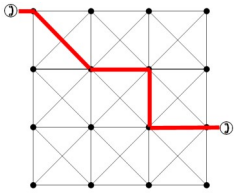
COUNTRY CODES & DOMAINS
 # 2: How Domains make sense of the internet
A SERIES OF GUEST ARTICLES BY MIKE LOCKE

Welcome to the 2nd of our short series of articles looking at how Sark can benefit from its own corner of the internet. This week: what's a domain name and what does it do?

With apologies to the real internet experts who have a deep understanding of the complex technologies tying the internet together, this article is a simplification. It has to be, I wrote it!

In the first article, we looked at the example of posts and how the UPU gets letters sent in one country to arrive at your correspondent in another.
The internet is, in fact, more similar to sending a letter than making a phone call. How so?

Making a phone call



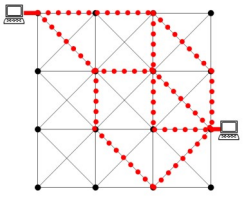
With a phone call, you have an electrical connection from your phone, along the copper cables in the ground (OK, an increasing number of people now have fibre), via telephone exchanges to the phone you are calling. The exchanges "switch" the direct connection between you and who you want to call.

Hence the shorthand of PSTN: Public Switched Telephone Network.

(If you are really interested in this, look up why Strowger, an undertaker, invented the electro-mechanical switch that made it possible to dial another phone number.)

Sending a letter

On the other hand, when we post a letter, there isn't a single direct connection from us to the destination. That's all sorted by the Post Office(s). We use the sender's address and give it to the Gallery. They organise Guernsey Post who look at the address and send the letter by the route they choose. The letter (usually) arrives.



The internet does the same. When we click on a website, our browser sends a series of "Internet Packets" (envelopes) carrying the request for the site, with our IP address and the IP address of where it is going. That's so the website can send back the series of IP packets for our browser to turn into the page on our screen.

The internet is many networks interconnected by special computers called "routers". Routers look at the destination address of a packet and sends it to another router closer to the destination. They switch each individual packet to where it needs to go: not necessarily by the same route. Whichever route is best for each packet at the time. That's called a Packet Switched Network.

Internet Packets, Internet Protocol

And now you know the difference between a "Public Switched Telephone Network" - the phone (some call it POTS: Plain Old Telephone System)and "Packet Switched Networks" – the internet.

As an aside, all our telecoms are undergoing a massive change from PSTN to "All-IP" where it's all based on your internet connection.

Digital and Analogue

"Binary" is that stream of ones and zeroes used by digital computers. It's a lot easier to get transistors to flip between 1 and 0 than to get them to work in analogue; the real world in which you and I live.

"Analogue" means just like the real world. For example, recording your height of 1.8m (5'11") as a voltage of 1.8v. It's true, analogue computers can, and have been, built. Concorde was designed, and flew, with analogue navigational and engineering computers. At least until refitted with digital.

Why change? Analogue computers are difficult. Digital ones are cheap and can be programmed to model the real, analogue world. In 4G mobile, your voice is sent digitally; if you listen to MP3 files, watch TV or listen to DAB radio, it's all digital. Computers and devices based on binary 1s and 0s now power our world – and the internet.

So what's an IP Number?

Now we know computers large and small run on binary, what's an IP Number? It's a special type of decimal number that is easy to translate into binary. It's based on 8-bits as this is one of the early computer standards. IPv4 numbers in binary range from 00000000.00000000.00000000.00000000 to 11111111. 11111111. 11111111. 11111111. This may be easy for a computer to understand but not for real people (or typists). We prefer the decimal version. 255 is 11111111 in binary so in decimal the smallest IPv4 number is 0.0.0.0 and the largest 255.255.255.255 – a lot easier to say (or type).

The internet is now moving to IPv6 to allow even more devices to be connected to networks. But the principles remain the same

What are IP addresses for?

In simplest terms, they identify a computer on the internet, and where it is. A name is who we're look-

ing for, an address tells us where they are and a route tells the packet (or letter) how to get there."

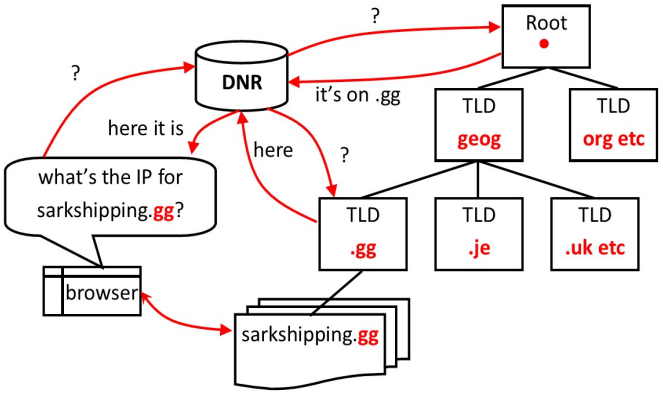
Every device connected to the internet will have an IP address. You can see yours by typing "what is my ip" in most browsers. They're fundamental to how computers, routers and smartphones communicate.

So to navigate the internet, visit sites etc. you—or your browser—need to know your own IP address as sender and the IP address of where you want to go.

Turning numbers into names

Unless very geeky, we just use the Domain Name e.g www.sarkshipping.gg But computers and routers work on IP addresses. How does typing the domain name get us the IP address of where we want to go?

As you type, your browser sends the domain name to a specialist router called a Domain Name Resolver (DNR) to ask for the IP address of the website you want. It's like a directory. It may or not know. If not, it sends the query "what's the IP address for this website on this domain?") up the DNS chain.



When DNR knows, it sends the IP address back to your browser which then knows where to go and ask for the webpage. That will be sent back as a stream of IP packets which your browser turns into the page you wanted.

Connecting the world, navigating the internet

In the very early days there were so few computers connected together, addresses were done manually.

ACRONYM CORNER

DNS: can be Domain Name System or Domain Name Server depending on context.

IANA: Internet Assigned Numbers Authority. The first body to oversee the Domains and IP address allocations. Currently a function of ICANN.

ICANN: Internet Corporation for Assigned Names and Numbers. The international multistakeholder NPO responsible for DNS, IP addresses and much else besides.

IP: Internet Protocol. The rules agreed by the internet community for how their networks communicate. Also specifies the Internet Packet.

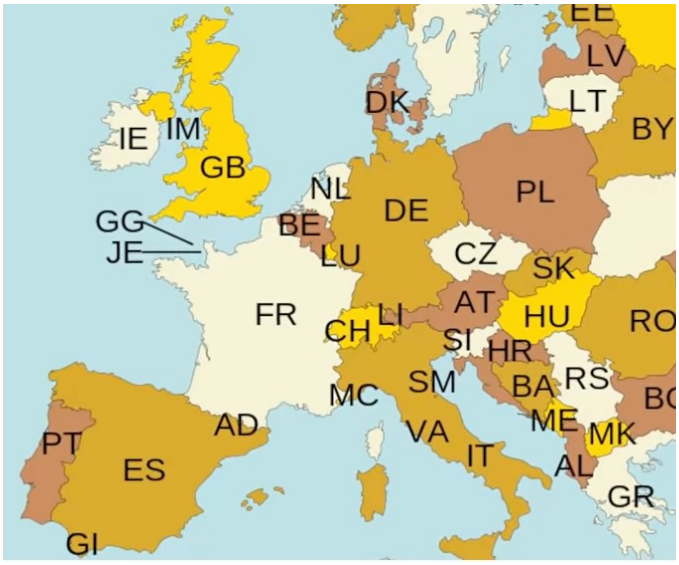
More networks started and wanted to interconnect with others and very soon, the manual method became too laborious. Hence the move to IP, for computers, and Domain Names, for people.

So the Domain Name system is a globally agreed system which translates the IP addresses used by computers and routers into the website domain names and email servers we use.

What types of domain are there?

ICANN manages the allocations of Top Level Domains. They were originally "Organizational" for bodies like governments .gov, commercial bodies .com, NPOs .org and others. And there's "Geographical" known as Country Code (ccTLD): .gg, .je .uk. .fr and so on. Initially allocated by IANA, ICANN now uses the ISO-3166 Standard to allocate ccTLDs.

If your country or jurisdiction is on the ISO-3166 list, it can be allocated an internet ccTLD. If it isn't, it can't. That's why the Country Code TLD is so important for the countries concerned.



Domains make sense of the Internet

Domain names have made it possible for real people to use the internet without thinking how they get to a website or how to send an email.

Without DNS, the internet couldn't work for us. The Domain Name System makes sure only proper, approved Domain Names get used and provides the navigation (routing) system for it all to just work.

Next week—and send us your questions.

In the next article "From Code to Domain", we'll look at how qualifying countries and territories, such as Sark, can use their ISO code to apply for an internet country code Top Level Domain.

Remember, you can ask anything on this or other articles via newsroom@sarknewspaper.com