

COMPUTE AT THE EDGE

Getting your IoT project right

Solution Guide





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IT'S TIME TO GET AN EDGE

For the Internet of Things (IoT) to work and fulfil its long-term potential, powerful computing devices must move to the network edge. The reason for this is because processing and analytics capabilities at the edge reduce latency and cost.

Consequently, powerful PCs are being used to function as IoT gateways. Embedded with key applications, they sit close to the 'things' which sense and collect data whether that be smart bulbs, industrial equipment or RFID tags. They analyse the data received in real-time and only send on that which is meaningful to the control centre. It means faster access to useful intelligence and less data traversing the network and saving on expensive bandwidth. This also creates savings in the data centre or cloud where it is more expensive to host data because of power, real estate and cooling constraints. By comparison, edge devices are increasingly small form factor appliances, making them simple to run and manage, low energy to power and easier to cool.

Most companies already have a strategy for their datacentre or cloud, but few have decided their edge strategy. But computing at the edge is a critical frontier for digital transformation - not just for manufacturers who are exploring the opportunities



of Industry 4.0, but for all kinds of businesses looking to optimise the delivery and even consumption of their products and services. Getting ahead of the IoT curve is therefore an important consideration for digital strategy. Of course, this transformation needs to be built on a solid foundation of reliable technology - both in terms of hardware, and operating system.

Over 17B¹

There's over 17 billion connected IoT devices in the world, with a compound annual growth rate estimated at 22%

¹ <https://www.informationweek.com/big-data/iot-technology-growth-and-security-trends-this-year-and-beyond>

IoT applications



Vibration



Pressure



Flow/Level



Temperature



Humidity



Current



Switch



Open/Closed



Illuminance



Metering



Tracking



Surveillance

What is an IoT gateway?

An IoT gateway is a physical appliance that serves as the connection point between the cloud and sensors and intelligent devices. Like a router, it provides upstream secure Internet connectivity and downstream LAN connectivity. However, it will also host and run edge-embedded applications and perform important analytics tasks to ensure transmission of selective data only. All data moving to the cloud, or vice versa, goes through the gateway, which is normally a dedicated hardware appliance. As a result, an IoT gateway will often also perform an important security role - protecting inbound and outbound data from targeted and unintentional threats.

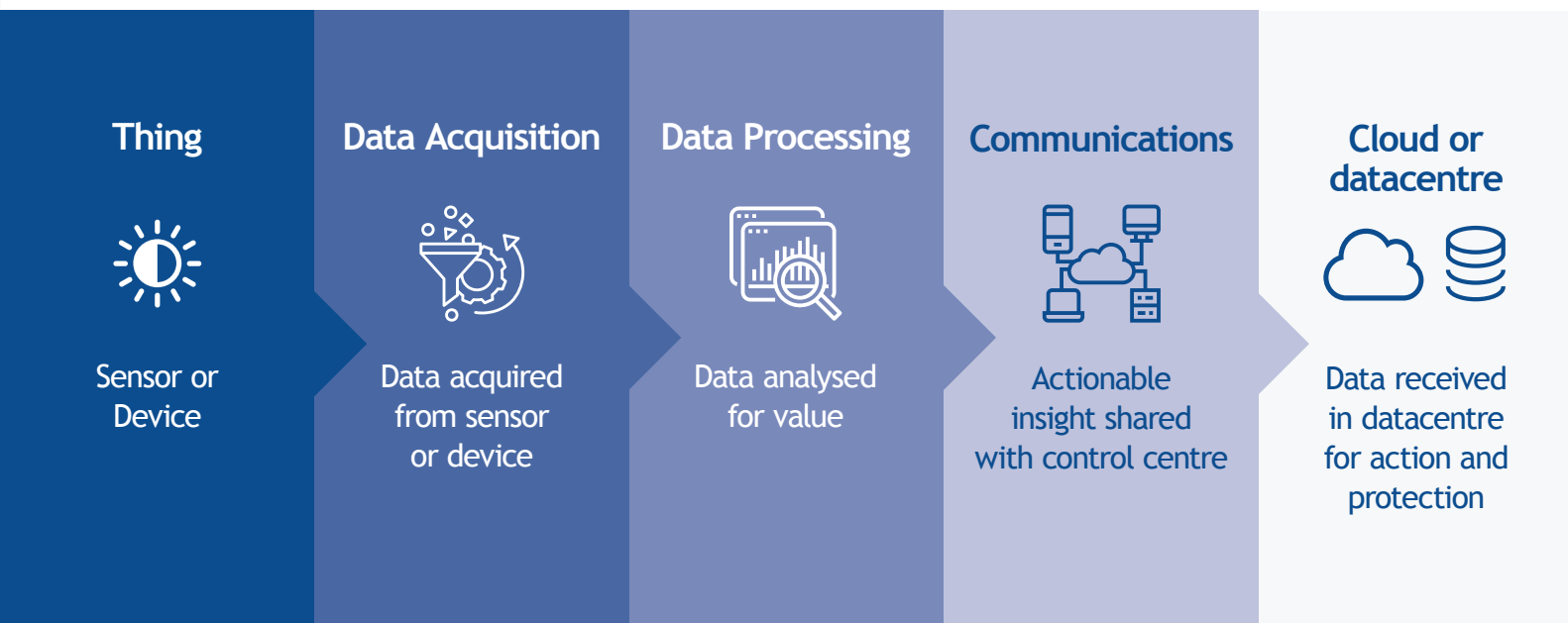
Some IoT devices include a built-in gateway, but an external gateway in the form of an appliance offers more flexibility, enabling a host of sensors, devices and off-the-shelf components to be connected into a complete system which saves time and cost. Furthermore, businesses are increasingly wanting to turn isolated systems in to Internet-enabled devices

where real-time information can be gathered from them or remote controls added to improve their operation. A dedicated IoT gateway is essential to achieving this.

In other words, IoT gateways act as the fundamental building blocks to develop secure, powerful and intelligent connectivity between other IoT devices and IoT applications.



Building your IoT architecture





Choosing your IoT gateway

The IoT gateway is a natural starting point for your IoT project. Developing your architecture and the ecosystem of devices you will need to deploy, heavily reflects in the choice of gateway. Hardware decisions impact your IoT project cost, user experience, application capabilities, and more. As a result, there are some important considerations to evaluate as you look to develop your system.

What will it connect to?

They are found in everything from industrial equipment, buildings, and cars, to freight shipments, pipelines, and people. Understanding what you are to connect and the data you will receive will impact IoT gateway selection. Increasingly, businesses are also looking to bring legacy devices into their IoT plans to bring equipment up to date and maximise investments. Millions of these legacy devices still have years of remaining value if they can be connected to the Internet. While older devices are less likely to accept modern connectivity standards, serial I/O ports can easily convert signals into Ethernet data for use in an IoT environment. Accordingly, for projects looking to capitalise on investments in legacy devices, this may become an important configuration option for gateway hardware, helping to deliver the levels of smarts and automation sought.



How will it connect?

Many IoT platforms will need to utilise some or all of Ethernet, Bluetooth, WiFi, Wireless LAN, and mobile networks to communicate. The choice of connectivity will be determined in part by the other devices the gateway needs to connect with, but also the proximity of the devices to the gateway - WiFi, Wireless LAN and 4G services being better suited to longer-range requirements. Newer IoT devices are also able to make use of 5G networking to transmit data even faster. The sensitivity of the data being transmitted will also have a bearing on selection, with some methods of communication more secure than others.

Not all gateways will offer all connectivity options. More expensive devices will generally include more flexibility, but it is important for project budgets not to unnecessarily over-spec connectivity options.



Where will it be installed?

The edge can literally be anywhere, so new variables need to be considered for computing devices deployed there. Size is often a problem - environmental factors dictate that traditional computers are simply too large and impractical. Small form factor devices are therefore prevailing in the IoT space. Likewise, mounting options will play a part - will the device be rack-mounted, does it need DIN rails, or will it be installed some other way? What will be the environmental tolerances the device is subjected to? Dust, heat and cold will all impact operation. Industrial applications especially challenge deployment because of the harsh conditions they need to operate in. In these circumstances, a ruggedised device may be more suitable.

What apps does it need to host?

The IoT gateway is likely to host IoT applications alongside data transmission duties. The amount of local intelligence required is an important design decision and will be application dependent. Analytics is commonplace in IoT scenarios and will generally require more local compute power. However, any type of software to be run on the device will dictate the specifications of the hardware chosen. OS is also a critical consideration here, as some systems like Windows 11 IoT Enterprise will allow you to harness emerging apps with powerful AI capabilities.



What data volumes do you anticipate?

Edge storage manages data capture and provides the resources necessary to store and analyse data in real time. The amount of data to be processed and the length of time it needs to be retained locally will influence the storage capacity required at the edge. Furthermore, latency demands may influence the choice of storage media - SSD is much faster than it's HDD equivalent and requires less power to run.

Who will service and administer it?

By its nature, the edge is likely to be where traditional IT teams are not present. Questions need to be asked about who will service IoT gateway devices and who will administer them. Some devices will need to be in hard to reach places so need to offer the reassurance of set-and-forget installation with little to no servicing required. It is unlikely these devices will have a local user interface, so you will simply rely on LEDs to identify whether the device is operational and functioning as expected. For this reason, it is helpful to use technology that has easy but secure remote management tools. Similarly, automated self-healing capabilities help to discover and remediate hardware and security issues before they stop your system working.





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What security features does it need to have?

Security is critical to your entire IoT platform. Data is just as at risk of malicious action at the edge as in the data centre. Apart from stealing data or modifying core system functionality, the presence of malware can decrease system performance. Also, because there is potential for devices to be accessibly located for example on a factory shop floor, there is physical security that needs to be contemplated including anti-theft measures like locks.

Modern IoT gateways should come with in-built security and privacy measures like encryption, authentication and zero-day vulnerability protection, but it is important to look at the standards to which these protections have been tested. IoT is like any other IT project in that you should seek to use security best practices and work with trusted sources of technology.

Cloud compatibility and certification

Cloud hyperscalers like Microsoft Azure and Amazon Web Services (AWS) are offering IoT-specific cloud platforms. To take advantage of these services, edge hardware needs to be compatible. Likewise, hardware needs to be certified to capture the opportunities of systems like Windows 11 IoT Enterprise, a powerful OS which uses enhanced AI to get the best performance (and security) from your IoT apps.



What to look for in your IoT hardware

While there are always project-specific considerations when choosing IoT gateway hardware, there are some consistent features to look for when evaluating your IoT hardware architecture:

- Reliability
- Easy to deploy and use
- Highly available
- High performance
- Affordable
- Connected
- Self-healing
- Ruggedised



Who should I use for IoT?

Lenovo is leading the way in small form factor computing for IoT. Its latest family of ThinkCentre PCs based on Intel, offer a secure IoT Gateway, designed to provide processing and security for the IoT devices you have in your environment that demand real-time responsiveness at the edge. ThinkCentre increases responsiveness and reliability by enabling the rapid relay of information between connected IoT peripherals, sensors and devices, even in harsher commercial environments. And thanks to additional legacy ports and peripherals it is easy to build out to your edge device needs.

Combined with a line-up of IoT-ready peripherals like smart cameras and motion-enabled lighting, choosing Lenovo hardware means less integration worries and faster time-to-value for IoT projects.

With Lenovo taking care of the hardware, the best route to develop your IoT networks is with Windows 11 IoT Enterprise - built to match standard Windows 11 deployments on PCs and other devices, IoT Enterprise gives you the ability to work with familiar tools when building your IoT environment, and deploy secure, smart, and effective software to your IoT devices.

Why Lenovo?

Not only does Lenovo have a solid reputation for delivering powerful PCs, but through their dedicated IoT business, Lenovo has done huge groundwork with their devices to pre-validate them with a host of recognised software platforms in sectors like retail, manufacturing and health to ensure their hardware solutions are ready to work from the get-go.





Lenovo Hardware



Scale

Lenovo is bringing a scale to PC manufacture not yet seen in IoT. Acquiring PC devices for IoT projects has been the domain of specialist PC manufacturers, until now.



Heritage

Lenovo's heritage in the PC has geared them up to be more competitive than anyone else, and a natural fit for Windows 11 IoT Enterprise.



Speed

Choosing Lenovo for your IoT means harnessing great components, in a Windows 11 architecture that is familiar to your IT teams, letting you hit the ground running.

The Intel® IoT Platform

Secure, scalable, interoperable

The Intel IoT Platform includes end-to-end reference architectures and a family of products from Intel and its ecosystem that works with third-party solutions to provide a foundation for seamlessly and securely connecting devices, delivering trusted data to the cloud, and creating value through analytics.

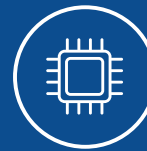
Windows 11 IoT Enterprise

Deploy IoT with confidence

Windows has long been the standard for enterprise computing, and Windows 11 IoT Enterprise keeps that trend. Designed in-tandem with Windows 11, IoT Enterprise lets you use the tools and software you're already familiar with to develop IoT applications, and run them on familiar architectures.

With a 10-year support commitment, Windows 11 IoT also ensures your systems will be usable well into the future.





Capture the IoT opportunity with Servium and Lenovo

We're no strangers to using Lenovo equipment for IoT, and we're ready to match you with the Lenovo technology your business needs. Combined with our Services Ecosystem we're poised to assemble the best experts with the right experience to help you capitalise on all the benefits IoT could offer to your business.

If you would like to learn more about Lenovo's IoT technology portfolio or want to better understand how IoT could benefit your business, please contact your Account Manager, email us at hello@servium.com, or speak to one of the team on **+44 (0)303 334 3000**.

About Servium

Servium is dedicated to creating great IT experiences - we seek to win the hearts and minds of IT strategy-makers, professionals and users. Our attitude is that no challenge is too big, no detail too small. We tackle both the ordinary and the extraordinary with the same focus and originality of thought that ensures solutions make a difference. It means we're one partner ready to assemble all the technology and know-how every medium to large organisation relies on. Matched by straight-talking, real-world experience and amazing service, our customers enjoy exceptional value; the product of the best innovation, latest thinking and a thriving ecosystem of technical experts.

Servium

Lenovo

 **Windows 11**