

Hyperscale Data center — Paris DC5

16+ MW IT built for exacting hyperscalers

 **Scaleway**
Datacenter



25 rue de l'Eguillette
95310 Saint-Ouen-l'Aumône, France



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Over the last five years, Scaleway has become the most successful colocation provider in France, selling a large number of MW across its Paris-based data centers.

Opened in 2018, DC5 is **one of the largest data centers** in operation in terms of capacity and surface area. It was specifically designed for hyper and big scalers, with a total IT capacity of 20MW.

DC5 is composed of **12 private and fully independent IT vaults of up to 1.8MW IT each** for which our clients can additionally choose one of three infrastructure designs (Hexacore, N+1 and Pure 2N).

DC5 is also powered by one of the most energy efficient architectures in the industry leading to substantial cost savings.

By virtue of its adiabatic cooling technology and hot aisle containment, DC5 allows our clients to obtain average rack densities of 8.2kW+ with **the lowest measured annual PUE in France at 1.15**.

01 Strategic location

In northwest Paris, DC5 is located in the heart of the Vert Galant industrial zone in Saint-Ouen-l'Aumône, 35km from the center of Paris. This area is isolated from any known natural or technological hazards.

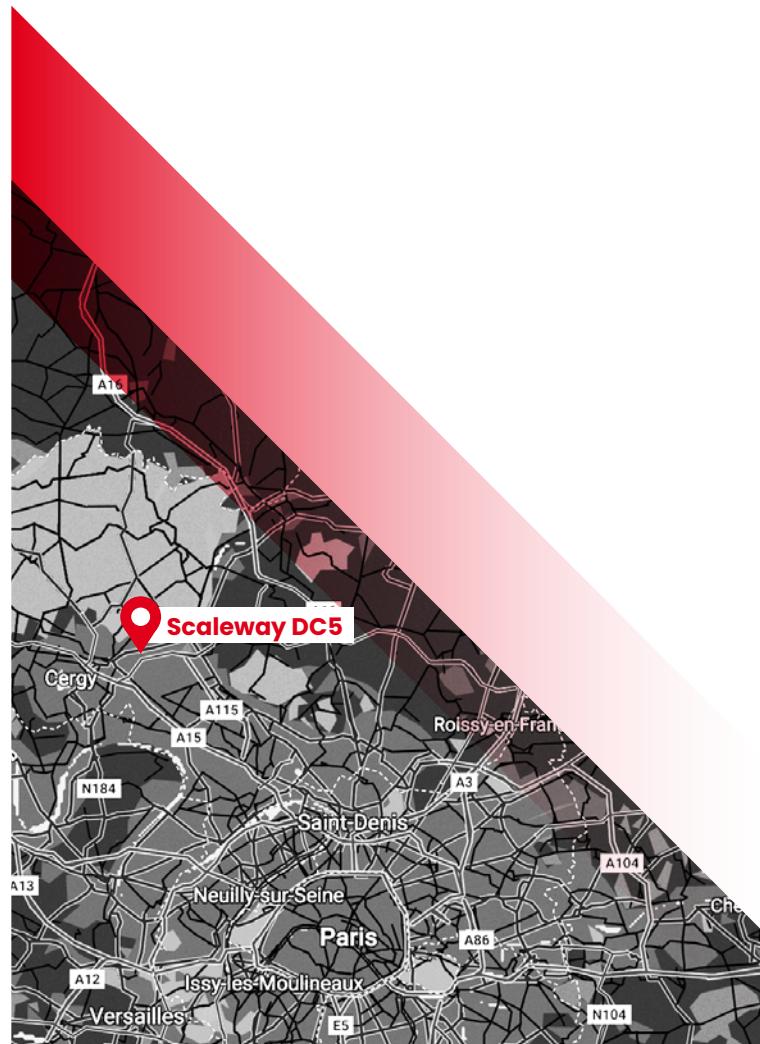
Vert Galant is the most recent business park in the Paris region and not only benefits from substantial electrical power availability, but from high density European fiber optic networks as well.

In the heart of France's leading industrial region

DC5 is located in one of France's largest business parks, comprised of 350+ leading companies, next to the internet backbones of Tier 1 operators and spread over 700 hectares of land. As such, long-term electricity supply of over 200MW and future expansion opportunities are ensured.

Near to Paris and close to the major national and international business and innovation networks, DC5 is ideally situated, accessible via the **A15 motorway** (35km from the center of Paris, 20 minutes from La Défense), a **TGV train station** (less than 20 minutes) and **Charles de Gaulle International Airport** (about 40 minutes).

Close to the internet backbones of Tier-1 operators, its location also benefits from high power capacity with more than 200 MW available.



02 Strategic sustainability

Improving sustainability through innovative and groundbreaking technologies

For Scaleway, powering data centers with solely renewable energy is a given - but it's not all we do for our clients and the environment. By eco-designing, building and managing our data centers, we control the entire value chain allowing us to be free to set ambitious efficiency, performance and environmental goals.

As an example of the aforementioned, we were the first colocation provider to introduce the Hexacore design back in 2010 that today is a must-have in every cutting-edge data center design.



In 2018, Scaleway implemented an adiabatic cooling design for DC5 and all new facilities to further improve efficiency and lower our carbon footprint.

Scaleway is committed to publishing its PUE (Power Usage Effectiveness) and WUE (Water Usage Effectiveness) for all data centers each year, with the goal of steadily lowering them through innovation and investment.

In addition to industry-leading metrics, Scaleway is also committed to banning toxic substances from its supply chain and creating a restorative and regenerative circular economy for its equipment to function up to 10 years through reuse and repair.

03 Unique cooling technologies

To continually improve our Real Data Center Efficiency metric, DC5 was designed to meet the complex compatibility challenges of hyper-scalability, energy efficiency and optimal economics.

*DC5 – Fans extract hot air.
Every other floor is used
as a ventilation duct.*

To combine power, availability and scalability while minimizing the environmental impact and maximizing savings, Scaleway's data center engineering teams left nothing to chance as everything was engineered to achieve exceptional energy efficiency.

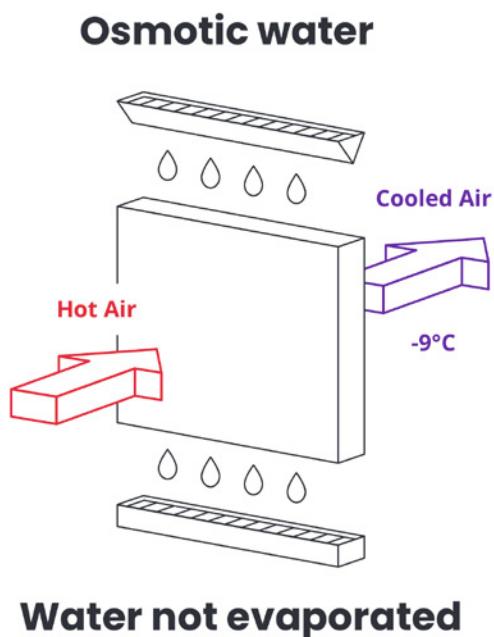


Adiabatic cooling

The first step towards financial and sustainability optimisation is tackling our principal cooling method for DC5. The cooling system in place at DC5 is unique in Europe as we leverage natural cooling principles instead of energy intensive air conditioning.

The principle is simple: when hot filtered air, that has high hygrometric capacity (the case in summer), comes into contact with a humid membrane, it discharges its heat. The water evaporates resulting in the air cooling down. All of this

is done without using any additional energy besides the pumps used to circulate the water. The cooled air is then diffused through the ceilings of the cold corridors in front of the racks. The hot air is confined behind the racks (hot corridors) and mixed or expelled depending on the outdoor conditions. The climatic and environmental conditions of DC5 are ideal for this concept. The design has been studied and perfected to work in the most extreme temperatures over the last 20 years.





The pure osmosis filtered cooling water is stored in 234,000 litre capacity tanks to ensure autonomous and sustainable operations in case of any interruption in water supply.

- Designed for outside temperatures up to 40°C
- No mechanical cooling
- No greenhouse gas emissions
- Adjustable power (1%)
- 234m³ on-site water stock
- High water quality treatment
- Reduced maintenance costs
- Optimized PUE
- Maximum lifecycle

The combination of direct free cooling and adiabatic technology makes it possible to cool the outside air by up to 9°C, while minimizing the addition of humidity (just a few mg) thus ensuring perfect compliance with the ASHRAE TC9.9 environmental standard.

The result of the aforementioned is **a record PUE of 1.15 without any greenhouse gas emissions.**

DC5 – Filtered hot air passes through the humid osmosis water membranes naturally reducing ambient air temperature through evaporation.



Climatic chamber

- Four 52U 6kW racks
- Available for customers
- Built for testing equipment
- Different electrical configurations (failures on both lines A and B)

To optimize settings and enhance the resistance of the equipment, a climatic room is available to our customers on-site.

DC5 - The climatic chamber is used to test equipment and optimize use.



Ice storage

- Off-peak time production
- Instant power availability
- Reduced energy consumption for cooling

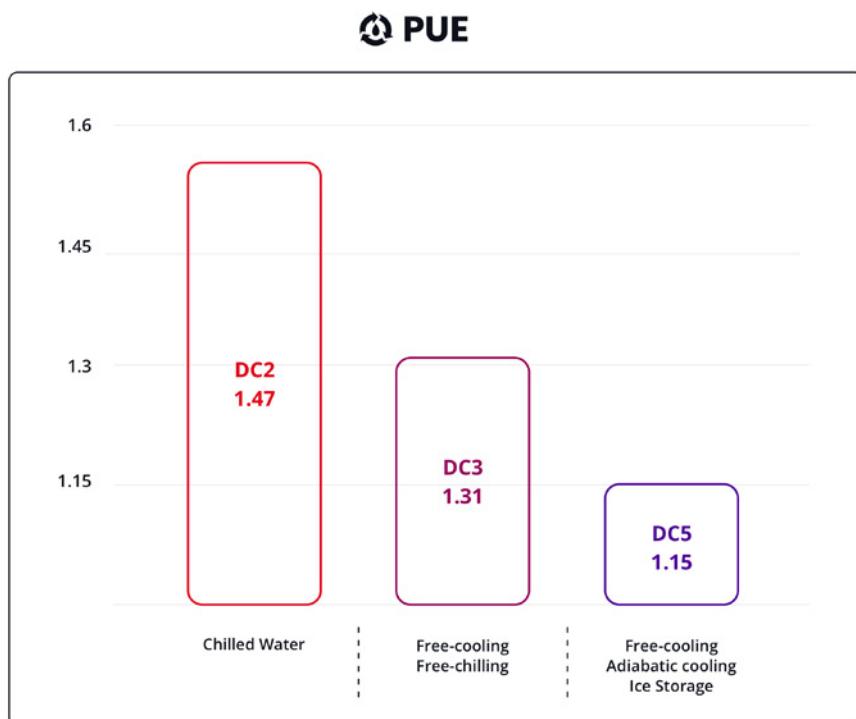
DC5 - The ice storage container.

The IT vaults are cooled by free cooling coupled with adiabatic technology, whilst the technical rooms are cooled by direct free cooling combined with chiller units. Scaleway Datacenter continues to innovate through an ice storage process which is designed to store the energy required to cool the technical rooms.

Ice storage drastically increases the efficiency of the chiller equipment. The ice is produced at night during off-peak hours and is then stored in a large insulated container.

This method is particularly useful when it comes to regulating variable loads, for example, technical rooms. On top of significant energy savings, an added advantage of this cooling method is the immediate availability of the produced cooling power. There is no delay in starting the chiller units.

The combination of these various technologies enables DC5 to achieve a PUE of 1.15, and pass on those energy savings to our customers in a high density configuration.



PUE comparison.

04 Secure and redundant power supply

At DC5, we ensure the availability and continuity of energy supply from the electricity providers to the IT equipment (servers, racks), cooling and security installations (fire, access control, video surveillance, supervision).

Even though the risk of an interruption to the power supply is considerably low in France as there is constant supply of electricity, DC5 is designed with risk mitigation in mind. To reduce the risk of a supply interruption, and to cope with potential failures or malfunctions, all IT rooms have been inverted and connected to generators for redundancy. Redundancy for all chilling and adiabatic cooling is also ensured by generators.

Grid connection and power supply

The electricity supply of DC5 is provided by several delivery and distribution stations that deliver power to the data center via parallel redundant high-voltage cables (20kV).

DC5 is equipped with 27 generators (1 of which is mobile) as well as 48 inverters with batteries providing 6 minutes of instantaneous site-wide autonomy.

Generators

The low voltage (400 volts) generators were custom built to meet Uptime Institute standards and are not designed as simple standby elements, but rather as continuous production units to be able to meet more demanding criteria.

The generators are all synchronized to the network, allowing uninterrupted tipping for load-tests or after a mains failure.

The generators are managed by PLCs (Programmable Logic Controllers), and a manual emergency mode allows intervention in case of faults.



Each room has two independent generators, each of which can be activated at any time in the event of a mains failure. An optional generator set is also available to provide a back-up power source in case of any other failed generator set.

To power the generators at DC5, Scaleway has installed four underground tanks, each capable of storing 40,000 litres of fuel oil. The pumps for filling the tanks are redundant.

DC5 - The generators.

For each tank, there are three pumps: one active, one emergency and one manual pump. The tanks and associated pipes are equipped with a leak detection module.

General Low Voltage Boards (GLVB)

All electrical power control, protection and distribution devices are also redundant. DC5 will eventually include 26 transformers for its 12 IT and operating rooms.

There are two GLVBs (General Low Voltage Board) per IT vault. Each GLVB manages half a room independently. Each GLVB has its own dedicated 20kV/400V transformer with 1250kVA, a dedicated 1,232kW/1,540 kVA generator set, two dedicated 500kVA inverters and eight dedicated battery branches.

Infrastructure designs

- **Hexacore architecture**

This Hexacore design provides the optimal efficiency/resilience ratio via four distinct inverted redundant electric branches. Six electrical branches combine to provide 2N services without the 2N premiums.

This design has been approved and certified by the Uptime Institute and has received multiple awards from the EU Code of Conduct for Data

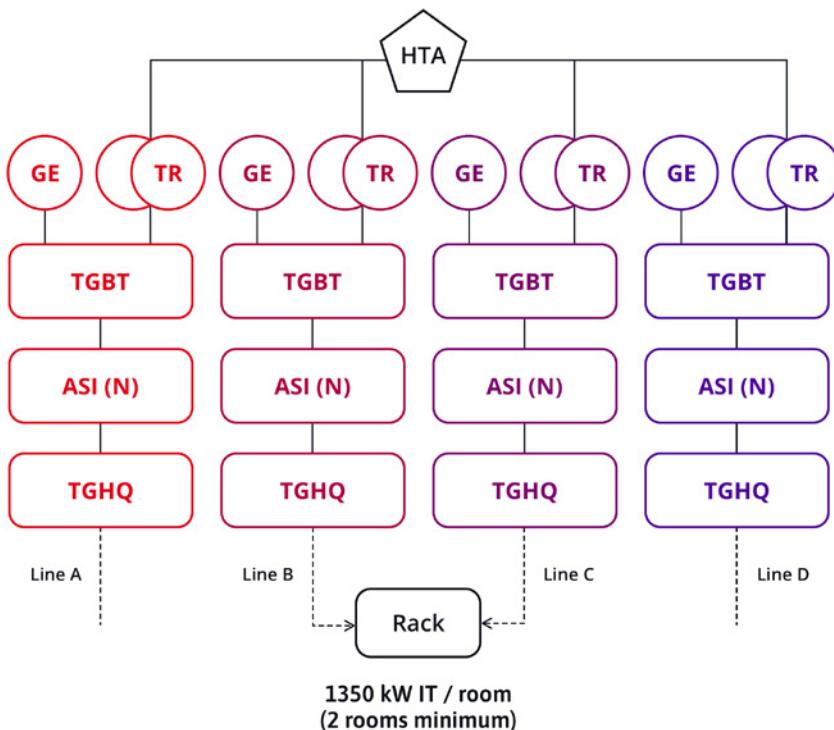
At DC5, clients can choose from three power configurations.

Centres. The Hexacore design strictly meets the criteria of uninterrupted supply and TIER-III concurrently maintainable.

This architecture offers a 100% availability rate.

DC5 - Hexacore Design diagram.

Hexacore Design



- A Standard N+1 type architecture

IT racks are powered by two supplies followed by generators. Only one of the two is inverted.

Should an interruption on the national power grid occur resulting in one of the two power lines temporarily going down, the backup generator sets kick in. While the general sets ramp up (avg. 12 seconds), the IT power continues to be delivered by UPS (uninterruptible power supply), and therefore function without any downtime.

This architecture offers 100% additional power when compared to a Pure 2B architecture, and an energy yield that is substantially superior (1-3% on average). 100% of the installed capacity can be used.

This process is fully mastered by Scaleway Datacenter and is inspired by the Open Compute Project (OCP) concept aimed at significantly improving infrastructure efficiency. The availability rate offered by this type of architecture is 99.99%.



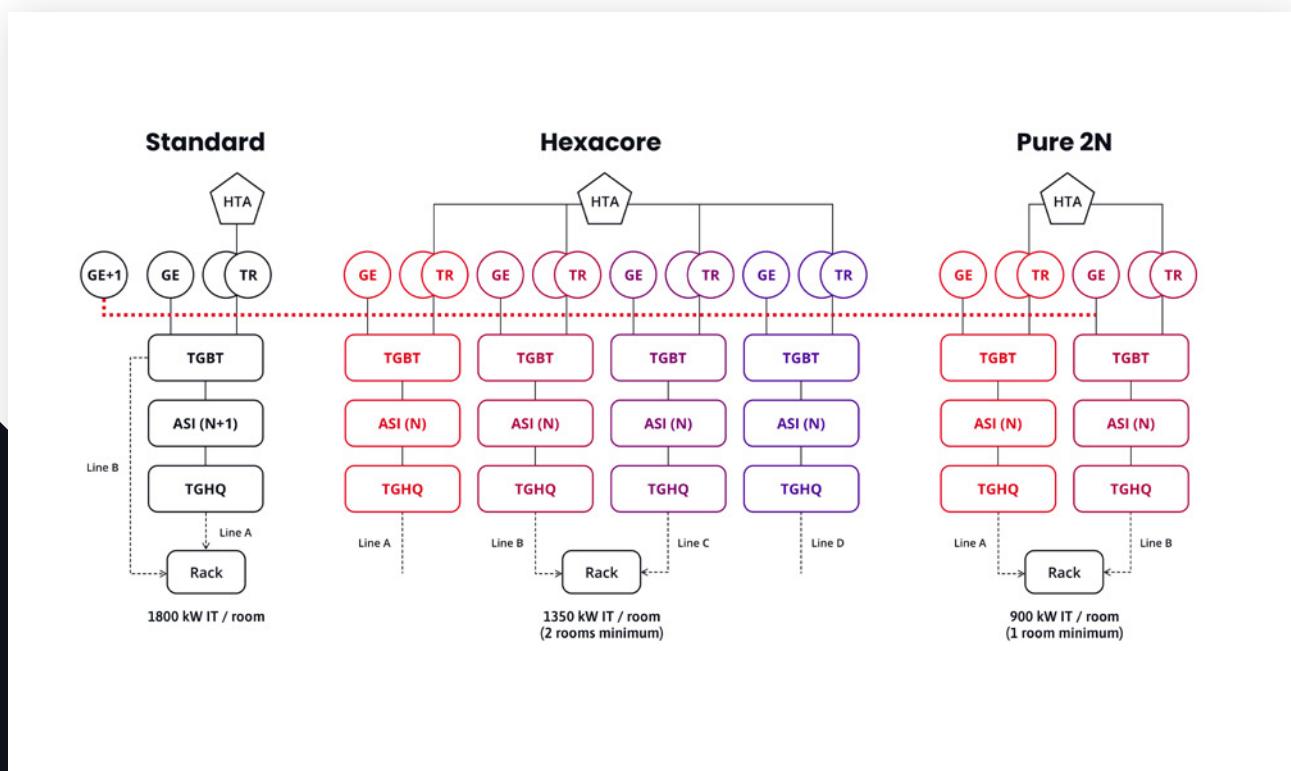
DC5 – The inverters (center) and their batteries (right) can be activated at any time in case of a power outage, while the generator ramp up.

Generator tests are carried out site-wide once a month. Power outage simulations are conducted on a quarterly basis. This allows for the correct functioning of the equipment and their redundancy to be verified.

- Pure 2N architecture

This architecture offers true 2N redundancy via two inverted electrical supplies which have separate backups. The maximum load of each never

surpasses 50%. In case of a branch failure, the load of said branch is immediately transferred to the other branch.



DC5 – Pure 2N Design diagram.

05 Network connectivity and interconnection

Three major long-haul backbones

DC5 is a **carrier-neutral data center** with routes to London, Frankfurt and Amsterdam at your fingertips.

Easy connection to the cloud

DC5 customers have direct access to leading telecommunication operators and major internet exchange platforms (FranceiX, Hopus) to connect to an even wider network of partners.

Access to the ecosystem of leading cloud actors makes DC5 an ideal choice for building hybrid clouds, connecting private clouds for low latency applications and leveraging the scalability and flexibility of public clouds.

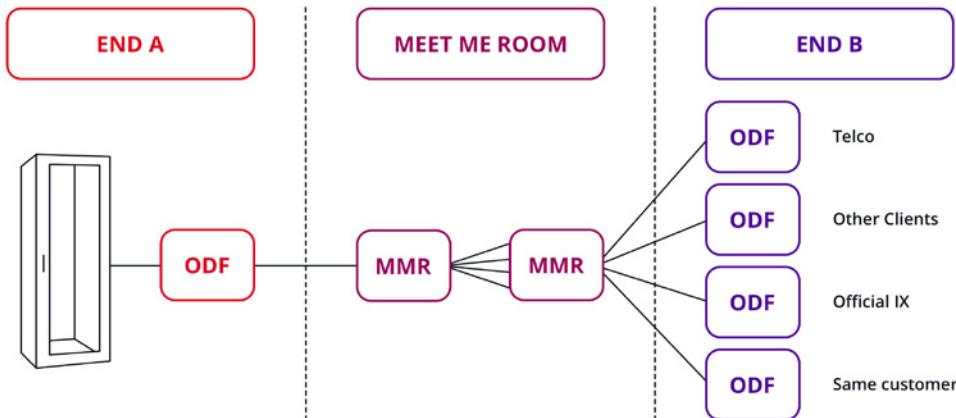
The connectivity advantages of DC5 include:



- Long-distance networks
- Dark fiber, DWDM services
- High capacity interconnections
- Low-latency, resilient and high-bandwidth connectivity options
- Access to leading public cloud providers via partners
- Cost-effective interconnection between Scaleway data centers
- Enhanced reliability
- Access to a wide range of network operators

DC5 – The ecosystem of operators available for interconnection.

Fiber Cross Connect



N.B. Each cross connect comes with a 4 hours recovery time.

DC5 - The Meet Me Room is located in the heart of the data center.

Multiple connectivity options

To connect DC5 to its other data centers, Scaleway has installed cable ducts with two separate arrivals following different pathways in order to avoid a single point of failure (SPOF).

A total of sixteen cable ducts have been installed on either side of the fiber optic pulling chambers for various operators.

The Meet Me Room (MMR)

The MMR and the various telecommunications operators are installed in the center of the data center, in a dedicated and highly secured MMR room.



06 Security and Resilience

The security of DC5 is ensured by the permanent monitoring of the site temperature and the redundancy of electrical systems. The physical security of the data center is ensured by comprehensive monitoring devices at various levels.

Anti-intrusion security

To prevent intrusions, DC5 is surrounded by **high barbed wire-lined electrified grid fences** with an alarm system feeding back to the central security station (PCS).

The periphery of the site is equipped with infrared protection (with alarms feeding back to the PCS) to detect possible movement anomalies. To ensure maximum security, arrivals and departures are monitored by **surveillance cameras covering the entire complex**.

The building itself permits a first level of protection due to the limited number of exit-only doors and emergency exits.

In order to prevent intrusions, **all access is strictly controlled**: badges, biometric recognition systems, vehicle security barriers, pedestrian portals, and visitors are escorted by a data center employee at all times.

DC5 - A biometric recognition system also restricts access to the site.

DC5 - Turnstiles are installed inside the building to control pedestrian flows.





DC5 – vehicle security barriers are equipped with an anti-recoil system.

Vehicle access security

A vehicle access control system with an anti-tail-gating/anti-pass-back facility to permit only one vehicle to enter or exit at a time. The anti pass-back system can be opened exceptionally by on-site security to allow passage of long trucks. Two turnstiles are installed on the outer limits of the site and inside the building to control the ingress and egress of personnel.

DC5 is closely monitored, **with 24/7 year round guarding services.**

Alarms are also in place to alert staff in case of intrusion or when a door is not properly closed.

In order to secure the various areas **within** the data center itself, **access rights to each area are strictly managed**. The doors are equipped with **keycards and fingerprint sensors**. Only authorized personnel are allowed access.

Fire prevention

DC5 fire risk prevention involves regular inspections of the facilities. Should an unlikely fire occur in the facility, an alarm system is triggered in two stages: sensors that detect smoke particles emitted by overheating equipment and a suppression system that targets the fire at its origin. If needed, a second alarm triggers the whole chain to secure the entire premises. Fire doors and containment systems make it possible to isolate the fire at its origin.

DC5 is equipped with a **new generation multipoint OSID linear VESDA detection system which complies with APSAD R7 requirements**, and is capable of detecting the smallest of smoke particles in the air by continuously sampling the air quality and triggering the alarm and subsequent mitigation actions if needed.

Management of other physical risks

Although located in an area that is not at risk from a meteorological point of view, **DC5 has its own rainwater retention basin**. In the event of a heavy storm, the basin fills up temporarily to act as a buffer. The water is contained and controlled before being released into the sewers at a rate of five litres per second so as not to saturate local sewage discharge collectors (a limiter has been installed for this purpose).



This map (High Flooding Risk Territory - TRI) represents the areas which could be flooded. These areas are determined either by the historic occurrence of floods, or by calculations. Three time periods are determined - frequent, medium and extreme events in order to denote the probability of a flood and its intensity.

- High flood probability
- Medium flood probability
- Low flood probability

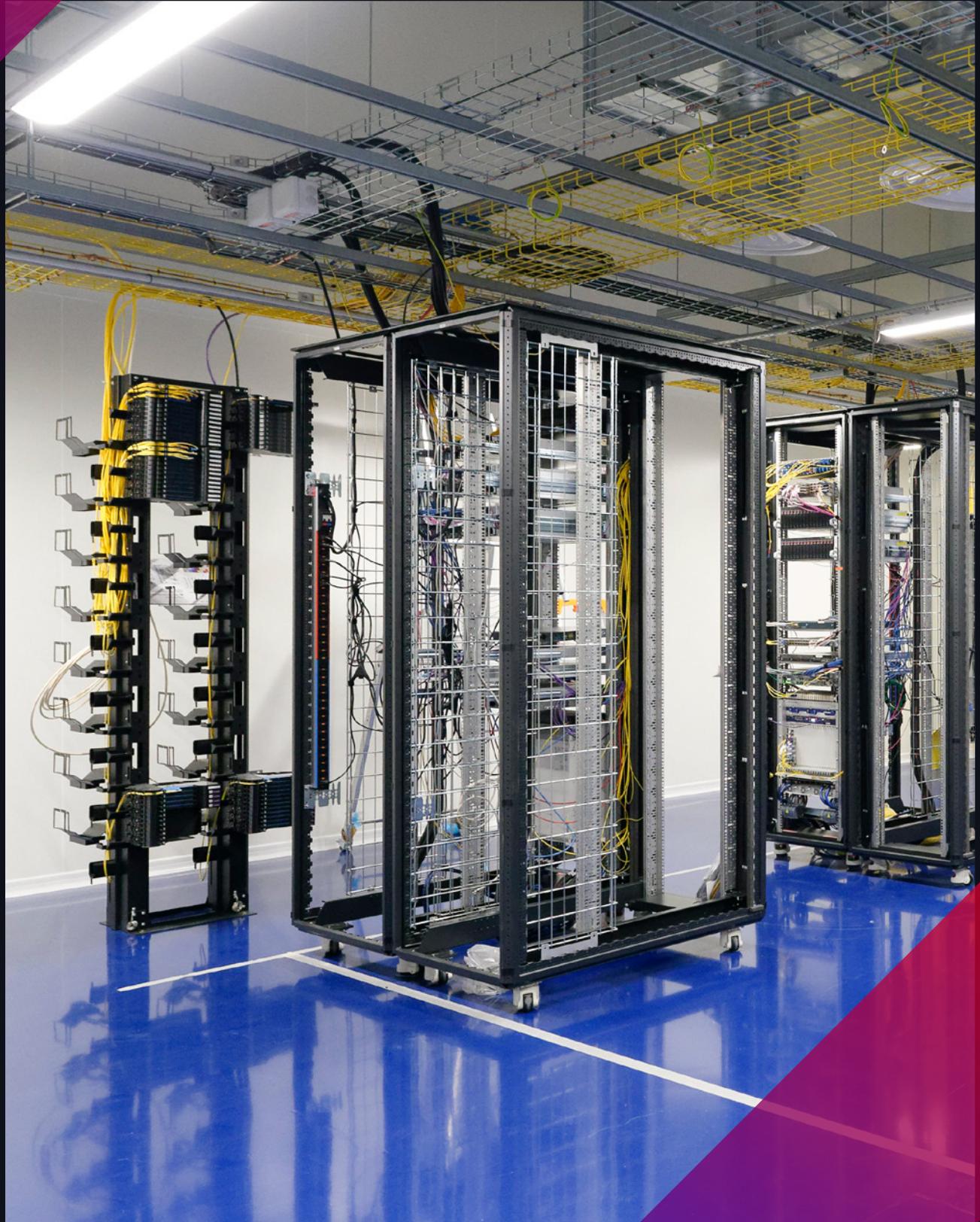
Saint-Ouen-l'Aumône natural risk prevention plan.

Hosting in France, GDPR compliance

France was one of the first countries in Europe to implement a **rigid personal data protection policy**, with the Data Protection Act of 6 January 1978.

France has also established the CNIL (The National Commission on Information Technology and Liberties), an authority dedicated to the protection of personal data, which ensures that technological innovations do not infringe on individual rights. The CNIL is involved in advising, monitoring and even sanctioning companies, if necessary, and plays a central role in data processing in France.

In addition, the general data protection regulation (**GDPR**) in force within the European Union prohibits the transfer of personal data outside the EU.



07 Compliance

Design compliance

- ASHRAE TC9.9, class A4
- Tier 3

Insurance certifications

- APSAD* R4
- APSAD R5
- APSAD R7

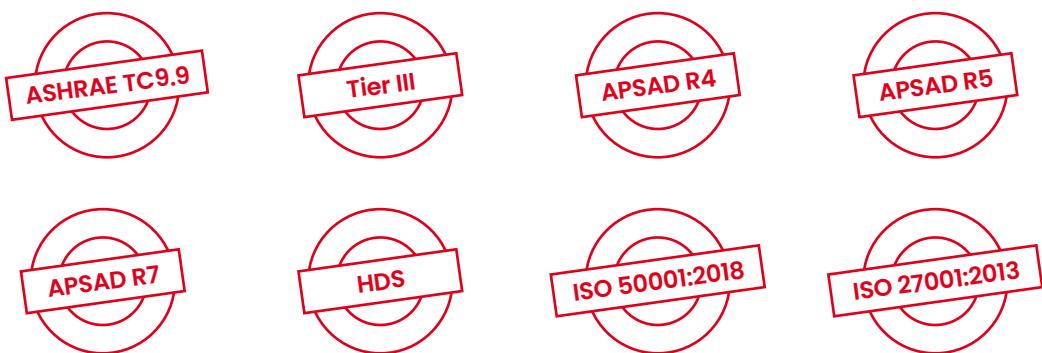
Certifications for hosting health data

- HDS

ISO Certifications

- Energy ISO 50001:2018
- Security ISO 27001:2013

*APSAD - French plenary assembly of damage insurance companies.



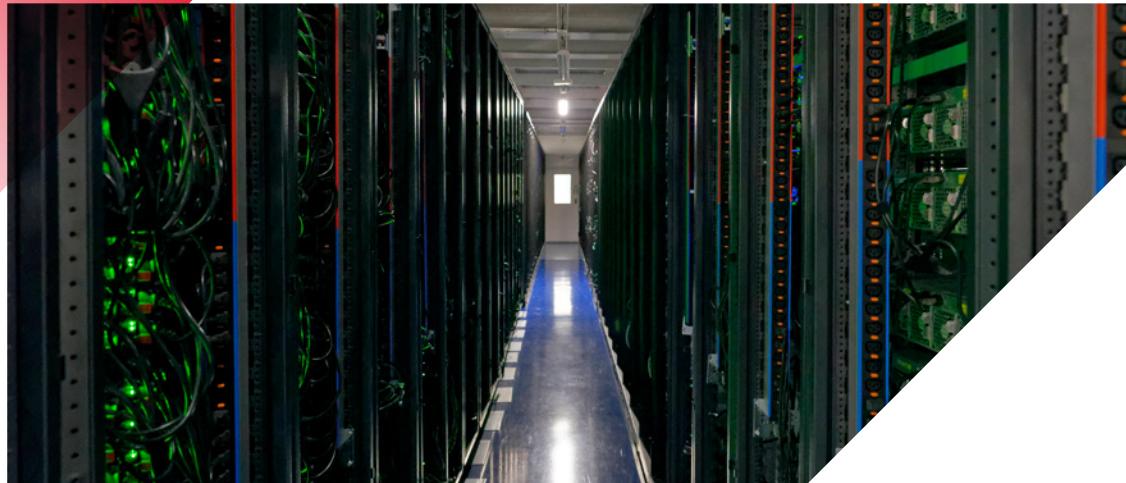
08

Room structure and organisation

DC5 is designed to accommodate modular projects and incorporates a capacity for rapid evolution “by design”. The site spans over 20,000m² and allowing for immediate optionality for any increases in demand.

Modular and ultra-high-density server rooms

The rooms are designed to accommodate 276 to 292 racks each containing 200 to 500 servers depending on the ranges. Designed for ultra high density and large-scale infrastructures, **each rack is equipped with two power supplies and natively supports a density of 6KW**.



DC5 – Room n°1, from the inside.

Each room consists of four rows of racks back-to-back. Each room is self-contained with two sealed hot and three sealed cold corridors in order to provide strict temperature control. Energy and network cables arrive directly through the ceiling (DC5 does not have a raised floor).

09 On-site teams and monitoring

The site has a security team present 24 hours a day, 7 days a week. A site manager, accompanied by technicians (all authorized), carries out the 24 hour operational maintenance of the site and interventions (remote hands) for customers.

Monitoring is carried out by a BMS (Building Management System) developed entirely in-house, controlling and monitoring more than 2,000 data points in real time.

Depending on the severity of an alarm, the technicians present on-site take the first steps required, accompanied by the on-call equipment manufacturer.



10 Available services

DC5 offers a full range of customer services to facilitate critical infrastructure projects and management. In addition, our on-site Remote Hands support is available 24 hours a day, 7 days a week.

Our technicians' local presence on-site

DC5's teams are on-site ready to carry out actions to ensure that the data center remains operational in optimal conditions (see detailed table).

- Highly automated supervision with permanent human presence

ACTIONS	AVERAGE INCLUSION PERIOD	AVERAGE COMPLETION TIME	WORKING HOURS DELAYS	OUT OF WORKING HOURS DELAYS
Remote support in a private data center	Immediate	15 minutes	20 minutes	40 minutes
Receipt/output of delivery	Immediate	30 minutes	20 minutes	
Visual diagnosis of one or more equipments located in 1 bay	Immediate	15 minutes	20 minutes	40 minutes
Starting or rebooting a server or active component	Immediate	6 minutes	20 minutes	40 minutes
1U rackmount server or active component installation	Planned operation	30 minutes	Planned operation	Planned operation
2U or 3U rackmount server or active component installation	Planned operation	30 minutes	Planned operation	Planned operation
Installation of server or rack-mountable active components 4U or 5U	Planned operation	45 minutes	Planned operation	Planned operation
Installation of server or rack-mountable active components > 5U	Planned operation	45 minutes	Planned operation	Planned operation
Installation of server or rack-mountable active elements > 10U	Planned operation	45 minutes	Planned operation	Planned operation

ACTIONS	AVERAGE INCLUSION PERIOD	AVERAGE COMPLETION TIME	WORKING HOURS DELAYS	OUT OF WORKING HOURS DELAYS
Installation of server or rack-mountable active elements > 20 Kgs	Planned operation	45 minutes	Planned operation	Planned operation
Checking cables	Immediate	20 minutes	20 minutes	40 minutes
Unit wiring	Immediate	10 minutes	20 minutes	40 minutes
High current pre-wiring	Planned operation	120 minutes	Planned operation	Planned operation
Low copper current pre-wiring (12-port strip to strip module)	Planned operation	720 minutes	Planned operation	Planned operation
Low-fiber power pre-wiring (6-port headband to headband module)	Planned operation	480 minutes	Planned operation	Planned operation
High-current connection in the rack	Planned operation	20 minutes	Planned operation	Planned operation
Garter brewing equipment	Immediate	15 minutes	20 minutes	40 minutes
Labelling of equipment/cable	Immediate	5 minutes	20 minutes	40 minutes
Assembly/disassembly of support (cd, usb key)	Immediate	5 minutes	20 minutes	40 minutes
Assembly/disassembly K7	30 minutes	30 minutes	20 minutes	40 minutes
Equipment hardware configuration	Planned operation	120 minutes	Planned operation	
Inventory management and referential monitoring		4 hours per month depending on the volume		
Console-based order entry and communication of results by telephone	Immediate	45 minutes	20 minutes	40 minutes

“Remote Hands” assistance



For critical infrastructure that requires complex and scheduled technical operations, **an advanced support solution is available at DC5**. Our on-site team can perform operations on your equipment, including:

- Replacing defective hardware (RAM, disk, power supplies, RAID controllers, switches, PDUs, etc.)
- Performing scheduled tasks, such as hardware maintenance
- Diagnosing and solving problems
- Inventory and equipment labelling
- Installing newly received equipment on instruction

Response time: under 20 minutes during working hours, 2 hours outside of working hours.

On-site client access and physical interventions

A secure storage room is at your disposal. **We know that your company's performance relies on having an excellent planning and organizational capacity.** Our team receives and stores your equipment (hardware, cabling, etc.) in the secure storage rooms in our data center and rids you of any disruption to the organisation of your business.

Other on-site services

DC5 offers multiple on-site services for you and your team. **You can consider our data centers as your second office**, this is why you have:

- On-site integration and storage rooms
- Offices
- Secure on-site parking
- Meeting rooms
- Inter-company restaurant (available in the industrial zone)
- Equipment lending
- Multi-client storage area: 10 working days

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Version 1