The Telecom and Communications Services Provider Data Imperative

How to Enable Transformation for Modern Telecommunications Infrastructure

AEROSPIKE

www.aerospike.com/telecom/

Contents

AEROSPIKE

The Industry is Changing: More Users, Devices, Data, & Traffic

With 42 billion Internet of Things (IoT) devices expected to generate 80 zettabytes of data by 2025[1] and 5 billion mobile phone users currently generating 2.5 exabytes of data daily[2], it is no surprise that **95% of businesses cite the need to manage unstructured data as a serious problem for their businesses[1].**

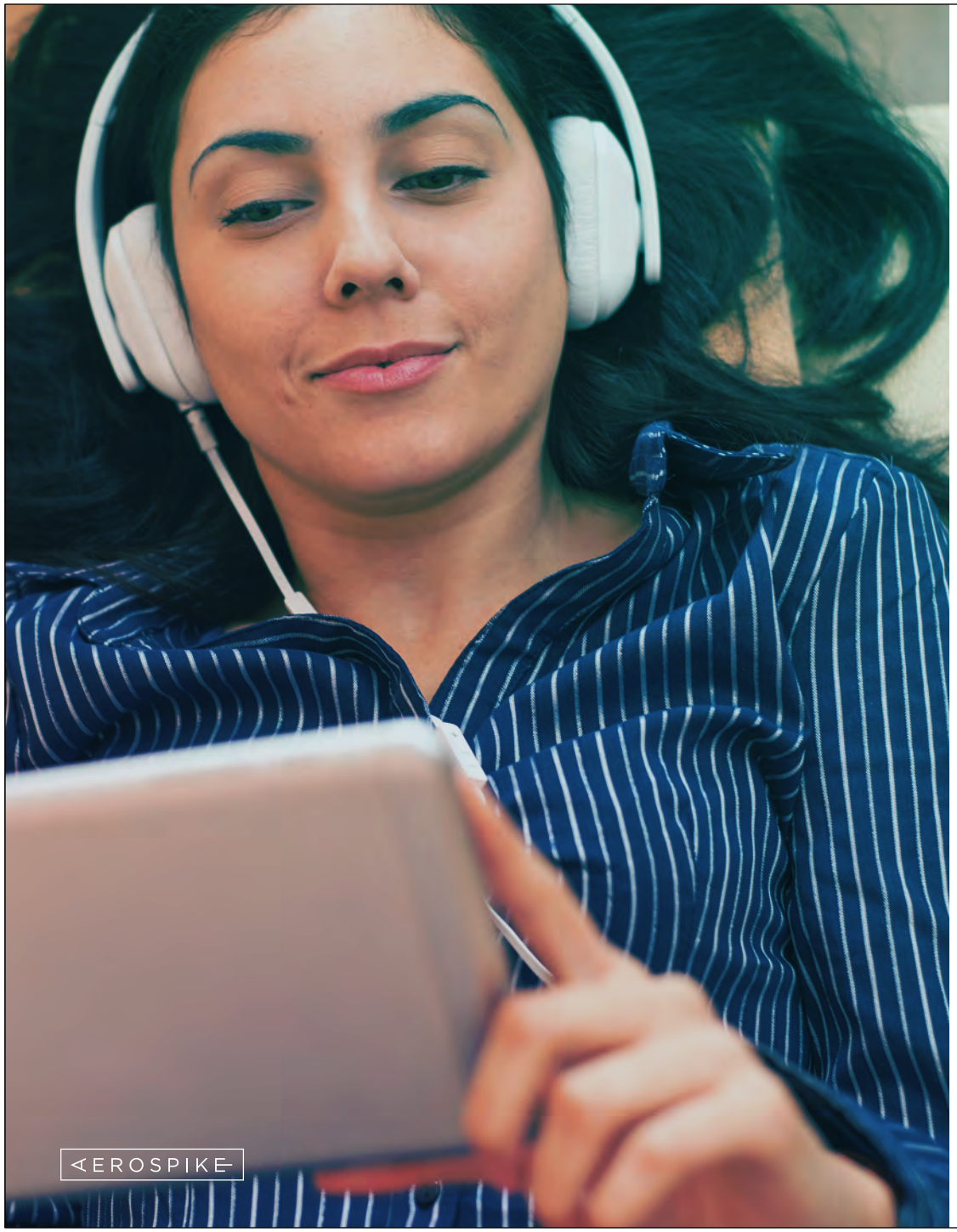
Poor data quality leads to poor decision-making, creating mistrust or churn between consumers and providers and brands.[1]

One of the biggest technology trends that is transforming Telecoms and CSPs is the ultra-low latency and improved data rates associated with 5G. These advanced capabilities bring network slicing, opening the door to net-new services with improved SLAs and higher profit margins.[3]

[1] 25+ Impressive Big Data Statistics for 2020

[2] How Much Data Is Created Every Day? [27 Staggering Stats]

[3] The 7 Biggest Technology Trends That Will Transform Telecoms In 2020



The Telecom and Communications Services Provider Data Imperative

There is a massive amount of streaming data coming in from mobile, business usage, 5G, and IoT sensor applications, and in the very near future: AR/VR applications and driverless cars.

The challenge is to manage, leverage, and analyze this data across silos, optimizing new investments in modern infrastructure and applications, and to provide the best customer experience - all at real-time speeds.

Net-net: The Telecoms and Communication Service Providers (CSPs) that provide the best customer experience will retain and grow their customer base and revenues.

Data Imperative Key Areas/Nexus of Forces

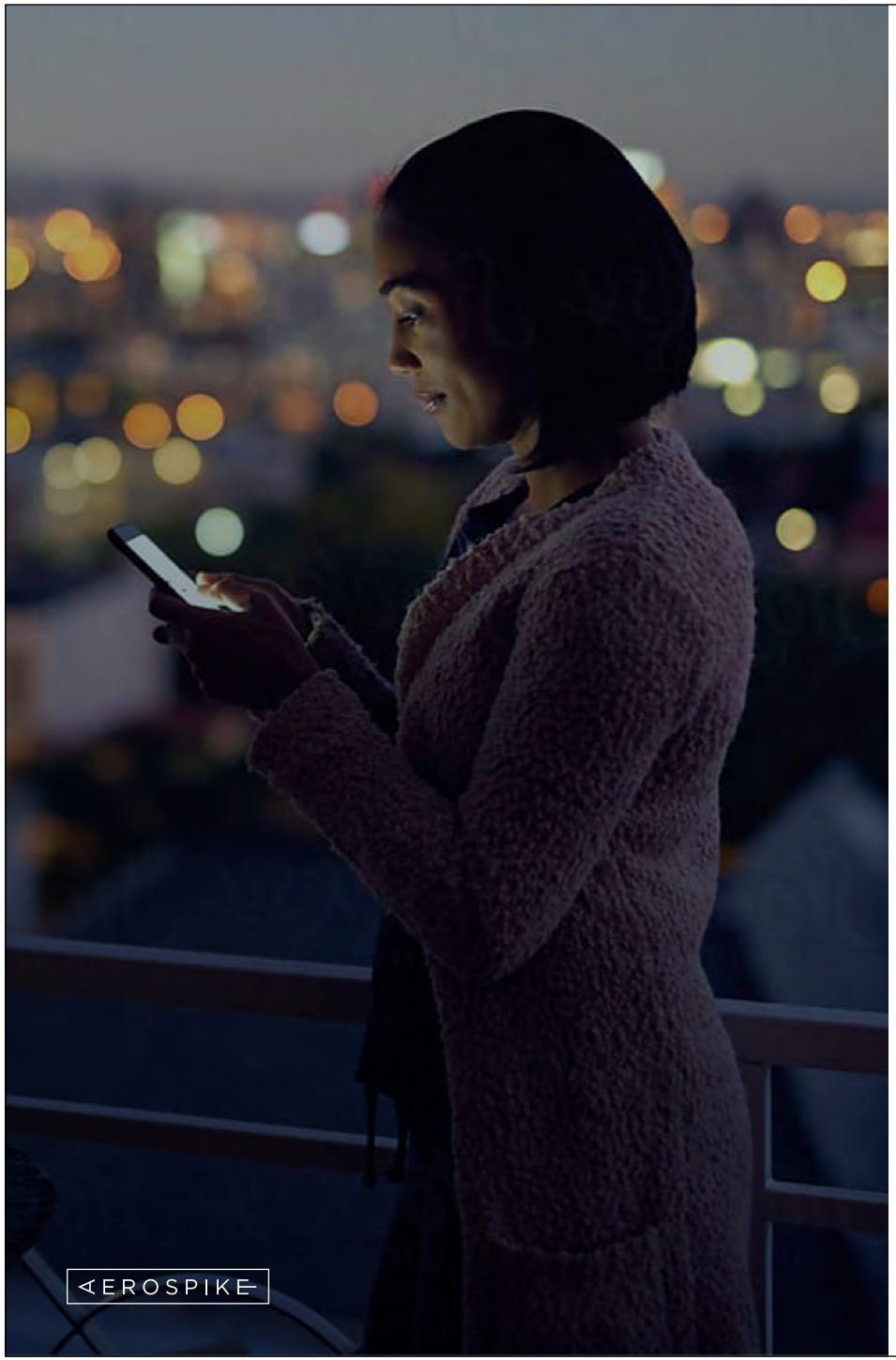
Given the challenges Telecoms and CSPs face in managing their data, it will be important for them to account for all the sources and disparate technologies (both new and legacy). These include:

Customer Data: In today's hyper-competitive economy, market share goes to those who develop and maintain warm, intelligent personalized relationships with their customers. The balance of power has shifted to customers in a profound way, and personalization, as a result, has become a critical differentiator.

CSPs need massively parallel low latency databases that can help simplify, collect and consolidate huge amounts of data at terabyte - petabyte scale in real time from all online and offline customer data sources so that a dynamic customer profile can be created with a single 360-degree view.

Artificial intelligence/machine learning (AI/ML) models at scale need to be applied to the data to predict customer needs and provide an optimal customer experience. There is no better way to deliver a superior customer experience than through personalization.

Continued on next page.



Technology: SPs are embracing fifth generation mobile networks (5G) that will provide more capacity and a higher density of mobile broadband. SPs are also moving to architectures based on Software-Defined Networking (SDN), Network Function Virtualization (NFV), ORAN, VRAN combined with hybrid operating models.

Industry Standards: 5G, SDN, NFV, VRAN, ORAN and SD-WAN are being driven primarily to increase capacity, develop autonomous networks, provide lower latency and self-healing network capabilities. At the same time, the industry is facing significant regulatory changes pertaining to issues such as net neutrality, data protection (GDPR), spectrum frameworks, as well as roaming and termination rules.

Business Models & Revenue Sources: SPs are also shifting their focus from boosting pure speed to improving their ability to handle many connections concurrently with 5G network slicing, within the same cell while maintaining low latency and better SLAs that lead to improved revenue streams.

This opens the way for other business drivers with microservices including offering Online Gaming, Streaming Media, Personalized Advertising, Online Charging & Billing Systems with self service capabilities that grow highly profitable revenue.

Transformation Relies on Data Access Spanning Silos

Because subscribers are constantly connected to their networks, they generate vast amounts of valuable operational data. Not unlike social media giant Facebook or search giant Google, Telecoms realize that ***this gold mine of data can be strategically leveraged with big data architectures and advanced analytics capabilities.***

However, in order to effectively use this data to provide a true Customer 360 experience, ***silos must be eliminated in key areas like billing, policy, charging and usage to be successful.***

Especially crucial to success is the ability to enable real-time usage of data from fast proliferating 5G - which demands more data scalability with the five or six 9s of reliability or no downtime with millisecond latency.

Data at Scale Will Transform the Traditional Elements of the Telecom Business

Telecoms that want to gain customers and their share of wallet can no longer afford to do business as usual. Thus, they need to transform areas of their business by enabling and analyzing a massive scale of data in real-time, often with machine learning, to transform (and thus improve) their:

AEROSPIKE

Fraud Prevention: Prevent unauthorized account access for TV, Internet, and mobile usage and services, or cloning of TV and networking devices.

Customer 360 and Churn Prevention: Delight each customer intelligently and contextually for a completely personalized customer engagement model across channels to create a segment of one. Identify customer events and patterns as they happen that can otherwise cause customers to be unhappy and leave.

Real-Time Charging and Policy Management: Personalize customer experience for rating, discounting, promotions and settlements across networks.

Real-Time Billing, Home Subscriber Server and Unified Data Management: 5G and IoT Telecom billing systems gain a new and special role in facilitating new revenue services that are based on ever-changing customer needs which can be service agnostic and need to be monetized efficiently with massive amounts of data.

Network Optimization and Capacity Planning

Ensure better Quality-of-Service by analyzing network traffic with AI/ML models in real time and fixing network problems in an automated way on the spot as they happen utilizing SDN, VFN, SD-WAN and O-RAN technologies.

Real-Time Decisioning Spearheads the Transformation

By leveraging real-time AI/ML decision analysis into transactions, SPs are achieving transformation across three core areas. With higher amounts of data coming in from more applications and devices powered by 5G bandwidths, artificial intelligence and machine learning has more data to leverage.

Analyzing "more data, faster" will lead to better outcomes for:

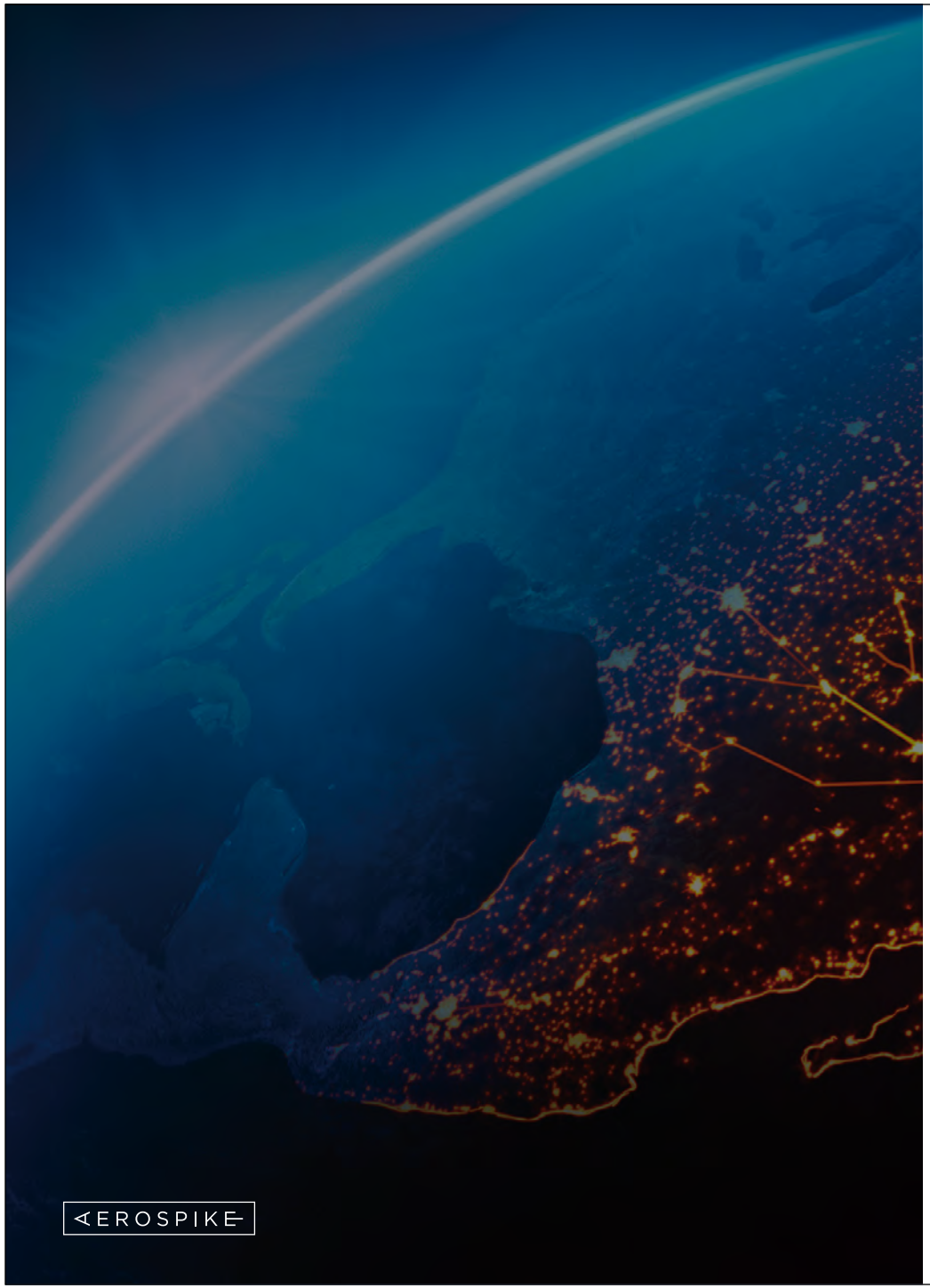
1. **Network Transformation:** Dynamically manage and optimize network resources to deliver the best user experience at the lowest cost.

2. **Customer-centricity:** Keep the customer at the core to reduce churn, provide the best support, market the right products, and foster revenue.

3. **Digital Innovation:** Promote new business models through hyper-personalization and manage data in real-time across a multitude of channels.

According to Gartner, Analytics and AI are the key to maintaining free cash flow from traditional telecommunications services since the automation capabilities improve operational efficiency and drive down costs.[4]

[4] Gartner: Top 10 Trends for Communications Service Providers (CSPs)



New Opportunities in the Telecom Value Chain

To move beyond merely being a data or infrastructure provider and become a true Service Provider and Digital Service Provider, Telecoms can move into adjacent data-intense services and offerings to gain value:

Real time Ad Tech: Mobile operators have huge mobile networks with massive amounts of customer data that can be leveraged to create new revenue streams and offers from their partners and customers with opt-in users.

Fraud Detection and Prevention Service: To help secure payments, TV and Internet access, calls and service authentication, illegal access, authorization, fake profiles, cloning of devices or services and behavioral fraud that can drain profitability.

Continued on next page.

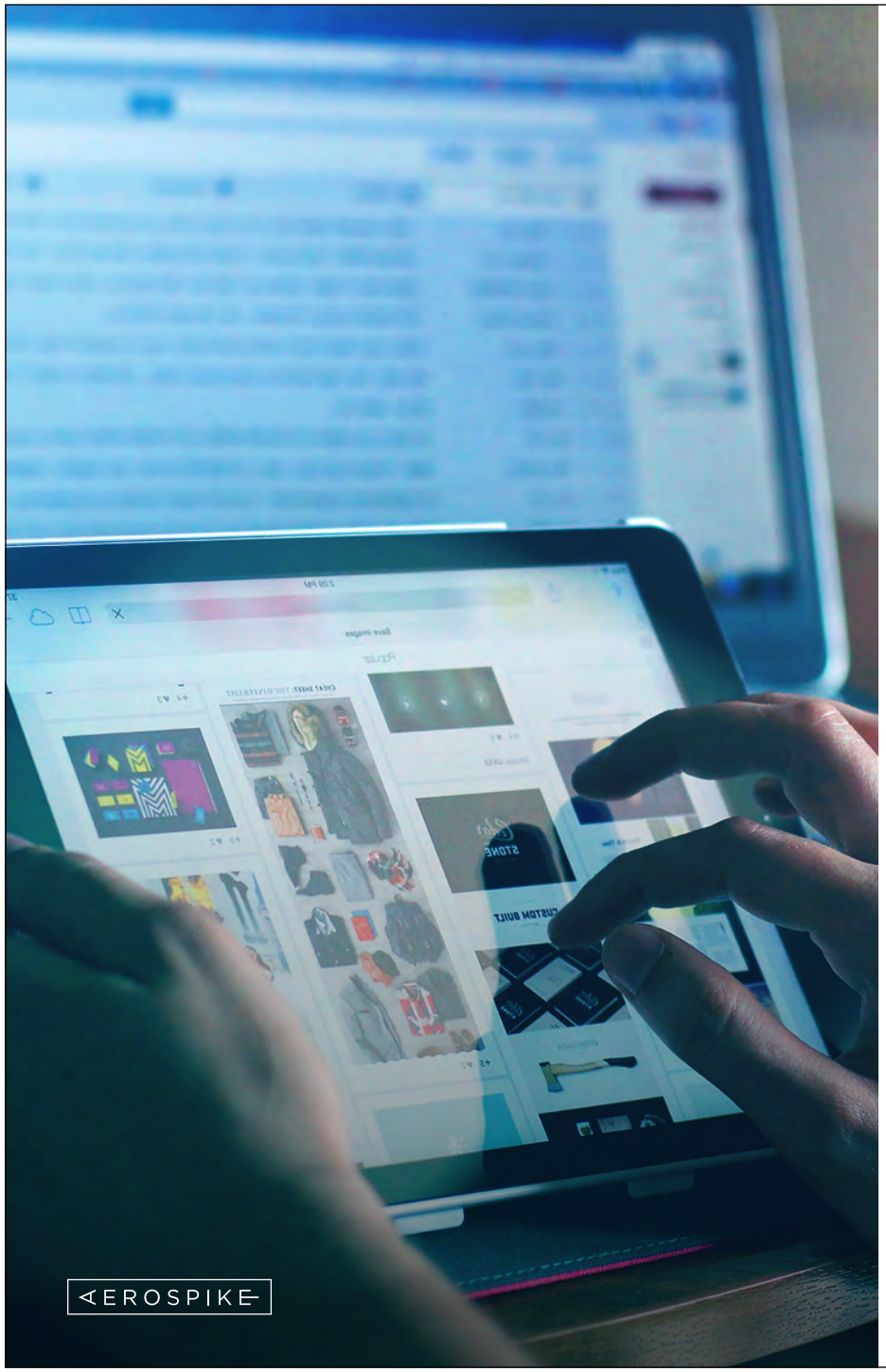
New Opportunities in the Telecom Value Chain (Continued)

Real-Time Payments: Successful real-time payments, whether peer-to-peer, B2B, or B2C with a fraud prevention service on top, accelerate customers sending and receiving funds.

Over-the-Top (OTT): The delivery of real-time, on-demand media content, services and applications over the internet in association with partners like Netflix, Amazon Prime and new CSP services.

Legalized Sports Betting: Represents an entirely new growth opportunity for telecoms and companies in the media and entertainment ecosystem.

Online Real-Time ML Chatbots: Improve customer service response times by being up-and-running 24x7x365 and reduce overhead costs while increasing customer satisfaction. Increase revenues with event-based chatbot solutions to upsell and cross sell products.



Edge Computing: Situational Analysis with Data Locality at the Edge

The dramatic changes in network traffic brought on by the pandemic of 2020 accelerate a shift that was already underway—namely, the development of more edge computing.

Edge computing preserves bandwidth and increases efficiency by processing information closer to the users and devices that require them rather than sending them to more central locations in the cloud.

Advances in artificial intelligence, machine learning, and database architectures require these data systems to converge. Analytics must be integrated with transactional processes to foster real-time decisioning.

By applying analysis to data at the edge, individual transactions can result in better business outcomes sooner at sub millisecond speeds. New 5G and IoT services, personalized products and services, more engaging customer experiences, threat detection, and fraud prevention are among the transactional outcomes that can ultimately grow revenues, increase customer loyalty, and reduce risk.

Real-Time System of Insight = Systems of Record + System of Engagement

To fulfill the promise of leveraging transactional analytics to achieve better business outcomes, an entirely new model is required — one that combines the virtues of transactional systems of record and analytics systems; and takes advantage of the data available to make the best decisions using AI/ML capabilities.

Forrester Research analyst Josh Hopperman describes the real-time combination of the System of Record (SoR) and the System of Engagement (SoE) as a Real Time "System of Insight": contextual, mobile, location-aware, and embedded in the way businesses interact.[5]

These new systems focus on subscribers and services, not processes, and harness a perfect storm of mobile, social, cloud, and big data innovation. The user experience is delivered in the context of having an improved end user experience through high quality consistent network service behavior.

[5] AI Innovation in Digital Banking

Capabilities Required for Telecom Transactional Analytics

There are several fundamental requirements for modern Telecom transactional analytics systems.

These include the ability to:

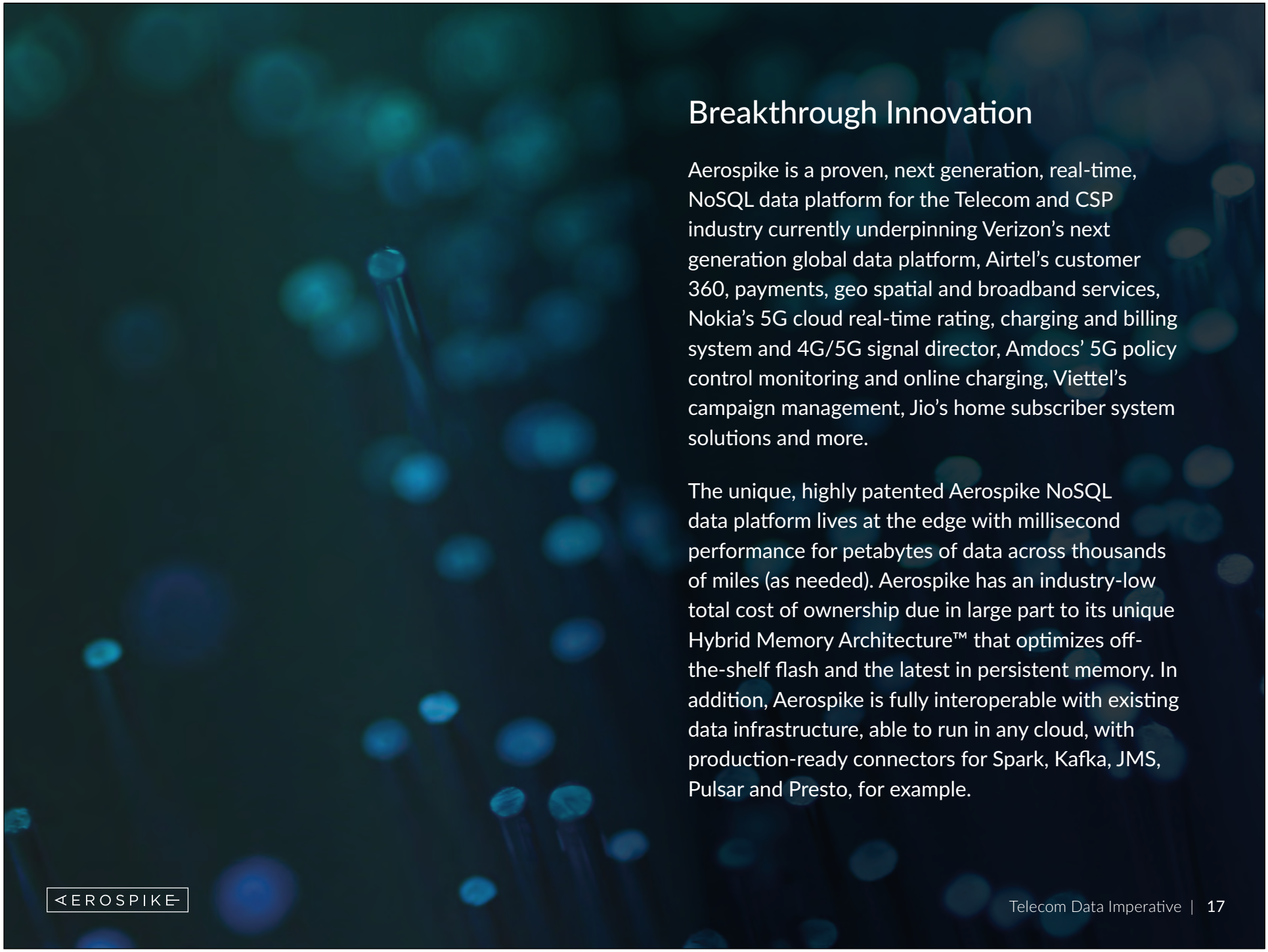
- continuously ingest, correlate, and analyze structured and unstructured data
- analyze data in real time, make decisions, and take actions instantaneously — during a transaction
- move data and decision points to the edge of the network for faster, better, and lower cost execution
- scale to hundreds of millions or billions of transactions across hundreds of millions of subscribers; handling petabytes of data

AEROSPIKE

Sustained Reliability at Scale is Essential

Prevailing relational databases that employ NoSQL databases as a caching layer on top for high performance (typically as RAM-based, in-memory systems) often fail, particularly when unanticipated peak loads occur. Without warning, response times can become unacceptable, latencies spike, data can get lost, errors in data accuracy can occur, and systems can become unavailable.

What is needed is a modernized database architecture designed for real-time decision-making that can power Systems of Engagement that work in concert with Systems of Record with predictable performance — at any scale, with a low total cost of ownership.



Breakthrough Innovation

Aerospike is a proven, next generation, real-time, NoSQL data platform for the Telecom and CSP industry currently underpinning Verizon's next generation global data platform, Airtel's customer 360, payments, geo spatial and broadband services, Nokia's 5G cloud real-time rating, charging and billing system and 4G/5G signal director, Amdocs' 5G policy control monitoring and online charging, Viettel's campaign management, Jio's home subscriber system solutions and more.

The unique, highly patented Aerospike NoSQL data platform lives at the edge with millisecond performance for petabytes of data across thousands of miles (as needed). Aerospike has an industry-low total cost of ownership due in large part to its unique Hybrid Memory Architecture™ that optimizes off-the-shelf flash and the latest in persistent memory. In addition, Aerospike is fully interoperable with existing data infrastructure, able to run in any cloud, with production-ready connectors for Spark, Kafka, JMS, Pulsar and Presto, for example.

Aerospike is known as the world's fastest and lowest latency database at terabyte and petabyte scale at ⅓ the cost of other database infrastructures.

Aerospike's patented Hybrid Memory Architecture™ delivers an unmatched competitive advantage by unlocking the full potential of modern hardware, delivering previously unimaginable performance and value from vast amounts of data at the edge, to the core and in the cloud.

AEROSPIKE

Aerospike combines performance with predictability and strong consistency with the ability to readily scale up and out and work in multi cloud deployments at internet scale. Aerospike's Hybrid Memory Architecture provides lower latency, simpler architecture and higher throughput than all other database architectures. Robust clustering and high availability make it ideal for mission critical use cases that require strict SLAs on latency. Aerospike's industries lowest TCO benefits can be compounded by additional savings and extra business benefits which are realized due to the ability to get more data, faster to enable better business outcomes sooner.

Aerospike can process streaming data from multiple sources and combine with existing system-of-record data for real-time analysis and decisioning. This makes Aerospike ideal for real time applications such as OSS/BSS, Rating & Charging, Billing, Fraud Prevention, Customer 360, Payments, AI/ML based applications, HSS/UDM, AdTech, Mainframe Offloading, MEC, Network Optimization, as well as mission critical customer revenue-generating applications.

Learn More

If you are an application developer, technical executive or a line of business leader interested in learning more about how Aerospike works and how it can benefit you or your customers' business, visit www.aerospike.com/telecom/.

About Aerospike

Aerospike is the global leader in next-generation, real-time NoSQL data solutions for any scale. Aerospike enterprises overcome seemingly impossible data bottlenecks to compete and win with a fraction of the infrastructure complexity and cost of legacy NoSQL databases. Aerospike's patented Hybrid Memory Architecture™ delivers an unbreakable competitive advantage by unlocking the full potential of modern hardware, delivering previously unimaginable value from vast amounts of data at the edge, to the core and in the cloud. Aerospike empowers customers to instantly fight fraud; dramatically increase shopping cart size; deploy global digital payment networks; and deliver instant, one-to-one personalization for millions of customers. Aerospike customers include Airtel, Banca d'Italia, Experian, Nielsen, PayPal, Snap, Verizon Media and Wayfair. The company is headquartered in Mountain View, Calif., with additional locations in London; Bengaluru, India; and Tel Aviv, Israel.