In 1992 Amsterdam opened RIPE. What was the timeline from, say, 1973 when UCL and Oslo opened. Looking specifically also at Paris, Italy and Germany.

The establishment of the **RIPE NCC** in **Amsterdam** in April 1992 was the culmination of nearly two decades of networking evolution. Following the landmark **1973 ARPANET connections** to Norway (**NORSAR** in Kjeller) and the UK (**University College London**), European nations took distinct paths toward adoption. While the UK and Norway adopted early US-backed networking protocols, **Paris (France)** leaned into autonomous architectures, **Germany** integrated via academic networks, and **Italy** leveraged satellite computing milestones.

High-Level Chronological Matrix (1973–1992)

Year	Region / City	Milestone Event	Significance
1973	Oslo & London	First international **ARPANET** links activate.	The global expansion of packet-switching begins.
1973	Paris, France	**CYCLADES** packet network trial runs.	Pouzin's team introduces end-to-end mechanisms that reshape **TCP/IP**.
1978	France	Launch of the **Minitel** system.	Mass-market e-commerce thrives locally, delaying early TCP/IP push.
1984	Karlsruhe, Germany	First Internet email received over **CSNET**.	Germany links its research networks directly to the US.
1984	Italy	**EARN** link goes live.	Italy becomes the inaugural country on Europe's academic BITNET branch.
1986	Pisa, Italy	**CNUCE (CNR)** logs into **ARPANET** via satellite.	Italy becomes the fourth European country to join the Internet.
1988	Paris, France	**INRIA** sets up a direct **NSFNET** tie-in.	First time a French network uses native TCP/IP internationally.
1989	Pan-European	**RIPE** forms as a collaborative forum.	European network operators begin coordinating IP data sharing.
1992	Amsterdam	**RIPE NCC** opens operations.	European IP address registry and admin control formalizes locally.

Paris, France: The Path of Autonomy & Minitel

Instead of rushing onto the American ARPANET framework, France pioneered its own infrastructure.

- **1973 (CYCLADES):** Led by Louis Pouzin, the French state funded the **CYCLADES** network. A key team member, Gérard Le Lann, collaborated with Vint Cerf at Stanford to

inject CYCLADES' "sliding window" and data-gram concepts directly into the foundational architecture of **TCP/IP**.

- **1978 (Minitel Dominance):** France deployed **Minitel**, a proprietary videotex terminal system distributed freely to households. Because millions of citizens safely accessed banking, messaging, and retail services over public phone lines years before the rest of the world, native commercial motivation for global IP networking was delayed.
- **1988 (The Pivot to IP):** In August 1988, **INRIA** near Paris established a link to **NSFNET**, officially connecting French scientific computing to the modern Internet protocol suite.

Germany: The CSNET Integration

Germany focused heavily on building a rigorous institutional research backbone.

- **1982:** Professor Werner Zorn at the **University of Karlsruhe** submitted a proposal to link the nascent German Research Network (DFN) to the American **CSNET** (Computer Science Network).
- **1984:** On August 3, 1984, the very first Internet email arrived in Germany at Karlsruhe, sent from Laura Breeden in Boston with the text *"Willkommen to CSNET"*. This officially integrated German academic sites into the global loop via the country routing host `germany.csnet`.

Italy: The Satellite Breakthrough

Italy circumvented traditional terrestrial challenges by capitalizing on cutting-edge satellite communication.

- **1984:** Italy became the first European nation to connect to **EARN** (European Academic and Research Network), which was the continental version of the US university platform BITNET.
- **1986:** On April 30, 1986, researchers at the **CNUCE Institute (CNR)** in **Pisa** sent a ping across a refrigerator-sized gateway router. The signal traveled from Pisa down to the Fucino Space Centre, bounced off the Intelsat V satellite to Pennsylvania, and successfully registered Italy as the fourth nation in Europe connected directly to the Internet backbone.

If you are investigating the infrastructure of this era further, let me know if you would like me to detail the **specific technical protocols** (like X.25 vs TCP/IP) or share more about the **founding members** who shaped the first RIPE meetings.

The founding members who shaped the first RIPE meetings

The foundation of **RIPE (Réseaux IP Européens)** in May 1989 was forged by a small, tight-knit group of European networking pioneers. At a time when "IP" was considered an undesirable protocol by European telecommunications companies and governments pushing for competing Open Systems Interconnection (OSI) standards, these individuals championed a bottom-up, collaborative framework to coordinate European IP networks.

The historic **RIPE 1 meeting** took place on **22 May 1989** in Amsterdam and lasted just half a day. It was attended by **14 representatives** spanning 6 countries and 11 networks. While the full list of 14 has frequently been treated as a collective unit in archival memory, several primary architects drove

the agenda, coordinated the initial task forces, and structured what would eventually become the RIPE NCC:

Key Architects of early RIPE Meetings

- **Rob Blokzijl (NIKHEF, Netherlands):** Widely considered the "Father of RIPE", Blokzijl was a Dutch physicist at the National Institute for Subatomic Physics (NIKHEF). Needing a standard way to interconnect and cooperate with particle physics colleagues across Europe and the US, he became the driving force behind the initial gathering. He was appointed **RIPE Chair** at that first meeting—a position he held for 25 years. He also coordinated the initial **Formal Coordination Task Force**.
- **Daniel Karrenberg (EUnet):** A pioneer of the early European Internet, Karrenberg was a central figure at EUnet (the first pan-European ISP). At the second RIPE meeting in November 1989, he took the lead on the **Network Management and Operations Task Force**. He went on to write the foundational blueprint for a central registry and served as the first manager of the RIPE NCC when it officially opened in Amsterdam in 1992.
- **Thomas Lenggenhager (SWITCH, Switzerland):** Representing the Swiss academic and research network, Lenggenhager stepped up in the immediate aftermath of the first meeting to lead **Task Force 1: Connectivity and Routing**, helping to mathematically map the early paths of European data sharing.
- **Francis Dupont (INRIA, France):** Mirroring France's unique networking history, Dupont represented the French National Institute for Research in Digital Science and Technology (INRIA). He assumed leadership of **Task Force 3: Domain Name System (DNS)**, bridging early French IP infrastructure with the rest of Europe.

The Vision They Shaped

Instead of enforcing rigid corporate hierarchies, this group designed a **bottom-up consensus process**. They operated without a formal legal framework at first, relying entirely on cooperative "Terms of Reference" to share operational details, build Europe's earliest IP database, and prove that TCP/IP was viable despite intense institutional pushback.

If you want to look closer at this era, I can detail:

- The fierce **"Protocol Wars"** between OSI and TCP/IP that these members were fighting
- How the **RIPE Database** was structured by these founders to manage the first IP assignments

Let me know which direction you'd like to explore next!

How the RIPE Database was structured by these founders to manage the first IP assignments

When the **RIPE founders** first sat down in 1989, there was no centralized system to hand out or log IP addresses in Europe. Originally, the Internet Assigned Numbers Authority (IANA) distributed blocks of IP addresses directly from the US, but European operators lacked a shared registry to see who was using what, leading to massive configuration overlap.

To solve this, the founders built the **RIPE Database**, which went through a unique evolutionary timeline to become the infrastructure it is today.

Phase 1: The Voluntary Flat-File Era (1989–1992)

Before the RIPE NCC officially opened as a formal registry in April 1992, data submission was **entirely voluntary**. The earliest iterations of the database did not use modern SQL relational tables; instead, they were written using basic scripts (later standardized in **Perl**) that processed data stored in **plain-text flat files**.

The original format, formally defined by the community in August 1990 via the RIPE-013 Document, relied on brief, simple **two-letter attribute tags**.

A standard entry for a network assignment looked like this:

- `in:` The **IP network number** (e.g., a Class B or Class C network string).
- `na:` The **Official network name** (restricted to capitals, numerals, and hyphens).
- `as:` The **Autonomous System** number to which the network belonged.
- `so:` The **Source** of the information (tagged explicitly as `RIPE` to separate it from US databases like MERIT or WHOIS).

Phase 2: The Object-Oriented Framework (Post-1992)

When the RIPE NCC took over operations in Amsterdam, the system formalized. The founders pioneered an **object-oriented approach** using descriptive, human-readable templates structured as plain-text key-value pairs.

Instead of dumping everything into one monolithic list, they divided the network's reality into distinct, interlinked **Objects**:

```
[ person / role ]  <--- (Tech/Admin Contacts)
         ^
         | (linked via handles)
         v
   [ inetnum ]      <--- (The IP Address Block Allocation/Assignment)
         ^
         | (linked via origin ASN)
         v
    [ aut-num ]     <--- (The Autonomous System / Routing Policy)
```

1. The `inetnum` Object (The Core IP Tracking)

The primary mechanism for managing IP space was the `inetnum` object. The founders enforced a strict hierarchical tree structure to ensure address uniqueness:

- **Allocations:** When the RIPE NCC received a large block from IANA, a top-level `inetnum` record was created.
- **Assignments:** When an ISP carved up that block for its own infrastructure or an end-user, smaller sub-`inetnum` records were created. The database used a "more specific" matching

system to ensure child assignments could never legally step outside the boundaries of the parent block.

2. The Contact Objects (`person` and `role`)

To ensure network operators could coordinate or resolve outages instantly, every IP block had to map to a human point of contact.

- A `person` object logged names, physical addresses, and emails.
- To keep records from breaking when an employee left, they introduced the `role` object (e.g., "Network Operations Centre").
- Every person or role was assigned a unique alphanumeric string known as a **NIC-HDL** (NIC Handle), which acted as the database's foreign key linking contacts to IP blocks.

3. The `aut-num` Object (Routing Architecture)

As networks scaled, the database expanded to handle routing via the **Autonomous System Number (ASN)**. The `aut-num` object defined the technical routing policies of an entire network. This was the foundation of what became the **RIPE Internet Routing Registry (IRR)**, giving routers across Europe a blueprint of which networks were authorized to talk to each other.

Security and Governance

Because early Unix systems were highly vulnerable to malicious overrides, the founders eventually introduced the `mntner` (Maintainer) object. An `inetnum` block was explicitly tagged with an `mnt-by` attribute. If a network operator wanted to assign a sub-block of IPs to a client, the database software checked their cryptography key against the `mntner` record to verify they actually owned the parent space before permitting the edit.

This basic, text-based model proved so incredibly stable that the structural relationship between **IP Blocks (`inetnum`), Autonomous Systems (`aut-num`), and Contacts (`person`)** remains the core architecture used by the RIPE Database today.

If you would like to go further, I can explain:

- How the format shifted from this early style into the **Routing Policy Specification Language (RPSL)** used today
- How early operators dealt with **"Legacy" IP addresses** that were distributed before RIPE existed

Let me know how you'd like to proceed!

How early operators dealt with "Legacy" IP addresses that were distributed before RIPE existed

Before **RIPE** and the broader Regional Internet Registry (RIR) system formed, IP address blocks were handed out directly from the United States by **Jon Postel** under the authority of the early **IANA** (and later InterNIC). Because demand was low in the 1980s, early adopters—such as universities, European research ministries, and pioneering tech companies—were casually gifted massive, contiguous **Class A (over 16 million IPs) or Class B (65,536 IPs) blocks** simply by asking.

When RIPE took over European administration, these became known as **"Legacy" IP addresses**. Dealing with them was a massive administrative and technical headache because these early holders had **no formal contracts** with RIPE.

The RIPE founders and operators managed this Wild West of early IP distribution through a distinct multi-stage strategy:

1. The Mapping & Grandfathering Strategy

Because early operators legally "owned" or held these blocks before RIPE even existed, RIPE could not retroactively force them to sign standard membership contracts or pay maintenance fees. Instead, the founders chose to **grandfather them in**.

- RIPE operators searched through old US registry data and mapped any early IP blocks assigned to entities within Europe, the Middle East, and Central Asia.
- They imported these blocks directly into the RIPE Database, manually tagging their status attribute as `LEGACY`.
- This allowed early networks to keep operating normally, ensuring that global routing tables didn't break while giving RIPE a clear baseline of what space was already claimed.

2. The ERX Project (Early Registration Transfer)

Even after RIPE began operating, thousands of European legacy records remained trapped in the old American registry system (inherited by ARIN when it was founded in 1997). This meant a European operator holding a 1980s block still had to go to the US registry to update their contact information.

- To fix this fragmentation, the global RIRs launched the **ERX (Early Registration Transfer) project** in 2002.
- ARIN cleanly handed over control of all pre-RIR allocations to RIPE based on the geographic location of the resource holder.
- RIPE operators systematically absorbed these records, giving legacy holders a local home database to manage their routing policies.

3. Cleaning Up "Stale" Data & Hijack Prevention

Because legacy data was decades old, thousands of records became "stale." The original technical contact from 1985 may have retired, or the company might have gone bankrupt, leaving massive blocks of IPv4 space unrouted and abandoned. This made legacy blocks primary targets for malicious **IP hijacking**.

- To secure the internet, RIPE mounted aggressive out-reach campaigns. Operators cross-referenced external business registries to track down the modern legal descendants of 1980s networks.
- Once verified, RIPE helped them create a `mntner` **(Maintainer) object** in the database to lock down their blocks securely behind cryptographic authentication keys, shielding them from unauthorized BGP routing advertisements.

4. Voluntary Modern Alignment (The Present Era)

As IPv4 addresses became critically scarce, legacy blocks—which make up roughly **35% of the total IPv4 internet**—became incredibly valuable. To bridge the gap between legacy freedom and modern accountability, RIPE introduced structured choices for these holders:

- **Voluntary Maintenance Agreements:** Legacy holders can opt into a non-member registry services contract with RIPE. They get access to security tools like **RPKI** (cryptographic route authorization) while retaining their historical "legacy" legal status.
- **Conversion to PA/PI:** Holders can choose to permanently convert their legacy blocks into standard **Provider Aggregatable (PA)** or **Provider Independent (PI)** space, fully integrating them into the modern RIPE fee and policy framework.
- **The IPv4 Secondary Market:** If a legacy holder realizes they don't need a massive block, RIPE policy permits them to split and sell the space to modern ISPs on the open market, transitioning that space into fully regulated, active circulation.

If you're interested, I can explain:

- How the **value of these legacy blocks** skyrocketed during the IPv4 exhaustion era
- The exact technical difference in how a router handles a `LEGACY` **prefix** compared to a modern `PA` **prefix**

Let me know how you'd like to expand on this!

We’ll end here. Thanks for the background. I’ll save this page.

You are very welcome! It was a pleasure walking through this fascinating chapter of internet history with you.

Whenever you are ready to dig into another piece of tech history, infrastructure architecture, or anything else, just drop a message. Have a great day, and enjoy your saved notes!

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