

# 1&1 IONOS SE (Enterprise Cloud) Service Catalog

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## 1 Scope of Validity

The Service Catalog is the central source of information regarding the services provided by the product unit Enterprise Cloud of 1&1 IONOS SE (further called IONOS) to its customers. The Service Catalog applies to the worldwide provision and operation of all services provided by the product unit Enterprise Cloud.

## 2 Infrastructure as a Service

Under the term “Infrastructure as a Service” (IaaS), IONOS offers its customers virtual computing, storage and network resources (hereafter referred to as resources). The customer is able to make use of these resources on a flexible basis as required. The resources used (cores, RAM, storage) are billed to the customer by the minute based on the price list, which is valid at the time. External data transfer, as far as relevant for billing, is priced based on volume.

The hiring and return of resources is performed by the customer. IONOS provides interfaces for this purpose, so that the customer can flexibly control the resources.

The following graphic illustrates the Enterprise Cloud IaaS model:

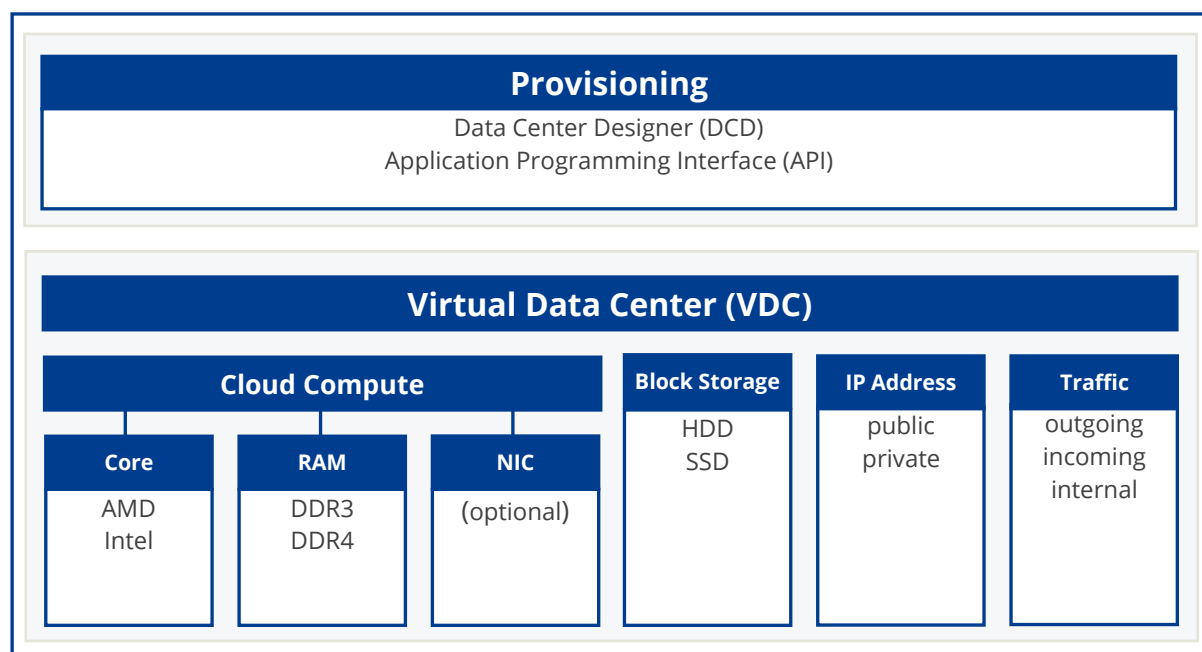


Figure 1: Enterprise Cloud IaaS model

## 2.1 Data Center Designer

IONOS provides the customer, in their personal customer area, access to a web application called the "Data Center Designer" (DCD). The DCD is a modern web application that the customer is able to access via standard Internet browsers. The DCD allows the customer to both control and manage the services or sub-services provided by IONOS, including:

- Creating, editing and deleting virtual data centers
- Creating, (re-)starting, stopping, and deleting virtual servers, including optional storages
- Configuring / modifying existing virtual servers, including optional storages
- Creating, editing and deleting snapshots
- Uploading, editing, using and deleting images
- Reserving and managing static public IP addresses
- Creating and managing private and public LANs
- Creating and managing SSH keys
- Management of integrated cloud services (S3 Object Storage, Managed Kubernetes, Backup)

## 2.2 Multi-User

The authentication on the IONOS DCD takes place based on an account to which at least one user name and one password are assigned. A distinction is made between three types of accounts:

- **Contract Owner** – this account is created automatically for the user that initially registered with IONOS. A "Contract Owner" type account is authorized to fully access all resources, create "User" type accounts and assign an "Administrator" role to them. Only one account of the type "Contract Owner" exists for each contract concluded with IONOS. User – with the "Customer" type account, for each contractual relationship, which is concluded with IONOS, it is possible to create or delete an unlimited number of accounts which are of the "User" type. "Administrators" can assign "Administrator" roles to accounts of type "User".

- **Administrator** - The role "Administrator" has the same permissions as an account of the type "Contract Owner" with the restriction that the payment method of the contract cannot be changed. It is possible to revoke the "Administrator" role again.
- **User** - with the "Contract Owner" as well as "Administrator" type account, for each contractual relationship, which is concluded with IONOS, it is possible to create or delete an unlimited number of accounts which are of the "User" type. Accounts of type "user" can be upgraded to "Administrators".

The Multi-User Management enables access to be generally limited to the following resources types:

- Virtual Data Centers
- Snapshots
- Images
- IP Blocks
- Backup-Units
- Kubernetes Clusters

The assigning of rights is based on groups. A group contains one or several "User" type accounts. A "User" type account can be a member of several groups. "Contract Owner" or "Administrator" roles do not need to be managed in groups as they have access to all resources of the contract.

The Multi-User Management distinguishes between the following authorizations for resources:

- **Read** – the resource and the objects they contain are visible. The attributes of objects can be displayed. The resource and the object it contains cannot be changed, nor can additional objects be added. The read authorization is implicit as soon as a group is assigned to a resource.
- **Edit** – the resource and the objects they contain are visible. The attributes of objects can be displayed and changed. The resource and the objects they contain can be deleted.
- **Sharing** – authorizations for access to the resource can be changed.

The following group rights can be configured per group:

- **Create Data Center:** create new virtual data centers

- **Create Snapshots:** create snapshots of storages for which the group members hold at least “read” authorization
- **Reserve IP Blocks:** reserve additional IP blocks and / or give back IP blocks, which are available to the group members via the “edit” authorization
- **Create Internet Access:** Allows provisioning of public LANs inside a virtual data center
- **Use Object Storage:** access IONOS S3 object storage
- **Create Backup Units:** create new Backup Unit account for backup agent registration and activation
- **Access Activity Log:** view Activity Logs for the entire contract
- **Create Kubernetes Clusters:** create new Kubernetes cluster

## 2.3 2-Factor Authentication

For every account that is configured for access to the IONOS DCD (“Contract Owner”, “Administrator” or “User”), the use of 2-Factor Authentication can optionally be configured with a one-time password pursuant to RFC 6238 TOTP. 2-Factor Authentication provides increased security during the login process. In addition to their user name and password, when they log in, they are required to provide a code, which is generated using a special application (an “authenticator”).

Each account type can activate or deactivate this option in DCD > Account management > Security for the respective account.

“Contract Owner” type accounts can make the use of a 2-Factor Authentication a mandatory requirement for “Administrator” and “User” type accounts.

## 2.4 SSH Key Support

Customers can inject the public part of an SSH key prior to provisioning using the IONOS DCD or Cloud API (version 2.0 or higher) in order to create an SSH login for storage volumes based on a public IONOS Linux image. This feature is not available for snapshots, private images and Windows OS images as well as MS SQL images provided by IONOS.

In DCD, it is possible to store up to 100 public SSH keys for later re-use. It is possible to mark individual SSH key as “default” which are applied to every provisioning automatically if previous mentioned requirements are fulfilled. Independent from SSH key store, customers can add SSH keys ad-hoc without storing them before. It is not possible to share

access to SSH key store across multiple users. Each user has access to his own SSH key store independent of his account role.

In CloudAPI, it is only possible to add SSH keys ad-hoc. You cannot access the SSH key store.

## 2.5 Remote Console

A HTML5 Remote Console is available for every provisioned server in a customer's DCD. The Remote Console allows the customer complete access to the server's monitor, mouse and keyboard. The customer has access to his server with the Remote Console even in the absence of SSH or RDP connectivity.

The HTML5 Remote Console has been developed for browsers that do not support Java. It uses HTML5 and JavaScript, which makes it independent of third party software or additional installations since all it requires is a compatible browser.

## 2.6 Cloud API

IONOS provides the customer with an Application Programming Interface (API). This API gives the customer automated control over the functions from the DCD. Upon request, IONOS will provide an API reference along with example software (Cloud-CLI) on how the API can be used (links below).

IONOS provides access to the cloud functionality for developers based on REST (Representational State Transfer). All account types are able to use the Cloud API.

<b>Documentation on the Cloud API</b>	<a href="https://devops.ionos.com/api/cloud/v5/">https://devops.ionos.com/api/cloud/v5/</a>
<b>Web service end-point of the Cloud API</b>	<a href="https://api.ionos.com/cloudapi/v5/">https://api.ionos.com/cloudapi/v5/</a>

## 2.7 Billing API

The Billing API enables "Contract Owner" type accounts to check the current usage and latest invoices of their IONOS account.

<b>Documentation on the Billing API</b>	<a href="https://devops.ionos.com/api/billing/">https://devops.ionos.com/api/billing/</a>
<b>Web service end-point of the Billing API</b>	<a href="https://api.ionos.com/billing/">https://api.ionos.com/billing/</a>

## 2.8 Activity Log API

The Activity Log API allows the customer the retrieval of a list of activities conducted either in the DCD or in the Cloud API within a specific IONOS contract. Accounts of the type "Contract Owner" and "Administrator" are authorized by default to access the Activity Log API and are permitted to grant access to the Activity Log API for the "User" type accounts.

<b>Documentation on the Activity Log API</b>	<a href="https://devops.ionos.com/api/activity/">https://devops.ionos.com/api/activity/</a>
<b>Web service end-point of the Activity Log API</b>	<a href="https://api.ionos.com/activitylog/v1/">https://api.ionos.com/activitylog/v1/</a>

## 2.9 Virtual Data Center

On the IONOS platform, the customer can create so-called "Virtual Data Centers" (VDC). A VDC serves as a repository for using the resources ordered by the customer. Access to the resources in a VDC – similarly to operating a physical data center – is only possible via a corresponding network or Internet connection. Within a VDC, the IONOS software allows for the distribution of various resources to different availability zones.

IONOS provides the customer with the flexibility to change the ownership of the virtual data center (VDC). Any IONOS customer who is a billing contract owner has the capability of transferring the ownership of a VDC created under the scope of his account with all related rights and responsibilities to any other customer having a billing contract with IONOS. In order to change the ownership of his VDC the customer is requested to contact the Support Team of the product unit Enterprise Cloud.

## 2.10 Virtual Server

The customer can lease various resources from IONOS and combine them into a virtual server. Within a VDC different resources can be distributed across different availability zones. A virtual server consists of the following components:

- Memory (RAM)

- Processor cores
- Storage volumes (optional)
- CD-ROMs (optional)
- Network interface cards (NIC, optional)

Virtual servers can boot from a storage volume, a CD-ROM, or a NIC.

Furthermore, it is also possible for a virtual server to be configured with the help of advanced settings for the use of “Live Vertical Scaling” (LVS). LVS allows further resources to be added to a virtual server while the operating system is in use. The scaling of resources without having to restart a virtual server can be applied as follows:

- Upscaling: CPU, RAM, NICs, storage volumes,
- Downscaling: NICs, storage volumes.

For IONOS provided public Images LVS is activated by default. LVS capabilities on private images can be changed before applying them to new instances. The Image Manager provides edit functionality to these properties. Linux supports all standard LVS functions, Windows server instances, however, only support upscaling of CPU, NICs and storage volumes, and downscaling of NICs at this time. LVS for RAM is possible starting from 1 GB RAM.

Possible configurations of a virtual server are presented in the table below:

## AMD Processors:

Components	Minimum	Maximum
Processor core (core)	1 core	62 cores
Random access memory (RAM)*	0.25 GB RAM	240 GB RAM
Network interface card (NIC)	0 NICs	6 NICs
Storage	0 Volumes	8 Volumes
CD-ROM	0 CD-ROM	2 CD-ROMs

\* Increment/decrement of 1 GB when LVS is activated



## Intel Processors:

Components	Minimum	Maximum
Processor core (core)	1 core	27 cores
Random access memory (RAM)*	0.25 GB RAM	240 GB RAM
Network interface card (NIC)	0 NICs	6 NICs
Storage	0 Volumes	8 Volumes
CD-ROM	0 CD-ROM	2 CD-ROMs

\* Increment/decrement of 1 GB when LVS is activated

### 2.10.1 Core

IONOS allows the customer to assign the appropriate processing power in the form of cores. IONOS will allocate these exclusively to the virtual server specified by the customer.

Model	AMD Opteron	Intel Xeon (Haswell / Broadwell)	Intel Xeon (Skylake)*
Use	Exclusive	Exclusive	Exclusive
Clock frequency	2.8 GHz	2.4 GHz	2,1 GHz

\* Intel Xeon (Skylake) are available in our data centers in Berlin and London.

### AMD Core

The AMD cores IONOS provides are AMD Opteron processors, optimized for high performance within cloud infrastructure.

Thanks to the processor design, allowing for a high number of cores within one host system, virtual instances with up to 62 AMD cores are feasible.

### Intel Core

The Intel cores IONOS provides are Intel Xeon processors that enable simultaneous computing of two threads or sets of instructions.

For each physically present processor core, the operating system addresses two virtual cores and shares the workload between them. This so-called hyper-threading approximates a system with two physical cores.

While hyper-threading can improve data processing performance, in order to exploit the benefits, it relies on the software to support the use of multiple processors. Current versions of Windows and Linux support this feature and can benefit from it.

## 2.10.2 Host Systems

A large number of host systems are kept ready at each location for operating virtual servers for the customers. Each host server is redundantly connected to the InfiniBand network. The host systems are assembled by the manufacturers based on our specifications and then delivered to the site.

## 2.11 Block Storage

The block storage, also called volume, offered by IONOS allows the customer to make use of a dual-redundant storage system (HDD).

Each block storage created by the customer is stored on two storage servers. For additional data protection every storage server is based either on a physical RAID-10/RAID-1E system (HDD), or a software based RAID-50 system (SSD).

Access to the volumes requested by the customer is achieved via the internal InfiniBand (RDMA) network.

Hard drive	Hard Disk Drive (HDD)
Use	Shared
Minimum and maximum size	1 GiB – 4 TiB per volume*
Read / write speed, sequential	200 MB/s at 1 MiB block size
Read / write speed, random	1,100 IOPS at 4 KiB block size

\*Larger volumes available on request.

Hard drive	Solid State Drive (SSD)
Use	Shared
Minimum and maximum size	1 GiB – 2 TiB per volume (up to 4 SSD per VM supported)
Read / write speed, sequential	1 MB/s per GiB at 1 MiB block size
Max. read / write speed, sequential	500 MB/s per VM at 1 MiB block size and min. 2 Cores, 2 GB RAM per volume
Read speed, random	75 IOPS per GiB at 4 KiB block size
Max. read speed, random	37,500 IOPS per VM at 4 KiB block size and min. 2 Cores, 2GB RAM per volume
Write speed, random	50 IOPS per GiB at 4 KiB block size
Max. write speed, random	25,000 IOPS per VM at 4 KiB block size and min. 2 Cores, 2 GB RAM per volume

## 2.11.1 Snapshot

IONOS allows the customer to create so-called snapshots of individual block storages. The copy created of the block storage can be accessed (and deleted) via DCD and API, and new block storages can be created based on a snapshot.

Provision speed	50 MB/s
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## 2.11.2 Operating System Images

IONOS offers standardized images of the following operating systems:

- CentOS
- Debian
- Ubuntu
- Windows

New versions of the standardized images may be added and old versions will be removed when the vendor no longer supports them.

**Note:** We reserve the right to add non-LTS and testing/beta versions. Please follow the vendor's recommendations and do not use them for production use cases.

## 2.11.3 Image Upload

IONOS allows the customer to upload their own images onto the infrastructure via upload servers. The procedure is to be completed individually for each location/data center. IONOS optionally offers transmission with a secure transport (TLS). The uploading of HDD and CD-ROM/DVD-ROM images is supported. Specifically, the uploading of images in the following formats is supported:

### CD-ROM / DVD-ROM:

- \*.iso      ISO 9660 image file

### HDD Images:

- \*.vmdk    vmware HDD images
- \*.vhd     HyperV HDD images
- \*.cow, \*.qcow, \*.qcow2    Qemu HDD images
- \*.raw     binary HDD image
- \*.vpc     VirtualPC HDD image
- \*.vdi     VirtualBox HDD image

A dedicated upload server is available for each data center location. Images can be transmitted to the upload server encrypted via FTPS (FTP-TLS) or unencrypted via FTP.

The following upload servers are available:

- Berlin:            ftp-txl.ionos.com
- Frankfurt:        ftp-fra.ionos.com,
- Karlsruhe:        ftp-fkb.ionos.com,
- London:            ftp-lhr.ionos.com
- Las Vegas:        ftp-las.ionos.com,
- Newark:            ftp-ewr.ionos.com.

Once the image has been transmitted to the upload server, the image will be converted into the internal image format of IONOS. The user will be informed by email when the conversion process starts.

Once the conversion is complete, the image will be available for use in the DCD or API under the name by which it was transmitted to the upload server.

## 2.11.4 Data Upload Service

IONOS offers customers who utilize the data centers in Frankfurt, Karlsruhe and Las Vegas the ability to transfer large amounts of data via a physically mailed data storage medium. This service supports a variety of data carrier interfaces like USB or SATA. To ensure data security, the data on the delivered data storage medium must be encrypted and have a total size of at least 1 TB.

All uploads are performed as a 1:1 copy to a volume and provided in the data center indicated by the customer. The customer is able to attach this volume to a virtual server of his choice in the chosen virtual data center.

After completion of the upload, the data storage medium will be returned to the customer. The data upload service can be requested by the technical support of the product unit Enterprise Cloud.

## 2.11.5 Storage Availability Zone

In order to secure data, improve reliability and create high availability scenarios, customers can assign availability zones to storage volumes (HDD as well as SSD). Virtual storage volumes to which different storage availability zones are assigned are operated on different physical resources. Availability zones can be assigned using the DCD or the Cloud API.

## 2.12 Virtual Network

IONOS allows virtual entities to be equipped with network cards ("network interface cards"; NIC). Only by using these virtual network interface cards is it possible to connect multiple virtual entities together and / or to the internet.

<b>Throughput, internal</b>	MTU 1500 / 64000	3 Gbps
<b>Throughput, external</b>	MTU 1500	700 Mbps
<b>Maximum number of packets per VM</b>	100,000 packets/s	

*The maximum external throughput may only be achieved with a corresponding upstream of the provider.*

## Compatibility

- The use of virtual MAC addresses and/or the changing of the MAC address of a network adapter are not supported. Among others, this limitation also applies to the use of CARP (Common Address Redundancy Protocol).
- Gratuitous ARP (RFC 826) is supported.
- VRRP is supported based on gratuitous ARP. For VRRP to work IP failover groups must be configured.

## 2.13 External Network

Depending on the location, different capacities for transmitting data to or from the Internet are available for operating the IONOS service. Due to the direct connection between the data centers at the German locations, the upstream can be used across locations.

The total capacities of the respective locations are described below:

Location	Connection	Redundancy level	AS
Berlin (DE)	2 x 10 Gbps	N+1	AS-6724
Frankfurt am Main (DE)	2 x 40 Gbps 5 x 10 Gbps <sup>1</sup>	N+6	AS-51862
Karlsruhe (DE)	4 x 10 Gbps <sup>2</sup>	N+3	AS-51826
London (UK)	2 x 10 Gbps	N+1	AS-8560
Las Vegas (US)	3 x 10 Gbps	N+2	AS-54548
Newark (US)	2 x 10 Gbps	N+1	AS-54548

<sup>1</sup> 2 x 10 Gbps toward Karlsruhe; 3 x 10 Gbps toward the Internet

<sup>2</sup> 2 x 10 Gbps toward Frankfurt am Main; 2 x 10 Gbps toward the Internet

1&1 backbone AS-8560, to which IONOS is redundantly connected, has a high quality edge capacity of 1100 Gbps with 2800 IPv4/IPv6 peering sessions, available in the following Internet and peering exchange points: AMS-IX, BW-IX, DE-CIX, ECIX, Equinix, FranceIX, KCIX, LINX.

## 2.14 Internal Network

IONOS operates several independent InfiniBand-based networks at each location. All InfiniBand networks are operated using the latest components from brand manufacturers with connections up to 100 Gbps.

IONOS uses the high-speed networks based on InfiniBand technology both for connecting the central storage systems and for handling internal data connections between customer servers.

<b>Capacity</b>	Redundant, 2 x 40 Gbps raw, 2 x 32 Gbps usable
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## 2.15 Core Network

IONOS operates a high availability core network at each location for the redundant connection of the product platform. All services provided by IONOS are connected to the Internet via this core network.

The core network consists exclusively of devices from brand manufacturers. The network connections are completed via an optical transmission network, which, by use of advanced technologies, can provide transmission capacities of several hundred gigabits per second. Connection to important Internet locations in Europe and America guarantee the customer an optimal connection at all times.

Data is not forwarded to third countries. At the customer's explicit request, the customer can opt for support in a data center in a third country. In the interests of guaranteeing a suitable data protection level, this requires a separate agreement (within the meaning of article 44-50 DSGVO and §§ 78 ff. BDSG 2018).

## 2.16 IP Address Management

IONOS provides the customer with public IP addresses that, depending on the intended use, can be booked either permanently or for the duration for which a virtual server exists. These IP addresses provided by IONOS are only needed if connections are to be established over the Internet. Internally, virtual machines can be freely networked. For this, IONOS offers a DHCP server that allows and/or simplifies the assignment of IP addresses. However, one can establish one's own addressing scheme.

## 2.16.1 Public IPv4 Addresses

Every virtual network interface card that is connected to the Internet is automatically assigned a public IPv4 address by DHCP. This IPv4 address is dynamic, meaning it can change while the virtual server is operational or in the case of a restart.

Customers can reserve static public IPv4 addresses for a fee. These reserved IPv4 addresses can be assigned to a virtual network interface card, which is connected to the Internet, as primary or additional IP addresses.

## 2.16.2 Private IPv4 Addresses

In networks that are not connected to the Internet, each virtual network interface card is automatically assigned a private IPv4 address. This is assigned by the DHCP service. These IPv4 addresses are assigned statically to the MAC addresses of the virtual network interface cards.

The use of the IP address assignment can be enabled or disabled for each network interface card. Any private IPv4 addresses pursuant to RFC 1918 can be used in private networks.

Network address range	CIDR notation	Abbreviated CIDR notation	Number of addresses	Number of networks as per network class (historical)
10.0.0.0 to 10.255.255.255	10.0.0.0/8	10/8	$2^{24} = 16.777.216$	Class A: 1 private network with 16,777,216 addresses; 10.0.0.0/8
172.16.0.0 to 172.31.255.255	172.16.0.0/12	172.16/12	$2^{20} = 1.048.576$	Class B: 16 private networks with 65,536 addresses; 172.16.0.0/16 to 172.31.0.0/16
192.168.0.0 to 192.168.255.255	192.168.0.0/16	192.168/16	$2^{16} = 65.536$	Class C: 256 private networks with 256 addresses; 192.168.0.0/24 to 192.168.255.0/24



## 2.17 Network Services

### 2.17.1 Cloud Connect

Cloud Connect enables the customer to create a direct and dedicated Layer-3 connection between their company network and their virtual data center (VDC). The customer can use Cloud Connect if both of the following conditions are fulfilled:

1. The connecting VDC is operated at the locations of Frankfurt, Berlin, or Las Vegas.
2. The customer has a dedicated line connection to the corresponding data center.

A connection can take place in different ways, for example, Dark-Fiber, MPLS or Cross Connect. For this purpose, the customer can contract a telecommunications company to establish the connection.

The IONOS support team is available to assist with any questions concerning the topic of cloud exchange and connection.

### 2.17.2 IP-Failover

The IONOS IP failover feature helps to minimize packet loss for high availability or failover setups in the event that one of the virtual machines experiences an outage. By setting up IP failover groups for public traffic, customers can define the network interfaces of virtual servers that are part of a high availability setup.

“User” type accounts can create or edit IP failover groups using only reserved IP addresses for which they have been granted access. The IP Failover feature only provides provisioning of the same IP to multiple network interfaces from different virtual servers on the same LAN. It does not monitor the availability of the service to be accessed by the given IP. The monitoring and GARP announcements to gateways must be made by the customer individually on each virtual server that is a member of an IP failover setup.

### 2.17.3 Load Balancing

IONOS offers the customer the function of a load balancer for public traffic within their infrastructure. This load balancer distributes the incoming network traffic according to an ECMP algorithm on the servers configured behind the load balancer.

<b>Throughput</b>	50 Mbps
<b>Max. open connections</b>	40,000 connections
<b>Max. backend servers</b>	100

## 2.17.4 Firewall

IONOS allows the customer to use a software firewall within their infrastructure. For this purpose, the virtual network interface cards of a virtual server can be assigned a packet filter. The network traffic, which is aimed at the virtual server, is already filtered before the customer's virtual machine.

<b>Throughput</b>	700 Mbps
<b>Maximum number of packets</b>	100,000 packets/s

## 2.17.5 DHCP

For every network interface of a virtual server, IONOS provides an IP configuration via DHCP. In this context, the type of the configuration distinguishes between whether the network interface is connected with the public Internet or a private Ethernet.

### Public Internet:

The following parameters are provided for the configuration via DHCP:

- Public IPv4 address
- Network mask (255.255.255.255)
- Gateway address
- DNS server address
- MTU (1500 / 64000)

### Private Networks:

The following parameters are provided for the configuration via DHCP:

- Private IP address (10.x.x.x)
- Network mask (255.255.255.0)

- MTU (1500 / 64000)

The DHCP server always uses the address A.B.C.1 in the class C network, which corresponds to the assigned IP address.

The configuration through DHCP can be optionally activated or deactivated via network interface (DCD, or Cloud API). The configuration via DHCP is activated for newly created network interfaces.

## 2.17.6 DNS

### Caching DNS

For the resolution of public domain names, IONOS operates a redundant set consisting of two DNS servers at every data center location.

These DNS servers are operated as “caching” DNS servers and / or DNS resolvers, and are automatically assigned to the virtual customer entities via the DHCP IP address resolution.

Customer-specific internal domains cannot be resolved on caching DNS servers.

### Reverse DNS

A standard reverse entry is assigned to all public IP addresses, which are assigned to the virtual entities.

These entries follow the format pAAA-BBB-CCC-DDD.pbiaas.com, whereby AAA-BBB-CCC-DDD corresponds to the IPv4 octets.

For statically assigned IP addresses, the existing reverse entry can be adapted according to the customer requirements via a Service Request to the technical support of the product unit Enterprise Cloud.

## 3 S3 Object Storage

S3 Object Storage is a standalone object storage solution based on the S3 API (Simple Storage Services) standard. IONOS provides facilities to manage and maintain accessibility

to the object storage. The user can access object storage either through a browser application, or through any standard S3 client or library of their choice.

IONOS S3 Object Storage offers the industry's best compatibility with the S3 API, which guarantees a high level of interoperability and compatibility with other object storage systems adhering to S3. Apart from the standard operations, which S3 entails, it allows a multitude of additional operations, such as:

- Versioning
- Logging
- Object encryption
- Detailed access management by means of access control lists (ACLs)
- Deleting multiple objects automatically
- Hosting a static website

S3 Object Storage is available for every contract and does not require further registration or activation. By means of a graphical interface as well as other standard S3 clients, customers can manage their objects and define access to them applying ACLs (access control lists) as defined by the S3 standard.

Our object storage is currently available in Frankfurt am Main only. Geo-redundant backups and auto-tiering will be available at a later date.

Endpoints:

<b>S3 Object Storage:</b>	<a href="http://s3-de-central.profitbricks.com/">http://s3-de-central.profitbricks.com/</a> <a href="https://s3-de-central.profitbricks.com/">https://s3-de-central.profitbricks.com/</a>
<b>Websites hosted on the S3 Object Storage:</b>	<a href="http://s3-website-de-central.profitbricks.com/">http://s3-website-de-central.profitbricks.com/</a> <a href="https://s3-website-de-central.profitbricks.com/">https://s3-website-de-central.profitbricks.com/</a>

## 4 Backup

IONOS is implementing the backup solution in partnership with the backup pioneer and market leader, Acronis. A theoretically unlimited volume of data can be stored in data centers, guaranteed and fully certified to ISO 27001. Data cables with capacities of up to 10 GBit/s ensure seamless data throughput, even for full backups.

Features of the fully integrated backup function:

- Comprehensive image backup (full backup) and/or incremental backup
- Rapid disaster recovery and complete data restore
- Easy data migration
- Encrypted data storage in ISO-certified data centers in Germany

The backup solution allows the customer performing a quick and efficient backup of data from applications and any images the customer is using. The customer can also backup data from applications that run on-premises or in private clouds in commonly used virtualized environments such as VMware and Hyper-V.

The fully integrated backup system supports following platforms:

- Windows Server and Desktop operating systems
- Linux
- Mac
- Hyper-V and other Hypervisor solutions
- Workstations, physical and virtual servers

## 5 Managed Kubernetes

Kubernetes (K8s) is an open-source system for automating deployment, scaling, and management of containerized applications. It groups containers that make up an application into logical units for easy management and discovery. Container technology makes software development more flexible and agile, however it is quite complex to manage and requires a certain level of expertise.

Managed Kubernetes offered by IONOS facilitates the fully automated setup of Kubernetes clusters. Several clusters can also be quickly and easily deployed, for example to set up staging environments, and then deleted again if necessary. Kubernetes also significantly simplifies and carefully supports the automation of CI/CD pipelines in terms of testing and deployment.

Managed Kubernetes solution provided by IONOS offers maximum transparency and control of the K8s cluster. This includes:

- Fully automated setup of entire K8s clusters
- Highly-available and geo-redundant control plane
- Full cluster admin-level access to Kubernetes API

- Dedicated CPU and memory resource assignment
- Double redundant and persistent HDD/SSD storage
- Easy integration of cloud services
- Regular security and version updates

The K8s service offered by IONOS is free of charge. The customer pays only for the cloud infrastructure actually needed.

## 6 Data Center Locations

IONOS uses data centers at different locations worldwide. The data center security concepts are always oriented to the highest industrial standards.

### 6.1 Berlin

<b>Operator</b>	United Internet AG
<b>Tier classification</b>	Tier-III, carrier neutral
<b>Certifications</b>	ISO/IEC 27001
<b>Fire protection zones</b>	One
<b>Power supply</b>	Availability 99.99% p. a.
<b>Battery buffer</b>	Yes
<b>Emergency power</b>	A/B system, 2N USV redundancy, Emergency diesel generator with N+1 redundancy
<b>Air conditioning</b>	Cold aisle containment, blow-in temperature 23 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes

## 6.2 Frankfurt am Main

<b>Operator</b>	Equinix (Germany) GmbH
<b>Tier classification</b>	Tier-III, carrier neutral
<b>Certifications</b>	ISO/IEC 27001, ISO 9001, SSAE 16/ISAE 3402, (SOC1, SOC2), PCI-DSS
<b>Fire protection zones</b>	Three
<b>Power supply</b>	Availability 99.99+% p. a.
<b>Battery buffer</b>	Yes
<b>Emergency power</b>	Emergency diesel generator with N+1 redundancy, capable of being refueled during operation
<b>Air conditioning</b>	Cold aisle containment, blow-in temperature 22 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes

## 6.3 Karlsruhe

<b>Operator</b>	TelemaxX Telekommunikation GmbH
<b>Tier classification</b>	Tier-III, carrier neutral
<b>Certifications</b>	ISO/IEC 27001
<b>Fire protection zones</b>	Two
<b>Power supply</b>	Availability 99.99+% p. a.
<b>Battery buffer</b>	Yes
<b>Emergency power</b>	Emergency diesel generator with N+1 redundancy, capable of being refueled during operation
<b>Air conditioning</b>	No explicit containment, temperature within data center 23 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes

## 6.4 London

<b>Operator</b>	Virtus Data Centres
<b>Tier classification</b>	Tier-III, carrier neutral
<b>Certifications</b>	ISO/IEC 27001, ISO 9001, ISO 14001, ISO 50001, ISO 20000, ISAE 3402 compliant, PCI-DSS compliant, BREEAM excellent
<b>Fire protection zones</b>	One
<b>Power supply</b>	Availability 99.99% p. a.
<b>Battery buffer</b>	No – the generators are rotary
<b>Emergency power</b>	Emergency diesel generator with N+2 redundancy, capable of being refueled during operation
<b>Air conditioning</b>	Hot aisle containment, temperature within data center 23 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes

## 6.5 Las Vegas

<b>Operator</b>	Switch Communication
<b>Tier classification</b>	Tier-IV, carrier neutral
<b>Certifications</b>	ISO/IEC 27001, ISO 9001, SSAE 16/ISAE 3402 (SOC1, SOC2), PCI-DSS
<b>Fire protection zones</b>	Two
<b>Power supply</b>	Availability 100% p. a.
<b>Battery buffer</b>	Yes
<b>Emergency power</b>	Emergency diesel generator with N+2 redundancy, capable of being refueled during operation
<b>Air conditioning</b>	Hot aisle containment, temperature within data center 22 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes



## 6.6 Newark

<b>Operator</b>	Anexio Inc.
<b>Tier classification</b>	Tier-III, carrier neutral
<b>Certifications</b>	SSAE 16 (SOC2)
<b>Fire protection zones</b>	One
<b>Power supply</b>	Availability 99,99% p. a.
<b>Battery buffer</b>	No - the generators are rotary
<b>Emergency power</b>	Emergency diesel generator with N+2 redundancy, capable of being refueled during operation
<b>Air conditioning</b>	Cold and hot aisle, temperature within data center approximately 23 °C
<b>Early fire detection</b>	Yes
<b>Fire extinguishing system</b>	Yes

## 7 Technical Support

IONOS offers its customers technical support by telephone and email. Experienced system administrators take the customers' calls and emails and address their concerns immediately. Any faults that may occur are rectified with suitable measures as quickly as possible.

Technical support can be contacted by email or telephone 24 hours a day, seven days a week, via the following contact details:

Contact details of 1&1 IONOS SE Enterprise Cloud Support Team:

<https://dcd.ionos.com/help/en/contact.htm>