CLOUDERA

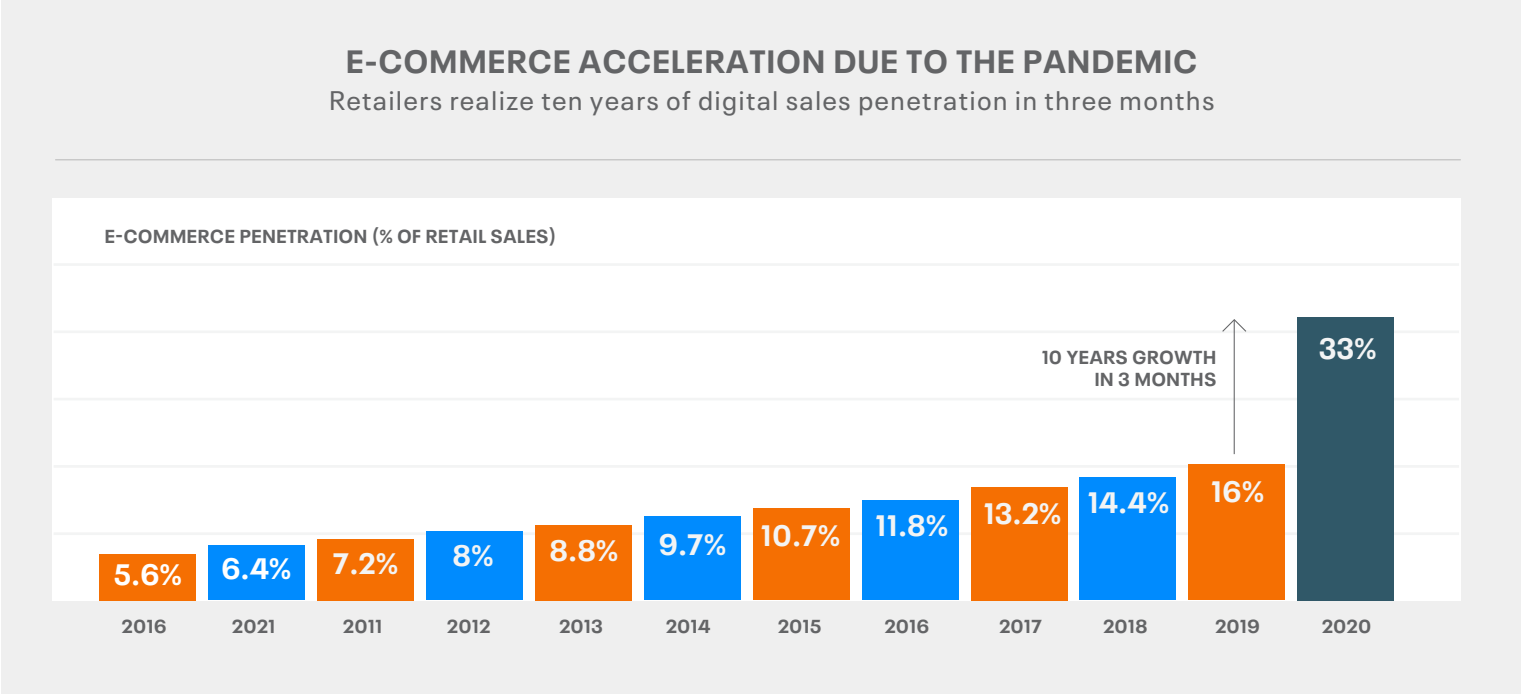
Communication Service Provider Opportunities with Hybrid Data and AI

Table of Contents

Changing Customer Expectations and the 5G Environment

Consumer behavior has changed drastically over the past 18 months, much due to the global pandemic. Work, education, entertainment, healthcare, financial services, local government, and countless other services have become increasingly dependent on digital interactions and the networks that make those connections.

Consider the changes in the way we interact with others: Zoom connects family members outside of the work environment, work-from-home capabilities make people rethink work-life balance — 74% of professionals expected remote work to become standard and 97% of employees didn't want to return to the office full-time in 2020[1] — and consumers' shift to e-commerce is revolutionary. Consider that e-commerce's acceleration due to the pandemic saw retailers' digital sales penetration realize 10 years of growth in just the first three months of 2020 alone. So what does this mean for the business of telecommunications?



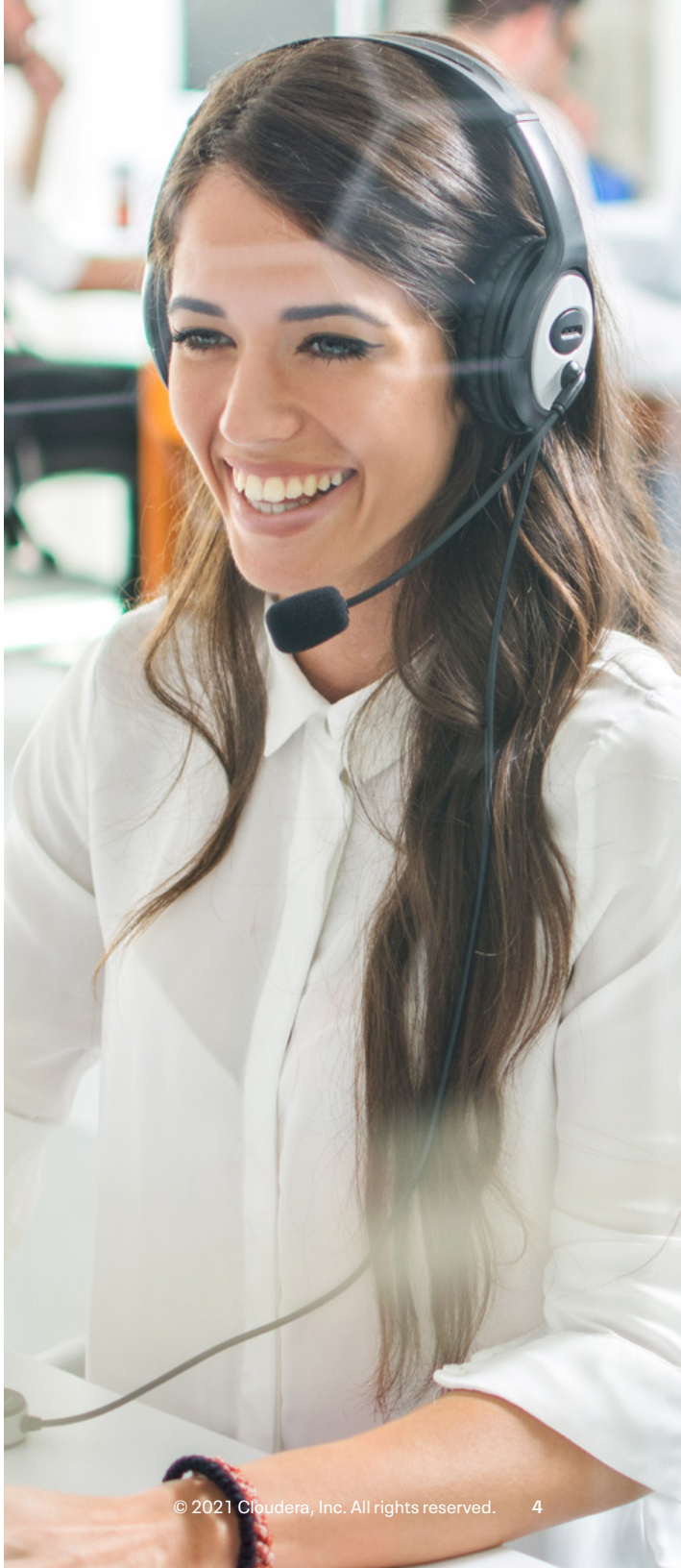
Source: ShawSpring Research, Bank of America, U.S. Department of Commerce, Forrester Analytics, McKinsey analysis

In the world of telecommunications, this shift has been positive in business terms, though the profile of services and consumer expectations has dramatically changed. Life is more digital than it has ever been before, and it's happening in the network cloud. Connectivity is no longer a mere convenience — connectivity is the threshold for doing business and consumers see service as the differentiator.

A recent Techsee telecommunications survey[2] showed that 39% of Americans who canceled a contract in the past 24 months cited customer service as the primary reason. Poor service was defined as companies wasting clients' time, repeated calls for resolution, and untrained service personnel.

Meanwhile, enterprise clients are demanding ever greater resilience and responsiveness from their Communication Service Providers. CSPs are increasingly strategic partners of local enterprises as they become dependent on telco networks for service delivery — whatever their business, education, logistics, government, retail — are all heavily dependent on their customers being able to transact and engage online in a speedy, secure way.

Clearly the game has changed and winning CSPs are pivoting these businesses to address this fluid environment.



Business Drivers for Analytics Investment

Consumer behavior and technology changes have exponentially accelerated enterprise digital transformation. The retail/consumer business is changing so dramatically as to be unrecognizable, while the enterprise side of the business is growing with great speed, ramping up both data demand and output, and increasing demands for automation. These are the foundations for a data powered enterprise in communications, media, and entertainment.

Let's explore three business drivers for analytics investment:

- **Improved customer experience**
- **Improving network performance and monitoring**
- **5G return on investment**

Improved Customer Experience

Customers are demanding improved Quality of Service (QoS) defined as zero downtime, latency, or disruptions due to location, content, or device and improved Customer Experiences (CX) in the form of instant problem resolution, self-service network options, or pay-as-you go services as work, education, healthcare, retail and finance have become increasingly dependent on networks. Customer expectations generated from other experiences and apps (like Uber, OpenTable, etc) are elevating the bar for CSPs, thus they can no longer just focus on "if the customer is going to leave us" and are transitioning to "how can I understand the customer better, make them happier, and do more business with them".

A 360° customer experience builds a deeper capacity for empathy, and optimizes every customer engagement for a 'good' experience, and potential up-sell. With this view, CSPs can move from mere chatbots to robotic process and network automation providing enhanced customer experiences.

Improving network performance and monitoring—Network cloud optimization

Software defined networks and network function virtualization (SDN/NFV) are enabling virtualization of telecommunications networks reducing the dependency on proprietary appliances and network specific hardware. Rapid deployment of new network elements, perhaps dedicated to a single service or even to a single enterprise client, is transforming the CSP's cost structure.

Automated network management is essential for new private enterprise networks and resources serving virtualized network elements. Enterprises are analyzing and understanding consumption and demand patterns around virtualized infrastructure for optimal resource planning. The sheer volume of virtualized elements means that the traditional approach of monitoring and alarms, prioritized for human intervention, simply can't apply.

5G return on investment

Telcos are pumping in over 1.5 trillion dollars into rolling out 5G[3], and are focused on monetizing these investments by rolling out new services and use cases. 5G offers consumers faster speeds but it's not just about faster speeds. 5G offers enterprises value too with pervasive connectivity, low latency and, crucially, ultra-high reliability, and security to enable more real-time mission-critical applications.

5G rollout is expensive and ROI will be monitored carefully by identifying consumption patterns optimizing rollout and resources for 3G/4G/5G hybrid and new 5G. To do this, enterprises will need to deliver analytics to optimize enterprise IoT services and to automate service assurance (e.g. in network auto scaling) to understand evolving consumption patterns and congestion points.

Migration to the Cloud

A key business imperative, the migration to the cloud is a competitive pressure being exerted by fellow CSPs on each other. While 5G, network virtualization and customer experience drive soaring demand for more Data and AI services, all of this is happening at a time when enterprise operations are moving from an on-prem-first to a cloud-first architecture because of the scalability the cloud provides along with a (sometimes false) promise of optimized infrastructure spend.

$1.5T

Telcos investment in 5G over the next **5 years**[3]

CSP Data Architecture Challenges

When transforming your business to become data centric, three challenges arise. First, architecture data silos cause bottlenecks and floods of data that occasionally overwhelm systems during surges of activity. Second, enterprise data policy is fragmented and inconsistent across multiple point solutions, data sources and clouds. And third, integrating data functions from point of collection at the network edge all the way through to AI applications requires detailed planning and testing.

Embrace hybrid data cloud

Keep data unified, secured and governed

Leverage data from Edge to AI

Hybrid data cloud

In recent years the public cloud has been seen as a solution and panacea for many companies' digital transformation strategies. However a recent Andreessen Horowitz study has shown that while the Cloud is a viable solution for start-up, expanding and emerging use cases, its true cost on market capitalization is vastly underestimated. Hybrid cloud enables you to unleash the full capabilities of on-premises apps by bursting to the public cloud in order to leverage on-demand infrastructure for highly computational workloads. Choosing enterprise data partners that can deliver hybrid workload solutions reduces risk by leveraging data where it lies, mitigating data transfer risk, minimizing possible confusing redundant data, and optimizing architecture use and spend.

What does this mean for CPSs? Hybrid data architecture allows cost optimization and the ability to manage different data sources in ways appropriate to their sensitivity (privacy), or scale (volume).

Highly transactional data-in-motion workloads that control and run essential business operations in real time stemming from log or time series data (on-line transactions, purchase order management, store operations, supply chain management as examples) can be run in one optimized environment, while analytical based workloads (sales analysis and forecasting, market research, budgeting and etc) that plan, solve problems, support decisions, discover hidden insight can be run in another. Providing CSPs a choice where and when data is stored, used and extracted opens options that lower cost and improve responsiveness.

Hybrid data cloud, continued

CSPs rely upon diverse types and a growing number of data sources to power their advanced analytics investments. Some of the sources are illustrated below.

THE DIVERSE TYPES AND GROWING NUMBER OF DATA SOURCES

User profile & Usage data

- Customer profile
- Account info
- Transactions
- Billing details
- Call detail records
- Location data
- Data usage
- Clickstream data
- Programming info
- App store info
- App logs

Network

- Network events
- Network traffic
- Network utilization
- Network inventory
- Network logs
- Network maps
- Network provisioning
- OSS data

IoT & Device Data

- Sensor readings
- Sensor metadata
- Device data
- Apps data
- GPS / location
- Set-top box logs
- Device profiles
- R&D

Marketing & CRM

- Promotions / offers
- Call center logs
- Campaigns
- Website / SEO
- Affiliates / merchants
- Surveys
- Competitive intelligence
- Social / search / sentiment

Public & Trade

- Demographic / census
- Policy / regulation
- Psychographic
- Inflation / macroeconomic
- Commercial / microeconomic
- Labor statistics
- Weather data
- Public health data
- Industry research

DERIVE BUSINESS VALUE

Keep data unified, secured and governed

CSP organizations, partners, and customers, all benefit from enterprise-wide multi-function analytics only if data is protected, secured, and well-governed throughout. Analytics and machine learning can become a risk if data security, governance, lineage, and metadata management is not holistically applied across the entire data lifecycle and all environments. Ethical AI and AI transparency are becoming increasingly important as machine learning automates more and more business processes.

Inconsistent data access policies and lineage cause inaccuracies in audit logs which can result in an InfoSec compliance nightmare and a loss of trust with customers or potential lawsuit and/or regulatory fines, not to mention the damage to the brand of the company. Gaps also lead to inconsistent insight and, with that, decisions that impact the business' ability to innovate and differentiate. A hybrid data cloud strategy has unified metadata, data access, governance, and lineage across all environments through one common user interface, regardless of where the data is sourced, migrated, or replicated.

What does this mean for CSPs? Cloudera's solution, SDX, delivers an integrated set of security and governance technologies built on metadata delivering persistent context across all analytics as well as public and private clouds. Consistent data context simplifies the delivery of data and analytics with a multi-tenant data access model that is defined once and seamlessly applied everywhere.

SDX reduces risk and operational costs by delivering consistent data context across deployments. IT can deploy fully secured and governed data lakes faster, providing more users of customer, partner, or enterprise data access their appropriate data, without compromise.

Key functions and benefits of SDX:

- Enterprise-Strength Security
- Governance and Compliance
- Shared Intelligence

Leveraging Data from Edge to AI

While many speak about leveraging enterprise data, few do it well. When you are developing a data strategy that uses all your data — from edge to AI — several constraints arise. The first is to recognize that CSP data sources are vast and varied, both in terms of content and form, such as the following:

- **Data generators**: network, billing and payments, care, third party, call center, survey, customer sentiment, and marketing
- **Data types**: structures, unstructured, semi structured video, and audio time series
- **Data speeds**: batch, stream, real-time, push/pull, and sub/pub
- **Data sensitivity**: private or public, PII, consented, unconsented, third-party client

In addition to data complexity, some CSPs will be wedded to specific point solutions for data warehousing or business intelligence reporting. This will require a platform like the Cloudera Data Platform (CDP) to integrate with these experiences because its open architecture allows easy integration with existing elements.

Retaining point solutions does come with risk. Many point solutions promote themselves as specialists in specific business process areas and the preferred solution — data warehousing, machine learning for example — can cause costly integration as is dealing with the multitude of unsynchronized uncoordinated upgrades.

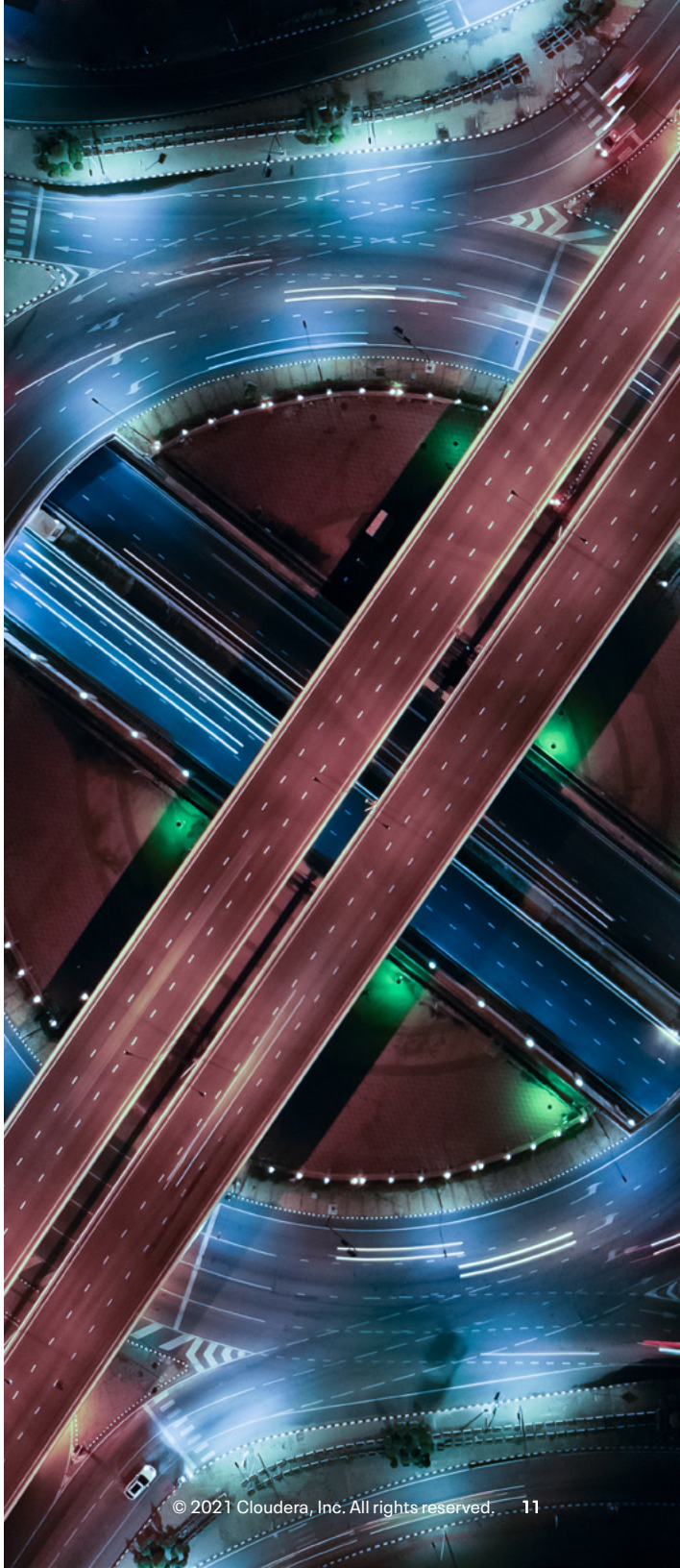
Many point solutions promote themselves as specialists in specific business process areas. However, point solutions — such as data warehousing, and machine learning — can require costly integration and dealing with many unsynchronized, uncoordinated upgrades.

Leveraging Data from Edge to AI (continued)

Open source technologies enable extensibility, flexibility, and avoidance of vendor lock-in, regardless of where the data is stored and workloads are run. This is one of the most important factors of a hybrid cloud because it enables novel solutions in the following ways:

- **Access to innovation:** The open source community drives change, innovation, and feature functionality at a higher rate than any one organization, even with heavy R&D investment.
- **Community of expertise:** Mature and active open source communities ensure that your developers are self-sufficient and productive with easy access to expertise and examples.
- **Flexibility and choice:** Organizations always have access to their data, and don't get locked-in by any vendor. Open source enables interoperability because the same services that run in private cloud are run in public cloud, so companies aren't beholden to any one cloud provider's business model and priorities.

What does this mean for CSPs? It's simple. **Now, CSPs can access data anytime, from any source and use it to power valuable use cases whether they be improving customer experience, improving the effectiveness of marketing and sales, network optimization, or customer care optimization.**



CSP Hybrid Data and AI Use Cases

Leading CSPs rely on data, analytics, machine learning, and AI technologies to drive digital transformation — converting raw data into actionable insights. They are turning to advanced analytics use cases such as improving customer experience, network monitoring and optimization, governance and connected ecosystems and data monetization to win market share, build customer loyalty, reduce operational inefficiencies, innovate and develop new offerings, and meet ever changing customer privacy demands.

Most Telecommunications companies have turned to Cloudera to build enterprise data strategies through the hybrid data cloud platform for four simple reasons:

- Maintain the security and privacy of a private cloud deployment combined with the agility of the public cloud
- Persist an enterprise wide, cross-cloud data governance regime ensuring consistent data policy enforcement
- Integrated enterprise data lifecycle experiences eliminating black box and point solutions
- Technologies based upon the power of the collective open source community

The following use cases outlined demonstrate the power of data and how they are transforming CSPs.

Use Case: Improved Customer Experiences

Customers leave CSPs because of poor connectivity and now more than ever — poor service. Churn shouldn't be a surprise for any CSP considering the vast introspective volume of data at their fingertips, but many approach churn in inefficient ways. Churn isn't just about predicting who's going to leave. It's about understanding them, listening, and then responding in an appropriate and timely way. Today, market differentiation is gained by optimizing customer experience.

Winning CSPs leverage data gleaned from customer profiles, device usage, network performance metrics, click-throughs, social media streams, and customer sentiment surveys to develop detailed customer profiles that allow them to use advanced analytics to proactively predict behavior used to head off early dissatisfaction before it becomes an ultimate failure.

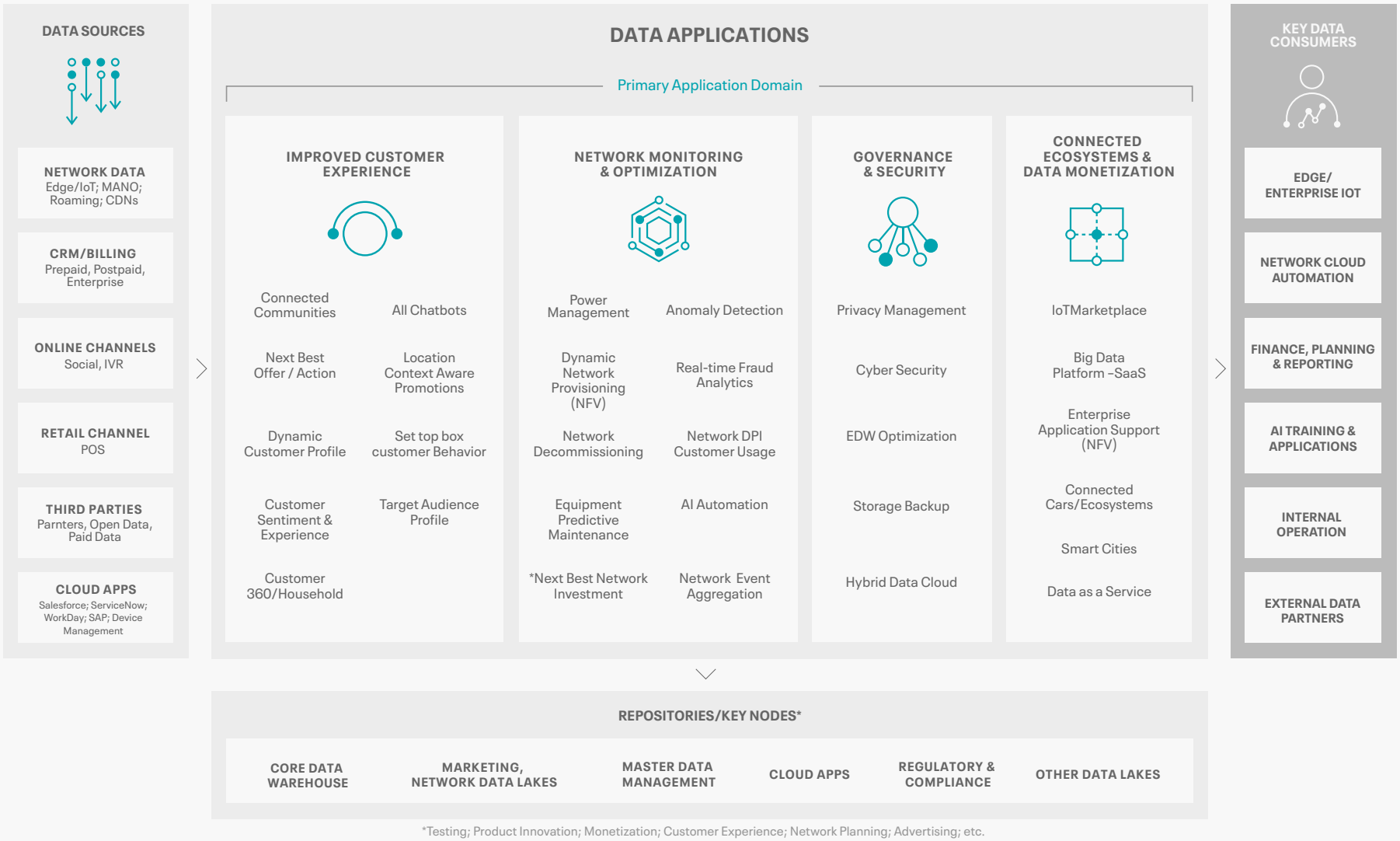
In addition to churn, using analytics and intelligence, CSPs can expand consumer spend by personalizing next best offers, optimizing campaigns, and creating location-based promotions. This enables CSPs to proactively present the right offer at the right time, in the right context, to the right customer to improve retention rates. Using data analytics, it is commonly known that CSPs are driving significant improvements such as an uplift of one percent of revenues just by optimizing their campaigns targeted to subscribers and at the same time improving their net-promoter score.

A recent Gartner report[4] predicts that in a few years from now,

89%

of businesses will compete mostly on customer experience.

CSP Data Sources, Stores and Use Cases



*Testing; Product Innovation; Monetization; Customer Experience; Network Planning; Advertising; etc.

Use Case: Network Monitoring and Optimization

Ericsson's Mobility Report states that 5G subscriptions will reach 580 million by the end of 2021.[5] That explosive growth in mobile and IoT generated data requires CSPs to continue to invest heavily in their networks, requiring as much as 30-40% of their capital and operating budgets every year. However, effectively predicting and managing the traffic moving through their network is a challenging endeavor, especially with new technologies, like 5G, that encourage new behaviors. Optimizing the network requires a real-time complex analysis of usage, mobility patterns, network logs, hardware bottlenecks, peak loads, and other granular details that will enable CSPs to optimize network utilization and traffic.

Service assurance driven by fault management and prediction, anomaly detection, and predictive maintenance of network hardware historically have required multiple point solutions. But with a single enterprise platform, new insights are gained understanding not just that a fault was identified and prioritized, but why it happened. By employing advanced analytics and machine learning across the infrastructure, a clear view of repeating patterns can effectively enable predictive maintenance, with many Cloudera customers preventing downtime before it happens. A single platform enables advanced performance management, where latency and throughput are not just measured, but analyzed and optimized. Finally, the same ML-powered platform enables strategies for prioritizing 4G/5G network expansion.

By employing advanced analytics and machine learning across the infrastructure, a clear view of repeating patterns can effectively enable predictive maintenance, preventing downtime before it happens.

Use Case: Hybrid Data Governance, Security and Privacy

As telcos migrate to the public cloud they find themselves in an environment that brings both security and privacy issues. At the same time, the scale of the data challenge becomes larger, while demands on speed — and real-time capacity — grow.

The benefits of the public cloud are clear, in terms of cost controls, speed to deploy, and agility. However, public cloud resources themselves can be expensive, while security, data residency, compliance and other control issues make the argument for an on-prem or private cloud capacity. At Cloudera, the hybrid data cloud approach offers the best of both worlds, allowing both public and private cloud workloads under a single orchestration and governance layer, Cloudera Shared Data Experience (SDX).

Communication service providers have become a target of cyber-attacks because of their role in building, controlling, and operating infrastructure that is widely used to transmit large volumes of personal and financial sensitive data. As device proliferation continues, cybersecurity takes center stage and they must race to ensure their networks and associated systems are secure from malicious attacks. The solution to this challenge lies in analyzing and securing network traffic and end points within this connected ecosystem.

Telecommunications is also experiencing a rise in fraud. Fraud takes the form of schemes to defraud the service providers themselves, attempts to defraud subscribers, and fraud conducted over the phone through the network.

To ensure security, and privacy, these multiple data environments all need to abide by the same access rules, while all users and analytics jobs must have consistent privacy rules across clouds. The requirement is for a single data governance environment to manage multiple workloads in a multi-cloud setting. Each of these unique data workloads need robust governance with holistic security and privacy management capabilities. A single platform enables CSPs to analyze their network and events to conduct anomaly detection in real time and discover 250% to 350% more fraud while generating 20 to 30 times fewer false positives.

An enterprise data platform enables CSPs to discover

250+

percent more fraud while generating **20 to 30 times** fewer false positives.

Use Case: Connected Ecosystems and Data Monetization

Connected Ecosystems

Telcos vitally participate in today's digital ecosystems, from marketing and advertising networks to Advanced Driver Assistance Systems (ADAS) and smart cities. The number of connected devices[6] representing the IoT ecosystem is expected to reach 25 billion by 2025, generating more than 1.4 billion 5G connections by 2025. Powered by 5G, this connectivity extends beyond personal smart homes and enables a complete ecosystem of connectivity among communities, the government, commerce, hospitals, and neighboring cities. As the connectivity layer for IoT and the edge, telcos are an integral piece of the puzzle. Beyond managing the connectivity requirements for billions of connected devices, CSPs are ideally positioned to provide end-to-end IoT solutions to collect streaming data while processing, storing, analyzing, and serving that data and resulting intelligence back to their customers.

Those ecosystems are all hungry for data. Sharing data in those ecosystems can be lucrative, but it also presents a risk. Making sure that API access is controlled through common rules across data sets protects the business from inappropriate data access. In addition, dependable governance on the data de-risks innovative data sharing ventures and opens up new opportunities for service and business innovation.

Data Monetization

In the IoT ecosystem, CSPs have a unique advantage in that they have access to wide varieties and ever-increasing sources of data, like subscriber demographics, network usage, device usage, application usage, location, and subscriber preferences. Given the data at their disposal, CSPs are mining, modeling, aggregating, and anonymizing these data sets to create powerful analytics that can be of significant value. By combining customer location information with customer demographics and preferences, CSPs can provide data analytics as a service (DAaaS) to key customer-facing verticals like retail, financial services, advertising, healthcare, and public services.

25B

Number of connected devices representing the IoT ecosystem by 2025[6]

CSP Customer Successes

LG U+

LG Uplus is one of the first telecommunication providers to commercialize 5G services, with a focus on bringing innovative services to its customers and enhancing the work efficiency of network workers since 2019. With Cloudera's data platform as its foundation, LG Uplus established the Network Real-time Analytic Platform (NRAP), which includes the necessary infrastructure to collect and analyze large-scale big data in real-time, from Mobile devices to the service equipment of the telecommunication company.

What is NRAP

The NRAP improves data utilization and analysis accuracy by providing data lake and data warehouse capabilities that include the processing and transmission of terabytes of data within a few seconds to the integrated Network Management System (NMS). With the real-time data processing capability of NRAP, LG Uplus has been able to achieve business benefits such as improving the customer center's customer quality response time and pushing the service-based network quality monitoring level to near real-time, thereby improving customer satisfaction and reducing the overall amount of fieldwork. With an integrated platform that supports real-time quality monitoring and analysis of network services, LG Uplus collects and categorizes data by type and monitors it on a single dashboard to reduce overall network operation costs and improve work efficiency.

Results

Rolled out as a pilot at the time when 5G services first went commercial, the NRAP now manages hundreds of types and hundreds of terabytes of data generated daily from telecommunication network services, enabling LG Uplus to gain meaningful insights from the data and manage services for a total of 20 million users in South Korea. Using the NRAP, LG Uplus continues to power the next-generation network operating system and secure data competitiveness to support digital transformation in response to the post-COVID19 era that LG Group is actively promoting.

"In pursuit of our vision of 'A Digital Innovator that Brings Joy to Customers' Daily Lives,' LG Uplus became the world's first telecommunication company to launch 5G services to respond to the evolving needs of customers. By building NRAP with Cloudera, we were able to gain confidence in using and analyzing data. This enabled us to improve operational efficiency and provide fast and reliable 5G services, thereby reducing network operating costs and increasing customer satisfaction."

Jin-Soo Jang, Manager of the NMS Development Team, LG Uplus

CSP Customer Successes, continued

Deutsche Telekom

Challenge

Preventing network fraud is a major challenge for telcos including Deutsche Telekom, a leading European telecommunications provider delivering services to more than 150 million customers globally. The volumes of network data that must be collected and analyzed are massive, and inability to respond in near-real time to suspicious events can be catastrophic. To better identify fraud patterns, Deutsche Telekom fraud analysts needed the ability to capture and analyze a greater volume of network data. The data they did collect was captured in silos, which limited visibility and made machine learning at scale impossible. Additionally, by creating an enterprise view of data — from network data to CRM data — Deutsche Telekom could also better understand its customers and address service quality issues earlier to improve customer satisfaction.

Solution

By applying machine learning and artificial intelligence, the company identifies network problems before customers notice them and can detect fraud patterns and real-time threats before the business is affected.

Results

Deutsche Telekom's modern data platform is driving tangible results across the business:

- **Reduced fraud:** Deutsche Telekom leverages large-scale, high-speed data processing and interactive querying within Cloudera to improve network quality and detect fraudulent activities in real time. Deutsche Telekom estimates this visibility helps reduce revenue loss caused by fraud activities by 10 to 20 percent.
- **Better customer satisfaction:** They have a deeper understanding of customer needs and desires. Deutsche Telekom has built a single enterprise view of customers, which has led to more targeted campaigns, generating revenues by the tens of millions of Euros while also reducing customer churn by five to 10 percent.
- **Improved operational efficiencies:** The business is moving faster with the modern data platform in place, and overall operational efficiencies have improved by 50 percent as a result.

"Sometimes you can see periods of low fraud activity, but suddenly there might be a peak which means hundreds of thousands of Euros lost within a day."

Ondrej Machacek, Senior Manager of Architecture and Integration, Deutsche Telekom

Driving CSP Industry Collaboration and Standards

Cloudera is now a contributing member of the TM Forum, an alliance of 850+ global companies working together to break down technology and cultural barriers between digital service providers, technology suppliers, consultancies, and systems integrators.

Through its Open Digital Architecture and AI & Data initiatives in particular, the TM Forum offers service providers the perfect environment to collaborate on best practices, drive interoperability, and share approaches to these opportunities. The catalyst program offers opportunities to collaborate with partners and service providers in new and evolving areas like 5G assurance, and virtualized network orchestration. Digital ecosystem design continues to evolve in different geographies and under alternate regulatory environments, but common challenges across service providers center on API structures and business models, where the Forum offers an opportunity to come together.

CLOUD NATIVE IT & AGILITY

Providing the architecture and frameworks to enable plug-and-play IT and networks

AI, DATA & INSIGHTS

Reducing risk and governing AI & Data to manage and monetize AI opportunities at scale

AUTONOMOUS OPERATIONS

Making zero-touch operations a reality by unlocking the possibilities of 5G and enabling end-to-end automation

BEYOND CONNECTIVITY

Unleashing growth by delivering future-fit connectivity and unlocking partnering at scale

CUSTOMER EXPERIENCE

Delivering deeply rewarding customer experiences to grow confidence, revenue, and loyalty

HUMAN FACTOR

Changing mindsets to transform business, striking the balance between automation, people, and culture

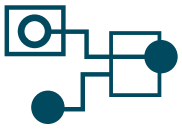
Conclusion

Telecoms across the globe are reimagining themselves within a digitally transformed future. Central to that future is leveraging a data tsunami resulting from newly connected consumers, products, and processes. Within this context, hybrid data, hybrid architectures, open source solutions, and governance and security have taken on a critical new importance. Leading companies, recognizing this, are seeking modern data management technologies to address this reality, and are increasingly looking to open source communities for innovation and answers.

Would you like to learn more, visit us at cloudera.com/telecommunications for more information.

We deliver a Hybrid Data Platform for any data, anywhere, from the Edge to AI.

HYBRID & MULTI-CLOUD



MULTI-FUNCTION

SECURE & GOVERNED

OPEN & EXTENSIBLE

Cloudera is deeply involved in helping companies succeed in the digital transformation journey serving many industries, such as Communications, Media & Entertainment, Insurance, Financial Services, Manufacturing, Retail, and Public Sector.

Learn more at cloudera.com or if you are seeking support in any of these areas or simply want to better understand how Cloudera can support you with data management and analytics, contact us today.

About Cloudera

At Cloudera, we believe that data can make what is impossible today, possible tomorrow. We empower people to transform complex data into clear and actionable insights. Cloudera delivers an enterprise data cloud for any data, anywhere, from the Edge to AI. Powered by the relentless innovation of the open source community, Cloudera advances digital transformation for the world's largest enterprises.

Learn more at cloudera.com | US: +1 888 789 1488 | Outside the US: +1 650 362 0488

Sources

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