Data networks for Audio/Video and Lighting

The slow emerging reality

Wouldn't it be nice if all one needed to connect two computers was a bit of wire?

Well, this was exactly the idea in the beginning. In the 1970s the US Department of defence initiated ARPANET, the early predecessor to the Internet we know today. This was quickly expanded with connections to academia. The first node on ARPANET in Europe was of course University College London. The largest CERN. If this foundational infrastructure didn't exist it would have been impossible for the visionary Sir Tim Berners-Lee to come up with his Hypertext Transfer Protocol. The foundation of the worldwide web. No one individual can be credited with the "invention" of the Internet. However, there are thousands of dedicated, imaginative, and largely selfless people who played their essential part.

In the 1970s Computers took up whole rooms. The whole idea of everyone having numerous connected devices was pure science fiction… even Startrek was conservative on that! A 32-bit address space was "fine" because having 4,294,967,296 addresses seemed plenty when computers were only in the sights of huge purses… but with that address space in the 1970s… it was abundant. With the advent of DNS and domestic Internet service providers, we faced the very real prospect of address exhaustion. In the 1990s a complete overhaul of Internet Protocol was proposed. Fast forward to 2024 and finally the US DoD has released a statement prohibiting purchase of any non Ipv6 capable devices.

Unlike ipv4 with its 4 billion addresses on 32 bits… IPv6 has an address space of 128 bits. The smallest "subnet" is 64 bits deep. In short – if all of humanity wanted to get into one network, it would fit in a 64-bit subnet and be allowed a whole ipv4 internets worth of address spaces! Practically this won't ever happen! And it still needs huge compute to do this of course. Given any user connecting to the Public Internet is given a /56 prefix, this means we all get 8 bits of ipv6 subnets in our houses! Or 256 64-bit address spaces! Remember 1 of these was sufficient to more than cater for all of humanity… address exhaustion is some way off.

Is this a Naïve Utopian view?

In the short term Yes! So, instead, lets not assume the originators of the Internet are at all "stupid", lets look at the problems IPv6 addresses.

1. IPv6 can safely say that it protects against address exhaustion. IPv4 in its global scale attempt was filled with inspired (to be honest) genius workarounds! All of these had the dual effect of a) making it look like the Internet worked, and b) by scaling beyond its intended capacity giving rise to a huge body of knowledge in a huge number of fields that may otherwise have suffered from neglect.
2. IPv4 was conceived at a time where security was not really a priority. It was either for military (enforced at the physical layer with guns and such like. Or, in its academic manifestation, confidence in the fact that academia is grounded in strict ethics of provenance, whilst simultaneously being protected by the shield that nobody else likely

understands what the author is talking about as well as the author. Nevertheless, in times gone by academia may have been keener to publish as soon as possible, and the open peer review in some circles is (was) highly desirable. IPv6 includes IPsec as part of its base. Remember the fundamental tenets of Cryptographic security have their modern roots in the work of a late 19th Century Dutch linguist Auguste Kerkhoffs, whose principles were adopted by William Friedman at West Point, where he used this foundational knowledge to develop cryptographic standards for the US Signal Corps. Friedman died before the start of ARPANET, but his take on cryptographic security in the military was a key influencer. Notwithstanding the ancients – Kerkhoffs relied on the ancient Greek mathematician and philosopher Euclid, who proved an inexhaustible supply of prime numbers (fundamental to cryptography). Once again, we see the loop of history.