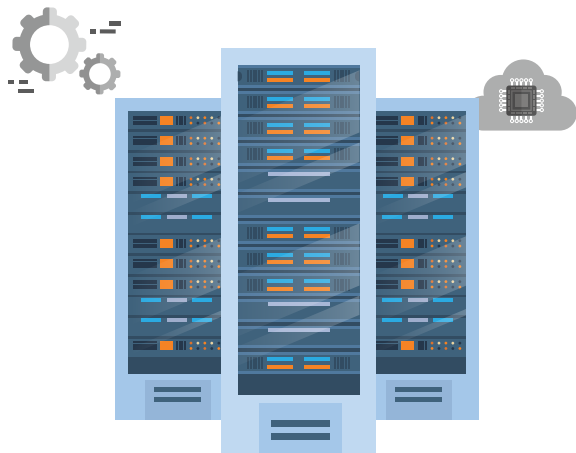


Data centres and the art of accelerated value



Executive summary

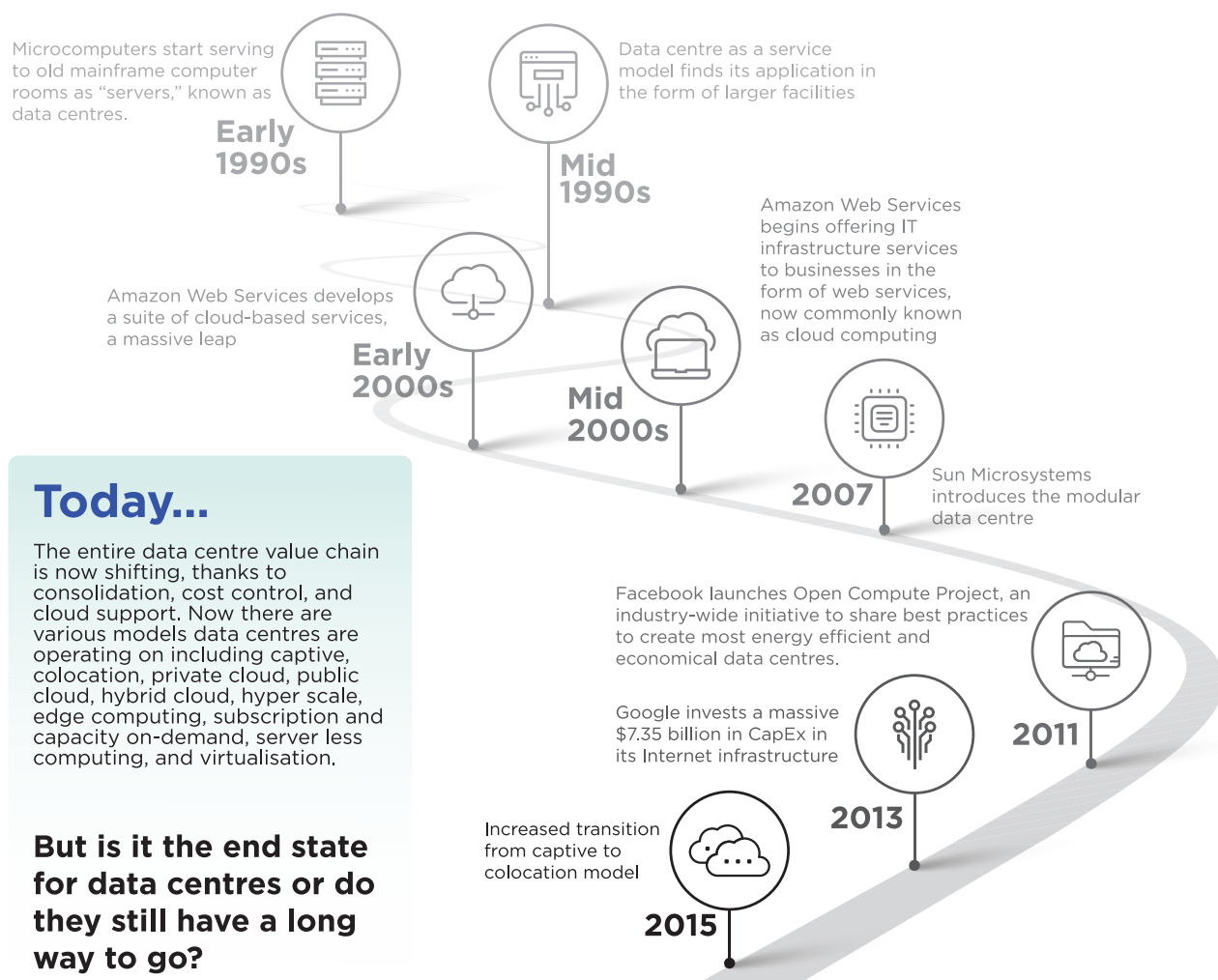
2020 needs to be the time for cultural shifts driven by technology; and investment in new network technologies is only a part of the whole answer. While we see disruptive trends in technology, big and small, design-led innovations will drive these changes. This paper highlights the paradigm shifts in design and execution philosophies which will redefine the data centre ecosystem



Data centres – an ever evolving playing field

Data centres are at the core of technological disruption. They have been ever serving the critical role of capacity enabler for enterprises. Right from the mainframe to cloud and captive to colocation, DC ecosystem has evolved massively over the decades.

A Brief Evolution Timeline



Today...

The entire data centre value chain is now shifting, thanks to consolidation, cost control, and cloud support. Now there are various models data centres are operating on including captive, colocation, private cloud, public cloud, hybrid cloud, hyper scale, edge computing, subscription and capacity on-demand, server less computing, and virtualisation.

But is it the end state for data centres or do they still have a long way to go?

Hyper scale to micro edge data centres – both are the need of the hour

Data guzzling mega trends like Industry 4.0, IoT, 5G and block chain will fuel the data centre bandwagon. According to IDC, with over 175 zettabytes of data expected by 2025, data centres will continue to play a vital role in the ingestion, computation, storage, and management of information along with business model innovation.

The following imperatives will pave the way for this to become a reality.

1. Maximise and optimise

The classic scalability challenge today is to maximise white space and grey space in the data centres, while optimising costs. Often, enterprises end up overbuying the capacity to meet up for future shortage. In turn, they get stuck paying for costly, unused capacity and the real estate to house it. Alternatively, there are chances that if they do not purchase enough capacity, their servers could go down if website traffic becomes overwhelming (consider a customer-facing business on Black Friday)... Simultaneously, there is a need to maximise white space and grey space while optimising cost.

2. Thrust on going greener

In data centre operations, 50% of the energy is utilised in running the infrastructure — UPS, power, and cooling — while the other half is utilised to drive the data. Massive power consumed for servers' management (electricity and cooling etc.) is a major pain point for data centres as it not only strains OpEx but also adds to the carbon footprint. According to IEA, global data centre electricity demand in 2018 was estimated at almost 1% of the global final demand for electricity. Hence, the go greener imperative is more than obvious.

3. More scale, but less hardware

According to IDC, data centres have grown in volume terms from 500,000 in 2012 to 8 million in 2019. Hardware dominance is the biggest constraint for scalability and cost optimisation. Every year, millions of data centres worldwide are purging metric tons of hardware, draining country-sized amounts of electricity, and generating carbon emissions as much as the global airline industry. This means that there is an increased usage of electricity, gas and e-waste - all at a global level.

4. Doing away with legacy - systematically

Above mentioned mega trends entail modernisation on many accounts – scale, scope of services, new applications, more virtualisation, etc. It is not easy to modernise colossal legacy data centres. On the other hand, enterprises find it a daunting task to take full connectivity controls of their applications. Customers locked into such ecosystems are limited to who and where they can interconnect.

Considering the humongous challenges around scalability and security combined with above-mentioned imperatives, solutions storming for creating competent data centres are absolutely critical.

Gartner predicts that by 2025, 80% of enterprises will shut down their legacy data centres. In fact, 10% of organizations already have. So going forward how will your enterprise break the silos of legacy data centres???

5. Physical, that's right... physical security

For most of the businesses, security is paramount and is a critical part of their program. Enterprises often only focus on cyber security, whereas physical premise security is also capable of derailing operations and data. Physical security threats can range from a physical breach to natural disaster to a terror attack. Companies need to focus their attention on the physical security requirement.

6. Managing 'everything' intelligently

CXOs and IT administrators face challenge when it comes to aligning their data centre strategies with increasing IT service demands. Owing to the ever-expanding data universe and financial stakes at play, the data centre processing and storage requires to be controlled intelligently. Otherwise, it could give rise to several complexities like management of multiple vendors and associated equipment, maintenance of SLAs in complex environments, optimising cost, monitoring frequent changes, and deploying new services and applications at a fast pace.



Inside out approach to data centres design

One of the key enablers for enterprises to solve these challenges is to implement solutions at the concept level and this could be achieved by ingraining right design elements.

1. White and grey space maximisation through design

With right planning, enterprises can provision or re-purpose white space and grey space in data centres, implement structured methods for provisioning servers and cables, and prepare their IT environments for the coming wave of virtualisation. Maximising the white and grey space is possibly the most challenging task today. Some of the approaches are mentioned below:

The data centre white space is built up using pods. This caters to the IT infrastructure as well as cable management. One of the racks in each row is allocated to networking equipment with a minimum of two fibres to each of the racks in the pod.

Challenging the current raised floor dominance, all networking as well as power cabling could be fed from conduits over the racks instead of under the floor. This coupled with advanced fibre and cable distribution systems will effectively manage transmissions.

Newer concepts like centre racks units capable of supporting extra in-row coolers and connected with under floor water piping can help minimise the number of operational racks, thereby creating redundant capacity.

By using these capacity planning processes, enterprises can even measure server and cables utilisation trends, analyse future capacity needs, and predict the exact requirement for a given application or service.

2. Sensor-led energy solutions for the greener imperative

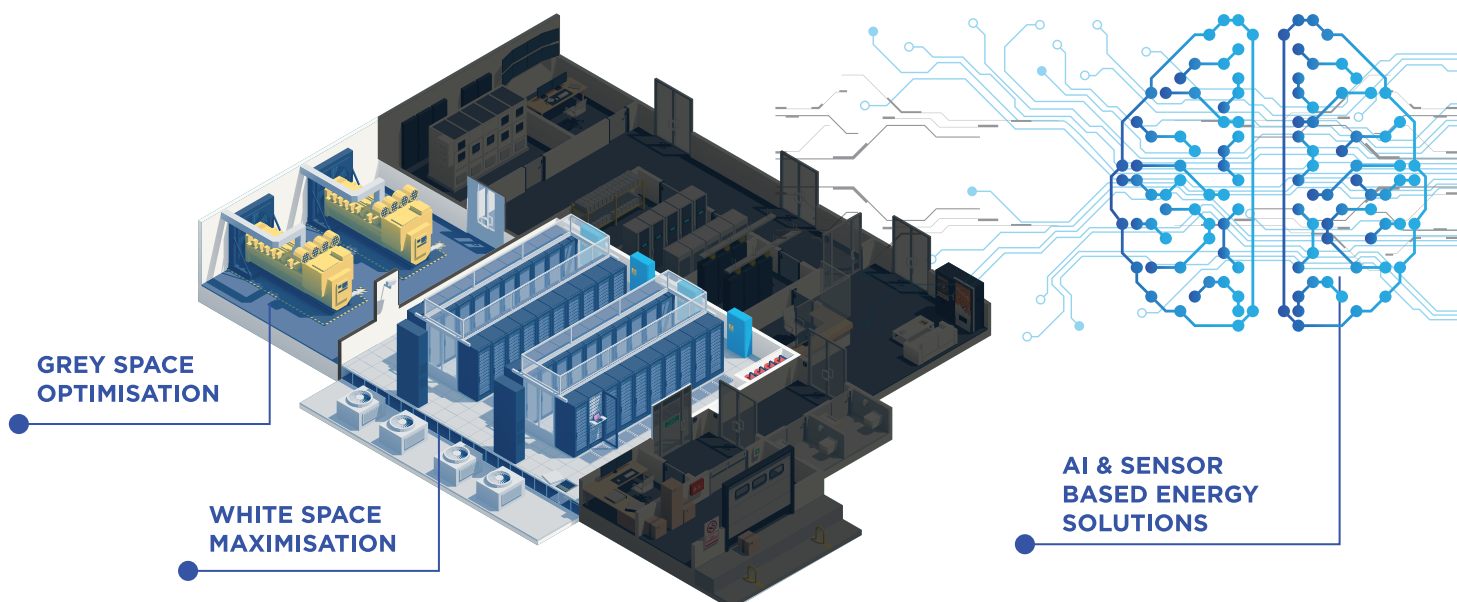
IoT sensors installed in data centres can track excessive humidity and control temperature without any human interference. The same applies for connected smoke and heat detectors. They help reduce massive power consumption for management of servers. AI/ML technologies can be utilised to automate and improve operational efficiency, which also includes resiliency and energy usage.

In 2018, Google used deep learning for reducing electricity consumption in data centres' cooling systems by 40%. Data was gathered from sensors installed on the server racks and then utilised for regulating water pipes for cooling. This could be an excellent use case for many enterprises to improve their data centres efficiency.

Another major improvisation is developing superior cooling techniques. Unlike the traditional approach of locating data centres in cold climates, servers and hardware could be designed in such a manner that can operate efficiently at higher temperatures without impacting reliability.

Power backup is another issue, especially for data centres constructed in tier-2 and 3 cities. Frequent power outages lay much stress on diesel generators. One solution could be using rack-mounted UPS system. These can be mounted in racks with width as small as 19" and generally fit in rack spaces. They provide uninterrupted power to the connected devices in the event of a power failure, thereby preventing failure of equipment and loss of data.

A PROGRAMMATIC APPROACH FOR DC MODERNISATION (1/3)



3. Open source, intelligent, purpose-engineered hardware build

Resource-optimised data centres, which could reduce hardware footprint, are need of the hour.

Optimising servers - Most of the servers are overprovisioned with hardware. To solve this problem, pooled resources can be incorporated allowing servers to share computing resources between systems. These resources can be shared across multiple servers rather than being limited to individual device.

Disaggregated system design - We could also look to inventing a data centre model by enabling a modular, sustainable infrastructure that enables the upgradation of only elements that are lacking in the system rather than re-designing the whole system.

Open source hardware - Enterprises are making hardware used in data centres more efficient, flexible, and scalable. They now opt for the open source hardware projects like the Open Compute Project (OCP), for scale proven hardware designs for their specific usage models.

Virtualisation - By inserting a virtualisation layer, which either uses hosted or hypervisor architecture, multiple OS could be run on one system at the same time. It decreases the number of physical servers and increases space utilisation efficiency by consolidating servers, you can actually prevent one application impacting the other at the time of upgrades as you have each application within its own virtual server. You can also deploy multiple operating system technologies on a single hardware platform.

4. Go for a technology-led integrated premise security

Opting for an integrated premise security approach ensures future-proofing the data centre against any type of security breach.

Some of the key elements of this type of a security setup could be:

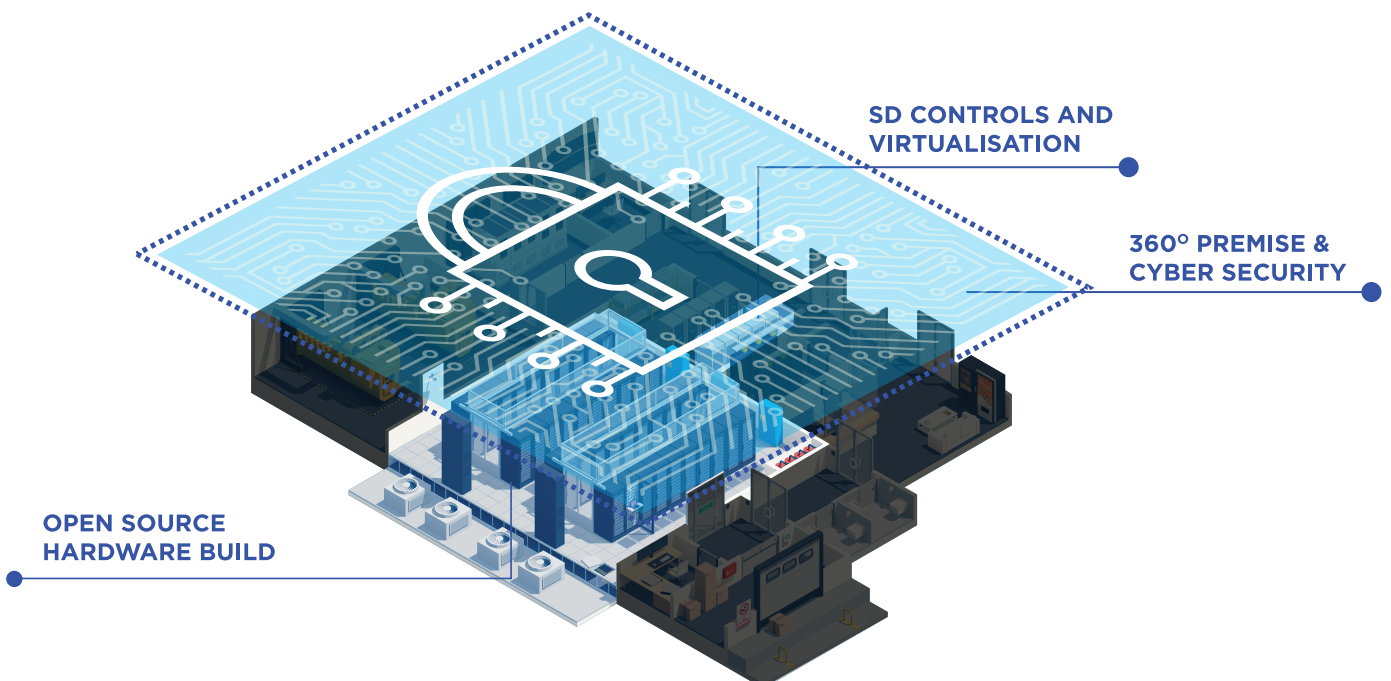
Optimising physical security solutions with advanced sensing, deep analytics, IoT, and AI - Your focus should be to provide end-to-end solution for achieving critical infrastructure security. It could be a combination of hybrid sensing technologies like fibre, radar, sonar, and lidar with big data and analytics. This would take care of security breaches from a 360° angle, be it, sensor-activated fire and natural disaster alarms, motion cameras to detect unauthorised entry or even detecting false alarms.

An integrated CCC to evaluate, communicate, and take action - An integrated Command and Control Centre (CCC) will enable evaluation of information sent by sensors, communicate it properly to all the stakeholders, and take programmed actions as per the defined situational protocols.

Complementing with cyber security - A data centre security ultimately aims to protect data, which requires installing right set of cyber security solutions on all levels - right from installing firewall to monitoring the traffic within the network to mitigating any threat that might have bypassed the firewall.

Apart from the above-mentioned security solutions, enterprises can also opt for biometrics, two-factor authentication, and geo-redundant data centres to attain 100% security level.

A PROGRAMMATIC APPROACH FOR DC MODERNISATION (2/3)



5. A programmatic approach to do away with legacy

When you are considering doing away with legacy data centre ecosystem, there are certain step by step approaches you can take to modernise your DC operations:

Install a rack-mounted ATS switch with dual power supplies as modern data centres supply resilience power feeds to maintain uptime and having only one power supply will have negative impact.

Do away with non-standard cabinets as they are not optimal for cooling. Instead use hot aisle containment. Legacy data centres typically utilize manual asset management as well as manual logs for controlling access. This is not efficient for scalability point of view and fully automated digital asset management systems need to be introduced. The access control also needs to be based on a digital system.

SDN allows enterprises to have centralised control over the network and automates service delivery. With the right global connectivity provider, an enterprise can order and provision connectivity services seamlessly across hundreds of data centres, all from a single platform. It also removes the cost and complexity in connecting data centres, while providing a solution for supporting long-term growth.

6. Integrated and simply controlled ecosystem

Data centres are complex ecosystems. There is much to manage starting from power supplies, utility operations, IT infrastructure, cloud platforms, software and DC networks. Currently, all of these are managed in silos. Deploying management and orchestration systems, which allow a single operational picture for all mechanisms is an absolute necessity.

Formula is simple - move away from disaggregated to an aggregated approach.

New age data centre management solutions (DCM), specifically designed for a fragmented data centre environment hold the key to provide resiliency, improve uptime, and reduce risks.

Envision a DCM Some of the essential elements of a DCM include:

- Common operational picture across all facility, Power, IT hardware, networks, and applications
- Data visualization with deep analytics to highlight anomalies across systems and locations
- Predictive analytics of power, space and capacity information to determine how to utilize the data centre more efficiently
- Graded disaster recovery protocols designed for unconditional continuity

A PROGRAMMATIC APPROACH FOR DC MODERNISATION (3/3)



Data centres need to be imagined and re-imagined as ecosystems and not as establishments. Above mentioned design-led interventions can be extrapolated to numerous other challenges and should be incorporated at the concept stage to create a formidable yet flexible data centre ecosystem to address present day challenges and also to scale them for future headwinds.

Data centres...beyond tomorrow

Of course, there is no one formula that will solve the data centre and scalability challenges of tomorrow. However, it is incumbent that the entire data centre ecosystem should join hands, bringing to the table solutions that will not only accommodate the data surges, but also energy-efficient infrastructure that will serve us for generations to come. Using design and execution philosophies (to be covered in the next paper) is a lever that data centre operators should use to their advantage.

About Sterlite Technologies Ltd (STL) STL is a global leader in end-to-end data network solutions.

We design and deploy high-capacity converged fibre and wireless networks. With expertise ranging from optical fibre and cables, hyper-scale network design, deployment and network software, we are the industry's leading integrated solutions provider for global data networks. We partner with global telecom companies, cloud companies, citizen networks and large enterprises to design, build and manage such cloud-native software-defined networks.

STL has innovation at its core. With intense focus on end-to-end network solutions development, we conduct fundamental research in next-generation network applications at our Centres of Excellence. STL has strong global presence with next-gen optical preform, fibre and cable manufacturing facilities in India, Italy, China and Brazil and two software-development centres.

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beyond tomorrow