is about 10 MB	10 Mbit/s	8 seconds

## WHAT CAN AFFECT MY CONNECTIVITY?

File Size	Upload Data Rate	Time it will take
A one-hour AVCi 100 HD Video is approximately 60 GB (Gigabyte)	10 Mbit/s	13 hours
If the video was 10 GB	10 Mbit/s	Over 2 hours
If the video was 30 GB	10 Mbit/s	About 6.5 hours

But in reality there are many factors that could get in the way, and slow down the rate of transfer. Understanding the difference between them, and how they are all interlinked will make your connectivity experience a thing of beauty or a living hell.

### **Bits, Bytes, Speed, Data Rates, Capacity and Bandwidth**

Often when we refer to speed, we really mean we want to know how long something will take – the time impact. At home that might mean the time it takes to download music or a movie. And when it comes to our businesses it probably means how long it will take to send some rushes, an edit or a final programme.

The answer, surprise surprise, is complicated.

The speed with which data can be transmitted from one device to another is known as the data rate, and it's measured in bits per second. Bits per second is the flow rate – like the blood flowing through your arteries.

## WHAT CAN AFFECT MY CONNECTIVITY?

But just how much blood can those arteries take? This is the bandwidth, or capacity. If you have bigger arteries then more blood can flow through in every second. If your arteries are clogged then the rate at which blood can flow will slow down – or to put it another way, it will take longer for the same amount of blood to flow through.

If you have a 10 Mbyte file and a 10 Mbits per second capacity then in roughly 10 seconds you can transfer the file, all other things being equal. Or if you have a 1Gbit per second connection and a 100 Mbyte file then in roughly one second you can transfer the file.

Is that a hard and fast rule? Well no. The table listed 8 seconds as the theoretical time it would take to transfer a 10 Mbyte file. The reason is that file sizes don't equate easily with data rate. File sizes are referred to in bytes; and there are 8 bits to a byte. So the maths conversion isn't that easy – and it's why lots of people round it up to about 10, as we have done in the example above.

## Asymmetry and Symmetry

You may have seen the term ADSL. It stands for Asymmetric Digital Subscriber Line. The clue is in the name. Most broadband connections (whether consumer or business) are known as 'asymmetric'. That means that the data transfer rate is different depending on whether you are uploading (sending) or downloading (receiving). Typically the data rate is greater for downloading than uploading. When you're at home and wanting to watch movies or TV programmes over the internet then that's what suits your need.

However for our business it's the upload data rate that is at least as important as the download speed. In TV production we care a lot about uploading files, so having connectivity from a provider that is skewed in

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favour of downloading doesn't help us. In reality of course, if we send large files then we probably receive them too. So what we really need is a high capacity symmetric connection.

This need for symmetric connection is normal for the world of television and it immediately pushes us into the world of specialist services.

### Contention

On your street there might be ten other houses that also have a broadband connection with the same supplier. These are your 'contenders'. As your supplier will be sharing capacity for your street between those ten houses your contention ratio is 10:1. However it's important to note that your supplier is also servicing lots of other streets, so when you add them all up the drain on the supplier's capacity becomes significant.

Within each of the stages of getting a file from A to B there may be contention, which could affect the performance and quality of your experience. Sometimes providers will tell you that your connection is uncontended - meaning that no one else outside your business can use it. It's far more likely they will tell you your connection is contended and the contention ratio is 10:1, 50:1, 100:1 or something similar. What this means is that if no one else is using the connection then you have the full benefits of the capacity you have bought. However up to 10, 50 or 100 others could join and start using the provider's capacity. In contention, the lower the ratio the better.

But it turns out that even contention can be asymmetric! You should find out if the contention is the same for upload and download or different. It may be that your contention ratio for download is 100:1, but for upload its 2:1. If all you ever need to do is upload then that's a really good option.

## WHAT CAN AFFECT MY CONNECTIVITY?

### Congestion

Congestion is easily confused with contention. And they are linked. Ever noticed that at certain really big news moments your home broadband connection slows down? That's because everyone is trying to access data at the same time.

Contention is rather like the fact that everyone in your street has a car and has as much right to use the road as you. Congestion is what happens when all those cars try to leave the street at rush hour: you'll probably have a wait at the top of the street.

Similarly with connectivity: if you want to send the file at a time when there is a peak of activity then your file will join the overall congestion being experienced. This is more difficult to protect against on a public internet connection.

### Concurrency

It's rare that you only ever want to send one file. More common of course is the situation where you are sending and receiving multiple files at the same time. The capacity from your provider is finite and so it becomes important to understand that when you send and receive multiple files they are all subject to the total capacity you have. One option is to have such high capacity overall that the combined data rates for the multiple files you are sending are accommodated. This might be an expensive proposition however. That's why you should consider how you manage the prioritisation of your content.

### The Other Side

Finally, it's important to realise that it's not just about your connectivity but also that of the person at the receiving end. So maybe you have a 1Gbit per

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second capacity and a 100 Mbyte file to send. No problem – except if the receiver only has a tiny capacity. It will be like trying to pour gallons of liquid through a funnel the width of a straw: it ain't going to be quick.

The good news is that if you are sending a large file to a professional broadcast operation such as a post house, service provider or broadcaster they are likely to have capacity greater than you. It's when you share material with production companies or freelance craft people that you may have problems.

In short, the capacity you are offered by a provider is almost never what you will get in real life, and it will almost certainly be affected by some of the factors we have just explained. Your capacity is to the provider's own network. Then your content is thrown into the mix with everyone else's (into the provider's overall capacity). After that, you also have to consider the capacity of the person you are sending the file to.

If you have bought a managed connectivity solution the provider may tell you they can guarantee you will receive the capacity that you have been quoted – this is a good position to be in, but make sure it's really true!

# Managed or unmanaged?

If you're handling media it is very likely that you'll need managed connectivity.

We've been saying rather a lot about managed and unmanaged connectivity. So it's worth focusing on them for a moment because understanding the difference will explain why we think managed connectivity is so important for our industry.

Your home connection to the internet via broadband provided by BT, Sky, TalkTalk or any one of numerous other internet service providers (ISPs) is known as an 'unmanaged' service. The ISP acts as a gatekeeper who enables you to join the internet. They may be able to 'manage' the traffic from you and all their other customers but once you are connected to the broader internet they have very little control of your traffic amongst all the other internet traffic. As the internet is a combination of many networks it can be nearly impossible to get an ISP to fix an issue you might be facing when they don't have any influence on other parts of the wider network.

Some companies, from the giant ISPs like BT to specialist providers like Sohonet, Colt, Venus, Level 3, Interoute and KCom can offer a managed network in which they actively control all the traffic flowing over the network.

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In effect they can set up a bus lane just for you, to ensure your data gets a guaranteed route across their network. The quality of the service they provide you can be further tailored to suit your needs, and can help mitigate many of the factors described in the last section.

This will cost you more than a regular consumer connection of course.

If your company doesn't handle any broadcast quality audiovisual material in its work then a managed network provider is probably overkill. But if you do, then, to put it simply, you either need to outsource that activity to a company that does subscribe to such a network – or you need to subscribe to one yourself. If you are involved in crafting content for broadcast, that means you are crafting data; and that data could hardly be more precious to you. Why wouldn't you take the best care of it?

### Connectivity optimisation tools

It's easy to get confused between managed network providers (like Sohonet and Colt) and connectivity optimisation tools (like Signiant and Aspera) since both are there to make your connectivity work better. And just to confuse things further it's also true to say that some providers can help you do both!

Think of it like this: The managed network providers give you your own bus lane. The optimisation tools don't do that – but they do help you weave through the traffic. It's the equivalent of having all the red lights being turned green just for you.

Optimisation tools have lots of features, but we will focus on just a few. The first is they try and get a sense of the network in the way your satnav tries to get a sense of the road network to understand your best route. Secondly

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they use techniques to speed up the transfer of your content, and help you manage sending and receiving multiple files. The detail of how they do this isn't really important, but suffice it to say they have recognised that the IP networks weren't designed to handle the fast transfer of large video files so they have looked at ways to optimise it. Thirdly, they can confirm that your file has arrived at its destination, and can provide you with analysis of how many files are being sent and received.

So these optimisation tools can help speed up and manage the transfer of files over unmanaged networks. To a certain extent, they can speed things up over managed networks too: the level of impact will depend on how good a managed connectivity provider is at optimising traffic on their own network.

It's worth remembering that even with these extra tools, your provider may have a pecking order and you might not be at the top of it. In the road example even if all the lights are turned green for you, you will still have to defer to the emergency services as they have priority over you!

# Is it safe?

Data privacy and security should be a consideration for anyone transferring media from A to B. The best way to understand your risks is to classify your data.

Before we get to classification, there are several things to consider before casting your precious data – whether it's video, audio, documents, email or any other kind – out onto the internet.

Value	What would the impact be if you lost the media or if the media was made available without your consent? Would your reputation or bottom line be affected if someone stole a script from your current drama commission? What would happen if a rough cut was released ahead of a TX date?
Privacy	Is your data protected? Is your data encrypted? Could it be hacked or stolen? Has your service provider agreed not to make anything you send through them (or stored with them) public without your consent?
Security	Has anti-virus software been deployed? Has intrusion detection on the network been enabled? Does your provider have firewalls? How would they cope with a 'denial of service' attack?

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**Copyright**

Who owns the content you upload? Could your media be used without your consent? Some online providers offer really cheap services but in the small print they state that because you store or send through them, they retain some rights to your content!

**Reliability**

Will the service and the account always be available? Could they be cancelled without your consent? Do they have backups in place if the main connection fails?

**Legislation**

Could your data be subject to any legislation – particularly in other countries? The best-known example of this is America's Patriot Act, which gives the U.S. government the right to intercept or seize any data held by American companies or on American soil if they deem it necessary in protecting national security. This is the reason many UK companies insist that even if their data is stored in the cloud, it's a British cloud.

The first thing you might want to do in addressing these issues (or even finding out more about what they mean) is to talk with your fellow DPP members – perhaps via our LinkedIn group. They may have experience to help you. After that you should do the following:

Classify your data – There are many examples of different classification methods. A simple set of categories might be:

- Is my data/file highly confidential
- Is the impact of losing it critical
- Is it ok for it to be public?

## IS IT SAFE?

Or you may choose to classify your data using this CIA method:

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**Confidentiality** How will you ensure a high profile programme isn't leaked?

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**Integrity** How will you ensure your high profile programme isn't altered and published without your permission?

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**Availability** How will you ensure that you can send your programme when you need to?

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Once you have a classification that is appropriate for you, you can then decide if you need to set restrictions or permissions for who has access to the file, and over which type of connectivity it can be sent. In spy movies they always ask if it's a secure line. Well, does your file need to be sent over a secure line? In which case you probably need to send it via a managed network provider; or you need to encrypt the file; or maybe set up a virtual private tunnel over the internet. We don't intend to go into detail here on what these all mean, but it's worth noting that if you use the internet then the level of risk to your content is higher.

Finally, put backups in place - if your file is lost or stolen make sure you have backup copies, and make sure you also have a backup way of delivering the file.

# Will it break?

Make sure you have a plan for when your connectivity fails – develop the plan together with your provider.

When things do go wrong it's usually because:

- You've got the wrong kind of service or made the wrong provision: your capacity just isn't enough for what you want to do. Perhaps your production team is trying to send a day's worth of rushes via unreliable wifi from a B&B in the mountains.
- There is a fault – a piece of equipment somewhere has broken or has stopped behaving properly. But do you know how to find out what's happened, and how it's going to get fixed?
- There is a disaster – a JCB has just dug up the fibre that supplies your connection. But do you have an alternative?

The first of these problems would be of your own making, but by now you'll already have thought about how to ensure you have the right connectivity to meet your needs. The second and third are all about resilience: how do you ensure you are protected from a problem not of your making?

Resilience boils down to understanding what level of service you need to maintain in the face of faults or challenges.

## WILL IT BREAK?

If your connection fails but there is no reputational or financial risk to your organisation, then you can wait to have the service fixed. You don't need any kind of backup. But just imagine if the fault lasts for hours or days. Even if you are only performing office functions and not moving large media files, it is hard to imagine your business wouldn't be impacted.

You may decide that you need two connections so that if one fails then the other is there as a backup. You may then want to think about making sure these two connections are from different providers so that if one provider has a problem then it doesn't affect both connections.

You might also consider that if someone was to dig up the street right in front of your office then you might want a connection that quite literally takes another route out of the building.

These are all things that you can achieve: you have more control over the resilience of your connection than you might expect. As always, of course, it will cost you more money.

In addition to the measures you can put in place yourself, you can talk with your provider about what resilience they have within their connectivity provision and network. How long do they say it will take to fix a fault? Can they re-route your traffic if there is an issue? Will they cover any financial impact of a fault? What if they are themselves dependent on others for connectivity – will they cover an issue if it's with someone else's network?

It's the sheer complexity of connectivity that perhaps poses the biggest threat to continuity of your service. It used to be the case that the Royal Mail was the one and only provider of postal services. It owned and operated all the

## WILL IT BREAK?

collection, management, distribution network and post offices. But now it is no longer the sole provider: it's a lynch pin among a numbers of providers, who may intervene at different points in the journey of your package - without you even knowing it. Connectivity is very similar. Even if you use a major provider like BT or Arqiva they may be the lynch pins in your connectivity, but they are supplemented by lots of other providers in getting data from A to Z.

Understanding how your content moves between all these providers is nearly impossible. But you can make sure you know where responsibility lies, and what the remedy will be if something goes wrong.

So what are the key questions you need to ask?

- Do I know who is providing my connectivity? Is it one company or a number of companies?
- Do I know how much I am paying for it? Am I paying for an always-on connection or ad-hoc. Are there limits on what I can do?
- What happens if my main connection fails? Is there a backup connection? Has it been tested?
- Do I have a single point of contact and ownership? Or am I the broker between a number of providers? When they all point the finger at each other for something going wrong will I be left to pick up the pieces? In my service level agreements and operational level agreement what is the recovery time that has been stated to recover from a fault? What is my provider's approach to support overall?
- Is there a person, team, or department that is responsible for connectivity in my organisation? Do I know who they are, when they work, and what they can do?

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- What performance have I been promised? Are my providers guaranteeing capacity and bandwidth? Is it contended or uncontended? Or am I subject to the demands lots of others might be placing on the connectivity.

Before you become overwhelmed by your sense of responsibility for something over which you have so little control, *do remember that your service providers are just as concerned as you that their service doesn't go down*. After all, connectivity may be part of your business – but it **is** their business. And they are experts in it. So you don't need to know how they'll ensure continuity of your service – just that they can give you assurance your service will survive any faults that may occur elsewhere in their or anyone else's network.

# *How should I plan for the future?*

Your dependence on connectivity is only going to increase - ensure the plan you have can change as your needs change.

The pace of change in network technology is so fast that anticipating business needs in the future is increasingly difficult. However, there are a few trends that our research suggests will shape connectivity in years to come.

- There will be a convergence in using IP based technologies among different industries (financial services, media, utilities) for more of what they do. IP will act as the ultimate backbone for all our industries.
- There will be growth in 'ubiquitous computing' – the cost of processing will decrease and the availability of computing as a service will increase. You will need fewer servers at your own office than you do today to do things like transcode or edit. Instead these will be offered as a service to which you can subscribe.

## HOW SHOULD I PLAN FOR THE FUTURE?

- There will be an increase in true cloud-based services, with little in-house technology to duplicate or support the service. And if your content is (securely) held in the cloud, then the connectivity to your office will become even more important.
- There will be significant growth in home broadband capacity.
- There will be an increase in use of mobile connectivity - LTE (4G and later 5G) services.

All these developments suggest that over the next two to five years connectivity capacity will significantly increase.

Does that mean you should hold tight until even home broadband is good enough? Well no. As the capacity and coverage increases so will the demand. Even without developments such as Ultra High Definition video we will still see massive increases in traffic over the internet. The stakes will actually get even higher: more data fighting to get across busy networks full of other big data.

This means that managed connectivity providers are likely to be increasingly useful. Organisations will need to judge carefully where and what type of connectivity is most appropriate for their needs; and when it's better to invest in internal capability or to outsource to specialists.

We'll leave you with this final thought: If you have been trying to 'make do', now is the moment to stop. Stop thinking about making do, and start thinking about how dependence on connectivity will fit into your business model. It's hard to imagine a business in our industry that isn't going to need very fast, very secure and very reliable connectivity within the next couple of years.

To go back to the analogy we began with, now is the time to get fit.

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