5G AND THE CLOUD:
enabling the next wave of digital transformation
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INTRODUCTION: 5G AMPLIFIES THE POWER OF THE CLOUD
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Over the past few years, cloud computing has transformed the way entire industries operate and enabled organisations to accelerate digitalisation, turbo-boost productivity and efficiency, and even create entirely new and disruptive business models. The advent of 5G – the next generation of mobile network technology – now promises to dramatically amplify the disruptive effect of the cloud.

With theoretical data transmission speeds of up to 100 times faster than 4G, fifth generation wireless networks could bring high-performance cloud applications and infrastructure to markets currently underserved by fixed-line infrastructure. But that’s just the beginning. In the longer term, 5G will play a key role in enabling many of the key technologies that will underpin the Fourth Industrial Revolution.

From artificial intelligence (AI) to virtual reality to the Internet of Things—5G will deliver the dramatic improvements in speed and latency required to support the technologies powering the smart cars, buildings, and cities of the future. But in the background, the power of the cloud will be key to running this sophisticated and deeply interconnected infrastructure.

In this eBook, we explore how 5G will reshape the cloud landscape in the years ahead. Though 5G may displace the cloud in favour of edge computing for some applications, the volume of data these applications will generate will be immense. The demand for storage and computing power to manage rising data volumes could accelerate cloud investment and take cloud computing to new heights.
PEDAL TO THE METAL FOR CLOUD COMPUTING AND DIGITAL TRANSFORMATION
Cloud computing has come of age over the past five years, moving from an emerging model of technology ownership into a central pillar of most large enterprises' IT strategies. Around the world, organisations are using the cloud to reduce operating costs, enhance speed to market and transform their customer experience.

Government entities are using cloud infrastructure to deliver services to their citizens in a cost-effective way. Retailers, banks, and other consumer-facing companies are harnessing the power of the cloud to bring services to a mobile and digital customer base. And without the cloud, market disruptors like Uber, Netflix and Airbnb would not be able to rapidly scale into world-beating businesses.

Yet this is just the beginning – we can expect growth to accelerate as organisations' confidence in, and expectations of, the cloud grow. The public cloud market was worth $227.8 billion in 2019, and is set to grow 17% in 2020 to $266.4 billion, according to Gartner. In 2020, Gartner expects the software as a service (SaaS) segment to grow to $116 billion and infrastructure as a service (IaaS) to reach $50 billion.

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When it comes to South Africa and the rest of the continent, cloud adoption has lagged the pace of Europe and North America. Research firm Xalam Analytics says that public cloud providers accounted for only 5% of Africa’s total enterprise IT market in 2019, with revenue increasing 60% over the previous three years to about US$500 million.

But with major cloud providers such as Amazon and Microsoft launching locally hosted data centres in South Africa, that picture is changing fast. Xalam expects public cloud services revenue to triple to about US$1.5 billion in 2023. As the Financial Times puts it, there is a ‘data centre gold rush’ underway with international vendors funding a boom in the African market.

Citing data from Xalam Analytics, the Financial Times notes that Africa accounts for less than 1% total available global data centre capacity, despite having 17% of the world’s population. But capacity has doubled in the past three years as service providers have scrambled to service demand for computing services from enterprise software users and consumers alike.

Bringing data centres closer to customers in Africa is one factor that is expected to spur major growth in the market. Many South African companies that had concerns about data sovereignty, bandwidth and network latency are starting to take a closer look at public cloud services as part of a hybrid cloud strategy for their future.

And as in the rest of the world, organisations in Africa have needed to fast-track their digital transformation and cloud computing strategies to keep running throughout the Covid-19 pandemic. National lockdowns and the expectation of months, if not years of physical distancing, are expected to drive higher interest in remote working solutions such as virtual desktop infrastructure and SaaS.

This is the cloud’s time to shine, offering an opportunity for organisations to put its scalability, flexibility, and resilience to the test. But despite the proliferation of high-speed fibre and growing investments in data centre infrastructure, cloud adoption is held back by a lack of broadband connectivity in many parts of Africa. Enter 5G, the fifth generation of technologies supporting cellular data networks.
The next generation of mobile broadband
The next generation of mobile broadband

5G is the next evolution in mobile network technology, building on the already significant benefits of the 4G/LTE and 3G networks that proceeded it. The technology is still in its nascent stages of global adoption, but momentum is growing. Around 100 5G devices are already commercially available, with another 280 announced, and 5G networks are live in more than 24 countries.

What’s all the excitement about? The obvious place to start is with speed. Intel predicts that 5G networks theoretically could reach speeds of up to 10 Gbps, or a 100-fold increase over 4G. In the real world, the speeds might be a mere 20 times faster than 4G, but that’s still a significant enough improvement to be a gamechanger for the user experience.

Someone downloading a high-resolution movie could do so in a matter of seconds rather than several minutes. A user in a videoconference could see colleagues in crisp ultrahigh definition, making the experience closer to a real-world meeting. And in future, 5G could enable the streaming of virtual reality content for training and other purposes.

The latency improvements that 5G will offer are as significant as the speed boost. Latency refers to the delay between the time it takes for a packet of data to travel between network points—and reducing latency has been a key goal of each iteration of mobile network technology. 5G networks will have even lower latency than 4G/LTE, with the round-trip transmission of data taking less than five milliseconds.

In practical terms, this means people will be able to enjoy services such as voice-over-IP with less jitter, echoing and delay, and video streaming and videoconferencing with less glitching and jerkiness. It also opens potential to deploy more responsive Internet of Things (IoT) solutions or for precise remote control of devices such as drones, critical sensors in factories, self-driving cars, etc.

The third noteworthy benefit of 5G is capacity. In large urban centres, robust 5G networks will be able to support large numbers of people using bandwidth-intensive applications at the same time. Consider the example of thousands of people in a stadium using their smartphone to stream high-definition video, for example.
5G in South Africa and sub Saharan Africa

As exciting as 5G is, the road to the new technology is likely to be a long one for South Africa and the rest of the continent. The challenger mobile data network, Rain, is the first operator in South Africa with a commercial 5G network in operation. Rain has around 250 5G sites which already ‘pass’ 500,000 households, with plans to expand this network significantly during the year.

In early 2020, Liquid Telecom announced that it is launching a wholesale 5G network in South Africa. The operator says the network will offer connectivity up to 10 times faster than 4G, allowing businesses to harness trends such as IoT, robotics and AI so that they can innovate, increase productivity, and deliver more connected customer experiences.

Although MTN and Vodacom have piloted 5G, they have been waiting for Icasa to provide them with network spectrum so that they can move ahead with commercial deployment. Both operators are hoping to launch commercial 5G networks in 2020—with Vodacom leveraging Liquid’s wholesale network— but evolution is likely to be gradual, as was the transition to LTE/4G and 3G.

According to a report from the GSM Association, South Africa will lead sub Saharan Africa in 5G activity. The report says mass deployment and adoption of 5G in Sub-Saharan Africa are several years away because of the cost of 5G infrastructure. Adoption will most likely take the form of 5G fixed wireless access (FWA) points acting as hotspots, says GSMA.
5G AS AN ENABLER FOR THE NEXT GENERATION OF DIGITAL SERVICES
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As a step-change in the speed, latency and capacity of mobile broadband networks, 5G promises to take digital transformation to new heights and to support organisations’ migration towards the cloud. As a beginning, 5G could support the provision of high-speed broadband services in many parts of Africa where it was previously unviable.

While the technology is not seen as particularly suitable for remote, rural areas, it could be used to blanket higher density urban areas with fast Internet coverage. This could, in turn, make it more viable for companies to roll out digital apps and service for their customers and employees—enabling them to drive more productive remote and mobile workforces, and to deliver richer customer experiences.

But beyond this early use case, 5G is expected to be a major driver for Fourth Industrial Revolution applications in nearly every industry. 5G is the key to unlocking the potential of advanced robotics, autonomous vehicles, drones, and the Internet of Things. It will provide the network capacity to cater for the billions of devices that will be added to the Internet in the years to come.
5G will thus be key to building the smart cities, homes, university campuses, factories, hospitals and other technology ecosystems of the future. Fast and responsive 5G networks will allow interconnected devices to perform more automated processes, using artificial intelligence and machine learning to make operational decisions in real-time.

These devices will produce and use vast volumes of data as they execute processes. Some examples cited by Intel include houses that give personalised energy-saving suggestions, traffic lights that change their patterns based on traffic flow, and supply chain management processes that ensure just-in-time delivery of materials while using predictive maintenance to minimise work stoppages.
Edge computing will help to reduce traffic between the cloud and the billions of sensors, robots and devices in factories, warehouses, farms, plants and offices expected to be connected to the Internet of the future. Edge computing will reduce latency, allowing devices to respond faster and reducing congestion in networks.

Edge computing is not, however, meant to replace the cloud, but complement it in applications that are about rapid action in response to an operational need. For example, it can help improve response times for an industrial IoT application, such as adjusting factory equipment settings in response to temperature or moisture readings, or zooming a camera when a motion detector picks up movement.

But the cloud will still have an essential role to play in processing higher volumes of big data. The cloud will be used to aggregate data from computing nodes on the edge to provide operational and strategic insights. Cloud providers and enterprises will need to make significant investments in developing capacity to manage, store and analyse a deluge of data.
PREPARING FOR THE 5G REVOLUTION
Major cloud providers such as Google, Amazon Web Services and Microsoft are preparing for 5G to disrupt and transform the cloud computing industry in the years to come. In the US, Amazon Web Services and Verizon are partnering to bring 5G to edge computing in a service that aims to bring more machine learning to applications and cut latency.

Microsoft is showcasing a concept called Azure Edge Zones, which is all about enabling emerging IoT, edge and 5G scenarios via a managed Azure cloud service. And Google has shared a vision for enabling telecoms networks to deliver business services through 5G networks through the Global Mobile Edge Cloud (GMEC) strategy.

As these developments show, enterprises should already be thinking about how 5G will slot into their cloud computing and digital transformation strategies. The network technology could have a key role to play in next-generation solutions such as AI, IoT and robotics solutions—in addition to the part it will play in enabling new workforce and customer experiences.

CIOs can start by identifying areas where 5G can deliver better or faster performance for applications and services they are already running and those that they plan to deploy in the future. They should particularly identify areas where they could disrupt markets or face disruption from innovators that leverage 5G.
It may be helpful to speak to key cloud and telecom vendors to understand their 5G and edge computing roadmaps. As noted earlier in this paper, widespread deployment may loom three or five years in the future because of regulatory and cost challenges, so getting a view of where 5G will be available, when and at what scale is key to preparing.

In the interim, organisations can continue to prepare their own infrastructure and their cloud computing environments for the next wave of digital change. They can, for example, assess whether they have the big data analytics capabilities to cater for masses of data at higher velocities, the cybersecurity capabilities to support a remote workforce, and an architecture that allows for rapid adoption of innovative business solutions.

Has COVID-19 had an impact on 5G rollout

The spread of the Covid-19 pandemic across the world is playing havoc with many industries, including the telecoms industry, and specifically the rollout of 5G infrastructure.

Analysts are divided regarding the effect of the pandemic on the rollout of 5G networks, in that some are saying that it will not have a material influence on the rollout across the USA, whilst some equipment suppliers are reporting that 5G deployment is slowing.

In Europe, various auctions of the spectrums required for the deployment of 5G networks have been postponed because of the spread of the virus; and without spectrum, 5G rollout cannot continue.

Meanwhile, with China reportedly having beaten the coronavirus on its home territory, it has lifted restricted movement of its people and has reopened its factories. China Mobile, the country’s largest operator, awarded 5G contracts worth $5.2 billion to local suppliers Huawei and ZTE during March 2020. The country is also determined to build over 500,000 5G base stations by the end of 2020.

Conspiracy Theory:

There have been a number of attacks on mobile phone masts by conspiracy theorists in various places across Europe, where towers have been set alight or otherwise vandalised. Such attacks reportedly began in the UK and these actions have led mobile carriers to issue a joint statement requesting people to stop setting mobile towers alight. There is at least one record of such an attack on a tower in Birmingham (UK), despite the site not even providing 5G services. This attack severely disrupted vital 2G, 3G and 4G services in that area of the city.

In the meantime, experts have weighed in to provide scientific evidence that indicates there is no link between the spread of coronavirus and the 5G rollout.
CHOOSING A PARTNER FOR 5G, THE CLOUD AND BEYOND
As an enterprise migrates to the cloud and prepares for next-wave technologies such as 5G, the right technology partner can help it adopt an agile, digital-first approach to building processes, solving problems, and delivering services. Nebula has deep experience in collaborating with organisations to develop strategies for large-scale cloud transformation.

We have a strong track record in helping large enterprises to put in place an effective and efficient cloud environment and move towards a future-ready, high-performance technology environment. Our expertise lies in helping businesses to put in place the platforms they need to innovate and improve their operational readiness for the hybrid cloud.

When combined, our cloud identity, cloud management and technology expense management solutions facilitate a seamless transition to the cloud and smooth management of the technology backbone:

- **Identity:** Enterprises need a way to provide a consistent, centrally managed cloud identity across applications for internal and external users. Surge Identity uses modern protocols such as OAuth2.0 and OpenID Connect to simplify identity management and application security across hybrid cloud deployments. It offers an optimised user experience with single sign-on user journey and a standardised login experience across applications.

Surge Identity is compatible with social media accounts and with most identity providers, which allows for effortless sign-in flow. The software uses standards from solutions such as Identity Server and Azure AD to enable interoperability within apps. To reduce development time, Surge Identity offers secure API-to-app integration for consumption of on-premise business data and logic as well as webhook integration. The self-service portal offers a single source of user data.
• **Cloud platform:** Most IT departments are not yet prepared to satisfy digital business demands with a platform for current and future innovation. Our Surge Cloud Platform is a Digitalisation-as-a-Service cloud platform that helps IT to accelerate application development and cloud workload deployment in a hybrid cloud environment. It enables the deployment of decoupled, scalable applications and back-ends in the cloud with high availability and redundancy. We work with organisations to help them develop a clear pathway to the cloud that will not disrupt day to day operations or core business teams.

• **Technology expense management:** Technology management continues to be manual and disjointed, meaning that organisations lack insights into their technology usage, spend or performance. The result is wastage caused by overbilling, redundant infrastructure, poor usage management in place, bad governance, lack of skill capacity and an inability to track and monitor spending.

The Nebula OneView solution gives enterprises integrated, real-time visibility of, and full control over, their telecoms and cloud usage, spend and service provider performance with live reporting and analytics. This solution helps organisations to simplify their operating environments by automating complex tasks. It offers tight integration with service providers and third-party business systems, as well as automated data collection. Clients benefit from comprehensive reports and in-depth analyses about technology spending, usage, risks and performance, giving them the insights they need to optimise their environments.

Over the years, we have helped some of South Africa’s largest enterprises in industries such as oil & gas, retail and financial services, to automate complex IT and telecoms tasks and to simplify management of heterogeneous technology environments. Contact us to find out how we can help your organisation to accelerate innovation to meet the growing demands of the business and its customers.
To find out more about OneView™, please send an email to ContactUs@Nebula.co.za with “OneView” in the subject line, and a Nebula staff member will contact you.

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