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TECHNOLOGY
Devouring Data:
5G, Edge Computing
& the Future of
Data Centers
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Devouring Data: 5G, Edge Computing & the Future of Data Centers

Foreword

Economies

5G, edge computing, and the resulting explosion of IoT will necessitate the creation of new data centers at a local level. The opportunities for genuine innovation for businesses across all verticals, as well as the economy at large, are huge.

But with significant opportunities comes significant challenges:
(to name a few)

- Information security
- Data center power consumption
- Industry regulation

In this short eBook, we pool the knowledge of some of the UK's most experienced commentators on 5G, IoT, and edge computing to discuss how the data center landscape may shift between now and 2025.

Devouring Data: 5G, Edge Computing & the Future of Data Centers

Contributors

This short eBook has been compiled by five experts in information technology, IoT, and edge computing.

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Rob is the Director of Marketing & Technical Services at Kingston Technology, and has been with the company since 1996. In his role, Rob is responsible for overseeing PR, Social Media, Channel Marketing with Digital Marketing Media, and Creative for all Kingston brands and products.

Pasi Siukonen
@Pasi_Kingston

Pasi is responsible for leading a team of experts supporting Kingston departments such as PR, Marketing, Field Sales, Technical Support, and Customer Service on Kingston products. His primary product focus is the Flash and SSD product lines.

Neil Cattermull
@NeilCattermull

Tech public speaker, ranked as a global cloud tech influencer and leading independent analyst. Program manager and business troubleshooter consultant to 100s of technical organizations!

Miriam Brown
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B2B Strategic Marketing Manager at Kingston Technology and with the company since 1997. In her role, Miriam is responsible for the marketing strategy, content, and campaigns for all Kingston B2B products.

Sally Eaves
@sallyeaves

Prof. Sally Eaves has been described as the "torchbearer for ethical tech." She brings a depth of experience from Chief Executive Officer and Chief Technology Officer roles, as a Professor in Emergent Technologies, and as a Global Strategic Adviser. Sally is an award-winning international keynote speaker, author, researcher, and influencer sharing original and authentic thought leadership.

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Consumers have developed an insatiable demand for the digital world.

Social media, streaming services, cloud storage. We live in an era of digital on demand and have the Netflix addiction to prove it. With data being devoured like never before, satisfying the hunger requires data centers. Lots of them.

That's good news for the economy. By facilitating the provision of digital services, each new data center is calculated at adding an average of £473m to the UK economy[1]. By 2025 it's predicted that UK data centers will be storing data worth just over £102bn annually[1]. The key piece in the puzzle is the widespread rollout of 5G.

It's no overstatement to say that it will transform the digital landscape.

5G is coming...

5G isn't just a step up from 4G. It's a rocket-propelled surge towards the stratosphere. 5G speeds will be between 100[2] and 800[3] times faster than existing networks. This future is fast approaching, with 5G rollout in the UK expected towards the end of 2020. And it will facilitate the dawn of a new era where everything is connected.

5G and IoT

5G is the gateway through which IoT will finally take off. That's because it provides the necessary infrastructure to carry huge data loads for a smarter and more connected world. Experts have predicted that 75 billion IoT endpoints will be connected by 2025[4].

Rob Allen
@Rob_A_kingston
Director of Marketing & Technical Services, Kingston Technology

"We're moving into what I would class as another industrial revolution in terms of economic impact and importance."

1. Digital Economy: UK Data Centers Will Be Worth $135bn By 2025 data-economy.com/uk-data-centres-will-be-worth-135bn-by-2025 [accessed 09.12.19]
2. University of Sussex: 100 times faster broadband is coming: 5G passes first test ScienceDaily. ScienceDaily, 5 July 2018. www.sciencedaily.com/releases/2018/07/180705110036.htm
3. FierceWireless: Verizon 5G performs over 800% faster than LTE, Speedtest data shows www.fiercewireless.com/5g/verizon-5g-performs-over-800-faster-than-lte-speedtest-data-shows [accessed 09.12.19]
4. Statista: Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 (in billions) www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide [accessed 09.12.19]

Section 1 – What's Driving the Growth of Data Centers?

Moving towards edge computing

Edge computing brings computation, data storage, and data analysis closer to the location that it's actually needed. That dramatically reduces response times, resolves latency problems, and reduces demands on bandwidth. To illustrate why this is important, we need only look to the approaching era of autonomous vehicles. Reducing latency, for example, from a few hundred milliseconds to one millisecond is crucial when data processing speed must be as near to instantaneous as possible.

Sally Eaves
@sallyeaves
CEO & Director,
Sally Eaves Technology

"Edge computing and 5G are mutually dependent. If we don't have everything synergistic with the 5G side of things, we're not going to benefit."

Yet autonomous vehicles are just one field driving the demand for edge computing. Everything from smart parking to automated traffic management, health monitoring, air pollution monitoring, autonomous streetlights, and a whole lot more depends on the arrival of edge computing. And as soon as 5G is here we will see rapidly increasing examples of edge computing in action.

Section 2 – Edge Computing and its Impact on Data Centers

Data centers and digital technology are in a perpetual dance.

The more demand for digital services grows, the more pressure is exerted on data centers. The more data centers are built, the more digital services can be provisioned. And so on, ad infinitum. Yet the arrival of 5G and edge computing will place more demand on data centers than ever before. So, what does the future look like?

What are the advantages of edge computing?

The advantages of 5G and edge computing are transformative. We have already noted how it will facilitate the era of autonomous vehicles. But that really is just the start. For example, 5G and edge computing will make it possible to monitor elderly people at home, with wearable tech that alerts neighbors, family members, or carers to a fall.

Or how about the opportunity for physicians to monitor a patient's vital signs while they convalesce at home? Or home toilets that analyze waste samples and detect developing illness and disease to enable people to take preventative medical measures. With 5G and edge computing, the smart cities we have read so much about—with automated traffic management, smart parking, optimized trash collection, automated streetlighting, and more—will have a fertile seedbed in which to grow. As for agriculture, it will be possible to use real-time data to optimize crop production and animal health, while deploying drones to fertilize crops.

By bringing more computing power to the edge it's going to be possible to create technological concepts that we haven't even imagined yet. the opportunities are limited only by the capacity of human imagination.

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"Data centers are growing astronomically, and this will further enhance services that can be provided to the customer."

Sally Eaves
@sallyeaves

CEO & Director, Sally Eaves Technology

"Barcelona is doing some great work with technology. What I like is the fact that they're engaging the citizens. They've got a lot of pilot projects that have been generated from the community up, rather than the other way around."

"By 2025, something like a fifth of data will be processed on the edge. If we can do real-time data analytics on the edge, that has got to be one of the biggest advantages."

Section 2 – Edge Computing and its Impact on Data Centers

Continued...

How will edge computing change the data center landscape?

As we imagine more and more applications for edge computing, it will inevitably create more data. More data means more demand for data centers. That, however, doesn't necessarily mean the creation of huge warehouses with thousands of rows of servers. The future is one of small data centers that serve local populations.

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"There will be huge growth in the number of small data centers closer to the user. Then you've got to have that insight as to what you load on that data center, in that area, to provide services from multiple data centers and multiple cloud providers."

Pasi Siukonen
@Pasi_Kingston

Technical Resources Group Team Leader, Kingston Technology

"In the next five or so years, we're going to start seeing data centers evolving into smaller and smaller computing systems, because there will be such a tremendous amount of data to create and process at the edge. With autonomous vehicles, for example, the cars themselves need to have a quick processing of the data, and that has to happen somewhere close to the cars."

Sally Eaves
@sallyeaves

CEO and Director, Sally Eaves Consultancy

"With edge computing and 5G coming together, there's the opportunity for truly localized digital services."

Section 3 – Preparing for the Data Explosion—and its Challenges

It's easy to get excited about the possibilities of the near future.

And transitioning to the creation of smaller, more specialized data centers perhaps sounds relatively simple on paper. Yet there are serious challenges to consider, not least who is going to fund and orchestrate the creation of these data centers.

Then, there are emergent security challenges to tackle and the not insignificant fact that data centers consume vast amounts of power. The challenges are there to be solved. But is there time to think creatively before the data volcano explodes?

Answering the call for data centers

The telecommunications sector will gain significantly from the move to 5G. Networks will be far more versatile and scalable. Therefore, it seems sensible to suggest that telecommunications companies will be involved heavily in the infrastructural facilitation of IoT applications and edge computing.

Yet this project is too vast to be managed alone, which is why we will perhaps see telecommunications companies working collaboratively with public bodies, as well as private tech companies to create the infrastructure of tomorrow's digital ecosystem.

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"I can only think of the telcos actually building out on this infrastructure project because it's huge, and 5G sits with them quite comfortably."

Sally Eaves
@sallyeaves

CEO and Director, Sally Eaves Consultancy

"For me it's all about far more collaboration and co-creation – especially from the smart cities perspective."

Pasi Siukonen
@Pasi_Kingston

Technical Resources Group Team Leader, Kingston Technology

"I think 5G is going to be, in my opinion, the one that's going to give a run for the money for those guys who are doing ISPs or internet service at home. Do they exist after 5G is dominant where you can have your phone as the router at home?"

Section 3 – Preparing for the Data Explosion—and its Challenges

Data centers pose a huge energy challenge of power. It's been estimated that by 2025, data centers will be responsible for one-fifth of the world's energy demands, dwarfing the power consumption of many individual countries[1].

There's been lots of innovation with the construction of large data centers—such as building underwater to reduce reliance on air conditioning. Yet with smaller edge data centers there's going to be less opportunity to rely on the natural world. Consumers will expect pioneering thinking in an age when ecological impact has never been higher on the social agenda.

Neil Cattermull
@NeilCattermull

Director,
The Future as a Service

"With the technology, in my opinion, we're still in the early stages. We haven't worked out all the wrinkles yet and ironed them out. It's exactly how the original cloud boom came around."

Rob Allen
@Rob_A_kingston

Director of Marketing &
Technical Services,
Kingston Technology

"We do suffer in the UK from short-sightedness on restructuring projects. You just need to look at our roads. I wish we would plan and look to the future, look beyond 2020, regarding the data center challenges."

With the emergence of IoT and edge computing, there are also significant data challenges to consider. This goes way beyond the level of humans interacting with machines through password protection. It's about creating an environment where machines and devices can interact with one another, without compromising the privacy, data security, and safety of the user.

There's also the fact that each person's attack surface is going to be radically enhanced. More connected devices mean more points of access to your personal digital ecosystem. We may see seemingly innocuous attacks—imagine your toaster being hacked—as malicious cyber criminals look for routes into consumers' digital infrastructure. Are micro data centers going to be equipped for the challenge of the multi-API connected world?

Pasi Siukonen
@Pasi_Kingston

Technical Resources
Group Team Leader,
Kingston Technology

"We're going to have a completely different security ecosystem to consider. If there's no more authentication by credentials or authority, such as a human individual, you're going to have to figure out different ways to protect data."

1. Data Economy: Data Centers Of The World Will Consume 1/5 Of Earth's Power By 2025 data-economy.com/data-centres-world-will-consume-1-5-earths-power-2025 [accessed 09.12.19]

Section 3 – Preparing for the Data Explosion—and its Challenges

Continued...

Of course, with any new technology, there's often a commercial imperative to rush to market. The danger with 5G, edge computing, and IoT is that moving too fast could create serious security weaknesses. We must find a way to walk the fine line between innovation and regulation—and do so at pace. Because 5G is coming.

Neil Cattermull
@NeilCattermull

Director,
The Future as a Service

"Regarding the security challenge of IoT, companies that you would never have expected to work together are going to have to collaborate thoroughly at the edge network level."

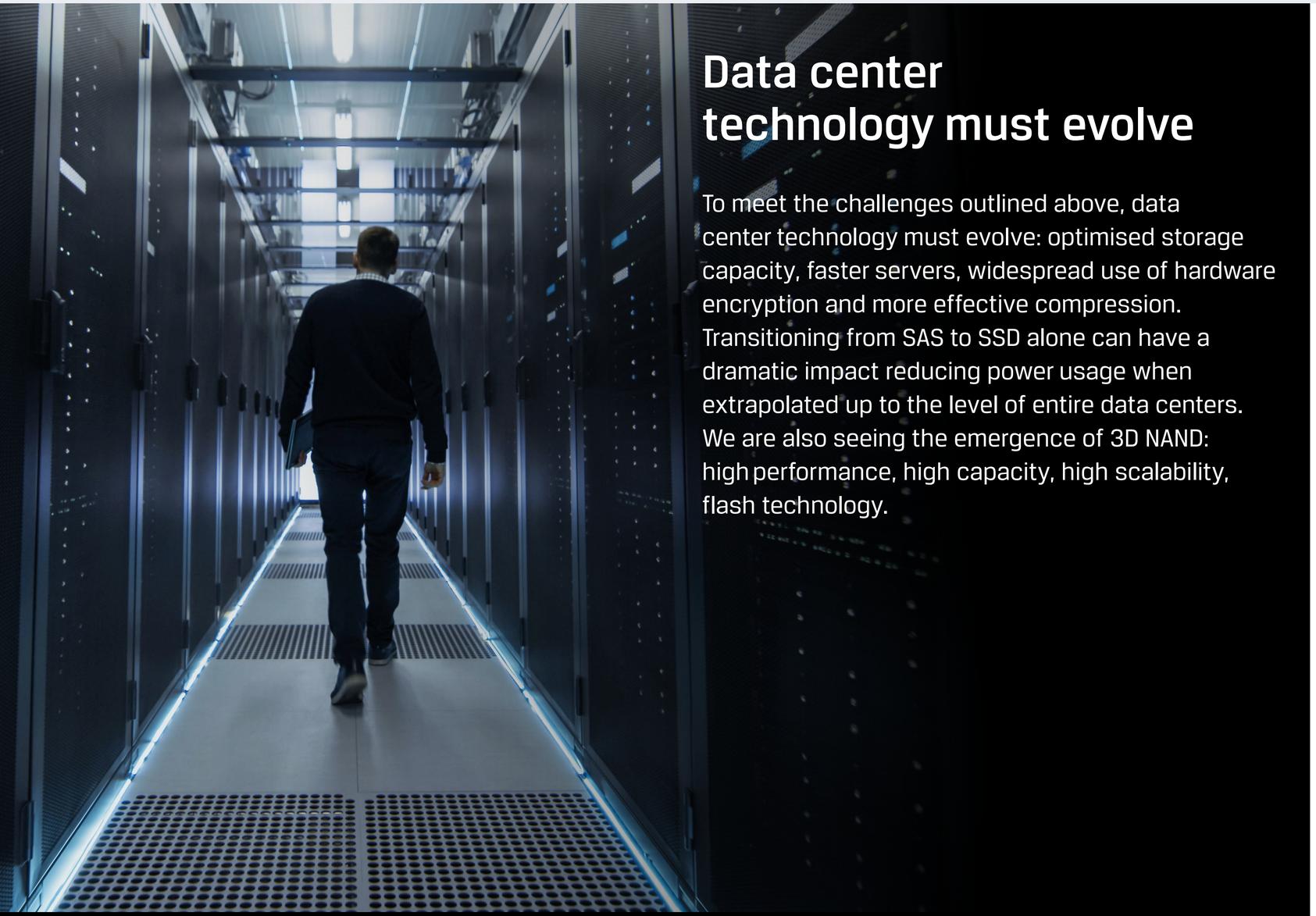
"You can overapply regulations to stifle any kind of innovation to the point where it's just a check in the box and people don't even understand what they're regulating or why. With 5G being such a massive, massive thing for everybody, we need to really plan how we regulate it."

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"GDPR is a step in the right direction because we are moving at a phenomenal pace with the production of so much data—and it's only going to increase."

Section 3 – Preparing for the Data Explosion—and its Challenges



Data center technology must evolve

To meet the challenges outlined above, data center technology must evolve: optimised storage capacity, faster servers, widespread use of hardware encryption and more effective compression. Transitioning from SAS to SSD alone can have a dramatic impact reducing power usage when extrapolated up to the level of entire data centers. We are also seeing the emergence of 3D NAND: high performance, high capacity, high scalability, flash technology.

Miriam Brown
@Kingston_MBrown

B2B Strategic Marketing Manager, Kingston Technology

"Even if you're looking at an edge server and it has a SATA drive, you could take out 10 SAS drives and replace with a smaller amount, and obviously, fewer moving parts and everything that goes with SSD."

Pasi Siukonen
@Pasi_Kingston

Technical Resources Group Team Leader, Kingston Technology

"Higher capacity 3D NAND means the generation or consolidation of your hardware is going to be even better, because you have fewer components to build, let's say a 40-terabyte storage device."

Section 4 – 5G and Edge computing: What Does it Mean for Business?

"We must act now."

It's a philosophy that many organizations adopt when it comes to the emergence of new technologies. Yes, there's little doubt that 5G and edge computing will enable you to provision brand new services, create brand new products, and give you the opportunity to reach your customers in brand new ways. But it's important not to move too hastily.

Put your business first

It's not about rushing out to buy the cheapest version of the latest product. It's about thinking about the relevance of your IT ecosystem in the context of what your business needs. It's about looking at your short-term and long-term goals and then finding the most suitable versions of the technology you need to make it happen.

For example, you may determine that you need to invest in SSDs. But there are many different types available, optimized for different purposes. Research is crucial. You have to know about what you're buying, what it enables, and why you need it. It should be seen as a business optimizer, rather than a business cost. That's how you begin to future-proof your business.

Neil Cattermull
@NeilCattermull

Director,
The Future as a Service

"I think in this day and age there's less customer loyalty. Organizations are going for what they think is the most appealing, without doing proper research. Quite often, using that kind of train of thought, you cut corners and you don't think about what's really suited for you."

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"What about if you're going to upgrade two years from now? What is the best combination of products, and what kind of upgrade do you need to do? It's not about simply making a shopping list of products and going out and buying them."

Section 4 – 5G and Edge computing: What Does it Mean for Business?

Working with an IT vendor you can trust

Navigating the increasingly complex IT ecosystem is far simpler when you can call on the services of a reputable IT vendor; a supplier of products who works with you on a personal level to make sure the products you are purchasing align with your goals as a business—not just for now, but for the future too. And that's where Kingston Technology excels.

Miriam Brown
@Kingston_MBrown

B2B Strategic Marketing Manager, Kingston Technology

"With a lot of businesses, a certain amount of their IT knowledge will be spot-on. But we can teach them how to utilize IT in a way that helps them move smartly towards their strategic and operational goals. That summarizes our free Ask an Expert service. It's not just 'deliver products and see you later.' It's about developing relationships with clients and being there as a continuous support mechanism."

Rob Allen
@Rob_A_kingston

Director of Marketing & Technical Services, Kingston Technology

"We have those one-to-one conversations as part of programs like KingstonCare. What are your pain points? How can we help? It's that way of listening to and accommodating people's needs. That's our nimbleness, and I think that's our strength."

Sally Eaves
@sallyeaves

CEO & Director, Sally Eaves Technology

"There's so much noise out there about different products and services, and people need to be able to cut through that. One way of doing that is to have a relationship with an IT provider that's long term, that's trusted. I think people need that more and more."

Neil Cattermull
@NeilCattermull

Director, The Future as a Service

"Tech moves at warp speed. New trends, new disruptive products and services, new security risks. At the end of the day, you don't get the longevity that Kingston has without experience and the ability to stay in tune with the market. You've done it. You've been there. You've supported large enterprises for decades. I wouldn't want to call upon someone who has less knowledge than Kingston."

Summary

- Ever-increasing demand for the digital world has fueled the rapid growth of data centers.
- The emergence of 5G and edge computing will necessitate further data center growth—including smaller data centers that are designed to operate solely at the local level.
- Telecommunications companies—in collaboration with other private organizations or local government bodies—are likely well-placed to create the necessary infrastructure for 5G and edge computing.
- Innovative thinking is required to resolve the security and power consumption challenges posed by unprecedented inter-device connectivity and increased proliferation of data centers.
- The seismic shift of the digital ecosystem will enable businesses to provision new services, create new products, and engage customers in new ways. But it's crucial to ask questions about the products that are best suited to your strategic and operational goals, rather than rushing to get to market fastest.

About Kingston

With 32 years of experience, Kingston has the knowledge, agility, and longevity to enable both data centers and enterprises to respond to the challenges and opportunities presented by the emergence of 5G, IoT, and edge computing.

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