# Tips for Facing the 5G Revolution

By: Dheeraj Remella

From the humble beginnings of the World Wide Web to today's advances, we are now on the verge of reaching a wireless digital utopia where connectivity and new information are as simple as the proverbial touch of a fingertip. Some people believe, and will argue, that we are already there — with the fourth-generation broadband cellular network technology, more commonly known as 4G, reaching its maturity in market and consumer use. Innovation in technological advancement marches on, however, bannered by the highly anticipated 5G network.

Fundamentally different from any other network the telecommunications industry has ever seen before, 5G is marketed as the future of network communication with superiority over 4G in every conceivable way. 5G possesses astounding improvements in speed, capacity, and coverage over 4G—testing download speeds of up to 50 GBps and network operation in the 24GHz and higher frequency ranges. This means ultra-high capacity with extremely low latency and coverage range that is only limited to the provider's capability.

In the coming months, Communication Services Providers (CSPs) across the globe will be busy rolling out their 5G networks, promising data rates 100 times those of 4G, network latency of under 1 millisecond, support for 1 million devices per square kilometer, and 99.999 percent availability of the network. As a result, 5G will generate data at an unprecedented velocity and volume. This "fast data" will fuel a wide range of data-driven services and digital business models.

To capitalize on the 5G phenomenon, organizations must operationalize fast data in order to make informed business decisions in-event and in real-time. But even with all the noise around 5G, a surprisingly high number of telcos are unprepared. Upcoming proprietary research, which surveyed 176 respondents who work in the telco industry, found that 36 percent of telcos don't yet have initiatives in place to meet the real-time needs of 5G but are planning it, and 10 percent have no plans in the works at all. This statistic doesn't bode well for those that are unprepared—depending on adoption rates, the new features and benefits of 5G will result in a massive new strain on datacenter infrastructure. Over the next three years, IP traffic is going to triple, achieving 3.3 zettabytes globally by 2021. Telecom companies will most likely handle this problem by increasing their investment in bare-metal infrastructure, meaning more servers, faster memory, and increased compute resources. But across the board, the time to lay the foundation for this arguably unprecedented opportunity is right now.

# The Fast Data Imperative

Fast data refers to a velocity of data so high that legacy IT systems and database technologies cannot manage and effectively process it. 5G data will stream at significantly higher speeds, volumes, and at lower latency than ever before. Legacy database technologies were simply not designed to process the vast deluge of data generated by the 5G network core or the applications and use-cases that will be enabled by 5G. While NoSQL technologies address the scale problem better than legacy databases, they fall short on the ability to do meaningful work such as in-line or preventative decisions and ACID (data consistency) requirements.

The successful monetization of 5G necessitates new approaches and technologies, including a real-time actionable decisioning system to take advantage of the increased amount of data creating

information from the same. Applications will need to move away from traditional store-and-query models that were designed for batch processing to more intelligent stream processing database technologies that can take real-time decisions on incoming event data.

# Fast Data Challenges

Network Functions Virtualization (NFV) and Software Defined Networking (SDN) implemented as microservices are the primary enabling technologies and architectures adopted by CSPs to drive operational efficiency and agility and deliver new, profitable business models. However, another key piece of the new-business-model-monetization puzzle is generating value from all of the data that is available. 5G will support higher-than-ever connection densities: up to 1 million connected devices per .38 square miles, compared to around 2,000 connected devices per .38 square miles with 4G. 5G will also carry a lot more data and transfer it much faster than 4G. Faster network speed will allow these devices to be continuously connected and thus generate massive volumes of data streaming in. 5G-enabled applications and services will have to keep up by performing transactional processing and analytics on streaming data in real-time.

The business value of data diminishes as the data gets stale. This phenomenon is accentuated even further for 5G data processing, where a lag of even a few milliseconds could lead not just to a loss of revenue (in use cases such as customer experience management, customer churn, fraud detection and others), but potentially even be catastrophic (in IoT use cases such as self-driving cars). Real-time analysis for actionable decisions is going to become a mainstay in the era of 5G. Action-oriented decision making while the data is fresh is the next key differentiator for data-driven CSPs. Real-time now means milliseconds; 5G demands moving from post-event reconciliatory detection to in-event data-driven decision-making for prevention. If action is not taken immediately, the opportunity to monetize an event or prevent a fraudulent activity is lost.

Unlike 4G, 5G's service-based architecture and the control and user plan separation render themselves well for an end-to-end virtualization for enabling network slicing. Network slices can be created for specific applications or use cases with guarantees on quality of service such as throughput and latency. The dynamic policy management and accurate real-time decisions, whether for internal optimizations or thwarting external threats, need to be made in milliseconds to assure the QoS guarantees. A well-designed microservices implementation can facilitate this delivery. When considering separation of state and business logic, one needs to be mindful of the nature of business logic. With the latency constraints in mind, the application flow control logic needs to reside with the stateless service instances and the data-driven decision-making logic must reside with the data to avoid unnecessary movement of data, which puts strain on the network and fails to meet low-latency decision-making needs.

While 4G was introduced to meet the demand of the growing number of Internet-connected smartphones, 5G is expected to enable billions to trillions of connected devices powering IoT use cases. Sensor data from industrial equipment and products, such as buildings, utility meters, vehicles, residential devices, wearables, and more will be generated at volumes too large to transport and store in a centralized data center. Additionally, a vast number of Industrial IoT use cases, such as predictive maintenance, demand the processing of data in real-time, where risk of a delay can mean equipment downtime and loss of revenue. This demand for real-time, high-volume data processing can only be met by edge and fog computing.

# Data Management Requirements

Why is it going to be so challenging to make the most of 5G? The network demands software capabilities and methodologies that are new to CSPs and telecom software solution providers. Below are the critical data requirements for implementing and deploying the control plane elements:

- **High Throughput and Low Latency:** The unprecedented combination of high speed and low latency 5G promises will open the floodgates on data streaming in from fixed wireless,

IoT, Video on Demand, Virtual Reality, and other apps. Provisioning and completion decisions will need to scale with the new, higher data volumes that 5G enables.

- **Linear Scalability:** As a result of the vast multitudes of streaming data generated from not only 5G-enabled applications but also from the network, subscribers, enterprise users, network operators and call processing, it will be essential for the 5G database to scale linearly at a moment's notice while consistently maintaining the high performance and low latency requirements.
- **HA/DR/XDCR:** To maintain the network availability of 99.999 percent 5G promises, the data infrastructure powering the applications and microservices is expected to have High Availability (HA), geo-local routing across multiple geographies (XDCR), and Disaster Recovery (DR) for failover built-in. Geo-local workload routing with automatic synchronization is necessary to not incur the cost of WAN latency to a central data center.
- **Cloud-ready and Cloud-native:** CSPs and software solution providers must be prepared to fulfill all of 5G's fast data SLAs with one underlying data infrastructure. The only way to support the scale, elasticity, agility, responsiveness and rich software functionality required for 5G microservices is in the cloud, without compromising on data accuracy and correctness.

# The Solution: Real-Time Data Architecture for 5G

As it stands, there remain areas where 4G may provide all needed capacity for personal and even small business needs. However, AR and VR, smart cities, mobile gaming, and production and logistics, in addition to others, will all improve on 5G maximum capacity networks.

What is the difference? Scale and utility. As the much-anticipated network emerges, the need for real-time, actionable, decision-making is greater than ever before. With a real-time data architecture powering next-generation applications and microservices, organizations can monetize their fast data to create a competitive advantage, transforming their infrastructure from post-event to in-event and actionable.

The question is: is your business looking to upend its competition through technological dominance, or will you accept technological parity and see what the future holds?