

"The Pouzin society ":

Should he return to starting to save the Internet?

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A good enough, but until when?

John Day in his book "Patterns in Network Architecture: A Return to Fundamentals [1] explains that Arpanet, the forerunner of the Internet," was too real to serve as a starting point. " The ideas were so inspired that it has achieved a sufficiently good. But by the way, we forgot to address some fundamental issues that John Day considers the number of September

The network has expanded, but Moore's Law has provided computing power increasingly larger bandwidth networks has also increased steadily for 30 years. Thus, despite the explosion in the number of Internet users and the diversification of applications, the network remained "good enough" until recently.

The current limits of the Internet

But things are changing. With over a billion people and as many objects connected, the 4 billion addresses available soon become insufficient (they are very unevenly distributed with more address to Harvard University as a whole the China. The shortage is expected to happen between 2010 and 2012 ...). Moreover, despite the constant increase in bandwidth, a problem of power arises in the routing very quickly how to find addresses in routing tables with huge routers that come to their limit of calculation? Finally it should be live very different needs on the network: those of ordinary people that we (the media, mobility, adaptability to new innovations), those objects (which support evil protocols that consume very verbose lot of energy when they should be autonomous for the duration of their lives, usually 2 years), or the needs of constrained networks such as military or banks need to ensure that the service contract (unlike Internet "best effort" which is the best possible way. Faced with these difficulties, several solutions are proposed [2].

One solution: a new version of the protocols of the Internet - Ipv6

The problem has been taken into account 15 years ago with the development of IPv6 [3], the new version of "Internet Protocol" (we currently use mostly Ipv4). The idea was to allow a large number of addresses (340 billion billion billion addresses) while retaining the basic philosophy of the network: a network in "best effort" does not need to connect before starting an exchange but independently carrying small packets of information. The idea at work in all parts of the Internet, comes from the work of a French team, Cyclades, which was led by Louis Pouzin. Datagrams (known today packets) flowing in a network without prior connection between the source and destination, was a revolution compared to the networks' connection with 'used. IPv6 also includes as options within the protocol which was only extensions sometimes incompatible with each other and not always implemented in routers. Thus, it becomes possible to ensure the safety, quality of service or the broadcast multicast (one sender, multiple receivers as those in radio or television) throughout. Finally, IPv6 offers an improved protocol for mobility (with a mobile device without necessarily return to its baseline). But the transition from version 4 to version 6 of the Protocol (version 5 is a special version dedicated to the broadcast continues the "streaming") requires the coexistence and development of facilities. The U.S. Department of Commerce has estimated at \$ 25 billion for the passage the United States alone. Yet IPv6 networks or mixed IPv4 and Ipv6 being. France is pretty well placed with the integration of IPv6 in the Freebox since late 2007 and the last meeting of standardized internet protocols, the IETF, which took place in late March, has been the subject of a specific meeting Ipv6 on migration in which Google said it was fully IPv6 compatible and has called on other companies to accelerate the migration.

A second alternative: a next generation network - NGN

But if the current approach of the Internet allows a wide adaptability to many types of needs, it suffers a lesser compensation optimization [4]. Telecommunications industry have sought their share to contractually guarantee a quality of service (QoS: Quality of Service) and thus different levels of services to suit the needs of some businesses such as banks. The concept of "best effort" at the base of the Internet does not allow them to engage. They proposed an alternative to solve the current difficulties of the network starting with a blank sheet or almost: the next generation network (NGN: Next Generation Network [5]). This is to

provide a common network for fixed and mobile. The network returns to the notion of connection (the path is established between the source and destination at the beginning of the communication to go faster all the packages) and switching (we focus on the delivery to the inside a single network with its own address and not to complete the routing in a network of networks which require a much larger field of addresses). For the rest, the idea is to keep on top (go to Network network) packets via the Internet (IP) and especially the IP addresses in order to maintain compatibility with the existing Internet.

The competition between the NGN and IPv6 are plays on the concept of with or without network connectivity and optimized network or adaptable.

Some other solutions to some of the problems of the current network

Beyond these two broad guidelines, there are such solutions to network objects. In this case, the premium consumer, and the protocols are not very talkative to save the most energy. The Zigbee protocol, for example, is adapted to local networks without son objects. LAN so that items can fit into the network of networks that the internet, it was proposed to add IPv6 addresses with an additional protocol: 6lowPAN.

Others still are developing solutions to several different networks to coexist on the same physical network, each using some of the time (the virtual routers with the protocol eg Gini) [6], or to enable networks to s'autoconfigurer in from objectives set by humans and their environment (autonomic computing) [7].\

A new solution: the rethinking of the concept of network

But for John Day, these solutions are only palliative. In his book cited at the beginning, it takes up a suggestion in 1972 by Bob Metcalfe, the inventor of the Ethernet (not to be confused with the Internet ...): "the network is the interprocess communication, and only this .

The inter-process communication (Inter-Process Communication: CPI) is a set of mechanisms to exchange data and synchronize programs running. This change of perspective, seemingly trivial, was described by Brough Turner, Chief Technology Officer at NMS Communications to "break fundamental theoretical [8]. John Day, for his part said that "the network structure is more simple than we had imagined [9]. What does

this passage as a data communication to a communication between processes?

The fact that the network not as a mere conduit of data with an address of departure and arrival, but as a mechanism for direct exchange between the programs has a first consequence: the data being included in a mechanism between programs rather than directly accessible, the network provides greater security. But beyond this, such a network offers a more simple: the IPC to integrate the connected mode (used in telecommunications networks and the NGN) and disconnected mode (used in internet protocols Ipv4 and IPv6) in the form of one single model with the two previous are only special cases.

In addition, the model in several layers of the Internet or other network types, each is not always clearly delineated, is replaced by a single mechanism: the CPI. It becomes possible to establish communications between processes of a machine, machines on the same network or between machines in the same "network of networks". This recursive approach allows a single system regardless of the scope while moving to scale.

Finally, such a network distinguishes the name of a machine or a process on this machine (which are used to identify) his address (which is used to locate). An application (such as a browser on a machine) may then call another application (eg a web server on another machine) by name. The communication mechanism between processes will then address it will be clean [10].

Thus, to scale networks, the mobility of terminals or the connection from one machine to several physical networks (the "multihoming") becomes a consequence of the network structure, rather than a further complication add to core networks. Such a network would be easier while adapting better to the increasingly large size of the network of networks.

The Pouzin Society

Such a network could develop quickly enough to solve the crisis of growth of the Internet? It is believed that a group of experts from the IETF who gathered around the ideas proposed by John Day to create the "Pouzin Society [11]. The name of the organization refers to the french

Louis Pouzin which is the origin of the concepts of datagram and connection-mode, an innovation that John Day in his book, described as "inspired." The first meeting of the group [12] was held on 4, 6 and 7 May in Boston as part of the Future-Net exposure on the networks of new generation [13].

It remains to see the detail that allows this new architecture and if it has other limitations. It will also put in place to validate the concepts. This could be facilitated by the fact that IPC mechanisms are known in operating systems of machines and there are many works being distributed between several machines.

One of the crucial questions will be how to put in place transitional mechanisms that can limit the costs [14] or even reduce them quickly if the new architecture, easier, saves them money. Few years and we know which solution (s) is (are) chosen (s) or if the crisis of the internet will be fine and well place ..

[1] John Day, Patterns to Network Architecture: A Return to Fundamentals, Prentice Hall, 28/1/2008

[2] Jean-Michel Cornu, Prospective: technologies and practices of tomorrow FYP /ditions, 2008 - "Towards networks increasingly varied post or IPv6 IP? pp 168-172

See also: 4 strategies for post-IP: complementarity or competition?
<http://prospectic.fing.org/news/4-strategies-pour-le-post-ip-complementarite-ou-concurrence>

[3] IPv6 will be the new Internet Protocol?
<http://prospectic.fing.org/news/ipv6-sera-t-il-la-nouvelle-version-du-protocole-internet>

[4] On the question of adaptability versus optimization, see Jean-Michel Cornu, Tome 1 Internet technologies of tomorrow, Fing, Paris 2002 - Chapter 1 "adapt to a world innovative" pp 15-20: <http://www.fing.org/?Internet-tome-1-les-technologies>

[5] Next Generation Network: optimizing the layers above and below IP
[http://prospectic.fing.org/news/next-generation-network-optimiser-les-couches-en-dessous-et-au Above-d-ip](http://prospectic.fing.org/news/next-generation-network-optimiser-les-couches-en-dessous-et-au-Above-d-ip)

[6] Virtual Routers: <http://prospectic.fing.org/news/routeurs-virtuels>

[7] Autonomic Computing: <http://prospectic.fing.org/news/autonomic-computing>

[8] Brough Turner, Pouzin Society - organizational meeting, today, 4 May 2009: <http://blogs.dialogic.com/2009/05/pouzin-society-organizational-meeting.html>

[9] John Day, *ibid.*

[10] The establishment of the address mode is similar to connecting with networks, but the inter-process communication makes it possible approaches more or less connected in terms of mechanisms chosen.

[11] Pouzin Society: <http://www.pouzinsociety.org/>

[12] <http://02d7097.netsolhost.com/meetings.html>

[13] <http://www.futurenetexpo.com/>

[14] Perhaps the arrival of virtual routers can be an opportunity to test large-scale existing networks and then gradually migrate users?