

"In the Beginning, ARPA created the ARPAnet.
And the ARPAnet was without form and void,
and darkness was upon the deep.

And the spirit of ARPA moved upon the face of the network
and ARPA said, 'Let there be a protocol,'
and there was a protocol. And ARPA saw that it was good.

And ARPA said, 'Let there be more protocols,' and it was so.
and ARPA saw that it was good.

And ARPA said, 'Let there be more networks',
and it was so".

-- Danny Cohen

Info about his Jobs

92-95



As Teaching Assistant
First Univ internet connection
Co-founded ISOC-CAT 1995

94-98



Cofounded 4th Spanish ISP

98-03



Internet Manager 2nd Telco Carrier

03-Act



Internet Research Invited Fellow
andreu@wiwiw.org

08-Act



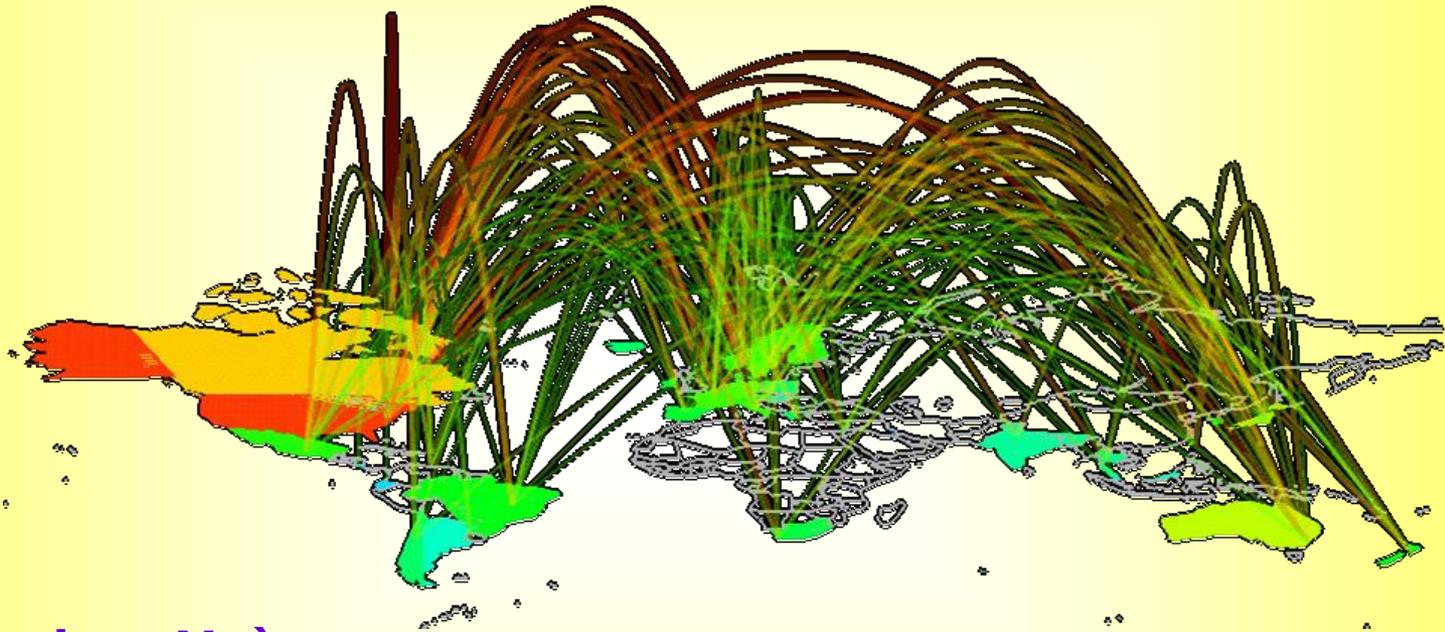
International Relations Director

09-Act



President of the Board
Spanish Chapter

Who is Who in the Internet World, a very personal view of the origins of the Internet



Dr. Andreu Veà



Internet Research Fellow
Stanford University
Palo Alto (California, USA)



Internet Society
Spain
President of the Board

**A close view from
the Silicon Valley**

GOALS

3

Share Knowledge

Know the past to Build the future

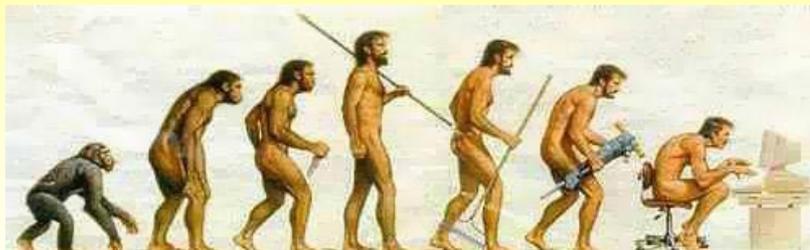
Introduce a New Way of Creating History

wiwiv^{org}
Who Is Who in the Internet World



MYTH

THE PREHISTORY OF THE INTERNET A TALE ABOUT THE UNKNOW



Larry Roberts' interview excerpts:

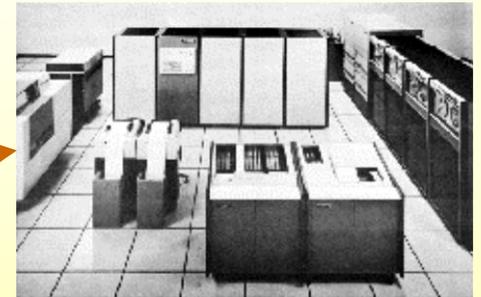
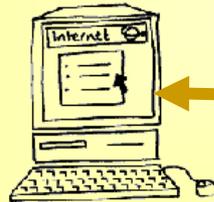
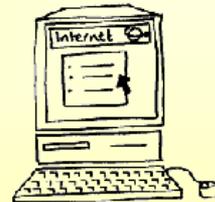
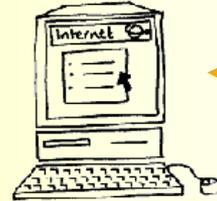
07-Mar-1964 First Paper on Secure Packetized Voice, Paul Baran, "On Distributed Communications Networks", IEEE Transactions on Systems. It is from this paper that the rumor was started that the Internet was created by the military to withstand nuclear war. **This is totally false.** Even though this Rand work was based on this premise, the ARPANET and the Internet stemmed from the MIT work of Licklider, Kleinrock and Roberts, and had no relation to Baran's work.

The ARPANET program as proposed to Congress by Roberts was to explore computer **resource sharing** and packet switched communications and had nothing to do with nuclear war or survivability. Reliability, however was one of the key network issues that dictated packet switching.



RAND Corp. Paul Baran o
nuclear myth "guilty"

BOB TAYLOR



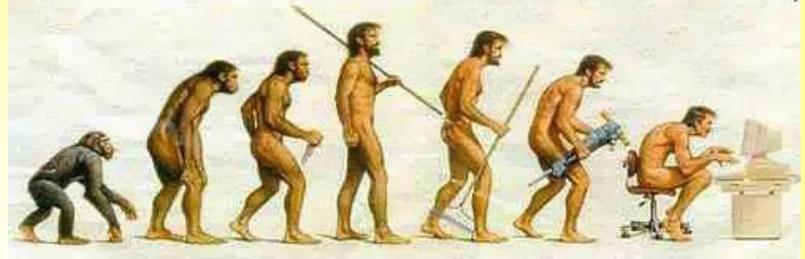
ARPA

Washington DC April 12th 1968.
Two hours missing
PENTAGON IPTO Office D Wing 4th Story

THE BEGINNING OF THE FIRST NETWORK CONSTRUCTION



Donald Davies
Did not convince the British PTT



ARPAnet



Larry Roberts MIT
1966 joins DARPA
1967 the ARPAnet plan



Packet
Switch



BBN Headquarters

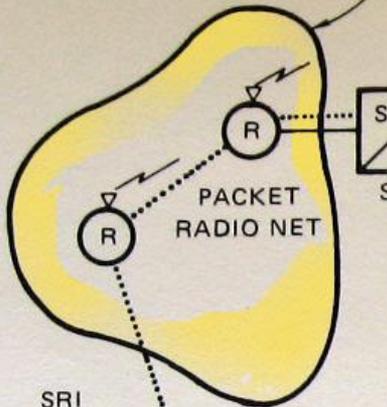


BBN team with the IMP

Origins

- BBN a Cambridge corp won the bid (Frank Heart) Dec 1968.
- Kleinrock UCLA worked in net measurement system.
- Robert Kahn designed the global architecture of ARPAnet

SAN FRANCISCO BAY AREA
PACKET RADIO NET



SRI
MENLO
CALIF

LEC

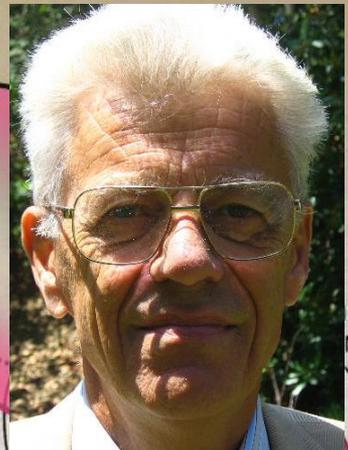
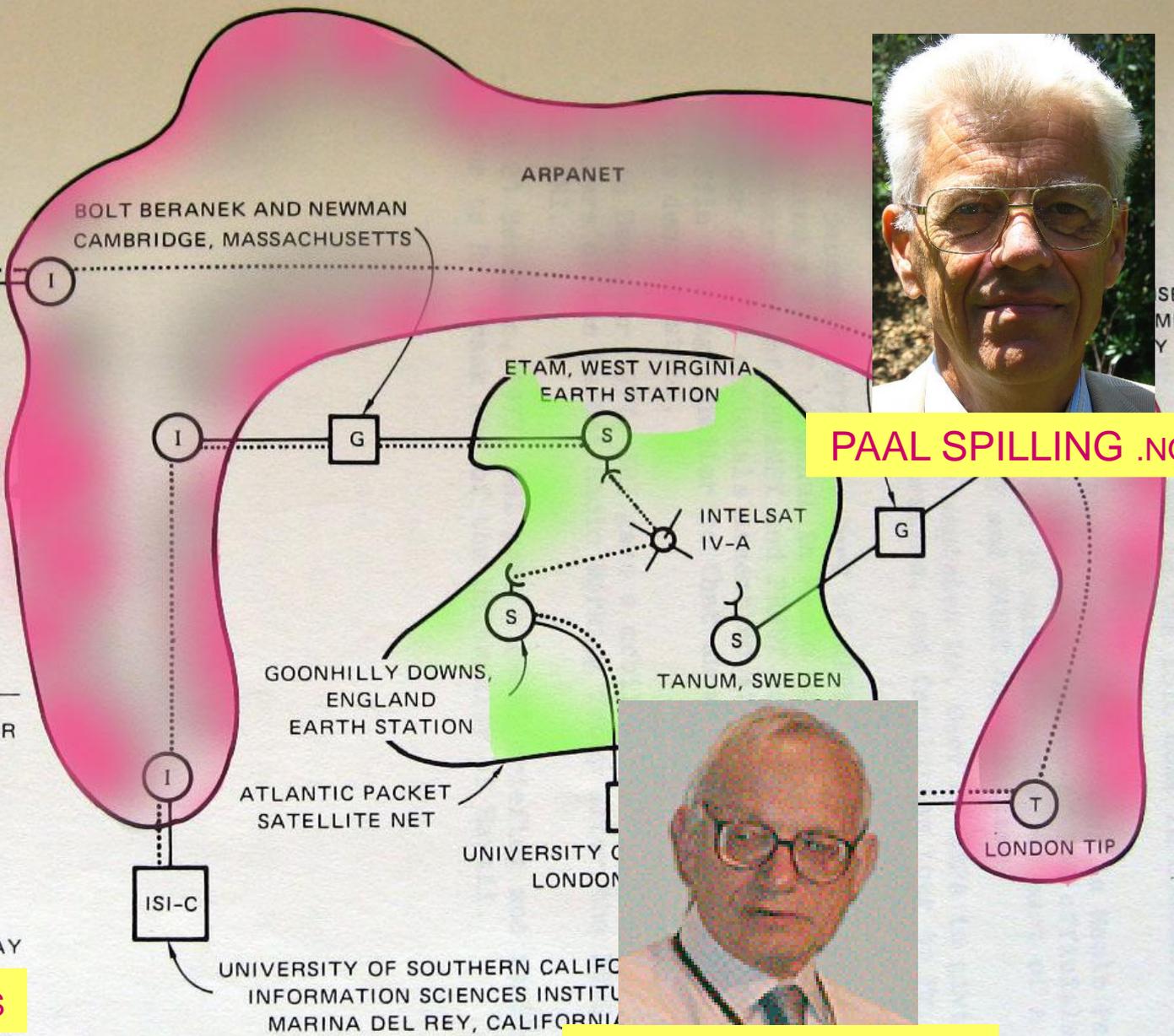
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DON NIELSON .us

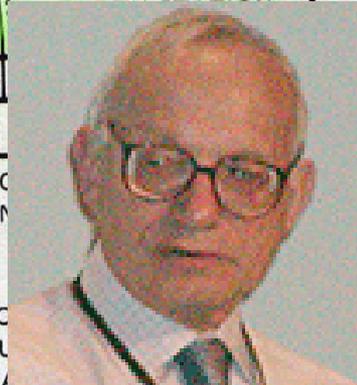
..... PATH OF PACKETS

BOLT BERANEK AND NEWMAN
CAMBRIDGE, MASSACHUSETTS

ARPANET



PAAL SPILLING .no



PETER KIRSTEIN .uk

SE
MENT
Y

AY

UNIVERSITY OF
LONDON

UNIVERSITY OF SOUTHERN CALIFORNIA
INFORMATION SCIENCES INSTITUTE
MARINA DEL REY, CALIFORNIA

LONDON TIP



Pictures Courtesy of Don Nielson
© SRI 1977

UK NPL-Donald Davies' Team

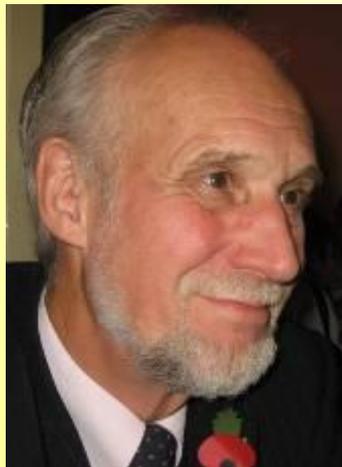


DEREK L.A. BARBER



PETER WILKINSON

NPL
network
creators



ROGER SCANTLEBURY



KEITH A. BARTLETT

As seen
in Oct-2006

1970's

LOUIS POUZIN (FRANCE)

技術展望/プロトコル (通信規約)

Univ. of Tokio. Protocol and Network comparison: 1974.

1107

表1 HOST/HOST プロトコルの比較

項目	ARPA 網	N1	CYCLADES
プロトコル名	HOST/HOST	HOST/HOST	End-to-End
主システム名	HOST	HOST	Transport Station
NCP 取扱受単位 (ビット)	メッセージ 8095	セグメント 2040	レター/アレグラム 2112/16
単位識別番号	なし	6 bits	8 bits
ヘッダ長 (ビット)	72	80	40~可変
メッセージ最大長 (ビット)	8023	1900×64	2048×128
ポート名	ソケット	論理ポート	ポート
ビット長	32	32	16
ポートの共有	不可	不可	可
プロセスとの対応付け	動的	動的	固定
リンク名	リンク	論理リンク	リエゾン
方向性	単向	単向	双方向
バーチャルコール (データグラム)	VCのみ	VCのみ	VC DG数局
誤り制御	メッセージごと	一連メッセージの集合 ACK	一連レターに対する集合 ACK
フロー制御	RFNM とバッファ制御	SPC によるウィンドウ方式	フレットによるウィンドウ方式
最大ウィンドウサイズ	—	255	15
送信側からのバッファ要求可	不可	可	不可

ほか、ポート番号と各プロセスとの対応関係は固定的であるが、ARPA, N1 では動的に定められる。

又、CYCLADES では情報の転送モードにレターとテレグラムの2種類があり、レターは ARPA/N1 のメッセージと同種のものであるがテレグラムは16 bits

はキーボードとプリンタを備えたような端末が設定され、基本機能とオプションの設定、コードセットの標準化、エコーの取扱い等が問題になる。

(3) 会話形利用プロトコル^{(9),(10)}

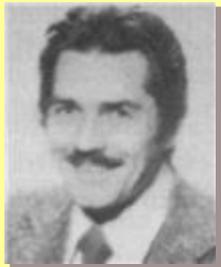
ARPA では Telnet と呼んでいるものがこれに相

これはユーザーのプロセスと、利用目的のプロセスとを最初に接続させるための手続きで、一般には相手のポート番号が不明であるため必要となる。すなわち、特定のポート番号を定めておき、まずそこへ接続することによって相手ポート番号を知る。

(2) NVT (網仮想端末)^{(9),(10)}

網内のすべての端末から全システムの会話形利用ができるためには、会話形端末として標準の端末を設定し、各 HOST ではローカルな端末のインタフェースとの変換をする必要がある。このような標準端末を Network Virtual Terminal と呼ぶ。NVT として

CYCLADES: French "efficient" version of the ARPAnet



Father of the *Datagram* and the first to use matching end to end protocols.

19848

During his personal interview in Paris (FR)



LOUIS POUZIN

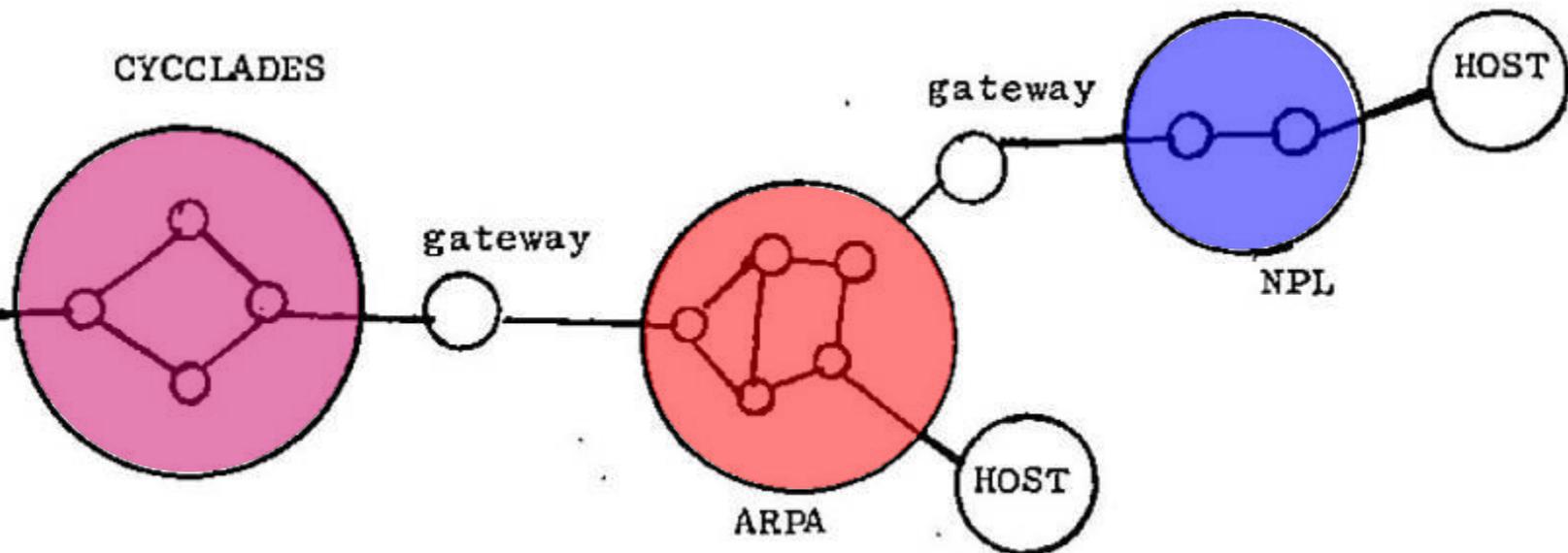


- After creating Cyclades
- He coined the CATENet concept
- His Work was broadly used by Cerf & Kahn in TCP/IP development.

CATENET INTERNET INTERNETWORK

concatenāre

To join or link things together.

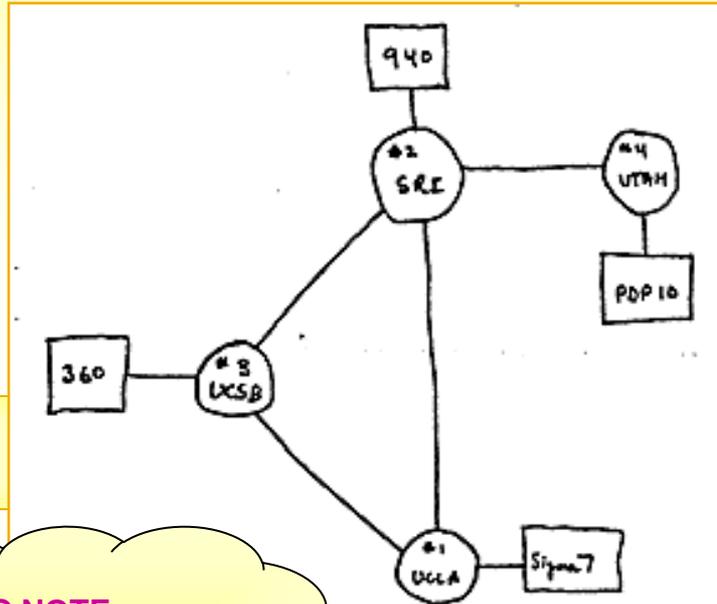


Schematic Diagram of CYCLADES (France), ARPANet (US) and NPL (UK). Prototype to create an Internet (1970's)

THE BEGINNING OF THE FIRST NET CONSTRUCTION



ARPANET



HISTORIC NOTE
In 30 years it reaches
more than 100 million of Hosts

ARPA NETWORK

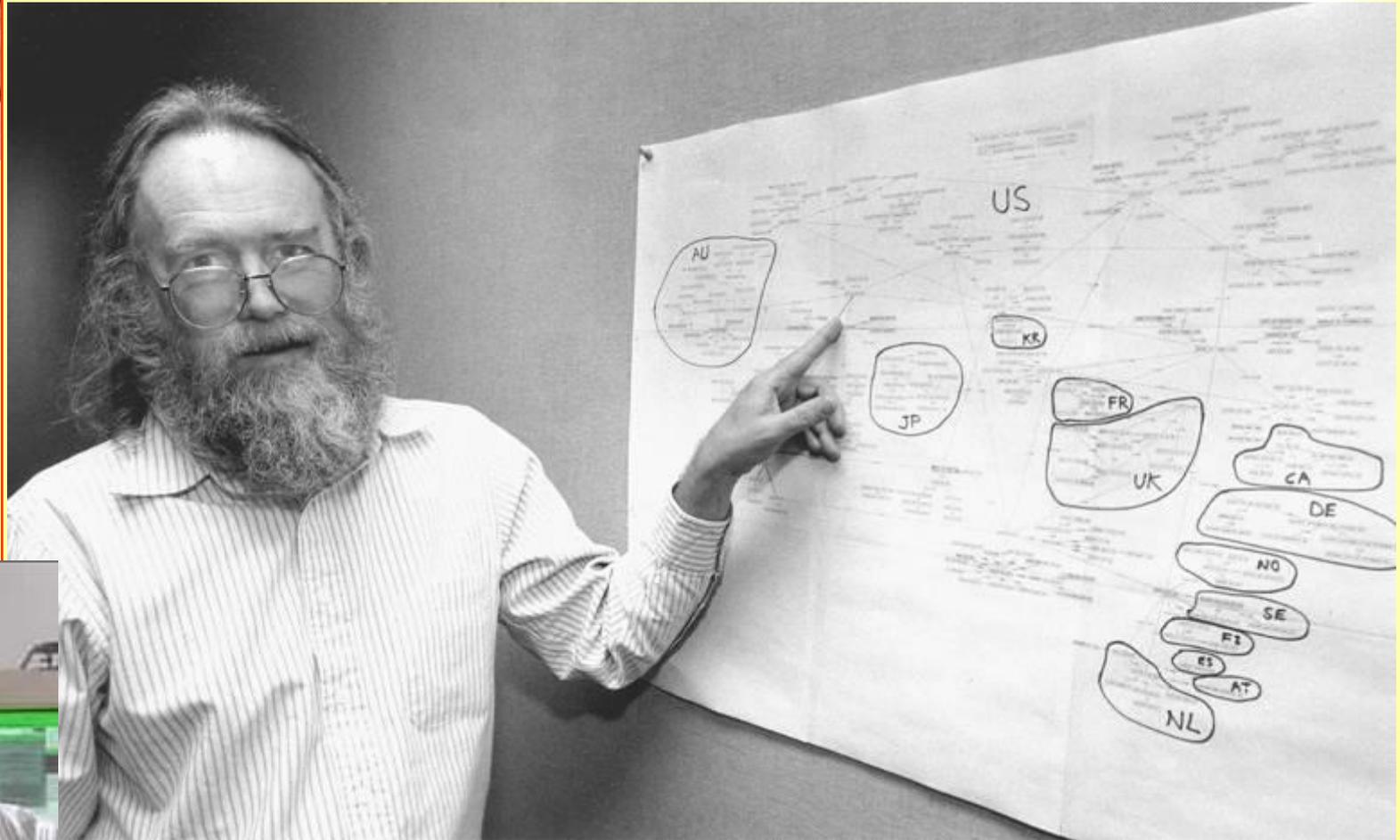
DEC 1969

4 NODES



Bob Kahn
Designed the
Architecture

JON POSTEL



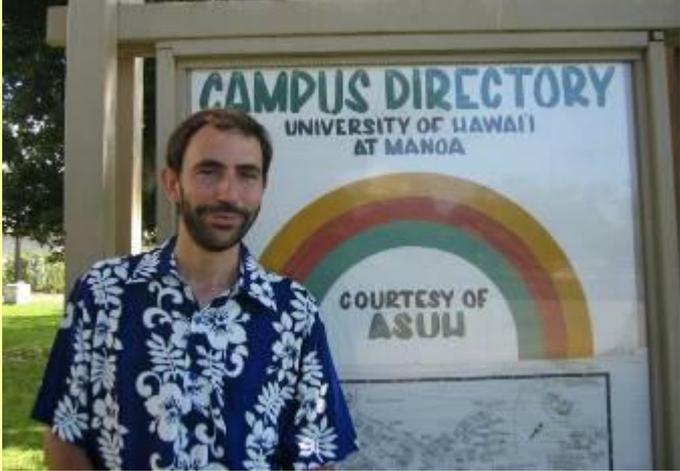
1970

NORM ABRAMSON



ALOHAnet
1ª Red
Paquetes

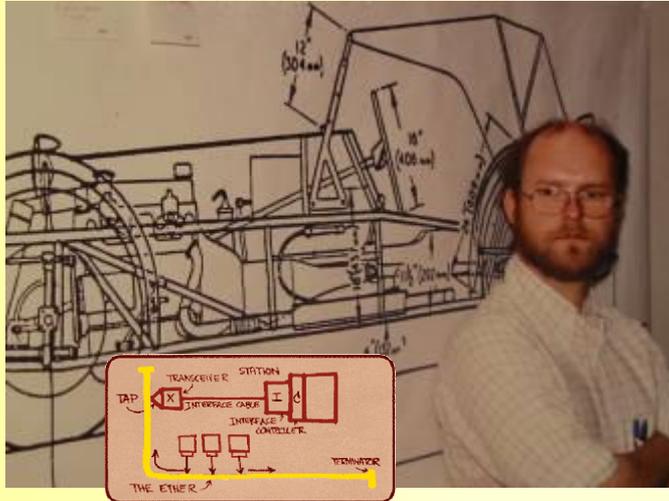
NORM ABRAMSON



CRC
Oahu (HI)

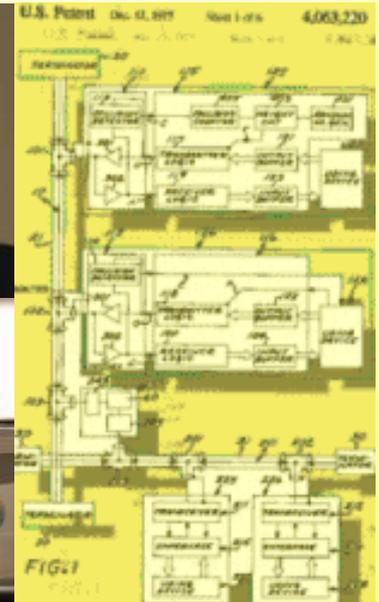
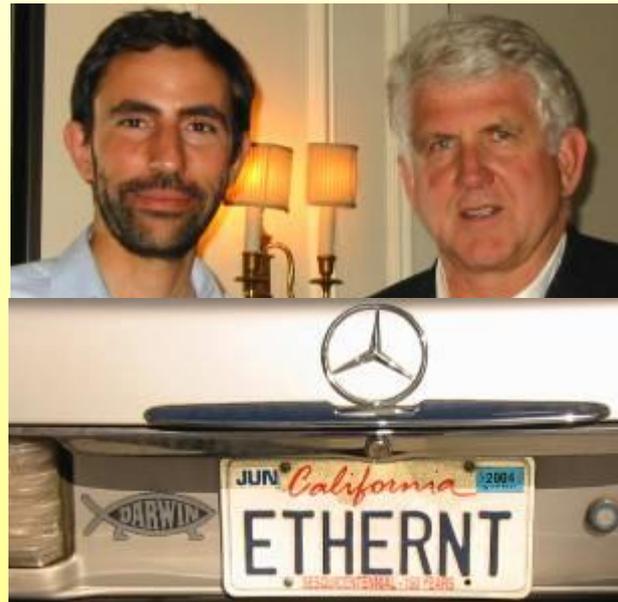


1972 DAVE BOGGS & BOB METCALFE



Ethernet

100Ms
units



1984

PAUL MOCKAPETRIS



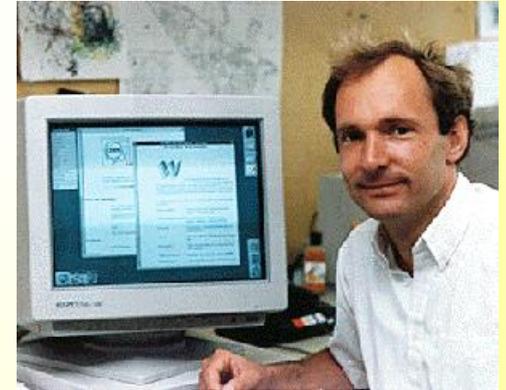
DNS
INVENTOR

1990

WWW The CATALYST

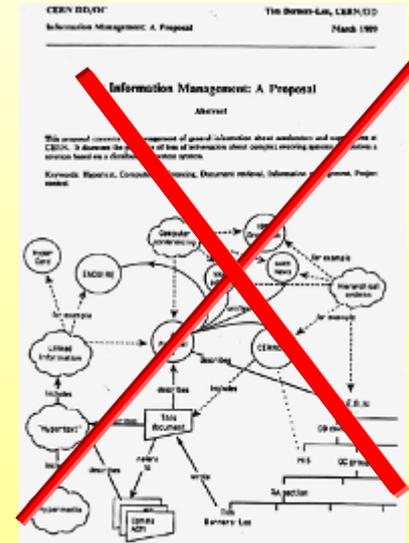


Tim Berners-Lee



On December 25 1990
First connection of a Browser
with a WWW Server

CERN (Suiza)



Many times rejected

1994

MOSAIC & NETSCAPE (BROWSER)



MARC
ANDRESSEN

1995 JERRY YANG & DAVID FILO (Stanford)



YAHOO![®]

1997 LARRY PAGE & SERGEI BRIN (Stanford)



Google







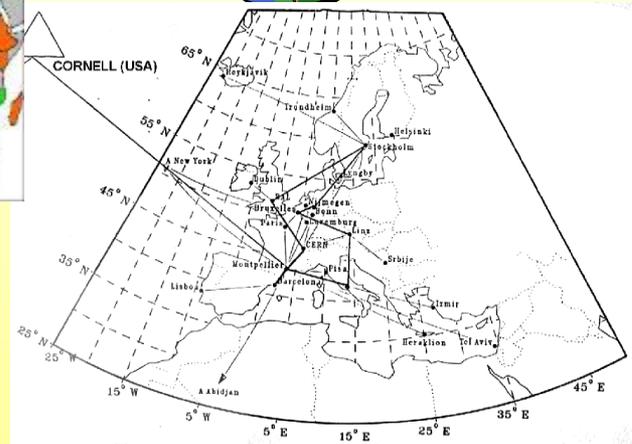
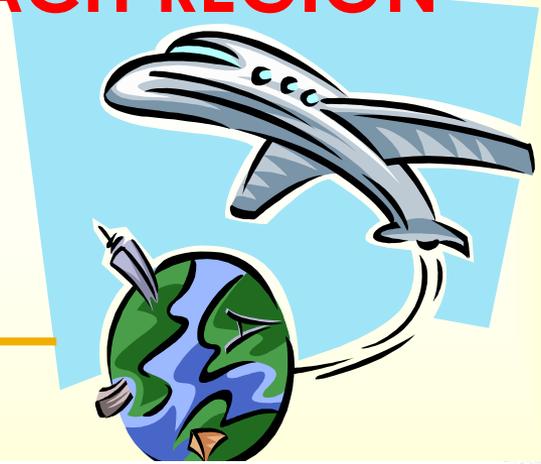
As an International Research Program



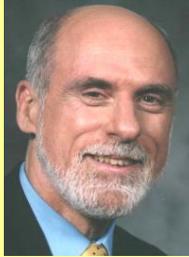
PERSONAL INTERVIEWS

DIRECT CONTACT

FOCUS ON EACH REGION



Wherever you are, we will come over to interview you



Vint Cerf



P. Mockapetris



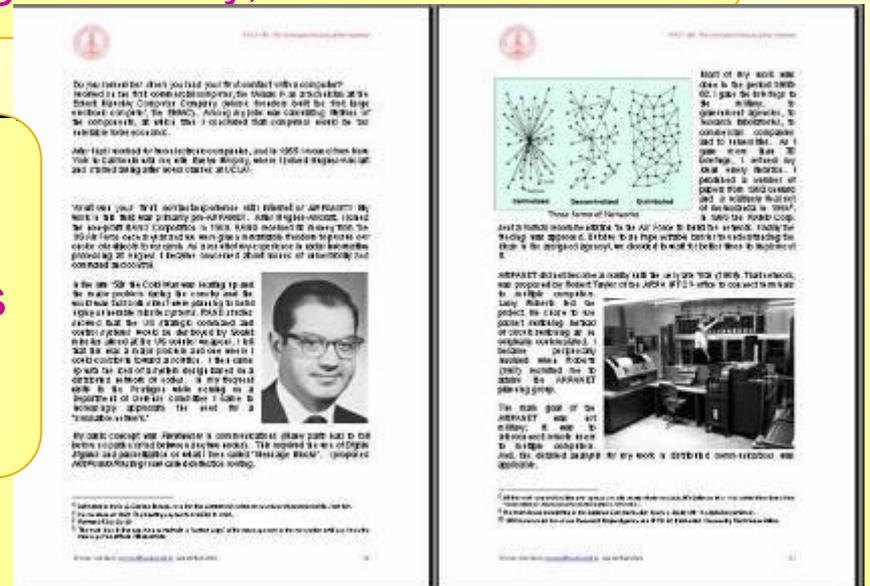
Gordon Bell



Fred Baker

- Collecting the Stories of the Internet pioneers, on digital audio format to preserve it for future generations to know. Wouldn't it be great to hear Thomas Edison or Graham Bell voices today?
- Designing and creating a huge timeline-sorted, open source repository to make possible browsing between the people who most contributed to the internet. In every single country, same method.

- Their voices, Text, Videos, and Old Pictures and Artifacts are conveniently archived and sorted.





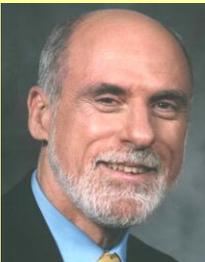
- ② **TO COLLECT LIFE INTERVIEWS**
First Phase: Oral Histories Recorded & Transcribed,
Photos and digital resources
- ② **SAME QUESTIONS TO ALL**
- ② **WORLWIDE PIONEERS**
- ② **TO REACH MAX DISSEMINATION**



THE *INTERVIEWS* MUST BE



Bob Kahn



Vint Cerf

- ② QUICK TO ACCESS
- ② EASY TO UNDERSTAND
- ② METHODOLOGICALLY PROVEN
- ② EQUALLY STRUCTURED
- ② FROM PRIMARY SOURCES
- ② ALL DIGIT-ALL (Text, Photos, Audio, Video)

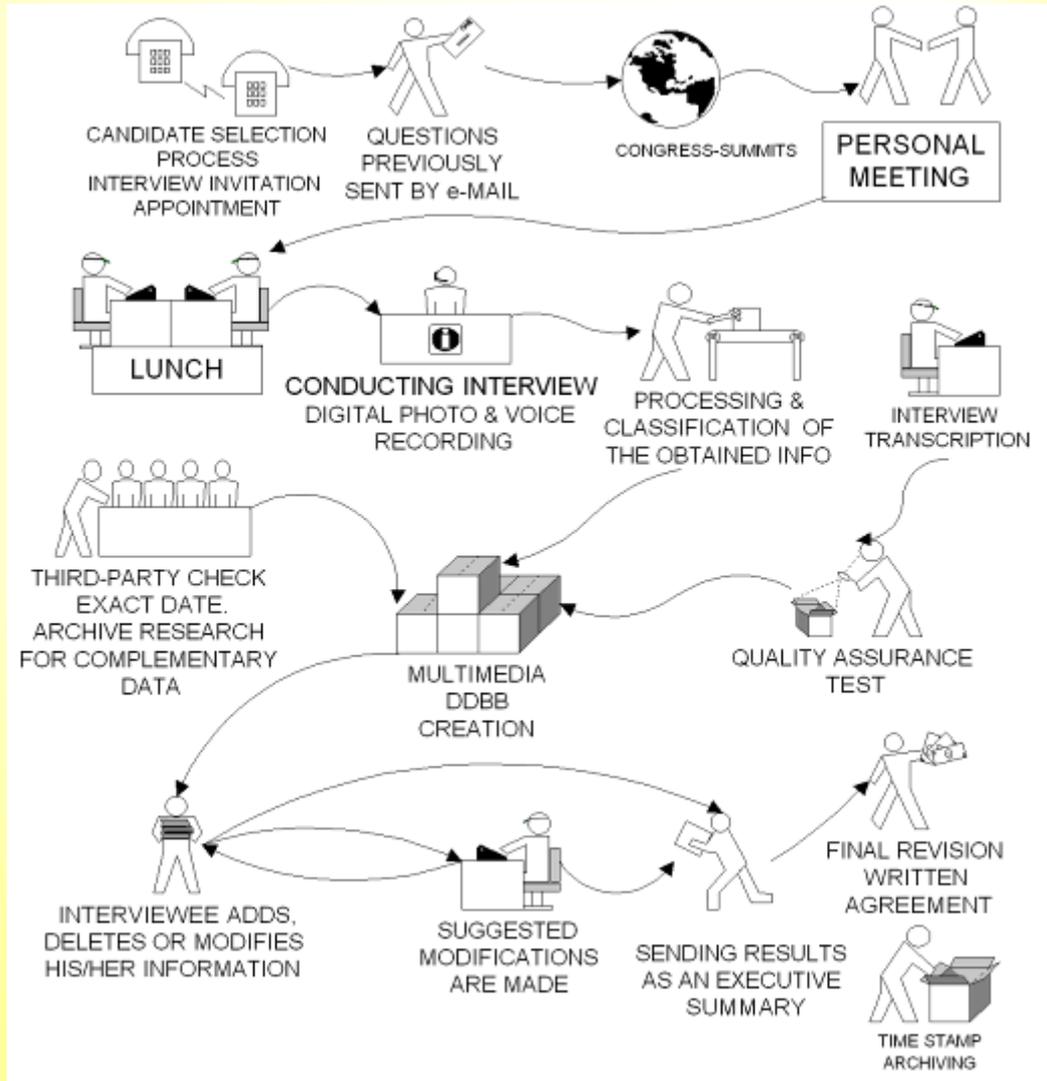
METHODOLOGY: Improved during 10 years



Only those who are quoted twice by other recognized pioneers are interviewed personally

From Primary Sources
Easy to read & Understand

WiWiW is an International
Multilingual, Non-Profit
Volunteering Based
Project



RESULTS: Multimedia Documents

Audio, Text, Videos, and Old Pictures and Artifacts are conveniently archived and sorted



Interview Results Reviewed by the Interviewee and his colleagues

ENET 100: The Importance of the Interview

Do you remember when you had your first contact with a computer? I worked on the first commercial computer, the Univac II, as a technician at the Robert Noyce Computer Company (whose founders built the first large electronic computer, the ENIAC). Among my jobs was calculating lifetimes of the components, at which time I concluded that computers would be too expensive to be economic.

After that I worked for two electronic companies, and in 1965 I moved from New York to California with my wife Evelyn Murphy, where I joined Hughes-Aircraft and started taking after school classes at UCLA.

What was your first contact/experience with Internet or ARPANET? My work in the field was primarily pre-ARPANET. After Hughes-Aircraft, I joined the not-profit RAND Corporation in 1969. RAND received its money from the US Air Force once a year and we were given a remarkable freedom to pursue our choice of subjects to research. As a result of my experience in radar information processing at Hughes, I became concerned about issues of vulnerability and command and control.

In the late '50s the Cold War was leading up and the major problem facing the country and the world was that both sides were planning to build highly vulnerable missile systems. RAND studies showed that the US strategic command and control systems would be destroyed by Soviet missiles aimed at the US coastal weapons. I felt that this was a major problem and one where I could contribute toward a solution. I then came up with the idea of a system design based on a distributed network of nodes. In my request letter to the Pentagon while serving on a Department of Defense committee I came to increasingly appreciate the need for a "vulnerable network."

My basic concept was Parwanish: a communications (many parts had to fall before a path is started between any two nodes). This required the use of DGVW Signals and packetization or what I then called "Message Blocks". I proposed NOT POINT TO POINT but you called it detection so that.



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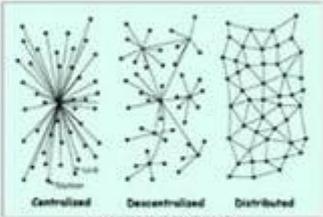
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ENET 100: The Importance of the Interview

Most of my work was done in the period 1960-62. I gave the briefings to the military, to government agencies, to research laboratories, to commercial computer and to universities. As I gave more than 30 briefings, I refined my ideas every day. I published a number of papers from 1960 onward and a relatively final set of memoranda in 1964. In 1965 the RAND Corp. sent a formal recommendation to the Air Force to build the network. Finally the funding was approved. It took to an impressive barrier to understanding the idea: in the assigned agency, we decided to wait for better times to implement it.

ARPANET did not become a reality until the very late '60s (1969). That network was proposed by Robert Taylor of the ARPA IPTO office to connect terminals to multiple computers. Larry Roberts led the project. He chose to use packet switching instead of circuit switching as he originally contemplated. I became personally involved when Roberts (1967) recruited me to advise the ARPANET planning group.

The main goal of the ARPANET was not military. It was to interconnect nodes to multiple computers. And, the detailed analysis for my work in distributed communications was applicable.



Three Forms of Networks



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PART VII: The Unknown History of the Internet

Do you remember when you had your first contact with a computer?

Yes I do, it was in January of 1953. I was studying Physics at Harvard. It was with one of the very first computers that ever existed. The MARK II. Personally with Howard Aiken². After that (during my part-time job) I used computers at Hughes Aircraft Company (CA) in their Systems Lab (summer of 1953)



What was your first contact/experience with Internet or ARPANET?

My first exposure to ARPANet was one year after I arrived to Hawaii, when I went over to Washington (Pentagon facilities) to talk with Bob Taylor³. Larry Roberts was there. I was looking for some support, for our research. They had ideas of building a network, although not via radio as ours. This was late 1967 to early 1968. We proposed that project because it was a very interesting thing to build at that time. Despite the terrible communication and phone systems and



services we had in Hawaii, that wasn't the main motivation, but it was the perfect excuse to have our project funded. When Bob Taylor quit ARPA to go to Xerox PARC, Larry Roberts funded the ALOHAnet project. We were then the first digital radio network to be "always on" non-dialup⁴ and connection free. Before designing the network we studied the patterns and characteristics of the data to be send. Computers send small amounts of information in random small periods of time. Like bursts. So in this case, the telephone dialup oriented networks, were not suitable to manage this kind of data patterns. That produced too much overhead⁵. This is today a big issue: In a typical web surfing session about 99.9% of the information sent from user to the internet (in an Ethernet connection) is overhead. The upstream link has

² Howard Aiken, 1900-1973. He designed the Mark I, and Mark II, granted by IBM's first CEO, Thomas J. Watson. He created the Computer Lab in Harvard, and one of the first Masters and PhD programs in Computer Science.

³ Bob Taylor: In that moment Director of the ARPANet office. See his interview.

⁴ Dial-Up: Referred to networks where you must dial a number to access. Like the conventional Telephone Network.

⁵ Overhead: Any bit in a digital data stream other than an information bit. Also called a control bit or, simply over-head. The digital information transferred across the interface separating the user and the telecommunication system (or between entities within a telecommunication system) for the purpose of directing or controlling the transfer of user information. In some cases the amount of overhead data sent is bigger than the information data we want to transmit.



PART VII: The Unknown History of the Internet

become terribly inefficient. As an example we can see that when we "click into a link" browsing the internet, the fundamental information-data to be transferred maybe is one or two bytes. But that must be translated for HTTP⁶ and then error control and correcting protocols are added. So finally you send 5,000 bytes for that one click. This problem is serious if we realize that in satellite and radio internet access systems 90% of the cost is in the upstream link (from the user to the network). Which makes this part of the system very very inefficient. So there are a lot of possibilities for a company there.

In your opinion, what are the key characteristics of Internet?

- I would like to highlight the anarchy aspects of the internet. Versus the overregulated telecommunications world that we have seen in the 80's. One of the best things has been to not to have to deal with telecom bureaucrats.
- The inefficiency of resources. I can't tell you any other technology where inefficiency is so pronounced in a key part of that technology. It is not a bad design. It was good at the 70's for symmetrical telecom services, but not anymore.



1971



1973

The ALOHAnet radio system. In Honolulu (Oahu Island, Hawaii - USA)

⁶ HTTP: Hyper Text Transfer Protocol. Protocol which manages the communication between a browser & a web server

PUBLIC DISSEMINATION WORLDWIDE



1970

NORM ABRAMSON



1971

ALOHAnet
1ª Red
Paquetes



1973



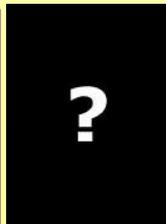
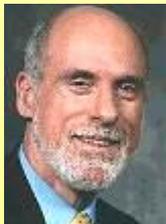
1976



INTERNATIONAL CAMPAIGN



**“WE ARE LOOKING INTERNE PIONEERS”
DO YOU WANT TO JOIN US?**



AWARDS



June 22nd, 2005

To whomever may concern:

I hereby,
as chair of the **INTERNET SOCIETY PROJECT GRANTS COMMITTEE**,

CERTIFY

that Dr. Andreu Vea, has been selected to receive the Internet Society project funding in response to his application titled <http://wiwiw.org> "Who is Who in the Internet World: A perpetual archive devoted to internet Pioneers worldwide".



The evaluation committee was made up with 7 independent and experienced judges from 8 different nationalities and has evaluated 25 international projects.

Excerpts from the awarding letter:

"Dear Dr. Vea,
We have been impressed with the application you submitted and wish to fund it in accordance with the terms of our Project Funding Policy and our Memorandum of Understanding.
<http://www.isoc.org/socialaffairs/projects>

The ISOC Project Committee has decided to award you funding in the amount of **US\$ 10,000** as soon as we can agree to the details of the funding disbursement and management".

As a personal note, I found Dr Vea's project both compelling and important.

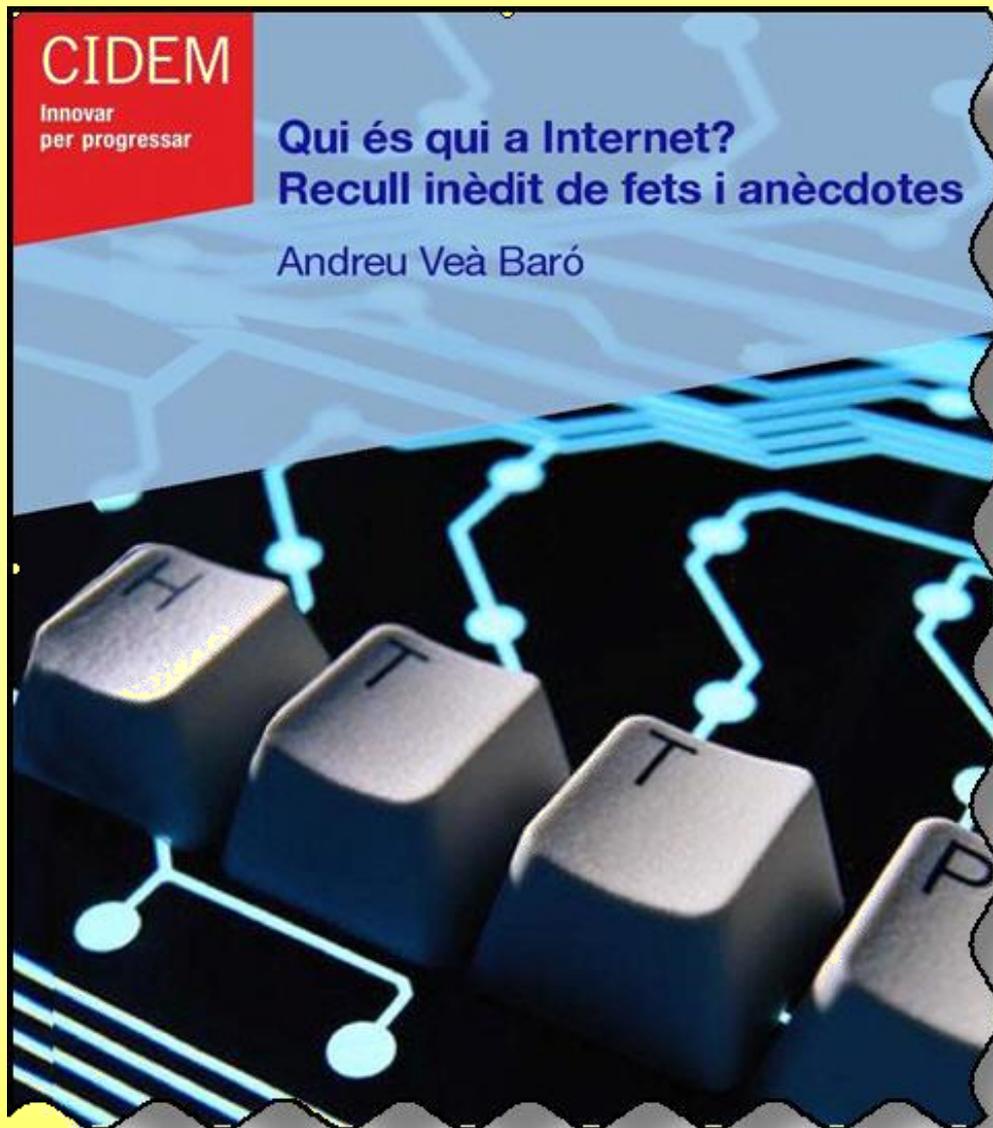
Very truly yours,

David McAuley
Project Funding Committee Chair
Internet Society Membership Director

Feel free to contact me at +1 703 326 9000 Ext 104
mcauley@isoc.org
www.isoc.org



With the support of CIDEM (Government of Catalunya, Spain)
Internet Society ISOC (Reston, VA)
Fundación CTIC (Gobierno de Asturias)
Private Donors (Vint Cerf, Dick Karp, John Gill, Don Nilson, et Al)



**LAST PUBLICATION
in Catalan [Nov 2005]**

**2.000 units
(sold out)**

**Next Book
(May 2023)
15.000 units**

WiWiW 3Q 2012 FACTS



+50 Worldwide Volunteers
+10 Core Team Members
+320 Pioneers Interviewed

Internet is for everyone

We need unknown stories, the important old e-mails which marked a milestone, group pictures, anecdotal situations, and, most importantly, your financial support to boost this project to preserve our collective internet story.



Barelona (.CAT)
Winter 2013

Andreu@WiWiW.org
ISOC President

September-1994-ARPAnet creators-25-Anniversary. Courtesy of Roland Bryan

QUESTIONS & ANSWERS ?



Thanks for your attention

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