



DNS domains

What are they? How to choose ours?

Guide for users



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1

WHAT IS A DOMAIN?

A domain name is an identification string that defines a domain of administrative autonomy, authority, or control on the Internet. **Simplifying, an Internet domain is a unique name that defines "something" on the Internet.**

This "something" can be a server, a web page, an application, etc. (Example: something.mydomain.org). A domain name generally identifies a zone, an organisation, or a server computer that hosts a website or the website itself.

The primary purpose of the domain name system (DNS – Domain Name System) is to facilitate access to resources. The most common resource is the translation between understandable and easy-to-remember names (<http://www.pangea.org/>) and the IP address of the resource on the Internet (109.69.8.145).

From a less technical point of view, a domain name is your name on the Internet; it serves to identify you uniquely and unequivocally. It allows you to identify all your services on the Internet (in your web pages, email addresses, distribution lists, or other applications that you can use on the Internet) under the same name (*something.mydomain.org*). This domain name gives you an "identity" and allows Internet users to communicate with you easily and conveniently. Thus, it is recommended that the domain name you choose has to do with the name of your entity, your project... so that the relationship is clear, that it be easy to write and memorise and that it be as short as possible, among other things.

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What is an IP address?

IP stands for "Internet Protocol" or Internet Protocol. This protocol is used for network devices to communicate with each other on the Internet. TCP, UDP, DNS, HTTP, and SMTP are other communication protocols.

The IP protocol assigns a unique address to each device that tries to communicate on the Internet; that is, it identifies the device on the network. The IP address has a 4-digit numerical format; each can be between 0 and 255, and the digits are separated by a period. An IP address could be: 63.145.212.34

There are two types of IP addresses: public and private.

→ More details in section 6



Besides giving you an "identity", domains have other interesting uses. For example, it makes it possible for any (network) service to move from one place to another on the Internet, even if the change means that it has a different IP address. In other words, if you have the domain that identifies you on the Internet, you can change your internet service provider without changing your email address or website address. Your domain goes with you to your new internet service provider, who will be able to configure them with your domain, and no visitor will notice the difference. It would be equivalent to the portability of telephone numbers. You can change your company and port your number, so you don't lose it and don't have to give a new phone number to all your contacts.

The registration of these domain names, or simply domains, is usually managed by **domain registrars**. These companies or entities sell their registration services to the public and act as wholesalers to create them in a public registry. Domain name **registrants**, that is, you, are called domain owners. Owning a domain means having the exclusive right to use it on the Internet as long as you maintain "ownership" of this domain. The domains are registered for annual periods, and as long as the owner renews the payment for this domain annually, he will continue to enjoy the exclusive use.

In principle, there is freedom regarding domain registration. Anyone can register any domain they want as long as it is available. Despite this, trade and intellectual property/trademark laws affect these registrations, which means that if the *cocacola.es domain* is free, I can register it for my use. However, a legion of lawyers from the trademark owner won't take long to "come for me" because they have rights over it. There are agile mechanisms to resolve disputes and assign a DNS domain name to whoever has rights over it.

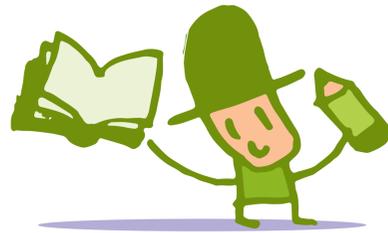
Registry: A domain name registry is an organisation that manages top-level domain names. They create these domains at the DNS authority (ICANN), set the rules for that domain name, and work with registrars to sell domain names to the public. For example, VeriSign manages the .com name registry.

Registrar: This is a reputable organisation, like Gandi.net, that sells domain names to the public. They can sell domains from various generic top-level domains (gTLDs) such as .com, .net and .org, or country code domains (ccTLDs) such as .us, .ca and .eu.

Registrant: The person or company that registers a domain name. Registrants can manage their domain name settings through their registrar. When changes are made to the domain name, your registrar will communicate the changes to the registry so that it is updated in the registry's database. When you register a domain name, you become a registrant!



Anyone can register their domains in one of the existing domain name registrars. In the case of Pangea, we usually register and manage domain registrations on behalf of our partners. In this case, we act in the role known as "resellers". By doing so and taking care of the domain registrations of our partners, we obtain more beneficial prices by volume for all partners in the registration fees. We carry out the administrative and technical procedures to facilitate the use of the domains to the partners so that they should not deal with or miss renewals, checks and verifications.





2 THE DOMAINS AND THEIR LEVELS

Domain names must follow the rules and procedures of the domain name system (DNS). Once a name is registered in the DNS under a top-level domain (TLD), it is an active domain name.

Domain names have a hierarchical structure. They are organised into subordinate levels (called subdomains) of the DNS root domain, which has no text name and is represented by a ".". The top-level names include generic ones (gTLDs), such as *com*, *info*, *net*, *edu* and *org*, and country ones such as *es*, *fr*, *pt*, *it*, etc. (ccTLDs). Below these first-level domains of the DNS hierarchy are the second (*pangea.org*.) and third-level domain names (*fesbal.org.es*) open to reservation by people or organisations that want to offer resources on the Internet, such as websites.

2.1 How is the syntax of a domain name?

A domain name consists of one or more parts, also called labels, concatenated and separated by dots, for example, *www.pangea.org*.

The final dot indicates the root and can be omitted. The rightmost label corresponds to the Top-Level Domain (TLD). For example, the domain name *www.pangea.org* belongs to the top-level domain *org*.

The **Domain Name System** (DNS) is a decentralised hierarchical naming system for devices connected to IP networks such as the Internet or a private network. This system associates various information (called resources) with domain names assigned to each participant. Its most important function is to "translate" human-readable names into IP addresses associated with devices connected to the network to locate and communicate with these computers on the Internet.

The **DNS** service uses data distributed in a distributed and hierarchical way that associates domain names on the Internet with values such as IP addresses. Although you can associate different types of information with each name, the most common uses are mapping domain names to IP addresses and locating email servers for each domain.

The **mapping** of names to IP addresses is the most well-known function of DNS. For example, if the IP address of the Pangea website is 109.69.8.145, most people reach this computer by specifying *www.pangea.org* and not the IP address. In addition to being easier to remember, the name is more stable since the numerical address could change for many reasons without you having to change the website's name.

Let's say that the DNS is an excellent **directory service** that allows you to communicate easily and comfortably on the Internet by names instead of numbers, which can also change more often.



The domain hierarchy descends from right to left in the name. Each label on the left specifies a subdivision or subdomain of the domain on the right. For example, the Pangea *tag specifies a subdomain of the org domain*, and *www* is a tag to create *www.pangea.org*, a name of the *pangea.org domain* that corresponds to the web server.

2.2 Top-level domains

When the Domain Name System was devised in the 1980s, the namespace was divided into two main top-level groups. Country domains (ccTLDs) are based on the ISO-3166 two-letter territory codes. These are the domains *.es* for Spain, *.fr* for France, and *.ad* for Andorra.

In addition, a group of seven generic top-level domains (gTLDs) representing categories of names and organisations were initially implemented. These were the *gov*, *edu*, *com*, *mil*, *org*, *net* and *int domains*.

These two types of Top-Level Domains (TLDs) are the top-level Internet domain names. Top-level domains form the DNS root zone of the Name System. Every domain name ends with a top-level domain tag.

Since then, the growth of the Internet has brought with it the need to expand the number of generic top-level domains available to accommodate more countries or more generic topics, which allows expanding the number of registrable domains and better specifying the scope of each domain.

At ICANN's 32nd International Public Meeting in Paris in 2008, ICANN initiated a new TLD naming policy to take a significant step toward introducing new generic top-level domains.

Number of characters

Each tag contains 1 to 63 characters of the basic ASCII alphabet. The empty tag is reserved for the root domain.

A fully qualified domain name cannot exceed a total length of 253 ASCII characters in its textual representation.

When names with non-ASCII letters are used, the name may look strange if the application does not interpret it correctly. This mechanism is called IDN. For example, the *.cat* domain allows registering domains with specific Catalan letters, such as *fundació.cat*

Device (Host) – A record

A device name with an *A (Address)* record in DNS is a DNS name that has at least one associated IP address. For example, the domain names *www.pangea.org* and *pangea.org* have associated with the address of the device that provides the Pangea web service.



This program provides for the availability of many new domains and a new application and implementation process, with a very high registration cost (starting at \$185,000). Observers believed that the new rules could result in the registration of hundreds of new top-level domains. In 2012, the program began and received 1,930 applications. By 2016, the milestone of 1,000 active gTLDs was reached. Since then, new TLDs have appeared, such as *.org*, *.ngo*, *.coop*, *.cat*, *.news* and a long etc., which accommodate all kinds of generic topics. The Internet Assigned Numbers Authority (IANA) maintains an annotated list of DNS root zone domains (<https://www.iana.org/domains/root/db>). The list of TLD domains available for registration can also be found on the websites of domain registrars.

IANA - Internet Assigned Numbers Authority -

<https://www.iana.org/domains>

IANA is the entity that oversees the global allocation of IP addresses, autonomous systems, DNS domain name root servers, and other resources necessary for Internet protocols. It is currently part of the ICANN organisation.

Initially, IANA was managed by one person, Jon Postel of the University of Southern California (USC), until ICANN was created to take over under a contract from the US Department of Commerce.

ICANN - Internet Corporation for Assigned Names and Numbers -

<https://www.icann.org/es>

The Internet Corporation for Assigned Names and Numbers is a non-profit organisation created in 1998 to take over tasks previously performed by the IANA and manage the DNS. Its headquarters is in California.

ICANN is an organisation that operates internationally and is responsible for managing IP addresses, service identifiers, managing the DNS domain system and its root servers.

→ More details in section 6



3

SECOND-LEVEL AND LOWER-LEVEL DOMAINS

Below the top-level domains in the naming hierarchy are second-level domains (SLDs). These are the names to the left of *.org*, *.net*, and the other top-level domains. For example, in the *pangea.org domain*, Pangea is the second-level domain.

Third-level domains go to the left of a second-level domain. There may be fourth and fifth-level domains, and so on. An example of a working domain name with four levels of tags is *www.grups.pangea.org*, the Pangea Mailman administration website. Each label is separated by a dot (dot). *www* is said to be a record of *grups.pangea.org* and *grups* a subdomain of *pangea.org*. In general, subdomains are domains that are subordinate to your primary domain.

Second-level (or lower-level) domains are often created based on the name of the entity, association or project. For example, *pangea.org* corresponds to the name with which we have registered our entity.



Below this level, the next one can designate a server or a group. Therefore, *ftp.pangea.org* designates the FTP server, *www.pangea.org* designates the web server, and *mail.pangea.org* designates the mail server, each one performing only that function and instead, *grups.pangea.org* groups the services related to mailing lists.





4 TIPS FOR CHOOSING A TOP-LEVEL DOMAIN

As we have seen before, hundreds of top-level domains represent numerous themes or areas of use and regional areas.

There are so many that we can be overwhelmed when it comes to deciding which top-level domain we want to register our domain. That is why we want to leave you with some practical advice below so that you can choose the first level or zone for your domain by your activity, values and principles.

If you are a non-profit association, **.org** is for you. It is one of the first to be created and is widely used for all kinds of “organisation” sites. The benefits of these domains finance the Internet Society (ISOC.org) that coordinates the development of the Internet.

In contrast, the first level, **.com**, is generic for “for-profit” commercial activities. The **.com** is the first area that was sold on the Internet and, due to this and other circumstances, unfortunately, it has become a bit generalised for all kinds of sites. But that it is one of the most widespread, and that it is popular, or that it sounds more familiar to us does not mean that it is the one that best represents us. Nor does it imply that it is better than others in terms of search engine positioning. About “search engine optimisation” (known as SEO for its acronym in English -Search engine optimisation-), there are many factors and actions that we can do to contribute to its improvement. To a large extent, these have to do with the programming code, the design and the contents of our website. For example, it helps to create quality content, that our page loads fast, that its structure and design are functional

More secure DNS

When you type a web address or any domain name (for example, www.pangea.org) into your browser or any internet application, your device sends a request to look up the IP address of that website. Although it is an encrypted website (HTTPS), traditionally, this request is sent to the DNS servers as clear text, usually from your Internet access provider. This makes it easier for third parties to see which websites you access.

Instead, **DNS over HTTPS (DoH)** works more securely. The name to be resolved is sent to a DoH-compliant DNS server over an encrypted HTTPS connection. This prevents third parties from seeing which websites you access.

DoH improves privacy by hiding domain name lookups from anyone listening on a public Wi-Fi network, your internet service provider, or anyone on your local network. DoH, when activated, ensures that your access network cannot collect and take advantage of personal information related to your access to domains and services on the Internet.



and easy to access, create clear titles and descriptions of the content of our pages, use "meta" tags and keywords well, limit HTML and JavaScript *frames*. Furthermore, it also helps to have a good presence on social networks, have cross-links with websites with similar topics, participate in forums on the same topics, etc. All this can be achieved with any TLD.

Since 2015, non-governmental organisations also have the domains **.ong** and **.ngo** (which correspond to the acronym for Non-Governmental Organization, in Romance languages and English, respectively) to specify a little more about *.org* since it is one of the first TLDs has perhaps become too generic. These two are specific to non-governmental organisations and carry their intrinsic values (solidarity, ethics, sustainability, equality, equity, etc.)

But even being an organisation or entity of the social and solidarity economy, you may be interested in highlighting or highlighting other aspects through the first level domain you choose for your domain. For example, if you are interested in highlighting the geographical area to which your entity or project belongs, you have the regional first-level domains. In our closest area, we have:

- .cat** - for Catalonia and the Catalan language and culture
- .barcelona** - is the local extension for the city of Barcelona
- .eus** - for the Basque Country and the Basque language and culture
- .gal** - for Galicia and the Galician language and culture
- .es** - for Spain
- .eu** - for Europe

In addition to indicating your geographical area of action or belonging, these top-level domains highlight your language and culture.



If you are a cooperative, the natural domain is **.coop**. To register it, it is essential to be a cooperative organisation and duly registered. This is an essential requirement that must be demonstrated by passing validation procedures.

For example, if you are an organisation related to network technology, you could consider the extension **.net**. The top-level domain **.net** is the generic one for "network" sites of communication networks, although it is currently used for domains that express some concept of a network in general. Along with *.org* and *.com*, it is one of the first top-level domains sold on the Internet and is widespread for all kinds of sites. For many years, when there weren't as many possible top-level domains as there are today, it became something of a catch-all for when a name you wanted wasn't available elsewhere. Today, for technological issues, new extensions have appeared, such as:

- the **.app**, intended for sites that offer applications

- the generic **.tech**

- the generic **.online**

- the generic **.cloud** for services and promotion of the "cloud"

- the generic **.digital** for digital themes

Another widely used top-level domain is the **.info**, generic for "information" sites. It has generalised to sites that offer information on various topics. It has become quite generic, although if your web pages offer information on a specific topic, you may find a specific extension. For example:

- .camera** for video-related topics

- .photos** generic and oriented to the world of photography



- .**photo** for professional photographers
- .**photography** oriented to the world of photography
- .**pictures** oriented to the world of photography and image
- .**house** "home" oriented
- .**catering** geared towards catering activities
- .**education** education-oriented
- .**courses** aimed at the education and training sector
- .**eco** an extension oriented to environmental issues
- .**energy** a generic extension for energy-related topics

The list of top-level domains is currently very long and continues to expand, so before choosing one, it is worth looking at what is available and seeing what best suits your needs.

Furthermore, an essential factor to consider is the price and the use restrictions. Not all extensions have the same price. This is marked by the Registry that manages it and depends on many factors: demand, the market they are aimed at, start-up costs, etc. That is why there are very cheap extensions and others with prohibitive prices. For example, the regional extensions of some tax havens may be worth a fortune, and some with notable names, because they are unique -for example, because they are the same name in different languages, etc.- are known as *premium domains* and usually have exorbitant prices.

There are also top-level domains with restrictions to register on them. For example, **.edu** is exclusive for universities and official educational entities, which in no way allows the registration of an entity or person that does not meet these requirements and can accredit it as required. Or the **.museum**, which is the exclusive one for museums or the **.gov**, which is only for US governments and public administrations, with stringent restrictions.

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5 MANAGEMENT AND MAINTENANCE

Once we have our domain name registered, we need "someone" to make it work so we can use it on our website, with our emails, etc. This "someone" is the DNS server. Each domain must have at least one pair of DNS servers assigned to it. This is where your internet service provider comes in.

In Pangea, we offer our members the registration and hosting of domains. Pangea has available and maintains DNS servers where all the domains of Pangea and its partners and associates are configured (see Note 3). These DNS servers respond for all configured domains. When an Internet user wants to visit a website or send an email to one of them, they are in charge of responding and indicating to which machine to send the mail or to which one to request that web page so that the Internet user receives it.

Within the domain hosting service that Pangea offers its partners, we also renew the domain registration every year, paying the corresponding fee for it in its Registry on behalf of our partners. Domains are registered for at least one year, although they can be registered for more extended periods (this does not usually bring an improvement or reduction in price). We also manage the information that appears in the "Whois" directory and its privacy, trying to hide all the information of the member so that it is not publicly exposed.





6

ADDITIONAL INFORMATION

6.1 About IP addresses

IP stands for “Internet Protocol” or Internet Protocol. This protocol is used for network devices to communicate with each other across the internet. TCP, UDP, DNS, HTTP, and SMTP are other protocols that regulate communications.

The IP protocol assigns a unique and unrepeatable address to each device that tries to communicate on the Internet, that is, the device's identity on the network. An IP address has a numerical format with four numbers, each between 0 and 255, separated by a point. An example of an IP address could be: 63.145.212.34

There are two types of IP addresses: public and private.

A public IP is an address assigned by your internet provider to be recognised on the Internet and to receive a response. Just as you can't drive your car out on the street without a license plate, you can't go to the internet without an address.

Usually, these IP addresses are reassigned by your internet access provider whenever you restart the router (router) or every so often. These IP addresses are known as dynamic IP addresses. If, for some reason (we have a server), we need always to have the same IP address, a static or fixed address for a device, we must contact the access provider and request that they assign it only to our router.

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A private IP address is the same as public IP address, except that it can only be used on a private network, our network, and is not accessible from the Internet. A typical example is a house where devices such as a computer, a mobile, and a television are connected to the same Wi-Fi or wired network. This network assigns a different private IP address to each device so that they can recognise each other. When these devices send IP packets to the internet, our router replaces the private address with its own public address and vice versa with the response. This is known as Network Address Translation or NAT. There are different ranges of private IP addresses that we will see below. For now, an example of what it would be like to have private IP addresses in a small home environment:

Router: 192.168.0.1

Mom's Mobile: 192.168.0.10

Dad's mobile: 192.168.0.11

My mobile: 192.168.0.13

Printer: 192.168.0.12

Tablet: 192.168.0.98

The private IP address ranges that we can use in any private network, since they are not seen from the outside, start with 10, 172.16 ... 172.31, 192.168.0 ... 192.168.255.

The most common private network range starts with 192.168. However, on the internet, you never see your device's private IP address but your router's public IP, as if all traffic originated from it.



6.2 ICANN

ICANN - Internet Corporation for Assigned Names and Numbers - <https://www.icann.org/en>

ICANN is a non-profit organisation created on September 18, 1998, to take over tasks performed by the IANA and manage the DNS. It is headquartered in California and is subject to that state's laws.

ICANN is an organisation that operates internationally and is responsible for managing the distribution of IP protocol addresses, protocol identifiers, coordination of DNS management and the administration of its root servers.

ICANN is dedicated to preserving the stability of the Internet through consensus-based processes. ICANN coordinates the DNS to guarantee the unique resolution of names; in this way, users can find all IP addresses without problems.

Today, ICANN is formally organised as a non-profit public utility corporation.

6.3 WHOIS

WHOIS (from the English "who is") is a protocol and a database that allows determining the owner of a domain name or an IP address on the Internet. WHOIS lookups can be performed either through a command-line utility or through many public web pages that allow such lookups. These pages rely internally on the WHOIS protocol to connect to a WHOIS server and make requests.

Some problems that can arise from the information that appears in the WHOIS are:

WHOIS

WHOIS (from the English who is, "who is") is a protocol and a database that allows determining the owner of a domain name or an IP address on the Internet. WHOIS lookups can be performed either through a command-line utility or through a multitude of public web pages that allow such lookups. These pages still rely internally on the WHOIS protocol to connect to a WHOIS server and make requests.



Privacy: The registrar's contact details appear, including phone numbers and addresses. This information is publicly available on the Internet.

Spam: Spammers routinely capture email addresses in the text of responses from WHOIS servers. Some servers include Captcha-type systems, where users must enter the letters that appear in an image (to avoid massive automated queries).

Support for non-English scripts: it was not written for an international audience. A WHOIS server cannot tell which text encoding it uses.

Lack of a centralised list of WHOIS servers: There is no list of all WHOIS servers. Therefore, the people who write WHOIS tools must find or build their list.

Each server responds in a slightly different format, so it is difficult to extract the information from each field automatically.

That is why private Whois exists so those who wish to can prevent their contact details from being publicly accessible through the WHOIS system.

There are several types of services:

Privacy service: the client registers the domain with their actual data, but said data is not revealed to the WHOIS queries; instead, empty data is returned or replaced by texts indicating that the data is not accurate for privacy reasons.

Intermediary service (proxy in English): The provider registers the domain name in its name and grants the client a license to use it. Thus, the domain provider's contact information is published instead of the customer's.



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