

POST-PANDEMIC ADOPTION OF CLOUD-HOSTED ENVIRONMENTS FOR VIDEO EDITING & TV PRODUCTION DURING A MINI (AND, IMPORTANTLY, MORE SUSTAINABLE) 'INDUSTRIAL REVOLUTION'.

T.Guilder¹, J.Barling² & J.Newcombe³

^{1&2} ITV Studios and ³Microsoft

ABSTRACT

For ITV, there were **four key goals** that drove us to investigate and try to harness the opportunities of the Cloud. The **first** goal was to explore the potential of a secure, virtual space for production teams to create, collaborate and have the ability to scale their resources & toolbox up (or indeed down) at speed. The **second** goal, was finding new ways to reduce hardware and office space costs, (as well as exposing the total cost of editorial, storage and the often-invisible wrap-around of Engineering support). The **third** was to continue to keep up with the latest versions of software and answer previously unanswerable Disaster Recovery requests without the need for CAPEX justification and investment. Lastly, the **fourth**, but by no means any less important goal, was that we wanted to turbo-charged the drive towards a more sustainable, environmentally-friendly production environment for our Creative Teams.

Our finished output was 10 x 45min shows and, ultimately, a valuable discovery was that creating television remotely and inside a Virtual, Cloud-based environment is viable (it actually works!). As a healthy bi-product, it is also much 'greener' when compared to more traditional, 'on-prem' ways of working - saving 40 metric tonnes of CO2 or, to put in context, Greenhouse gases of 9 vehicles for an entire year or CO2 emissions from 5 homes for a year, per virtual edit suite!

INTRODUCTION

By the end of March 2020, we had adopted a wide range of software, techniques and various 'creative' mechanisms to enable our teams to continue editing the live shows, through remotely accessing systems in a now very quiet West London office base. By April, around 75% of our editing was achieved by people working offsite – which was very much unprecedented. We all worked together as a team to keep the shows on-air, sending out video tutorials and extra hardware (monitors, keyboards, long ethernet cables etc) to help turn our colleague's homes (actual example in Fig 1 below) into satellites of remote edit suites.



Fig 1

However, as time went on, the global pandemic created a catalyst for more *permanent* change and new trends started to emerge. There was a new appetite for experimentation and increased demand for technology-based solutions to problems. The notion of making do or 'getting-by' was now replaced by phrases such as 'Sustainable New Normal' and 'working from home' was now a necessity as opposed to a rare privilege.

One shift was that the technology teams suddenly had a more prominent seat at the table and a new-found voice (as opposed to the historical main visibility largely being when 'things went wrong'). Around the same time, the *DPP* called many members (most of whom are industry leaders & their suppliers) to contribute to a white paper on the Cloud and its use in Broadcast Media. This started with a discussion and concluded in a 60+ page write up with some powerful quotes to reaffirm that our industry really was changing as a direct result of lessons learnt during *Lockdown 1.0*.

'The Cloud for Media' researched and authored by Rowan de Pomerai in early 2020 was a particular source for re-affirming what we were already witnessing in our own areas with quotes such as "COVID has increased the sense of urgency among media companies to work in the cloud" and it also cited research estimating that '49% of the world's data will reside in public cloud environments by 2025'.

Around the same time our Senior Leadership Team were actively encouraging us to run trials and prove the concept of Editing in the Cloud. To de-risk the trial, one of our extra, pre-recorded commissions (a cookery show called *'John & Lisa's Weekend Kitchen'*) was selected to test out the new production environment in the Cloud.

It cannot be stressed enough that nothing like this was available 'off the shelf', so we decided to collaborate with both internal Cyber and Enterprise Common Platform Teams *and* external resources (including 3rd Party suppliers *Microsoft, Accenture, AVID, Telestream and Support Partners*) to build something for a very specific use-case. Around approximately 10 months later the setup was built, tested, users on-boarded and we were ready to create some TX content, fully in the Cloud.

DESIGN & TESTING

The first step was to provide a rough sketch of what the 'dream scenario' would be and build something as close to it as possible (below in 'Fig 2'). This took the form of looking at systems and workflows that currently existed on-prem and replicating them in the Cloud. Since 2007, we had installed on-prem setups of this type within ITV, with huge levels of resilience inherently built-in, but we'd never been able to answer the question of what happens if we ever had to leave the building at short notice. This concept work could potentially provide a system that we could spin up and our Production Teams could access remotely from *anywhere*.

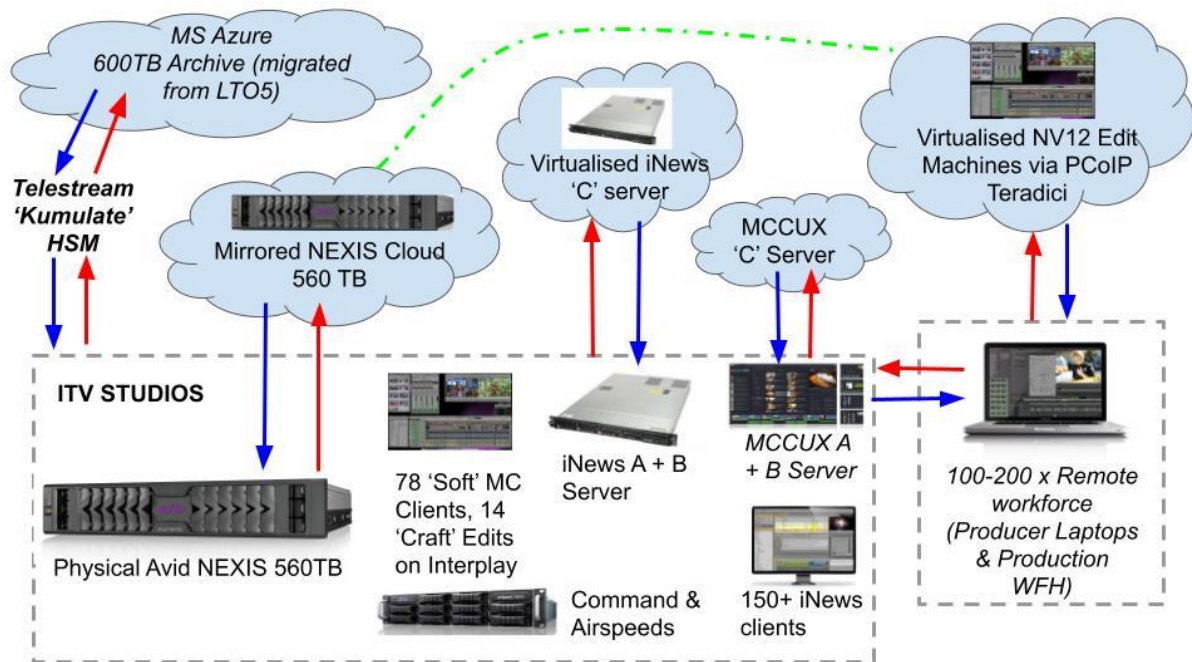


Fig 2

A business case was put forward to fund the project and subsequently approved. The business case for migration of some of Daytime's post production capacity to the Cloud was to make remote working sustainable for the longer term and free up significant amounts of office space. At the same time the use of a SaaS solution would mitigate CAPEX-funded investments and commitments on a routine 5-year cycle. The funding would be based on a subscription and an OPEX-based model.

Next step was to put together a project structure, comprising of key stakeholders, a project manager and engineers with disciplines in both Broadcast and/or I.T. We would initially meet with stakeholders on a fortnightly basis, increasing in frequency to every week nearer the end of the project. The ambition was to turn this around within 6 months, which was, with hindsight, over-ambitious given that this was not a 'well-trodden' path.

Fortunately, another area of our business was planning to build 2 x diverse ExpressRoute links into Azure for another use-case and we had already started to sync our Active Directory with Azure's for our user accounts to gain access. Working with our internal Enterprise Common Platform team and Support Partners, we were able to explain the

concept and start to sketch out the design. We quickly found that meetings and emails (all alongside our usual workload to maintain the business-as-usual was time-consuming and we needed a mechanism to help us progress much faster. Cue the Slack channel. By project close, the *daytime-cloud-project* Slack channel was just under 50 members strong, but it undoubtedly saved us many hours (and many additional meetings!).

HIGH LEVEL OVERVIEW

Core Infrastructure

- 1 x Standard B2s Teradici Security Gateway and Connection Manager
- 1 x Standard B2ms Leostream Broker
- 3 x Standard NV12s V3 Avid MediaComposer Workstations
- 1 x Standard DS11 v2 Avid Production Management Core
- 1 x Standard F8s v2 Avid Production Management Services
- 1 x Standard F8s v2 Avid MediaCentral Ingest •
- 1 x Standard D16s v3 Avid MediaCentral Cloud UX
- 1 x Standard DS4 v2 Avid NEXIS Online
- 1 x Premium Block Blob Storage account

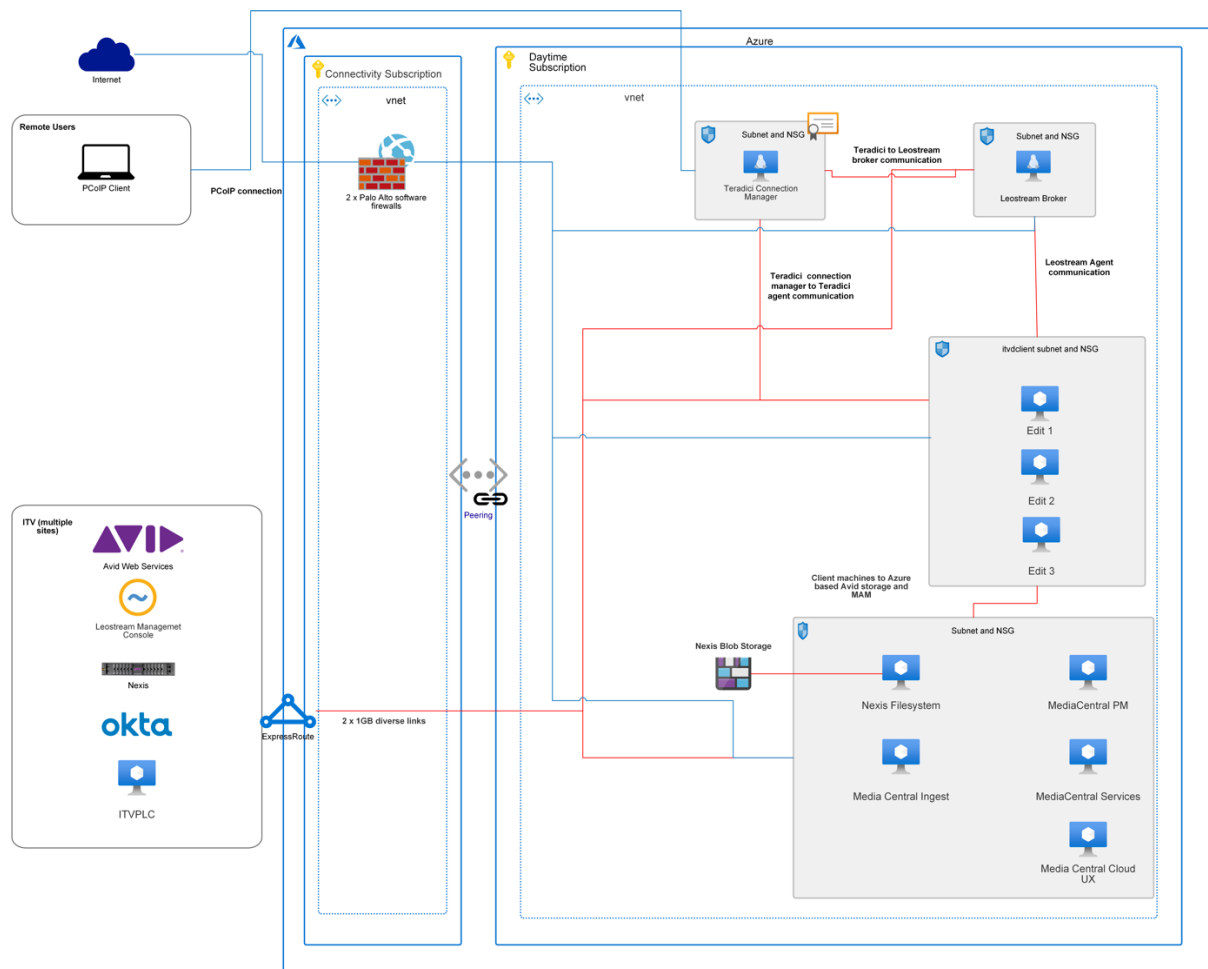
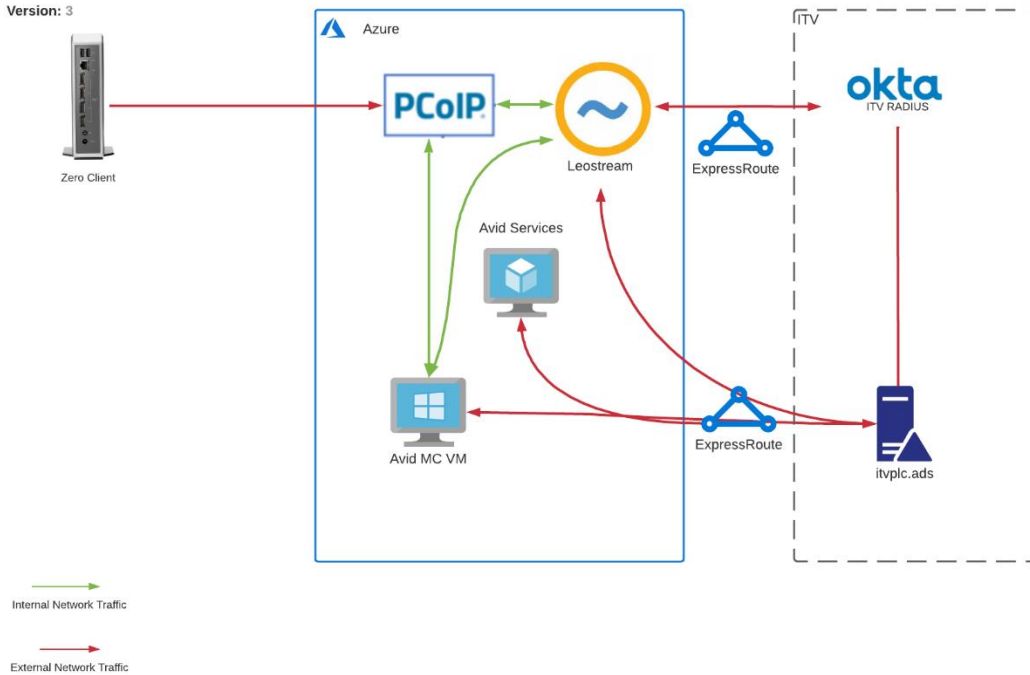


Fig 3

Description: ITV AVID AUTHENTICATION



Version: 3



4

Fig

BUILD & USER ACCEPTANCE TESTING (UAT)

Once we had a signed off design (as pictured above in fig 3 & 4) approved by our Enterprise Common Platform and Cyber teams, it was time to work on the build and get it ready for User Acceptance Testing or 'UAT'.

We ran several test sessions with our end-users – both operational and technical). The initial feedback from one of our Craft Editors was encouraging – *“it’s just like being in the suite”*. We had a focus on the first and last mile connectivity, ensuring that the 10ZiG v1206 device was cabled into their home Broadband router (fig 5) and that latency was kept to a minimum by deploying our environment in the UK South Azure data centre. Unsurprisingly, in many ways, this setup proved more performant than the 3-4-year-old PC hardware & network on-prem. There was also a certain level of appeal in being able to upgrade or downgrade the VM far quicker than we could order, ship and rack one and also being able to adapt and keep up with the latest software releases.



Fig 5

We also had considerations around making sure that Producer's needs were catered for. The notion of 'Over-the-Shoulder' working became an area of focus for our project (Producers traditionally being sat in the same room as the Craft Editor, collaborating on the creative process and literally being able to see the edit timeline over their shoulder). We gave our Producer a 10ZiG and Virtual Machine allocation to log into via Teradici PCOIP and rough-cut material themselves. We also had a separate VM for them to see a view of the Editor's timeline, live (with a sub 1-second latency). This continues to be an area that we are finessing and have ambition to plug in the capability for annotation tools and 2-way communications in order to get this as close to the true Producer/Editor collaborative experience without physically being in the same room.

'PEN TESTING'

Partly due to naivety (and partly due to our previous experience having been in building post-production systems on-prem using hardware – i.e storage, servers, switches, workstations etc – that were not Internet-facing). Security took the shape of an access card into the building and room. So, we were not familiar with the notion of 'pen testing'. Our Cyber security team steered us towards a 3rd-Party that could test how secure our environment was and flag any changes that should be applied. It was crucial to strike a compromise *between* making it secure (so that sensitive media & data could be kept safe) and not breaking or affecting the performance of the environment. OKTA was a key element for this part of the design as was Leostream which provided monitoring and tight control over the start-up/shutdown times of the VMs.

SERVICE REHEARSAL TESTING OR 'SRT'

Again, an acronym and practice that is widely adopted by other Corporate environments when rolling out I.T Systems, but not necessarily by Media/Broadcast areas. 'SRT' for us was linked to the over-the-shoulder solution – 'Secure Reliable Transport', but we were informed that it meant something completely different to our Common Platform team. It was basically a simulation of issues with our new environment (i.e the ExpressRoute

would be taken down), monitoring how Engineering teams reacted when a support call came in and then a post-match analysis into how the resolve could be improved next time. Fundamentally, this was a day of 'dry-run' testing, sitting across various channels (depending on whether you were the Red or Blue team) and then recording the outcome. This work was essential for getting any faults or misunderstandings amongst Support teams out of the way before the Production Team used the environment.

'GO-LIVE'

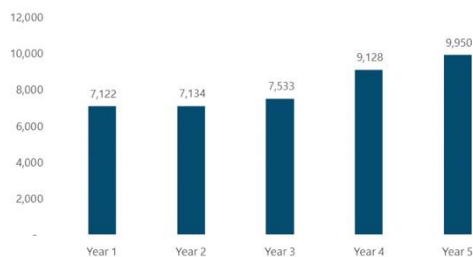
This step into the world of remote cloud editing required close co-operation between multiple teams and across diverse specialisms. It included contributions from Support Partners - an external supplier for project management of the design and build in Azure, and ongoing support; application providers Avid and Telestream; ITV Group Technology including teams covering platform architecture, networks, identity, devices, cyber security, and SIAM; Accenture for service transition and BAU support; as well as users and support staff from ITV Daytime, plus ITV Studios Technology for assistance with overall project management.

In summary, we were extremely proud to have been a part of this project team that delivered a completely ground up and innovative solution that challenged many traditions. This will only improve and progress with the use of better 'over-the-shoulder' tools and a dedicated internal cloud-platform support team. So, this is where we find ourselves today, evolving that solution and, importantly, trying to keep up that same amount of momentum and appetite for experimentation that we discovered back in March 2020.

Beyond the technology benefits, fundamentally, working in the Cloud is more environmentally friendly (fig 6) and looks set to assist us with our 2030 targets – it puts an end to that traditional routine cycle of buying a non-recyclable asset, powering it, cooling it and using it before disposing of it. Furthermore, with teams being able to work remotely, it means less travel by our individual members of staff and it is an enabler of an improved work/life balance.

ITV Carbon Footprint Reduction (KgCO₂e) per year

Reduction in ITV carbon footprint over 5 years by migrating from On-premise to Azure is 40,866 kg co₂e.



*Taking Server Growth Rate & Data Center Migration Plan into consideration



Fig 6

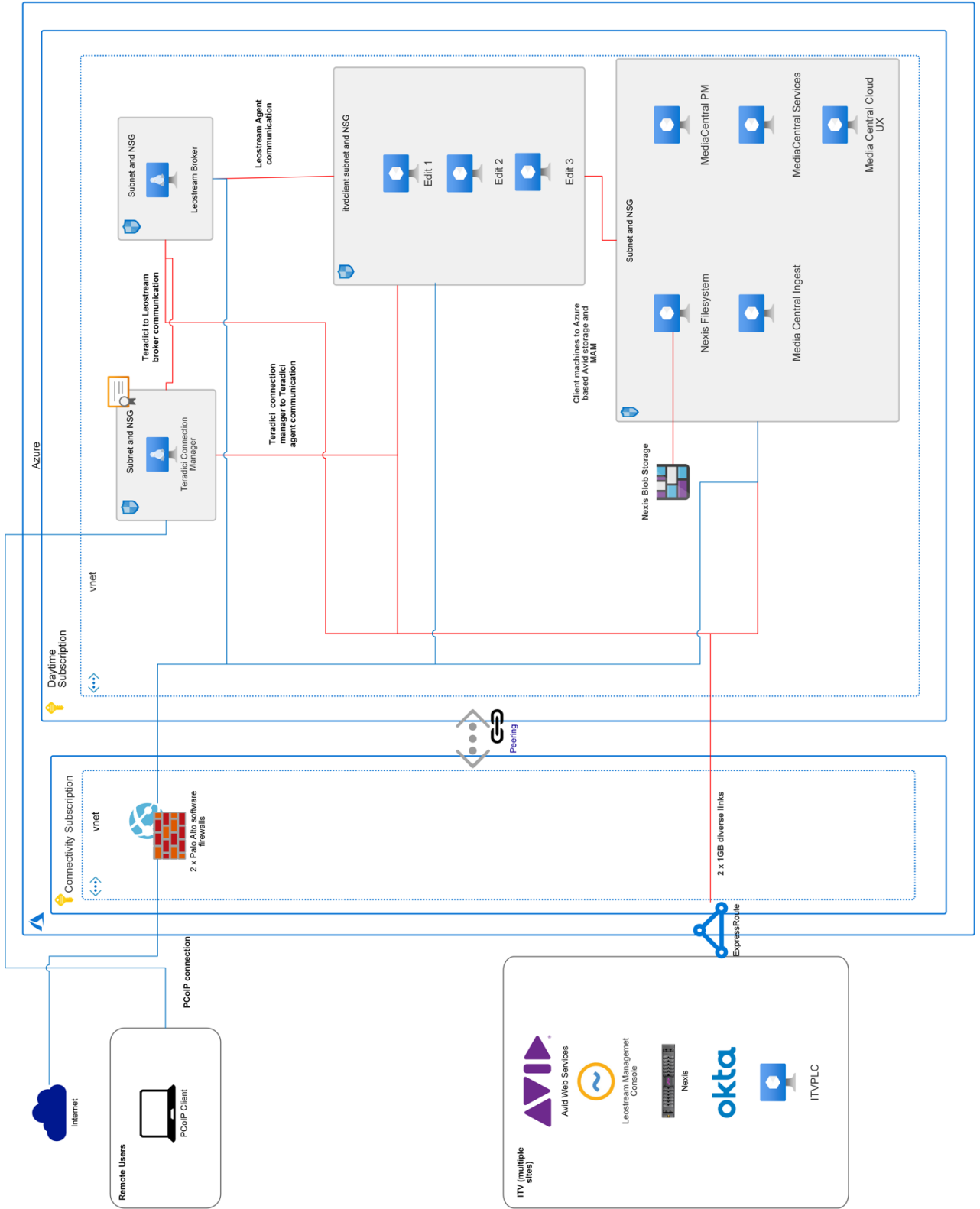
The project itself presented a wide range of challenges and required the use of some new technologies and techniques – often for the first time (each with their own sets of three letter acronyms!). It was a true journey into the unknown and good co-operation and communication between the internal and external teams was a trademark of this project throughout. The outcome was positive in that we have a viable, cloud-based system that has since been used for editing *John & Lisa's Weekend Kitchen*, with the first TX having successfully aired on 13 November 2021.

REFERENCES

- 1- *The Cloud for Media* was researched and authored by Rowan de Pomerai, CTO of the DPP, published August 2020

APPENDIX – ADDITIONAL DOCUMENTATION

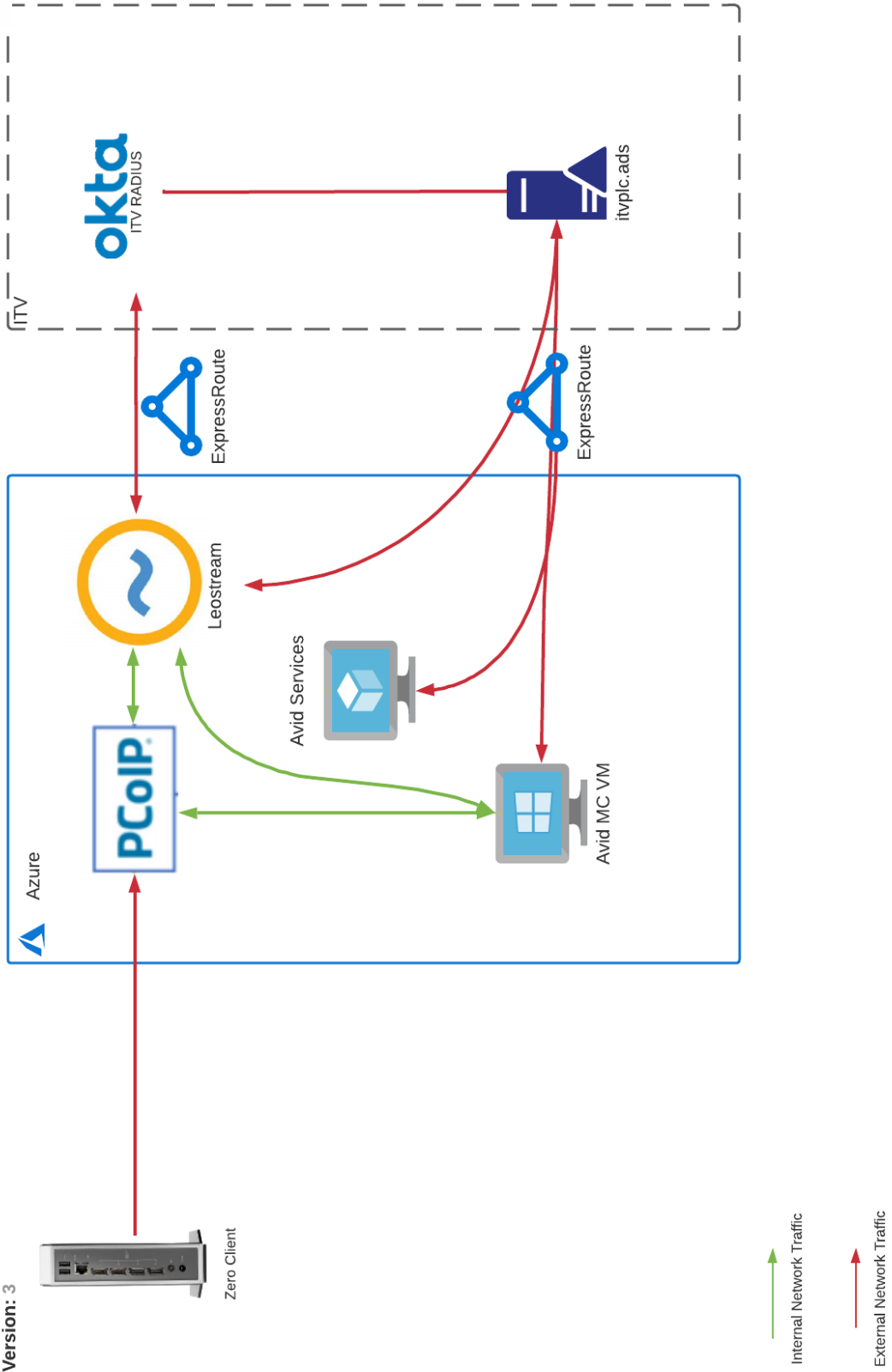
- 10ZiG <https://www.10zig.com/>
- Avid Media Central <https://www.avid.com/products/mediacentral>
- Avid Media Composer <https://www.avid.com/media-composer>
- Avid Nexis <https://www.avid.com/products/avid-nexis-cloudspaces>
- Azure ExpressRoute <https://azure.microsoft.com/en-gb/services/expressroute/>
- Azure vNet <https://azure.microsoft.com/en-gb/services/virtual-network/>
- Azure Virtual Machines <https://azure.microsoft.com/en-gb/services/virtual-machines/>
- Azure Blob storage <https://azure.microsoft.com/en-gb/services/storage/blobs/>
- Leostream <https://www.leostream.com/solution/teradici-pcoip/>
- SRT <https://www.haivision.com/products/srt-secure-reliable-transport/>
- Support Partners <https://support-partners.com/>
- Telestream Kumulate <https://www.telestream.net/kumulate/overview.htm>
- Teradici Cloud Access Plus <https://teradici.com/solutions-services/cloud-access-plus>



(larger copy of fig 3)

Description: ITV AVID AUTHENTICATION

Version: 3



(larger copy of fig 4)