

## A closer look at Merlin

### Technical specifications for the world's most sustainable data centre

The opening of Capgemini's Merlin data centre marks a decisive leap forward in data centre design and construction principles. Merlin is a very green data centre – a statement backed by its world-leading Power Usage Effectiveness (PUE) of 1.10. However, energy efficiency is just one side of the incredible story behind Merlin.

Designed against a backdrop of rising demand for IT services and increasing upward pressure on the price and availability of finite resources, this new data centre, located in Swindon, UK, has been built – from design and location selection, through

to completion and the future addition of capacity – with sustainability and energy efficiency in mind.

Despite its industry-leading sustainability credentials, Merlin has been built without comprising Capgemini's ability to meet client requirements. Data centre services provided from Merlin will be cost-effective, flexible, resilient and secure.

Read on to find out more about what makes Merlin so special.





**Rack space in Merlin**

## Technical specifications

### Certified Tier 3

The finished site will be certified as an Uptime Institute certified Tier 3 data centre, one of only three such sites in the UK.

### Total capacity

Merlin is capable of delivering 3,000m<sup>2</sup> of available technical floor space, comprising 12 modules each of 250m<sup>2</sup>, containing 1,248 racks sized at 800mm x 1000mm x 46U.

The modular data centre comprises:

- A Climate Control Air Optimiser module
- A power delivery module housing A&B Bus Bar terminations at the distribution panel, BMS & CCTV services, fire extinguishing gas bottles and release mechanism
- VESDA & fire alarm detection systems
- 4 sections making up the 250m<sup>2</sup> technical floor for each module.

### Highly secure with enhanced options

The site has been built to a security level compliant with a List X audit, for example, Ministry of Defence and Police Authorities. The modular computer halls can deliver Intrusion Level 3 (IL3) and 4 (IL4) rated security to suit the client by applying different build options. Each module can also be upgraded to include a High Intensity Radiation Screening shell to meet the requirements of the UK Government's Security Equipment Assessment Panel for data security.

### Flexible power options

Each module offers a minimum of 1,000Watts/m<sup>2</sup> as standard. This can be upgraded to 2,000Watts/m<sup>2</sup> through the addition of a second cooling unit either at the start or during operation, without any service disruption. Individual racks can be expanded beyond 10 kW.

### Power resilience

Two diversely routed 7MVA (Mega Volt Ampere) supplies are connected

to the on-site substation, rising to 14MVA when required. One supply is always active, the other would be energised in the event of a primary sub-station failure. This power is backed up by continuous rated generators that can deliver power indefinitely. The containerised flywheel UPS system and fast-start generators ensure uninterrupted power supply in the event of grid failure. Each power unit contains 3 generators, in an N+1 configuration supporting 1,000m<sup>2</sup>. When upgraded to 2,000Watts/m<sup>2</sup> density, 6 x generators in an N+2 configuration per 1,000m<sup>2</sup> would support the load.

### Power efficiency

Each 250m<sup>2</sup> modular room with a full technical floor load at 1,000Watts/m<sup>2</sup> will use 232 kW of energy for the IT equipment with only 10 kW of power used to cool the servers – a reduction in cooling energy of over 92% compared with a conventional data centre using chilled water, and 75% compared with a high-efficiency modern data centre with free cooling. The energy losses in the transformer and UPS are very low at only 60 kW per 1,000m<sup>2</sup>. Bus Bars feed racks via 16 Amp and 32 Amp snap in commando boxes. No Large Scale Power Distribution Units (PDUs) or electrician required.

### Dedicated security and fire detection

Each unit has a dedicated CCTV network of cameras with audio links to enable contact between engineers and the control room. Fire detection systems include Very Early Smoke Detection Alarm (VESDA), which provides continuous air sampling for maximum early warning and detection, and all fire and security panels are configured to N+1 redundancy for resilience.

### Meeting and presentation suites

A range of client facilities for meetings, presentations and conferencing are available on the upper floors and fully equipped with state of the-art equipment.



**Inside the Merlin facility**

### Clean build rooms

Four client build rooms are available for secure tech refresh activities. These rooms can be patched via fibre to any modular computer hall network.

This facility can be booked by the client and Capgemini will provide varying levels of security depending on the nature of the client's business, for example, Government IL3 security.

### Modular BMS and climate control

The Trend Building Management System (BMS) is the most sophisticated and energy-efficient ever designed.

Fully managed hot and cold air flows enable constant peak operational efficiency. The use of Computational Fluid Dynamics in the design of the modular data halls has enabled the designers to plan and control every aspect of air path. The entire air path from the air optimiser, through the cold corridors into the servers, then out to the hot aisle, prevents recirculation of hot air and improves efficiency. The climate control system is virtually maintenance-free. The Energy Reducing Cold Aisle containment system ensures that the corridor is sealed and pressurised with a blanking panel system to stop cold air loss.

The cold aisles feature motorised louvered doors which adjust the air volume appropriately for the number of powered servers.

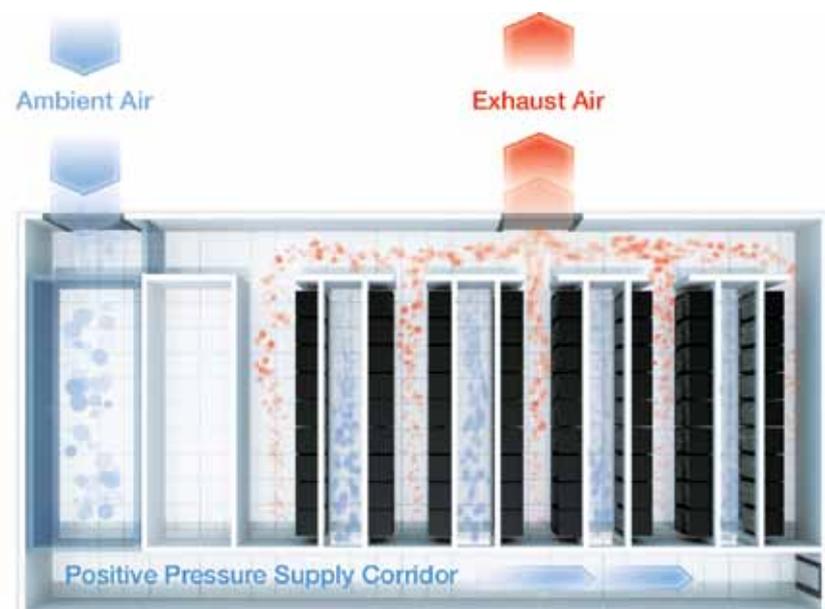
This sophisticated BMS features hundreds of sensors continuously monitoring the air temperature and quality, and able to make very fine adjustments. Thermal imaging is used to monitor constantly for any hot air leakage into cold aisles, while sensors in the hot aisles monitor for temperature, humidity and air pressure and velocity.



A data centre module consists of 6 sections (7 for a power density of 2,000Watts/m<sup>2</sup>)

### Innovative cooling system

Each module is equipped with a highly efficient dedicated Air Optimiser climate control cooling unit which cools air in three stages, with primary "fresh air" cooling, second-stage evaporative cooling and backup third-stage cooling through Direct Expansion R410a (DX). If upgraded to the higher 2,000Watts/m<sup>2</sup> density, an additional Air Optimiser can be added without any service disruption. This represents a reduction in cooling energy of 92% compared with a conventional data centre of nearly 50%.



Data centre module – normal air flow

## Client benefits

Capgemini's data centre modules offer a range of potential benefits to clients, including:

### Total flexibility

Clients can specify exactly what they require for their data management: either rent space or racks within multi-client modules, or specify the configuration of a dedicated module. The duration of the contract can be varied to the length that fits the client's business need. The power provision can be doubled without disruption, and the cooling adjusted to suit. In effect, each module is a data centre in its own right and built specifically to order for the client.

### Corporate Social Responsibility

Merlin offers clients the opportunity to host their data in a sustainable environment with greater power efficiency and with less impact on the environment than comparable facilities.

It offers clients the opportunity for their data storage and management to contribute to their environmental targets and carbon footprint reduction.

### Peace of mind

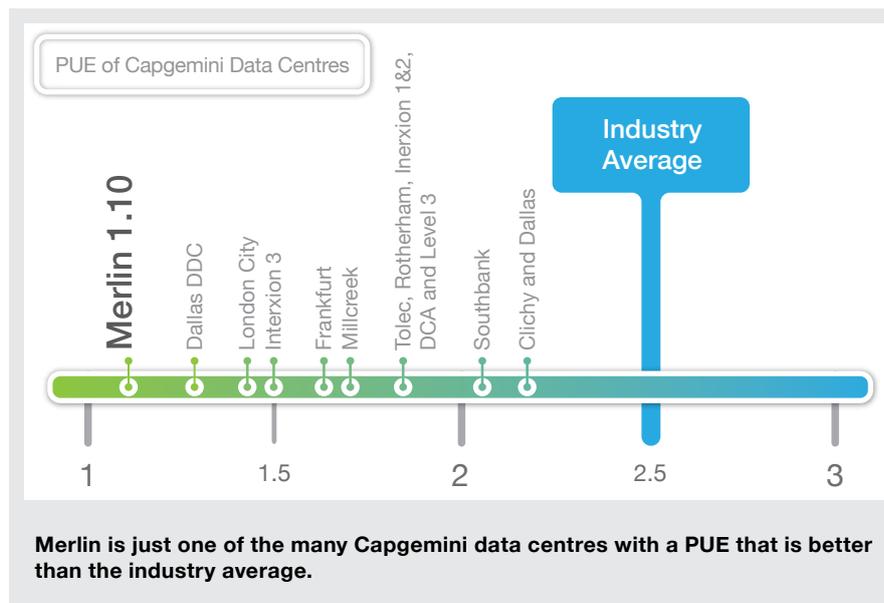
A complete module comes with a full range of flexible security packages. As well as a dedicated multi-access level, biometric security system, access can be controlled as the client requires without the need for building escorts or physical access controls and barriers that are customary in normal shared data centre facilities. Clients can even assign their own data management teams to oversee their dedicated modules. Merlin's security classification and Security Equipment Assessment Panel (SEAP) ratings give peace of mind, and physical security aspects such as radiation and blast proofing can be upgraded to suit individual needs, for the whole or only part of a module.

## Speed to implementation

Thanks to the modular design and off-site build, a client can have its dedicated and fully customised data centre up and running in 22 weeks, as opposed to the typical 12 to 18 months.

## Cost effectiveness

Merlin's unique modular design means no additional cost overheads for total building power will be passed on to the client. The client can purchase as much or as little as they wish, meaning no charges for under-utilised space.



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