HEAVY READING

WHITE PAPER

Data Analytics Power Market Growth for CSPs

A Heavy Reading white paper produced for Google Cloud

Google Cloud

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INTRODUCTION

A data-centric design philosophy is a cornerstone of the telecommunication industry's transition to cloud-native communications. Sprawling and complex networks, with myriad products and services, are impossible to manage without the knowledge and visibility provided by automation and advanced data analytics, informed by a data-centric design. Customer experience (CX), network performance, and service quality are influenced by many small interactions that can only be tracked, correlated, and reported on through artificial intelligence (AI)/machine learning (ML)-enabled automation. In this report, Heavy Reading examines how a data-centric design can transform the communication service provider's (CSP) business, improving customer experience, reducing churn, supporting network performance, and enhancing security.

PUTTING THE BRAKES ON CUSTOMER CHURN

Personalizing the CX helps increase revenue by increasing retention rates, reducing costs—particularly customer acquisition costs—and improving customer satisfaction. However, the personalization of CX demands a real-time response to customer requirements, ease of use of services, quick access to information as required, and an end-to-end view of the customer and business process lifecycle. CSPs still struggle to meet these demands. Many do not have well-structured customer engagement practices and lack coherent customer engagement strategies. Customer acquisition, retention, upselling, and cross-selling succeed with precise targeting, segmentation, and personalization. It takes data and intelligent positioning to win customers.

LIVING WITH UNCHECKED TRAFFIC GROWTH

The overall growth in network traffic (which continues to double every two years), the dominance of video traffic, which today makes up 82% of all network traffic, and the growth in the number of connected devices combine to create a network environment in which it is difficult to anticipate and plan for traffic overall, let alone traffic spikes. The Omdia Device Tracker recorded an installed base of 2.12 billion devices in 2010. This figure grew by a factor of 5 to 11.46 billion devices in 2021 and is forecast to reach 13.34 billion devices in 2024. This does not include Internet of Things (IoT) devices. Heavy Reading expects the installed base of IoT devices to grow from 29 billion in 2021 to 47.9 billion in 2026. None of this includes the fully autonomous vehicle, which is looming closer on the horizon than one might expect. Industry estimates put network data generated by these vehicles at 50GB of traffic per vehicle per hour.

In addition to the growth in connected devices, the transport itself adds to the difficulty of preparing for network growth. Fiber outages are startlingly common. One Tier 1 carrier commented that it sees a fiber cut, on average, once a day. Complex, interconnected networks can experience catastrophic outages when one link or node fails, impacting all other connections in the region. AI and data monitoring with predictive analytics can anticipate equipment and network failures before they happen, preventing costly outages. Predictive AI models can simulate different traffic scenarios and contain anticipated damage preemptively.

THE FINANCIAL DOLDRUMS OF THE CARRIERS

Carrier annual capex, worldwide, has hovered for the past five years (and longer) between 16% and 18% of revenue for both fixed and mobile networks. Profitability (measured by EBITDA) for the top 40 Tier 1 carriers (by revenue) has, likewise, varied only slightly between 31.5% and 32.8% of overall revenue. Total global carrier revenue has swung only slightly between a 0.5% retraction and a 2.3% growth. There is, of course, much variation between individual carriers and global regions. The overall message, however, is not bad. The problem is that it is not good either.

Connectivity remains the focus of most CSPs. Growth has been through acquisition, earnings have been sustained through operational consolidations, and network performance has been maintained or improved by advances in wireless technology, storage, and silicon. Looking to the future, this CSP business model is increasingly unsustainable, as CSPs bear the burden of the network infrastructure but are not participating fully in the online, over-the-top (OTT), and cloud economy. CSPs need a new data-centric strategy to increase revenue, particularly in high margin, highly differentiated, and customer-centric services, to reap the benefits of their investments.

IMPACTS OF COVID-19

CSPs' response to the connectivity demands of the COVID-19 pandemic was rapid and impressive as traffic patterns changed abruptly, virtually overnight. However, along with the increase in remote work, commerce, content distribution, and social networking, the pandemic also ushered in major changes to customer engagement, accelerating a shift to digital support—a shift that is almost certainly permanent.

Customers interact with digital networks at multiple touchpoints, not only for shopping, but also for work, content consumption, and interaction with peers. In the past, CSPs learned about CX from contact centers. Today, the data of a customer's purchase journey, from the initial research to purchase, spans several websites and communication services. The only way to gain insights into customer behavior and improve their experience is to aggregate data all along their pathways.

CSPs need to deliver an omnichannel experience to the customer, regardless of the online or brick-and-mortar platform. CSPs that struggle to step up to this challenge and that deliver a fragmented CX will see customer churn and a failure to win new customers.

EDGE COMPUTING IS MULTIPLYING COMPLEXITY

Edge computing places network nodes, applications, and storage close to the end user with the goal of improving both application and network performance. Currently, there are approximately 7 million cell sites around the world. Edge computing is expected to increase that number by an order of magnitude over the next 10 years.

Many edge applications impact customers' daily experiences. For example, innovative smart city applications influence the experience of parking and navigating congested traffic, street lighting, security cameras, emergency notifications, and more. CSPs need to be able to track customers' experiences in this highly distributed edge environment and respond to developing problems proactively before they have a chance to impact the customer.

The next few years will also see a rapid increase in the autonomous vehicle market as it accelerates from its current campus-focused market and moves toward fleet cars. It is expected to grow from 1.4 million shipments in 2021 (for both commercial and consumer autonomous vehicles) to 12.9 million shipments in 2025. Further advances in AI and ML will improve the management and troubleshooting of this highly complex, highly distributed, safety-first use case. It will also expand the portfolio of related services that carriers are able to offer consumers and enterprises. One example is amassing and interpreting data on driver behavior to improve road safety and prevent accidents.

CUSTOMER EXPERIENCE

CX is not only customer service and product satisfaction, but also the quality of experience (QoE) with the network itself. For example, the hybrid workforce's productivity and peace of mind are affected by the quality of video conferences. Congestion anywhere in the network can be the cause of jitter and delay in streaming video. CSPs need data on traffic flows across the entire network in order to pinpoint choke points and redirect traffic through the least congested route.

The quality of customer service is another critical factor in CX. Everyday encounters, such as purchases of mobile devices and any time lag in connecting them to the network, can be a source of irritation and will be reflected in the number of complaints at contact centers.

By tracking each type of complaint and correlating them with customer churn data, CSPs will gain detailed information about what, specifically, impacts the CX. With millions of mobile device users, the monitoring and tracking of CX data is a gigantic but critical task.

CSPs must ensure that solutions have a unified customer engagement strategy that delivers a consistent experience across channels. CSPs can do this by

- Continuing to invest in central data repositories.
- Developing a robust data management and analytics infrastructure.
- Ensuring the integration of customer engagement channels with these capabilities.

This, however, is easier said than done, requiring ever more sophisticated data processing. For example, the analysis of customer complaints is most effective when natural language processing (NLP) is added, enabling the parsing of emotions.

Synthesizing data across multiple sources, analyzing it, and then acting upon it with an AI engine to deliver high performance, multi-channel CX *at the scale needed* is beyond the capabilities of most CSPs today.

5G AND MARKETING TO CUSTOMER SEGMENTS

The emergence of 5G is changing the landscape of CX. The cadence of new service introductions by the CSP has increased from years/months to days or even hours. As the demand for e-commerce has boomed, so have delivery services. The post-pandemic hybrid workforce's hunger for network services and applications has grown enormously across a variety of vertical industries, including healthcare, retail, banking, education, and more.

Different customer segments have varying needs for products, services, and service quality. CSPs need detailed data to personalize and monetize new and existing services. They must track customers' purchase journeys and experiences to target relevant offers. Rather than have services become mired in pilot purgatories, CSPs must be able to fail fast and transition quickly to new, more promising services. To do this, the CSPs and their partners must be able to collect and analyze the data that reveals what steps lead to a successful launch, promoting customer retention and increasing revenue.

Data-driven ad spend and marketing campaigns increase efficiencies by identifying the customers most likely to be receptive to a product. Analytics can help identify which partner earned the most sales, the touchpoints eliciting the most product inquiries, and calls to action producing the most responses.

Network automation will become critical as marketing campaigns increase their reliance on real-time sourcing of data. CSPs, for example, can observe the emotional responses of customers to offers on digital screens in shopping malls, gauge their preferences for products in real time, direct them to shops most likely to fulfill their needs, and follow up with data on conversions.

GETTING TO THE ROOT OF A PROBLEM WITH BSS/OSS AND DATA ANALYTICS

The growth in traffic, devices, network edge locations, and services can lead to a deluge of incident reports and alerts when things go wrong. Business support systems (BSSs) and operations support systems (OSSs) become swamped, making it hard to separate the signal from the noise. The root cause of poor CX is hard to analyze without the corresponding network operations data from the OSS. CSPs need analytics to find the correlation between network performance and customer complaints. Automated data-driven root cause analysis can understand and resolve a problem before it is reported, or even noticed, by the customer.

When a customer does report a problem, the CX is affected by the speed of problem resolution. A business, whatever its size, cannot tolerate an interruption of service when it is engaged with its own customers. CSPs need predictive analytics to anticipate an outage and halt a problem before the customer loses service—and business.

Customer retention is challenging and costly and can be impossible if the customer has had a poor experience with the CSP. By capturing customer service data as it happens, CSPs can deliver remedies that contain the damage, thereby avoiding the discounts and incentives needed to re-acquire a disgruntled customer.

SECURITY

Customer confidence in the CSP, and the CSP's reputation overall, can be irreparably damaged by a security breach. Firewalls no longer protect a corporate environment that is increasingly porous, with hard to define perimeters. The proliferation of hybrid workers and IoT devices has created a number of easy-to-exploit attack vectors. A CSP (and corporate) attack posture must protect against multiple avenues of attack, whether volumetric, domain name system (DNS), or application based.

Advanced analytics are an essential part of the security arsenal. Data pertaining to visitor identity can be used to prevent the entry of unauthorized persons. Analytics can also be used to spot malware by tracking anomalies in the pattern of visitor behavior or to "fingerprint" applications so that unusual behavior can be flagged, even in the case of encrypted applications.

DATA ANALYTICS ACROSS THE ENVIRONMENT

The aggregation of siloed data across touchpoints begins with a standard dictionary that creates a common language and set of references across silos. Time is then required to "learn" an application and gather enough information regarding the normal performance of the application on any given date and time in order for ML-powered analytics to identify an anomaly and issue a notice or alarm. This is particularly challenging in a 5G, cloud-native network where nodes, applications, and users are in a constant state of flux.

The previous record of learning and success is the most important predictor of success in data analytics projects. For example, anomalies are a great source of insight. However, it takes a trained eye to tell whether a spike in traffic reveals a surge in sales or a cybersecurity threat.
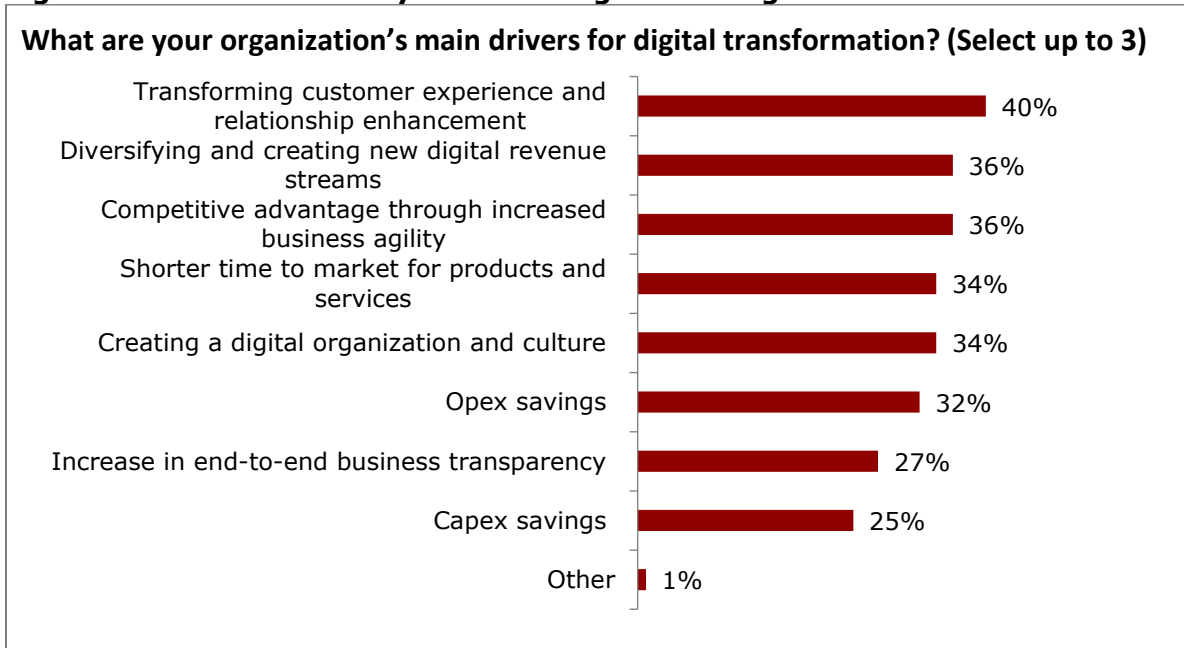
In addition, much of the value of data expires quickly—in as little as five minutes. Successful execution of data projects depends on aggregating massive amounts of data quickly.

Insight generation requires the correlation of high volumes of information to determine, for example, the impact of events on sales. Individual segments of customers are affected by different types of events. Finding the correct correlations takes years of experimenting and testing models.

CSPs AND COLLABORATION WITH HYPERSCALERS FOR DATA-DRIVEN CUSTOMER EXPERIENCE

CSPs recognize the importance of CX for their future. Their goals for digital transformation confirm the importance of CX for the business strategy of CSPs. CX is their most important objective, followed by diversification and creating new digital revenue, as indicated in **Figure 1**.

Figure 1: CSPs have clearly articulated goals for digital transformation

What are your organization's main drivers for digital transformation? (Select up to 3)

Driver	Percentage
Transforming customer experience and relationship enhancement	40%
Diversifying and creating new digital revenue streams	36%
Competitive advantage through increased business agility	36%
Shorter time to market for products and services	34%
Creating a digital organization and culture	34%
Opex savings	32%
Increase in end-to-end business transparency	27%
Capex savings	25%
Other	1%

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Source: Omdia, Service Provider Digital Transformation Strategies Survey 2021

The volume, diversity, and complexity of the structured and unstructured data and the need for specialized technologies, such as advanced voice recognition and AI—all at a monumental scale— bring us to the conclusion that CSPs need partners to reach their goals in a timely manner at the scale needed, and CSPs agree.
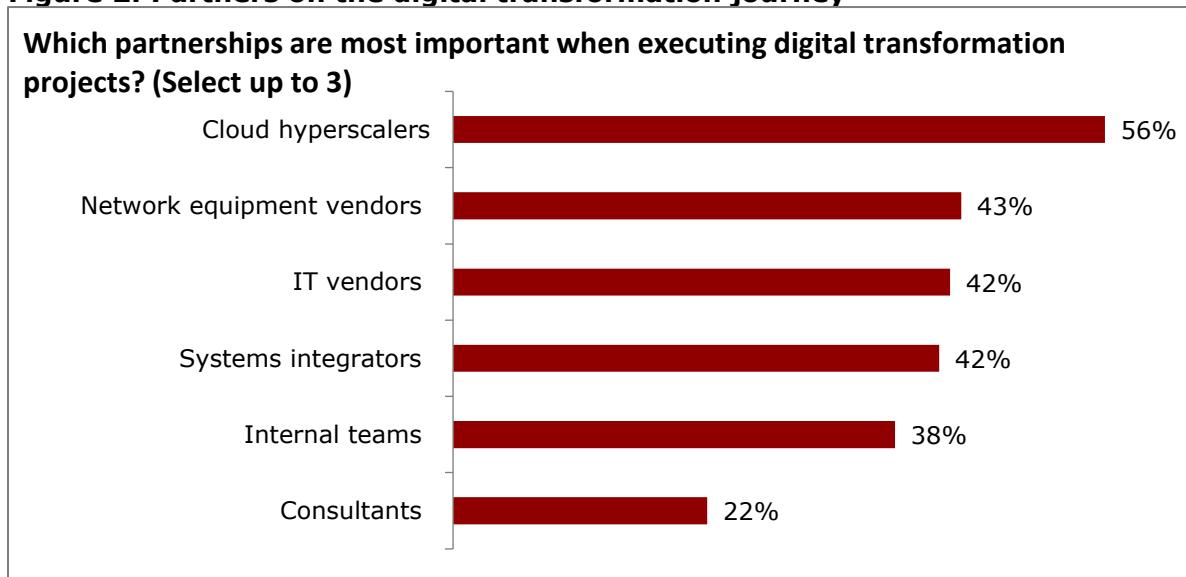
Heavy Reading asked CSPs who they would partner with to achieve their digital transformation goals (see **Figure 2**). Their first choice, by a 13% margin, is hyperscalers, followed by network equipment providers (NEPs)—their traditional partners for all things network. Digital transformation for CSPs is less about the network and more about the data and the customers. Transforming the CX and enhancing relationships require new revenue streams and business agility. CSPs think that hyperscalers are the partners that can best help them when it comes to expertise with big data, automation, and AI.

WHAT HYPERSCALERS BRING TO THE TABLE

Hyperscalers simplify and speed up data processing with data platforms that consolidate, clean, and understand data. Their cloud-native computing platforms adapt quickly and flexibly with DevOps to create applications to process and analyze data for new purposes. Increasingly, they analyze data from repositories stored in multiple clouds with standard data mining tools. In addition, they have visualization software to understand the meaning of the data and make decisions quickly.

Hyperscalers have continually developed new techniques to extract insights from data for real-time actions. They have an inventory of ML and AI learning models that they use to automate and accelerate the creation of new models. Additionally, they have libraries of metadata and APIs to integrate data from numerous sources. More sophisticated models, such as reinforcement learning, are helpful for the precise targeting of customer segments. In addition, specialized techniques like genetic algorithms have been deployed to monitor operations data and find opportunities for optimization in telecom networks. CSPs have immense storehouses of both customer and operations data from which to mine and reap value, finding both revenue-earning opportunities and cost controls.

Figure 2: Partners on the digital transformation journey

Which partnerships are most important when executing digital transformation projects? (Select up to 3)

- Cloud hyperscalers: 56%
- Network equipment vendors: 43%
- IT vendors: 42%
- Systems integrators: 42%
- Internal teams: 38%
- Consultants: 22%

n=106
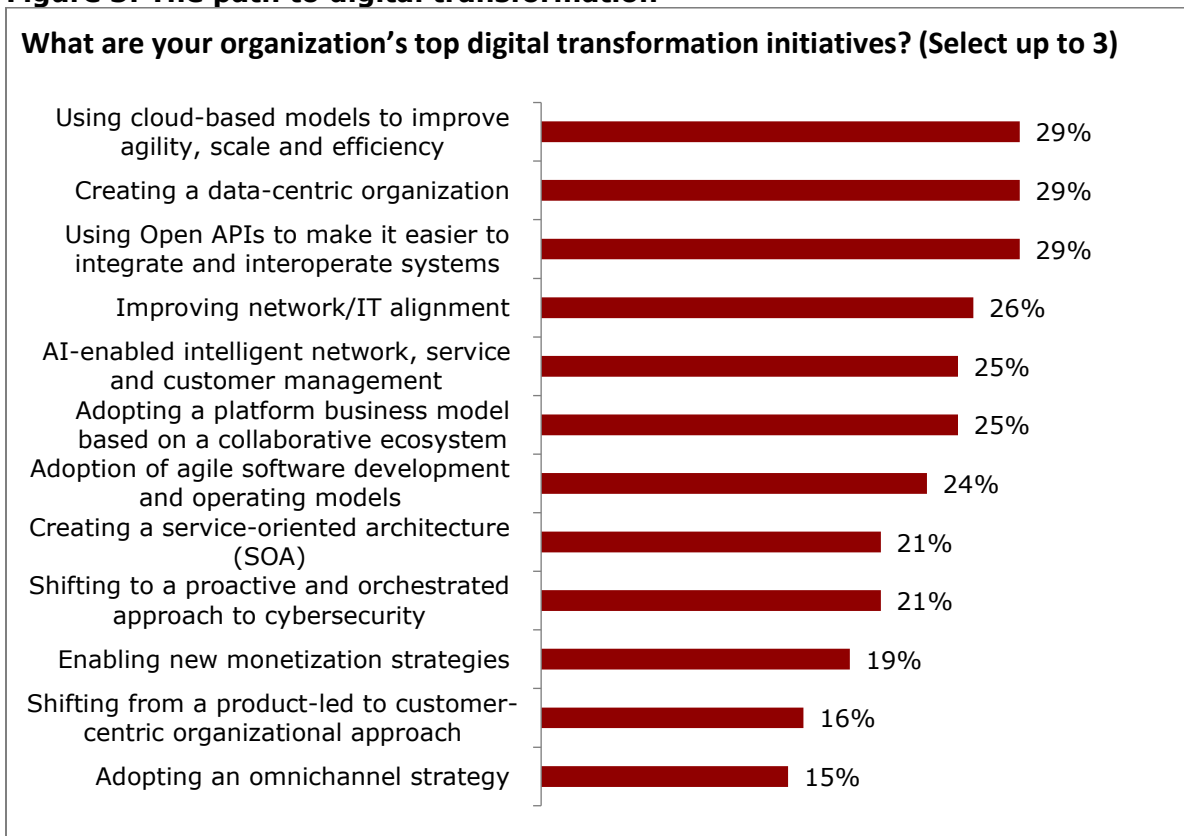*Source: Omdia, Service Provider Digital Transformation Strategies Survey 2021*

CONCLUSIONS

CSPs are sitting on gold mines of data that await data mining that will yield the benefits of higher revenue, better CX, and lower operational costs. They have an opportunity to break a long pattern of modest growth, stagnant profits, and a struggle to acquire and retain customers. The opportunity is poised to only grow as 5G expands the universe of digital services. Data-centricity across the network is the prerequisite to rejuvenate the business. Digital transformation has set the stage for a new era of growth for CSPs.

CSPs have outlined the process that will bring them into this new era, and the first two steps are the adoption of cloud-based models and creating a data-centric organization (see **Figure 3**). All of the other tasks prioritized by CSPs for digital transformation are critical to a data-centric organization as well, including APIs for data integration, AI-enabled intelligent network, service and customer management, and cloud computing.

Hyperscale companies have accrued knowledge of and skills in mining data for over a decade. They have developed software for automation, crafted algorithms for gleaning insights, and developed software frameworks for cloud-native communications and computing—and all at the large scale that CSPs need. CSPs have an opportunity to leverage partnerships with the hyperscalers to accelerate their journey toward data-centric digital communications.

Figure 3: The path to digital transformation

What are your organization's top digital transformation initiatives? (Select up to 3)

Initiative	%
Using cloud-based models to improve agility, scale and efficiency	29%
Creating a data-centric organization	29%
Using Open APIs to make it easier to integrate and interoperate systems	29%
Improving network/IT alignment	26%
AI-enabled intelligent network, service and customer management	25%
Adopting a platform business model based on a collaborative ecosystem	25%
Adoption of agile software development and operating models	24%
Creating a service-oriented architecture (SOA)	21%
Shifting to a proactive and orchestrated approach to cybersecurity	21%
Enabling new monetization strategies	19%
Shifting from a product-led to customer-centric organizational approach	16%
Adopting an omnichannel strategy	15%

n=106
Source: Omdia, Service Provider Digital Transformation Strategies Survey 2021