

CERN celebrates another key contribution to the internet

CERN recently celebrated the 20th anniversary of the first web proposal. This was a fundamental achievement that everyone knows at CERN. Amazingly, another key contribution from CERN seems to be better known outside: the role that it played during the period 1982–1994 in the creation of the internet, i.e. the transnational transport network that supports all applications, including the web. This network, made up of switches and links, uses addresses to identify connected computers. They are called IP addresses. RIPE (Réseaux IP Européens) – the organization that allocates IP addresses in Europe today – stems from an initiative in which CERN was instrumental and is the outcome of a small meeting held at CERN.

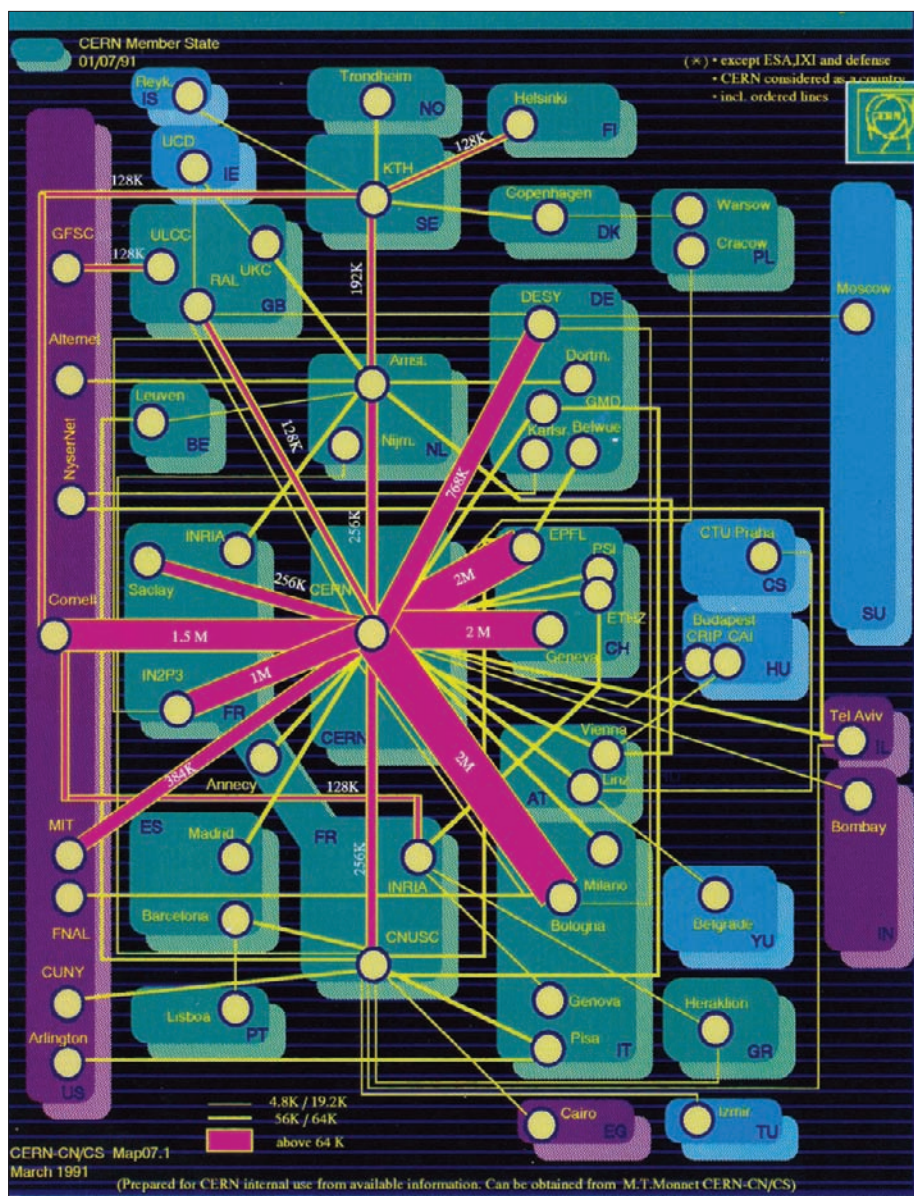
On 7 May this year in Amsterdam, RIPE celebrated the 20th anniversary of its creation, where veterans of this epic tale were invited, including Olivier Martin, now retired from CERN, and me (see www.ripe.net/ripe/meetings/ripe-58/).

The ceremony was part of the 58th RIPE meeting, which assembled more than 500 attendees. The very first meeting also took place in Amsterdam on 22 May 1989 and was attended by just 14 people. But how was CERN involved with this?

Crystals

Capitalizing on its experience gained in the 1970s with the on-site network CERNet (a genuine suite of networking technologies developed entirely at CERN, and following the principles of today's internet), CERN started a programme of external networking in the early 1980s. The major HEP centres in Europe set up direct links to CERN and soon physics centres in other regions requested direct connections as well. At that time, the centres and CERN were connected directly by means of leased circuits specially constructed by telecommunications operators. Often, these connections were ground-breaking where major technical or administrative obstacles had to be overcome. For example, the first data connection between China and the scientific world was carried out in July 1988 by means of a slow link set up between IHEP and CERN by me and my colleague Giorgio Heiman during a memorable trip in Beijing. The leased circuit involved multiple operators and it traversed China, the former USSR and eastern Europe.

Networks grow like crystals: when



A map of the European internet in the early 1990s: a big star with CERN at the heart.

one hub starts crystallizing, everyone wants to connect to it and not elsewhere, as everyone prefers to be just one hop away from the heart. Therefore, non-HEP scientific centres started to set up links to CERN, often serving as relays to other domestic HEP sites.

The heart is CERN

At the end of the 1980s, CERN had become the centre of an enormous star-shaped network, one of the largest in the world. In 1989 when Olivier Martin organized the

conversion of these links to IP technology, CERN immediately became the largest internet hub in Europe. Just imagine: in 1991 80% of the internet capacity installed in Europe for international traffic was terminated at CERN in Building 513. It is no surprise that the performance of Tim Berners-Lee's first web server impressed the world: it was at the heart of the European internet, benefiting from the fastest links and was just a few hops from most destinations.

In fact a year before, it had become clear

Conference and event reports

to Olivier Martin, Brian Carpenter (leader of the Communications Systems group) and me (in charge of External Networks) that the technical conversion to IP technology of the entire CERN External Network was necessary and inevitable. However, it was also obvious that the management of our giant hub would eventually become problematic with the operational arrangements of that time. In particular, back in 1988, IP addresses were allocated for the entire world by an American organization, the Network Information Centre (NIC). It was evident that eventually the European internet would not remain as a star around CERN; this is not CERN's mission. There was an obvious need for a structure to coordinate the management of the internet in Europe.

Abandon of power

I had the honour of convening the very first meeting of the Coordinating Committee for Intercontinental Research Network (CCIRN) in May 1988, co-hosted by CERN and the University of Geneva. This committee was the first attempt to harmonize the inter-regional operation of the emerging worldwide research network.

The second meeting took place in October 1988 at a summer resort in Western Virginia, US. The main topic was "the future of the internet" and the Americans turned up in force, with representatives from the Department of Energy and the Department of Defense, together with Vint Cerf, co-inventor of the TCP/IP protocols. The European representatives were thin on the ground: a German representative, a British representative and me representing CERN. At that time, the European policy was opposed to the internet technology, hence the lack of enthusiasm to send participants to an internet-focused meeting from the National Research and Education Networks.

Towards the end of the meeting the Americans, led by Vint Cerf, became amazingly insistent: "It is essential that you, the Europeans, set up a structure to allocate internet addresses in Europe. It is not good that we keep doing it for you." My two colleagues did not seem too concerned, replying that they did not foresee the use of the internet in Europe. I comforted our American colleagues, replying that there were indeed several people in Europe that believed in IP and were willing to set up such a structure.

The Americans, sometimes accused of wanting to dominate the internet world, showed great respect towards the Europeans on this occasion.

The gang of six

On my return from Western Virginia, Olivier and I called a meeting at CERN with the interested parties from Europe



Five of the RIPE pioneers at the 20th anniversary celebrations in May. From left to right: François Fluckiger, Daniel Karrenberg, Enzo Valente, Olivier Martin and Rob Blokzijl.

to promote the idea of a structure to coordinate IP networks in Europe, and in particular the attribution of addresses. Time was pressing.

This founding meeting took place at CERN in December 1988, in a small office of Building 600.

Six people participated: Rob Blokzijl from Nikhef (NL), Mats Brunel from SUNet (SE), Daniel Karrenberg from EUNet (NL), Enzo Valente from INFN (IT), and Olivier Martin and me from CERN. Rob said: "The weather was horrible. Cold, heavy rain. The room was dark and smoke-filled. We had the impression we were writing a page of history". Enzo recalled: "The tension was palpable. The ideas were popping up so fast. I needed to smoke. Every 10 minutes I had to get to the door, my arm and the cigarette outside in the corridor, my body inside." Indeed, the undertaking was technically and politically complex (IP was not at that time the technology favoured by politicians in Europe).

At this meeting, Daniel Karrenberg proposed the name RIPE for the organization that we were creating. A French name and an acronym that was also relevant in English: time was indeed RIPE for the Europeans to organize the internet in Europe.

Six months later, the first meeting of the RIPE forum took place in Amsterdam chaired by Rob Blokzijl. A bit later, an operational structure was created, the RIPE-NCC (Network Coordination Centre) in the form of an independent, not-for-profit membership organization.

It was essential that this organization was neutral and fully independent, not controlled by particular governments or commercial companies as it was to manage what we expected would become crucial resources for the internet and therefore for the society at large.

Daniel Karrenberg became the first managing director of the RIPE-NCC.

Twenty years later

Twenty years later, the RIPE forum continues at a pace of two to three meetings per year. The RIPE-NCC is still the authority that allocates internet resources and related services to internet service providers, telecommunications organizations and large corporations located not only in Europe, but also in the Middle East and parts of Central Asia. It is one of five Regional Internet Registries providing internet resource allocations, registration services and coordination activities that support the global operation of the internet. It employs 100 people and has 5000 contributing members (see www.ripe.net/membership/indices/). Even though RIPE represents the interests of its members, most of which are commercial firms, its neutrality remains a guarantee against the pressure that is inevitable when managing scarce resources.

What are the gang of six, who laid down the principles, doing now? Rob Blokzijl is still the chairman of the RIPE forum. Daniel Karrenberg, after spending more than a decade as managing director, is now the RIPE-NCC chief scientist. Enzo Valente is the chairman of GARR, the Italian Academic and Research Networks. Olivier Martin retired from CERN a few years ago. We have not been able to locate Mats Brunel.

After the launch of RIPE, CERN continued its contributions to the development of the internet in multiple fields. For example, CERN was a founding member of the Internet Society (ISOC) and of the European Backbone (Ebone). It also set up the first high-throughput internet transatlantic link with IBM – but that is another story!

Useful links

RIPE: www.ripe.net/
Le Réseau des Chercheurs Européens: www.larecherche.fr/content/recherche/article?id=14841

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