

Whitepaper

Previder Data Centres

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Introduction

Previder has two new, energy-efficient data centres in Hengelo (Overijssel) in the Netherlands. The larger of the two is called PDC2 and the second data centre (PDC1) will be used for fallback applications. With four separate data rooms, PDC2 is the largest carrier-neutral data centre in the Netherlands. PDC2 users can optionally have access to office space equipped with ICT facilities and extensive meeting rooms with audio visual equipment for presentations. PDC2's power supply and cooling system are of the latest generation and the data centre is ISO 27001 certified. In a nutshell, PDC2 has a number of unique features that ensure an extremely high level of reliability.

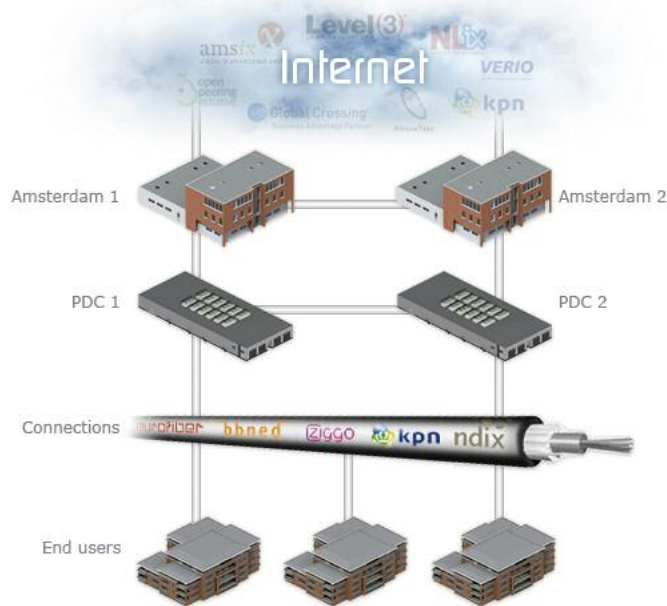
ISP services

Previder supplies a range of additional ISP services, such as connections, national and international domain registration, DNS and e-mail facilities. In addition, Infrastructure as a Service (IaaS) is available on the basis of Cisco UCS, Netapp and VMware. More information about these services can be found at www.previder.nl.

Address details	
Adres	Barnsteenstraat 15 7554 TC Hengelo (Ov.) Nederland
Telefoon	088 - 332 33 33
Fax	088 - 332 33 34
Website	www.previder.nl
Twitter	twitter.com/previder
Hyves	previder.hyves.nl
General info on data centre	
General	Brand new data centre. Concrete and steel supporting structure with aluminium façade cladding and concrete inner shell
TIER classification	TIER 3+
Certification	ISO27001
Height above sea level	14 metres above Amsterdam Ordnance Datum (NAP)
Area	2500 m2
Area of data floor	1600 m2
Number of rooms	4
Presentation rooms	2 (fitted with AV equipment for presentations)
Number of temporary workspaces	6
Parking spaces	32
Accessibility	7 minutes from the A1 motorway 14 minutes from the German border 35 minutes from Apeldoorn 90 minutes from Amsterdam
Loading and unloading	Secured loading / unloading area
Maximum floor load	18 kN/m2
Clear height above data floor	5.5 metres
Height of data floor	100 cm, all cables below floor
Type of data floor	Anti-static
Maximum roof load	100 kg/m2
Racks	19" racks with perforated door (dimensions 600 X 1000 x 47HE)
Footprints/Private corridor	On request

Connectivity

PDC2 is completely carrier-neutral. Users of PDC2 will therefore be able to connect to a variety of carriers. KPN, Eurofiber, TrenT and Ziggo are some of the carriers which have their fibre optic networks in the immediate vicinity. Fibre optic cables can enter the data centre via three geographically-separated supply points (manholes). Ducts run from the manholes to the central meet-me room, where carriers can terminate their fibre optic cables, and there is rack space available in the data rooms for the installation of equipment. Internal cabling will be taken care of and managed by PDC2 employees.



The Amsterdam Internet Exchange (AMS-IX) is the largest and most important internet exchange point in the world. PDC2 will be directly connected to various AMS-IX housing data centres in Amsterdam via its own, redundant fibre backbone. Capacities of 100 Mbps, 1 Gbps or 10 Gbps can be leased in order to create a link between these data centres or to connect with the AMS-IX.

Two internet exchanges (NDIX and NL-ix) are also present in the data centre so that data traffic can be exchanged between sites or with suppliers of online services.

Own IP Connectivity

It is also possible to opt for a connection to Previder's own IP backbone for access to the internet. The ring-shaped network is linked to a number of data centres in Amsterdam via redundant multi-gigabit connections. In Amsterdam, the network is linked to a number of transit providers and traffic is also exchanged with around 125 other service providers via peering agreements on the AMS-IX and NL-ix.

Internet access can be purchased based on the amount of data traffic or on the basis of bandwidth. With the latter, it is possible to choose from a flat rate or burstable bandwidth. More information on this can be found in the product sheet on IP connectivity.

Data connections and VPN

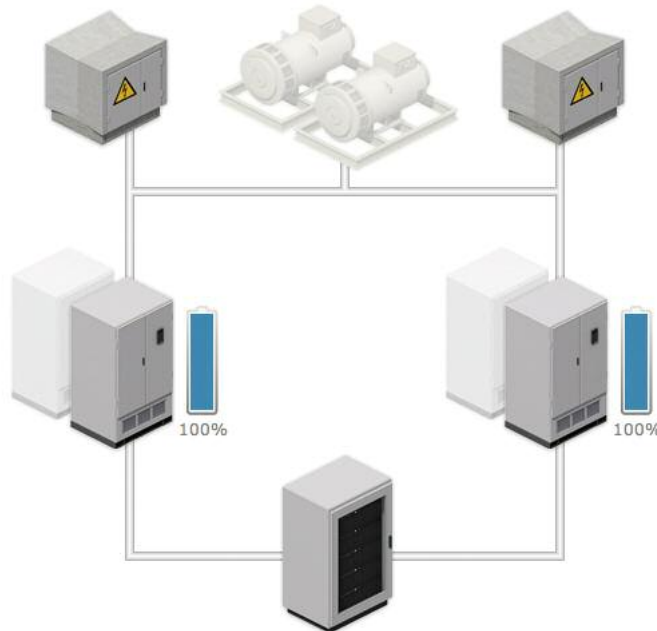
Apart from via fibre optic cables, the data centre is also accessible via a number of other access technologies. These include ADSL, SDSL, VDSL, FttC, FttO and FttH from the main suppliers in the Netherlands, such as KPN, Eurofiber and bbned. These connections can be used for internet access, as well as for Virtual Private Networks which are offloaded directly at the data centre. This creates a safe and reliable network environment which is highly suitable for applications such as:

- ICT equipment installed in the data centre
- Teleworking
- SaaS
- Linking sites with centralised, secure internet access

Connectivity	
External connections	Three geographically-separated supply points (manholes)
Transport capacity	Option to lease capacity (from 100 Mbps upwards) (Ethernet/DWDM)
Carriers	PDC2 is a carrier-neutral data centre
Internal connections	Controlled by PDC2 and managed in an automated system
Fibre optic suppliers in the vicinity	includes KPN, Eurofiber, TrenT, Ziggo
Internet Exchanges (present in PDC2)	NDIX, NL-ix
IP-backbone	Via redundant network with peering on AMS-IX and NL-ix, various transit providers

Electricity supply

When designing the electricity supply for the data centre, everything has been done to guarantee continuity. As a result, the data centre will be able to continue operating independently in the event of a total failure of the mains current.



Grid connection

Electricity is primarily supplied by the data centre's own connection to the grid which provides a 6 megawatt power output. This is supplied via two transformers which form the point of connection with the public electricity grid. 100% green electricity is used.

Diesel generators

In the event of a failure of the grid connection, the electricity supply will be taken over by diesel generators. These generators are located outside the data centre in a separate, enclosed building. When power fails, the generators will start up fully automatically. Account has been taken of a solution for possible malfunctions so that no problems will arise in the event of a generator failure (N+1 configuration). The generators are tested with no load each week and with a load each month. There is sufficient fuel available to be able to provide electricity for 48 hours. A contract has been signed with a fuel supplier who will be able to deliver extra fuel within 24 hours so that continuity can be guaranteed.

UPS

The UPS (Uninterruptible Power Supply) provides a guaranteed, clean supply of electricity. Fluctuations in voltage are filtered and power interruptions are intercepted by the UPS. In the event of a mains current failure, power will be supplied by the UPS units until the diesel generators have started up automatically.

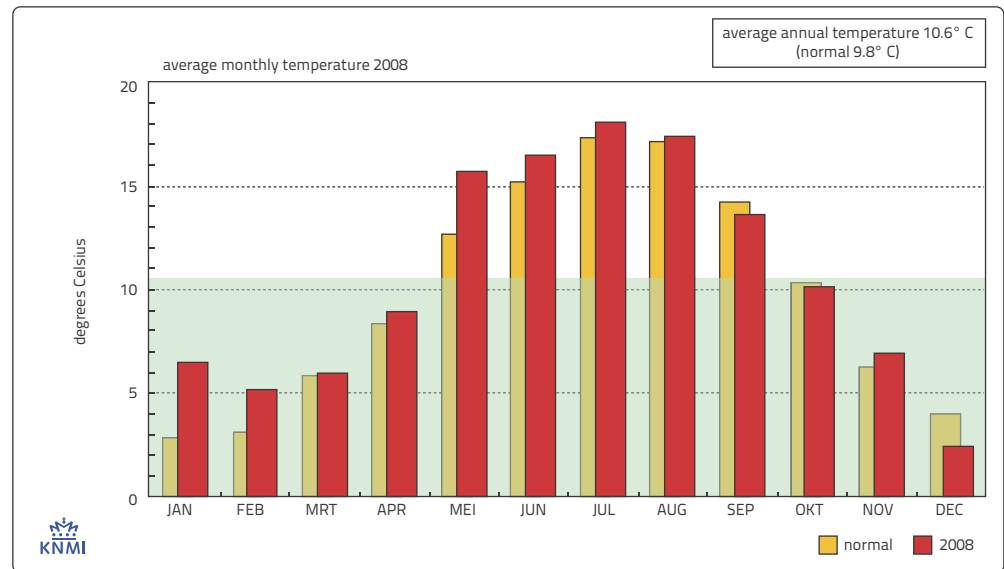
Supply of power to the racks

Power is supplied to the racks via primary and secondary feeds (2N) which each have their own UPS units. This means that if one UPS fails or there is a break in the cable between a UPS and the racks on the data floor, the power supply will not be affected. Each feed is fitted with a 16 amp fuse. Each rack can be supplied with a 32 amp current as standard, consisting of a primary feed (2 * 16 amps) and a secondary feed (2 * 16 amps). Three phases / 420 volts can be supplied on request. PDC2 is fully equipped to provide high density hosting.

Electricity supply	
Power supply	6 megawatts, 100% green electricity
Transformers	2 x 2500 kVA
Power supply to the racks	230 V, via two separate paths (2N)
Power current	Three phases / 420 V available on request
Standard capacity	4 * 16 amps per rack
High Density	Available on request
UPS	2 x 3 x 550 kVA (2 * N+1) per room
Diesel generators	4 * 2100 kVA (N+1)
Capacity of diesel generators	48 hours at full load with 60,000 litres of diesel (available) and a contract for fuel delivery 24/7

Cooling installations

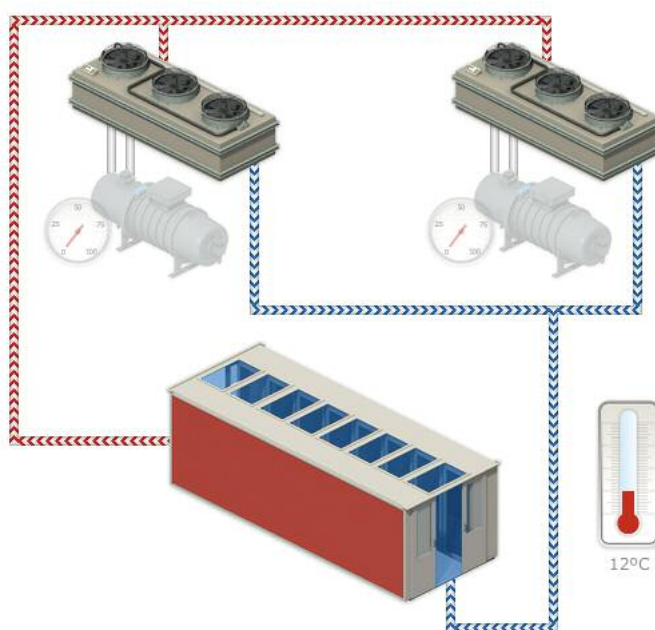
PDC2 is fitted with free-to-air cooling systems. These systems use cold outside air as much as possible, which means that no energy at all is required by the compressors of the air conditioning system. If the data room is fully utilised, the system can operate optimally up to an outside temperature of 16° C. With a lower rate of utilisation, the system can also operate at higher temperatures. In the Netherlands, the average temperature for 2008 was 10.6 degrees. This means that this environmentally-friendly system can be used for most of the year. When the temperature is higher, the compressors switch on gradually to keep the temperature in the data rooms at the correct level.



Annual average temperature for 2008; free-to-air cooling used only in area shaded green

N+2 air conditioning units (ACUs) have been installed in each room. Cold corridors are used to ensure that only the racks, and not the entire data rooms, are cooled. The cold air is carried under the floor to the corridors, where the air is blown upwards and flows through the racks with equipment to the chillers (N+1) installed on the roof, which are fitted with pumps (N+1).

The temperature and speed of the fans that blow the air under the floor are controlled by pressure and temperature sensors. These sensors also communicate with the chillers on the roof, so that the correct capacity is supplied at all times.



The temperature in the cold corridors is maintained at 25° C (+/- 2° C) with a humidity level of 50% (+/- 10%). This reduces the intensity of the cooling required in comparison with traditional data centres that are cooled to 19° C. Studies have shown that higher temperatures cause no problems for the equipment, as the equipment has been designed for this.

An additional cooling capacity of up to 24 kW per rack can be supplied on request for High Density hosting.

Climate control	
Cooling concept	Environmentally-friendly free-to-air cooling system with cold corridors on the data floor
Capacity	Average 2 kW / m2 Maximum 24 kW / m2
Pipes	Fitted with leak detectors, placed under the data floor
Cooling	N+2 ACUs per room
Heat dispersion	N+1 chillers
Configured temperature	25° C at 1500 mm height +/- 2 degrees
Relative humidity	50% +/- 10%
High Density	Up to 24 kW per rack on request

Security

The data centre is equipped with various physical and electronic security systems and strict access procedures are in place to guarantee safety.

Fire prevention

With regard to fire prevention and extinguishing, the data centre uses an aspiration system. This highly sensitive system can detect smoke and heat in any room of the data centre at the point of highest concentration - above the ACU. This system samples the air being exhausted, using laser technology to detect the presence of smoke.

If fire is detected on or under the data floor, the gas extinguishing system is activated automatically. The system uses Argonite, an environmentally-friendly gas that is not harmful to humans, equipment or the environment. The Argonite is sprayed into the room at high pressure (42 bar). This lowers the oxygen concentration in the room to 15% within a few seconds and maintains this level for 60 seconds, extinguishing the fire.

The diesel generators are located in a different building, separated from the data centre. There is a water mist extinguishing system for each generator.

Monitoring and access control

Customers have access to the data centre 24 hours a day, seven days a week all year round, although strict access procedures apply and physical and electronic security measures are in place. The data centre is monitored 24 hours a day.

The site is enclosed by high steel fencing and vehicles must enter and exit via electric sliding gates. The data centre is protected with an intrusion detection alarm (highest security certificate - 4) and video cameras are used on the grounds around the data centre.

Access is only granted to people authorised beforehand. Proof of ID must be shown to the security staff on duty before entering the building. An electronic card is then needed to gain access to the authorised room(s) and rack(s). All rooms are monitored via CCTV and the images are kept for a maximum of one week in connection with privacy laws. The images can be viewed in the event of incidents.

Building management system / NOC

A team of specialists in the Network Operating Center (NOC) has a complete overview of all activities in and around the data centre. Critical parameters and reports of systems, networks and building data are monitored continually and a report is made of system performance and building data as part of the ISO 27001 certification and the signed SLAs.

All systems for fire prevention, security, cooling, alarm installations and other technical systems are connected to the building management system (BMS). The BMS also provides the connection between the various systems and measures the energy consumption of the individual users of the data centre.

Security	
Monitoring of data centre	Present 24/7/365
Physical security	High steel fencing around the site Electric sliding gates for incoming and outgoing vehicles Secured loading and unloading areas
Alarm system	Highest security certificate (4) Closed-circuit television (CCTV) inside and outside
Access control	Electronic card in combination with valid ID
Fire protection	
Fire prevention	Special steel construction and rooms separated by fire-retardant walls with a delay of 60 minutes
Fire detection	Aspiration system with smoke detection
Extinguishing systems	Environmentally-friendly Argonite system in the rooms Water mist extinguishing system in the emergency power generator room Fire hose reels in the corridors with water pressure detection
Building management	
Advanced building management system (BMS)	Stability of the environment Important electrical and mechanical systems Interaction between various systems Critical parameters, report on system performance Connection of safety systems if fire alarm is activated Power consumption meters

Fallback to PDC1

PDC1 is Previder's second data centre. PDC1 is a distance of 4.5 km from PDC2 as the crow flies and is connected to PDC2 via a number of redundant 10 Gbps links. PDC1 is also part of the redundant fibre optic ring. This is why connections also run from PDC1 towards the data centres in Amsterdam.

PDC1, in combination with PDC2, is highly suitable for High Availability solutions. When malfunctions occur in the equipment placed in PDC2, the equipment installed in PDC1 can be used as a fallback solution. This enables an optimum uptime to be achieved. By using real-time replication, a fault-tolerant environment can even be created. This makes it possible for operations to continue without a noticeable interruption in services in the event of a total failure of the equipment in PDC2. Additional services are available such as remote hands and monitoring. Various support contracts and backup facilities are also available.

Fallback location	
UFallback location (PDC1)	4.5 km away from PDC2
Data floor area	90 m ²
Connection to PDC2	Several 10 Gb links
Additional services	
Support options	Remote hands Help with installation & configuration
Storage & backup	iSCSI SAN, HA storage, Bulk Storage
Managed services	VPS / Cloud computing OS management Monitoring (email, SMS, pager)

Disaster recovery centre

Previder provides office space equipped with all ICT facilities that can be used when the customer's site is no longer operational due to a disaster such as fire or a power failure. This location can quickly be put into operation, as use can be made of the server capacity and communication options available in the data centres.

Green IT

PDC2 uses a significant amount of clever technology to ensure minimum energy loss. The environment was one of the factors taken into consideration when the data centre was being built. The aim is to achieve a PUE value of 1.25, which means that only 25% of the power will be used for supporting systems. In comparison, there are data centres which have a PUE value of 2.0. This makes PDC2 one of the greenest data centres in the Netherlands. 100% green electricity is used.

Specsheet PDC2

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Adres	Barnsteenstraat 15 7554 TC Hengelo (Ov.) Nederland
Telefoon	088 - 332 33 33
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Website	www.previder.nl
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General info on data centre	
General	Brand new data centre. Concrete and steel supporting structure with aluminium façade cladding and concrete inner shell
TIER classification	TIER 3+
Certification	ISO27001
Height above sea level	14 metres above Amsterdam Ordnance Datum (NAP)
Area	2500 m2
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Presentation rooms	2 (fitted with AV equipment for presentations)
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