Data Centre Integration and Federation

A Foundation for Transformative Content Delivery

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Mobile apps, the Internet of Things (IoT), video streaming, online gaming, cloud options such as SaaS, IaaS and other content services depend on high-performance networks. As a result, the distribution of content—including blogs, music, videos, games, news, entertainment, e-commerce and corporate IT—is growing increasingly complex.

Overall, the market for content delivery services is expanding by an estimated 30 per cent per year. Providers vary nearly as much as the content they distribute. The organisations transporting content come in all shapes and sizes, from traditional media outlets including the New York Times and Gannett to video streaming services such as Netflix, to multinational online giants such as Facebook, Apple, Microsoft, Amazon and Google, serving consumers and enterprises alike.
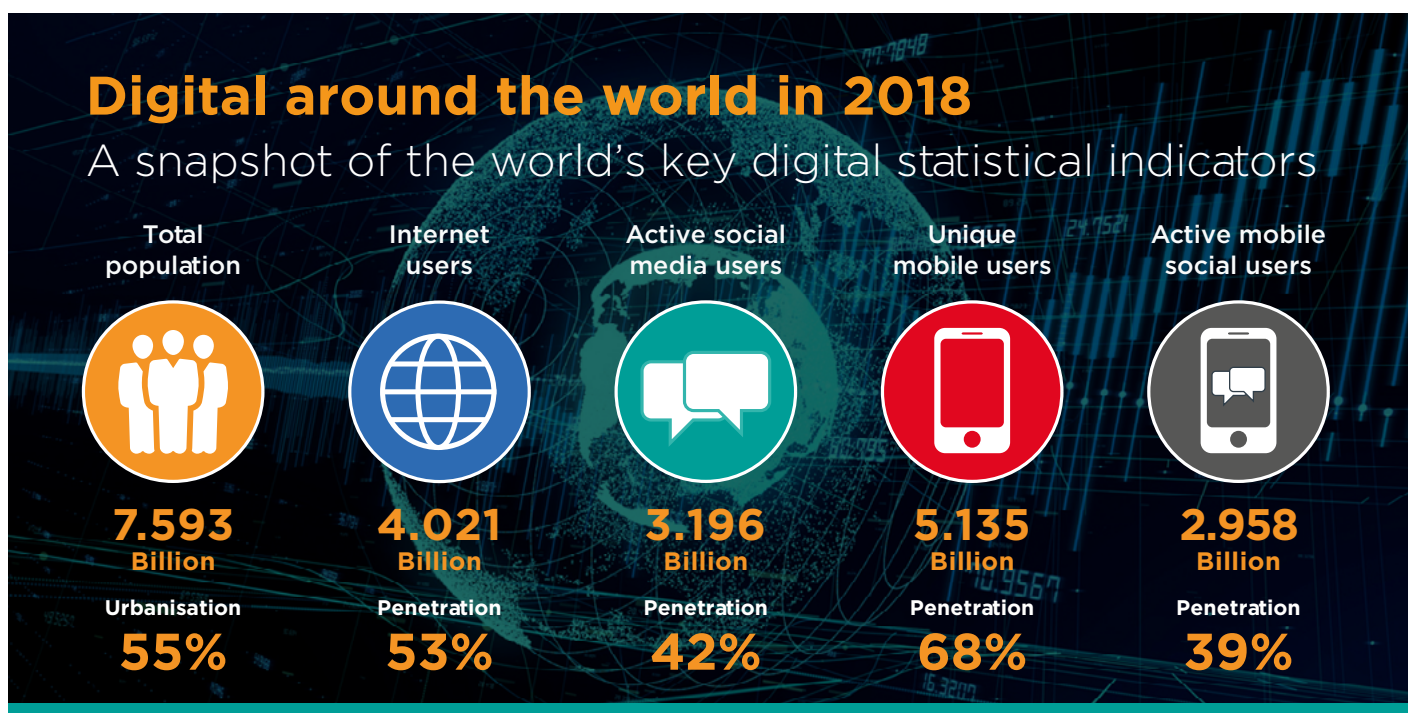
What these companies have in common is a desire to deliver new and innovative online content services. To keep up with skyrocketing global demand for social networks and information, including everything from mobile data to high definition video, content providers must scale and automate their operations as much as possible to keep costs low and performance high. Now, more than 65 per cent of adults use social networking sites—a nearly tenfold jump in the past decade, up from 7 per cent when the Pew Research

Centre began systematically tracking social media usage in 2005.

In the quest to deliver the best possible customer experience and differentiate from the competition, many providers are working to bring that content closer to consumers to enhance each user's experience with less delay and buffering and consistent access to high-quality video and other forms of content. As they work to deliver high quality content, remove network limitations and improve the quality of each user's experience, many are finding that agile, high-performance networks offer the best path forward.

As these businesses mature into 'viral' services, they must adapt to audience demands or risk having customers quickly abandon their offerings for other, higher performing alternatives. As a result, many content providers are working to build out data centre and WAN capabilities and expanding the use of 100G packet-optical networks.

Others rely on public network infrastructures. However, as classic internet infrastructures are consumed by online video, response times increase, leading to lost advertising revenue and abandoned viewership. By building network infrastructures, content providers regain control of the user experience.

Digital around the world in 2018
A snapshot of the world's key digital statistical indicators

Total population	Internet users	Active social media users	Unique mobile users	Active mobile social users
7.593 Billion	4.021 Billion	3.196 Billion	5.135 Billion	2.958 Billion
Urbanisation 55%	Penetration 53%	Penetration 42%	Penetration 68%	Penetration 39%

No matter which path they choose, these organisations need faster transaction processing capabilities, along with faster data transfer rates to keep up with audience demand for services that rely on the internet for news and entertainment. And while every provider has its own separate business model, scalability, cost and automation are of paramount importance for all.

Driving Data Centre Integration and Federation

Users will no longer stand for poor performance from online apps. But content providers, much like other service providers and network operators, still can face difficulties inherent to delivering dedicated bandwidth when their customers need it, including long lead times for network orders, static bandwidth and bandwidth contention issues. To keep pace with content demand, all providers must accelerate time to market.

One key driver behind growing content demand is the IoT. According to Statista.com, there were estimated to be 20.35 billion connected devices by 2017 – this figure is expected to touch 75.44 billion by 2025.[1] However, the potential significance of IoT does not necessarily lie in the sheer number of connected devices alone, but in the way we utilise the data these devices generate once they are connected. Ovum predicts that:

'The next few years will see rapid advances in the Internet of Things (IoT)...the digitisation of physical objects that record everything from user locations and usage patterns to an individual's vital signs, creates an incredible amount of data that can be mined to drive decision-making, optimise the performance of systems and processes, save time for people and businesses, and improve quality of life.'[2]

These potential benefits which IoT offers businesses will surely drive further investment into IoT services in the near future. These services include design, installation and operation of IoT systems, along with connectivity solutions and other consumer services. Juggling growing IoT demands, along with users connecting to content, and enterprises, which require enormous amounts of high-performance bandwidth, is a challenge.

Data Centre Federation (DCF) can make a pivotal difference in managing bandwidth requirements to help keep content and consumers working, playing and learning productively for years to come. Federation concepts ensure consumers and enterprises gain highly available, secure access to content, data and services. Data Centre Interconnect (DCI) is a fabric that connects and protects the information across multiple data centres. Federation helps content owners prop up their data in a distributed topology and serve their applications closer to users and ISP networks. Traditional networks are taxed by video traffic, e-sports, e-book downloads and streaming music, increasing demand for DCI connectivity. The impending terabits of data from the IoT will only exacerbate the bandwidth challenges.

User and machine access to content will require networks that can support far more traffic than ever before. For the IoT to truly succeed, data must move across the network freely and securely. Consequently, DCI and DCF become critically important. To send data from sensors to the data centre, as well as between data centres and storage platforms, requires highly available bandwidth performance to conduct meaningful analysis in a timely fashion. For example, smart cars currently process sensor information transmitted from varying sources, in near-real time. These cars have grown into mobile hot spots on wheels, where data is constantly being received and analysed by on-board systems that provide alerts for everything from faulty headlights to low tire pressure.

Passengers may be texting, searching, streaming, or navigating using their smartphones. In the future, driverless cars will require data to track vehicles and aid in preventing collisions; that data must flow freely to keep passengers safe.

Meanwhile, advances in coherent optics have paved the way to transmit data at rates of 100G and much higher, over almost any distance, dramatically improving DCI performance. This special report highlights primary advances in DCI and DCF that are helping to meet booming content demand, both inside and across data centres.

1 Statista.com quoted in Ovum report 'The Future of Enterprise Digital Transformation'
2 Intergrating the IoT Economy'

Requirements for Consideration

Key requirements in delivering high performance include:

1. Optical networks – High-performance optical networks offer very low latency, which is crucial to gaining responsive real-time applications and high-quality video performance. Optical networks provide a lasting foundation for highly flexible, adaptable networking that delivers greater automation, end-to-end orchestration, and streamlined multivendor performance to meet content delivery needs today, and for years to come.

2. Bandwidth – No matter where users seek to connect, high-performance bandwidth and capacity are needed to support content delivery. Transactional database queries require faster response times. Without high-performance networks in place, content delivered from cloud services may suffer from latency issues, which may result in frustratingly slow performance for users.

3. Storage requirements – With video and data streaming from smartphones, watches, cars and countless other sensors and devices, storage requirements are growing exponentially, and are often unpredictable. This is why the focus must shift from local storage to centralised and distributed storage capacity. Content providers must help determine how enterprises can harvest and use IoT data cost effectively. And the location housing cloud-based data can also make a big difference in response time performance. When cloud-based content is stored in a cloud service, DCF can help drive low-latency, high-capacity performance.

4. Federation – To meet growing bandwidth and performance demands, it is crucial to 'federate' campus data centres, joining multiple data centres on a high-performance optical WAN so they function as a single virtualized data centre. 'Federation' has been loosely defined as a united body formed by a number of nations, states, or other organisations, each retaining control of its own internal affairs. Federation ensures customers maintain highly available, secure access to content and services. Because DCF ensures high performance with up to six 9s (99.9999 per cent) availability, federation would allow the delivery of a more consistent, high-quality user experience. Guaranteed performance is made possible via the virtualisation of data and storage running on a high-performance WAN.

How Colt powered by Ciena Helps Resolve the Challenges

Colt powered by Ciena can help content providers secure and federate data centres, providing turnkey migration processes that will also help safeguard operations. In fact, Colt can help with every phase of content delivery, offering well-managed and controlled processes, with rollbacks available to ensure a safe way out of any step taken along the way.

In addition to enabling more streamlined performance, once key functions are automated, Colt powered by Ciena can help content providers deliver more advanced services such as bandwidth on-demand and end-to-end service orchestration to help them build new differentiated services as the content needs of their audiences evolve.

Ultimately, combining the speed and performance of optical networks with the automation and virtualisation of Software-Defined Networking (SDN) and Network Functions Virtualisation (NFV), and advanced Multi-Domain Service Orchestration (MDSO), can bring powerful benefits to content providers. Setting the stage for machine-to-machine automation, technologies such as SDN are paving the way for advanced network orchestration and advances such as peering, which brings internet domains together and content closer to consumers. Rapid resource deployment and the ability to support real-time or 'live' events are both considered critical to content delivery networks of the future.

Automating cross-connect services, for example, will allow content providers to migrate away from the manual processes associated with patching, largely because doing so can reduce interconnection time from months to minutes. This process currently requires sending a technician to find the correct port and plug into that port, while also removing old patch leads—all without disturbing the bundle of other cables inside most patching rooms today.

By implementing DCF, content providers can eliminate human error and inefficiency. Because these companies invest heavily in technology to help deliver content, those who leverage optical networking will optimise performance—and gain higher profit on revenue generated. The ability to automate IT will remove human intervention and allow providers to manage and store more content while reducing the risk of human error.

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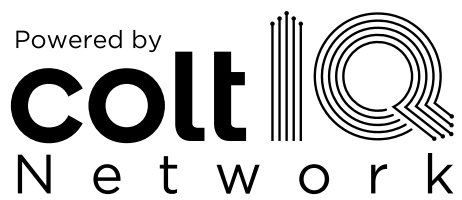
For more information
visit www.colt.net

Tel: +44 (0)20 7863 5510
E-mail: sales@colt.net

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