CONTENT & DIGITAL MEDIA INFRASTRUCTURE

From the brink to the edge: An overview of the current challenges, drivers and opportunities for Entertainment, Content and Media infrastructure.

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DATA CENTERS

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SOLUTION SNAPSHOT

This IMDC solution overview sets out the key drivers behind the rapid rollout of virtualized end-to-end media platforms, covering production, partnerships/supply chain opportunities and edge capabilities, and explains the critical role that colocation can play.

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INTRODUCTION

BACK FROM THE BRINK

Covid hit the media and entertainment industries hard. In 2020, there was a 71% decline in box-office revenue. Live music revenues plunged by 74%. Total global entertainment and media revenue fell an unprecedented 4% (US$81.0bn).

In the face of this potential crash, streaming platform growth provided hope. Total data consumption increased 30% during the year, sparking a new, higher forecast growth trend. OTT video, video games and internet advertising showed above-average rises. While VR was the fastest-growing segment and shows the shape of things to come, streaming services, social media and gaming remain the core income drivers. There has been little bounce back since then, with consumption remaining high as the pandemic becomes endemic.

These twin pressures have brought many media businesses to a digital crossroads. Despite drops in revenue, decisive investment is now taking place to maintain uptime and performance. Virtualization is a necessity rather than a nice-to-have.

Digital architectures that used to be adequate now hold businesses back. 'Pure-play' digital operators are in the driving seat and this is forcing mixed businesses to restructure. Outsourced structures are an advantage, as automation and remote management put the onus on providers to deliver new capacity and services and allow a clearer focus on the core business in challenging times. As Netflix has demonstrated, the earlier the move to a virtual environment, the more flexible, streamlined, and scalable the business model will be. But public cloud costs more and can mean ceding control, so careful planning is required to get the right mix of private to public.

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DRIVERS

COMMERCIAL

CAPITAL PRESSURES
Shift of equipment and other costs from Capex to Opex; pay-per-use processing aligning project costs to project revenue.

DEVELOP NEW CHANNELS & SERVICES
Increased drive to specialise and splice content; multiple channels; accelerate speed to market; related need to focus on core strengths.

EFFICIENCY
Cost efficiencies and content optimization; future-proof approach to technology & procurement.

SUSTAINABILITY
Tension between generating and monetizing content while minimizing environmental impact.

WORKFLOW REDESIGN
New workflows supporting distributed operation; removing geographical constraints on systems and teams.

GROWTH PLATFORMS
New IT systems and infrastructure have helped maintain business operations. This has driven the acquisition of new viewers and helped to protect the bottom line.

COMPLEXITY/STRATEGIC PARTNERSHIPS
Need for more and better strategic partnerships with suppliers to address the scale and complexity of operational challenges.

AUTOMATION/FACILITIES
Need for facility footprint review, remote communications, services and HR solutions driven by pandemic pressures

CONTENT SECURITY
With more content on public networks, security has a growing urgency and price tag (ransomware)

QUALITY OF EXPERIENCE/CUSTOMER RETENTION
Criticality of uptime and bandwidth; packet loss or delay can ruin the viewer experience

TECHNOLOGICAL

5G
Higher bandwidths, lower latency and the ability to run services at the network edge, with service level differentiation via network slicing.

ULTRA HD, HDR AND WCG
Hugely increased bandwidth and processing requirements and promoting media-centric processing (bringing resources to content rather than vice versa).

IP/SDN ORCHESTRATION
SDN combines with standards like SMPTE ST 2110 and AMWA NMOS to allow remote end to end live service management.

CLOUD/CONTAINERIZATION
Potential for on-demand scalability and provisioning to meet peak business demands; containerization enables resource orchestration.

MICROSERVICES
Discrete software services designed for cloud or on-premises infrastructure; includes ingest for incoming feeds, live mixing services, file-based services, transcoding, versioning for distribution; manageable via Service Mesh.

MEDIA FUNCTION VIRTUALIZATION (MFV)
MFV decouples software from hardware, replacing various media processing functions such as synchro-nisation, adaptation and mixing with cloud-based software which can be run on a private or public cloud or both.

AI/ML ANALYTICS
Automated media logging, framing, editing and user/activity analysis.

MULTI-PLATFORM PUBLISHING
All products need to be distributed/available on all platforms.

MIGRATING TO MFV

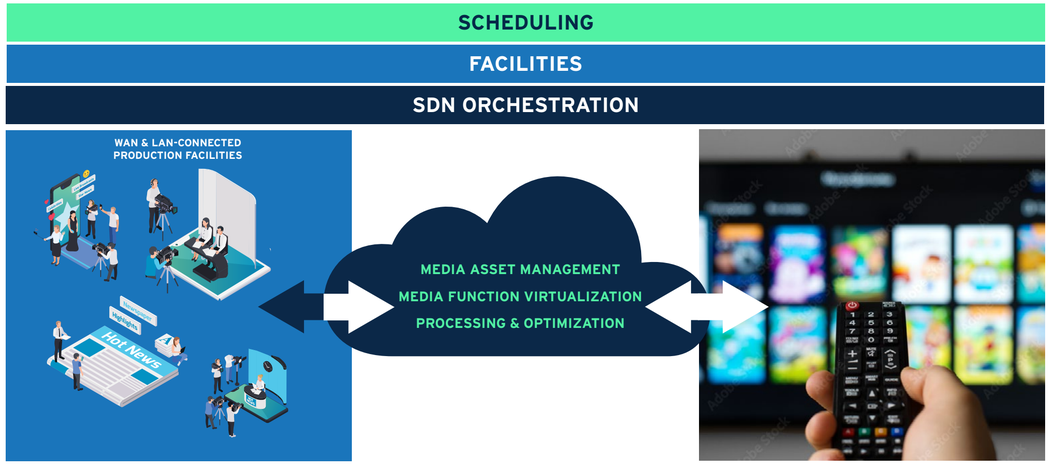
These commercial and technological forces are driving a wholesale shift from on-premises resources to colocated core, cloud, and edge networking. New technologies like containerization and process orchestration provide service portability and minimise the need to re-implement business processes to support different platforms. MFV is the key goal in the development of this IP/SDN-driven architecture

MOVING TO MFV

- First stage migration would involve creating independent Media Asset Management (MAM) facilities across multiple existing sites connected by WAN. The MAM software can then be redistributed to core colocation sites in a shared 'federal' operating model that is ready to extend.

- The next phase builds upon the centralization of the MAM, media storage and central processing and adds MFV. Physical hardware devices can then be replaced by software-based functions running both within the cloud and on commodity server hardware located in the shared core colocation data center site. This is then connected to network edge facilities running leaner edge-specific versions of the software.

This model enables the managed evolution of the MAM system to a point at which services for the management of ingest, workflow, storage and other functions are combined via an open API gateway with production tools from a range of technology suppliers. Content analytics and value-add functions like AI-based meta-tagging or automated highlights creation for live feeds can also be added in phases.



Virtualization decouples software from hardware by replacing various media processing functions such as synchronisation, adaptation and mixing with virtualized instances running as software. These run on colocated hardware with direct connects to public cloud infrastructure.

The MFV solution allows content producers, owners, broadcasters and aggregators to do more with less, creating an end-to-end workflow which enables them to reach a broader range of consumer devices with more content versions at higher speeds.

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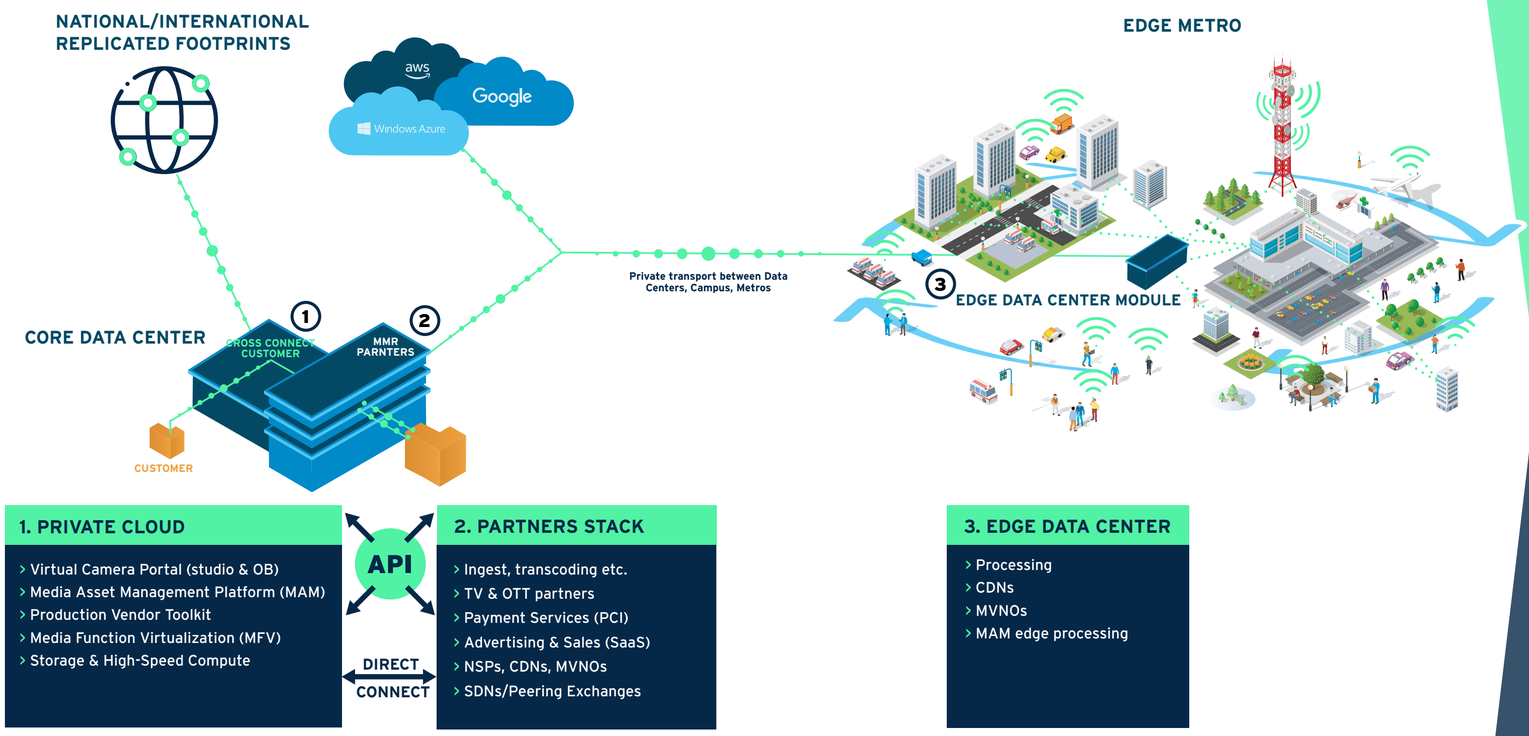
MULTITENANT MEDIA ASSET MANAGEMENT

MULTITENANT MAM

A multitenant cloud-neutral facility makes an effective and scalable core data center for the new architecture, enabling both operators and service providers to focus on services rather than physical security, operational efficiency or onboarding partners.

Ready-made ecosystems are critical for both core functionality and evolution. Regional, national and international IP and SDN connectivity, CDNs, MVNOs, TV, OTT, marketing, sales and payment partners create a low-cost core connectivity ecosystem with a range of specialist service providers and partners nearby. These can scale with the model as it evolves.

Linked edge colocation capability is also critical to QoE. HD streaming services in the cloud can interconnect with content delivery networks near the edge for caching and last-mile delivery and core MAM functions can customize it to device level.



KEY INFRASTRUCTURE CONSIDERATIONS

INFRASTRUCTURE

ECOSYSTEMS

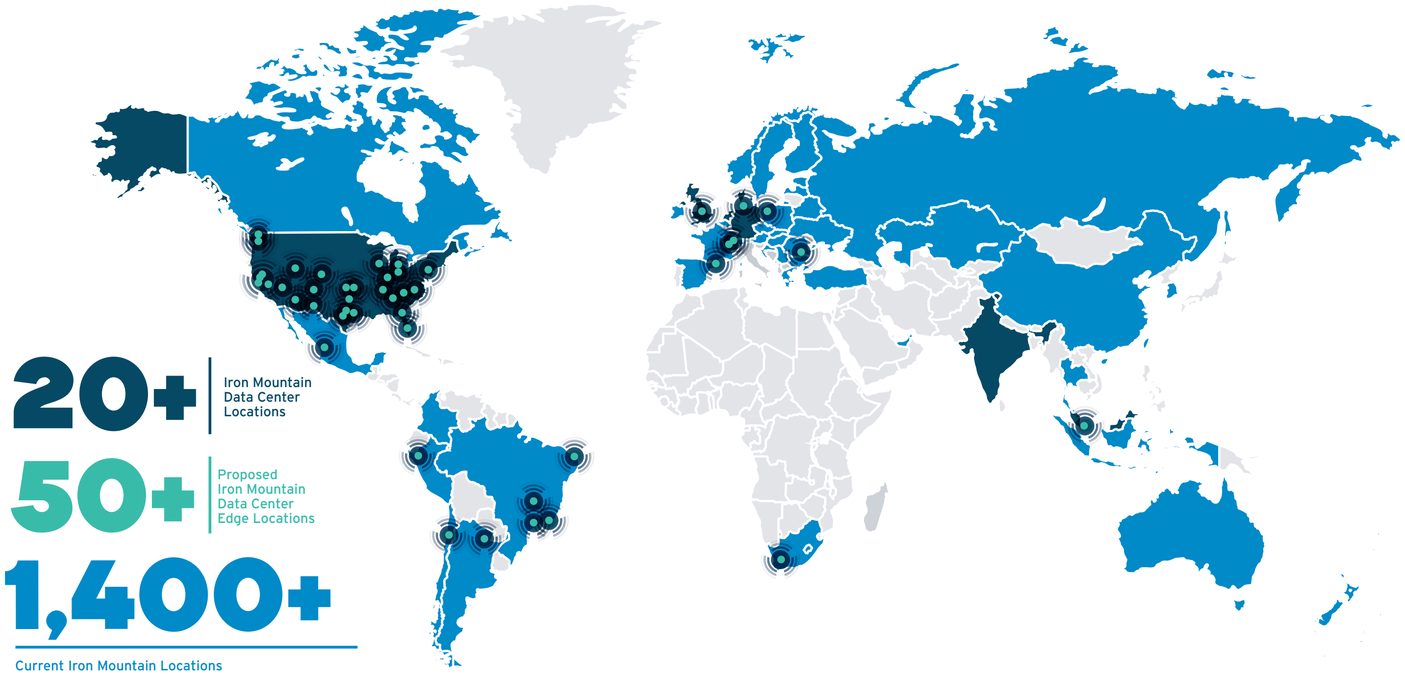
A growing set of directly connected supply chain partners is critical to an end-to-end MFV production and distribution model. Directly connecting to partners and providers within the same data center drives down latency and increases efficiency, cutting a huge amount off network costs and accelerating connections to new services. Global interconnections and direct cloud connects will support content transit and core workflows. A range of network, SDN, CDN and exchange services will make data costs more competitive. Also look for proximity to payment, advertising, sales and media partners.

At the Metro Edge critical ecosystems will also grow. While there may be an initial overriding need for speed for a specific application, in time most customers will use the edge as a new business hub, with full service provision, partner transactions and interconnectedness that in many cases does not touch the central cloud.

CORE TO CLOUD TO EDGE CAPABILITY

Core sites generate massive processing and multiple partnership capability and can direct-connect to both ecosystems and multiple public clouds, but as 5G rolls out more and more processing will take place beyond the cloud. The pressure to move closer to both point of production and consumers is even greater for AR or Ultra HD services, where virtual versioning and slicing on 5G will drive processing power to the edge. By 2025 Gartner predicts that enterprise-generated data that is created and processed outside a traditional centralized data center or cloud will rise from 10% to 75%.

A new internationally-distributed edge architecture will both process and deliver the next generation of digital media services. This will happen at scale. According to The Linux Foundation the global power footprint for infrastructure edge deployment will grow from 1 GW in 2019 to 40 GW by 2028.



INFRASTRUCTURE (CONT.)

Locations & Latency		
Latency (ms)	Data Center Type	Typical Applications
> 60	Core	Core compute and cloud apps, orchestration, backup
40-60	Network Edge	Consumer VR/AR, Hosted Desktops, Remote Data Processing
< 5	Metro Edge	Ultra HD and AR. IoT Gateways, Telecom NFV, Cloud Gaming, Cloudlets, AR
< 1	Outer Edge	5G processing, Industry 4.0 (drones, robots)

The edge is a moving target. The most useful metric for defining required locations and capacity is latency. These can be useful subdivided into four categories by application.

In addition to 20 core data centers in North America, EMEA and APAC, Iron Mountain owns 1400+ smaller facilities worldwide, all of which are used for secure media asset storage. 695 of these facilities are located close to city centers or airports in the sub-5ms zone – the Metro Edge. Spread across 50 countries, they provide a valuable source of potential Network Edge and Metro Edge locations for our customers.

To address this demand IMDC is rolling out a proprietary customizable modular solution based on extensive customer and use case research. For a straightforward deployment IMDC typically builds and deploys in 24 weeks, but warehousing components can shave time off this.

UPTIME, RESILIENCE, SECURITY

For core data centers, Tier 3 and above facilities with redundant and resilient infrastructure and failproof configuration are necessary. Comprehensive physical and data security layers guard your vital assets. Major clouds are a prime target for hackers with media, leisure and entertainment industries accounting for 32% of ransomware attacks. Iron Mountain works with all of the major content producers in Hollywood and major news networks and understands the processes for protection of high-value media assets.

For maximum physical security underground facilities offer even greater protection from intrusion and natural disasters. A good indicator of security at smaller edge facilities is whether the facility complies with US government SCIF (Sensitive Compartmented Information Facility) standards.

REACH & SCALABILITY

Provider capability in capacity and power planning must be up to providing timely space and operational support for core and partner servers and connections. For edge developments, expertise on the ground and access to space are critical in working with utilities, regulators, logistics, contractors and staff.

REMOTE SERVICES

By moving to a full-service colocation model which offers cross connects, builds and installs, smart hands and migration management via a web interface, operators can become more location independent without the need to travel to a physical building or location to perform many of their daily duties. Operators can also use virtualised control surfaces with distributed monitoring from satellite or home locations.

INFRASTRUCTURE (CONT.)

STANDARDS

A consistent global approach to standards will give the physical and operational support your asset management system needs. Look for ISO 27001, SSAE18 SOC 2 (Type II)/SOC 3*, PCI-DSS, ISO -50001. Region-specific certifications are also key; in North America, NIST SP 800-53*, FISMA HIGH, FedRAMP and HIPAA (Type I); OSPAR in Asia; ISO 450001 and 9001 in EMEA.

SUSTAINABILITY

As data levels rise, sustainability is critical to long-term value and should be integral to standards. For instance, last year IMDC became the only colocation provider to offer simultaneous, global ISO 50001 Energy Management and ISO 14001 Environmental Management certifications. These standards should be extended to cover the edge; both build and operations. Energy should be sourced or offset with renewable generation. Demand 100% renewables, providers should be able to offer this by now. And go a step further if possible. Look for carbon credits for your CSR reporting, energy load-matching and, if the site is suitable, renewable generation as close as possible to the point of use.

CONCLUSION

BUILDING THE EDGE

Many of the moves proposed here are common-sense ones which media organizations and their partners are already pursuing. Automating and virtualizing functions which traditionally took up real estate and human resources; cutting back on fixed connectivity costs; increasing scalability; switching to software rather than hardware-defined solutions; orchestrating content; building end-to-end services.

However, while these moves are important in the battle to maximize competitiveness in the face of change, they are more about defending market share and creating additional flexibility and room to manoeuvre than generating new revenue.

As the spectacular economic transformation of media production and delivery in the last decade has shown, the one area where new and defendable revenue positions can be gained is by being among the first to uncover new markets with new services.

Whatever shape these services take, a key to their commercial success will be rich ecosystems and effective edge infrastructure. At the edge there are new customers ready to consume both existing and new services. Creating a virtualized core model which is easy to replicate and roll out at new multitenant edge locations will generate a powerful competitive advantage for early movers.

EDGE COMPUTING IS USUALLY FRAMED AS IMPROVING WHAT IS ALREADY IN PLACE, BUT THE REALITY IS DIFFERENT: Even in areas with high internet penetration, bandwidth is often unpredictable, making the task of serving millions of users from cloud regions or zones with sub-second response times difficult to impossible, a major consideration for content owners and value chains.

MORE THAN	LESS THAN	MORE THAN
40%	**1/3**	**50%**
of the world's population has no reliable internet access	of internet users have high-speed broadband	of overall web traffic comes via mobile phones

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GET IN TOUCH

To discuss your plans and requirements please contact us on:

US: +1 833 476 2656
NL: +31 800 272 4433
UK: +44 844 417 8379
BE: +32 2 712 2020
datacenters@ironmountain.com

ABOUT

Iron Mountain Data Centers operates a global colocation platform that enables customers to build tailored, sustainable, carrier and cloud-neutral data solutions. As a proud part of Iron Mountain Inc., a world leader in the secure management of data and assets trusted by 95% of the Fortune 1000, we are uniquely positioned to protect, connect and activate high-value customer data. We lead the data center industry in highly regulated compliance, environmental sustainability, physical security and business continuity. We collaborate with our 2,000+ customers in order to build and support their long-term digital transformations within our 3.5M SF global footprint spanning 3 continents. For more information, visit www.ironmountain.com/data-centers

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