



CATEDRA TELEINFORMATICA - DEPARTAMENTO ELECTRONICA - UTN - FRM

Unidad 1: Introducción a la Teleinformática

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Introducción a Internet

- ❖ Bibliografía
- ❖ Protocolo TCP/IP
- ❖ Historia
- ❖ Organización de Internet

Bibliografía

- ❖ Los principales textos de estudio son:
 - ❖ Redes Globales de Información con Internet y TCP/IP, Douglas Comer, Pearson
 - ❖ TCP/IP Illustrated Vol 1 The Protocols, W. Richard Stevens, Addison Wesley
- ❖ También puede consultarse
 - ❖ Redes de Computadoras, Andrew Tanenbaum, Prentice-Hall
 - ❖ Comunicaciones y Redes de Computadores, William Stalling, Prentice-Hall

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Bibliografía con't

- ❖ Para estudiar como se implementa la pila de protocolos:
 - ❖ Interconectividad de Redes TCP/IP Vol II Diseño e Implementación, Douglas Comer, Pearson
 - ❖ TCP/IP Illustrated Vol 2 The Implementation, W. Richard Stevens, Addison Wesley
- ❖ Para estudiar aplicaciones y programación de aplicaciones
 - ❖ Internetworking with TCP/IP Vol III Client-Server Programming, Douglas Comer, Pearson
 - ❖ Unix Network Programming, W. Richard Stevens, Addison Wesley

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Protocolo TCP/IP

- ❖ Es un conjunto de protocolos, aplicaciones y servicios para administrar y explotar redes.
- ❖ Está desarrollado para múltiples plataformas.
- ❖ Es un sistema abierto, sus protocolos son de dominio público.
- ❖ Permite interconexión de redes (interredes).
- ❖ Es la base de la Internet.

Principios Internet

- ❖ **Cerf and Kahn's internetworking principles:**
 - ❖ minimalism, autonomy - no internal changes required to interconnect networks
 - ❖ best effort service model
 - ❖ stateless routers
 - ❖ decentralized control
- ❖ **define today's Internet architecture**

Vendor Independence

- ❖ Before TCP/IP and the Internet
 - ❖ Only two sources of network protocols
 - ❖ Specific vendors such as IBM or Digital Equipment
 - ❖ Standards bodies such as the ITU (formerly known as CCITT)
- ❖ TCP/IP
 - ❖ Vendor independent

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Historia de Internet

- ❖ 1961: Kleinrock – la teoría de colas demuestra la efectividad de la conmutación de paquetes
- ❖ 1964: Baran – conmutación de paquetes en redes militares
- ❖ 1969: ARPANET: red experimental del proyecto de investigación de DARPA (Defense Advanced Research Projects Agency). Es la primera red de conmutación de paquetes.
 - ❖ Original backbone of Internet
 - ❖ Wide area network around which TCP/IP was developed
 - ❖ Funding from Advanced Research Project Agency
 - ❖ Initial speed 50 Kbps

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Historia de Internet

- ❖ 1970: ALOHAnet satellite network in Hawaii
- ❖ 1973: Metcalfe's PhD thesis proposes Ethernet
- ❖ 1974: Cerf and Kahn - architecture for interconnecting networks
- ❖ late 70's: proprietary architectures: DECnet, SNA, XNA
- ❖ late 70's: switching fixed length packets (ATM precursor)

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Historia de Internet

- ❖ 1975: ARPANET se transforma en una red operacional.
 - ❖ NCP (Network Control Protocol) primer protocolo host-host
 - ❖ Primer programa de e-mail
 - ❖ ARPAnet tiene 15 nodos
- ❖ 1979: ARPANET tiene 200 nodos
- ❖ 1979: se forma el primer comité informal para guiar y coordinar los protocolos y arquitectura de la red. (ICCB) Internet Control and Configuration Board.

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Historia de Internet

- ❖ 1983: se adopta el conjunto de protocolos TCP/IP como el standard de la red, y su uso obligatorio para conectarse a la red.
 - ❖ Se parte en 2 redes: una para investigación (ARPANET), y otra para fines militares (MILNET).
- ❖ 1983:
 - ❖ Comienzan los desarrollos universitarios en UNIX: Berkeley Software Distribution.
 - ❖ smtp e-mail protocol defined
 - ❖ DNS defined for name-to-IP-address translation
- ❖ 1985: ftp protocol defined
- ❖ 1988: TCP congestion control

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Historia de Internet

- ❖ Early 1990's: ARPAnet decomissioned
- ❖ 1991: NSF lifts restrictions on commercial use of NSFnet (decommissioned, 1995)
- ❖ early 1990s: WWW
 - ❖ hypertext [Bush 1945, Nelson 1960's]
 - ❖ HTML, http: Berners-Lee
 - ❖ 1994: Mosaic, later Netscape
 - ❖ late 1990's: commercialization of the WWW

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Historia de Internet

❖ 1987 - 1992: Se transforma en el backbone NSFNET

- ❖ Funded by National Science Foundation
- ❖ Motivation: Internet backbone to connect all scientists and engineers
- ❖ Introduced Internet hierarchy
 - ❖ Wide area backbone spanning geographic U.S.
 - ❖ Many mid-level (regional) networks that attach to backbone
 - ❖ Campus networks at lowest level
- ❖ Initial speed 1.544 Mbps

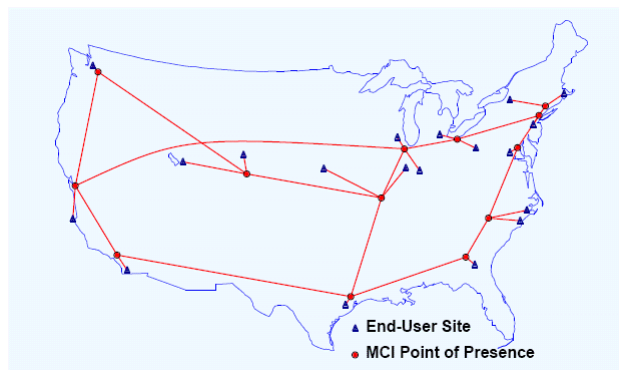
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Historia de Internet

❖ ANSNET (1992-1995)



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Historia de Internet

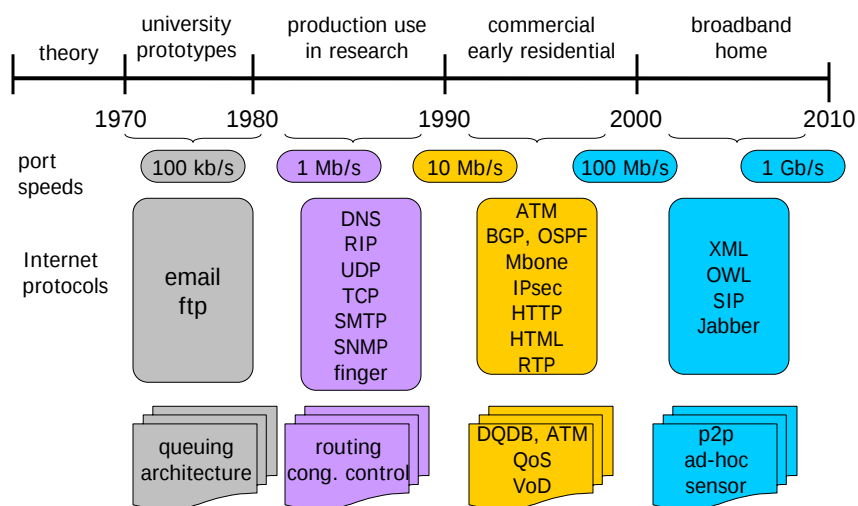
- ❖ vBNS NET (1995)
 - ❖ very-high-performance Backbone Network Service
 - ❖ 1998, connect more than 100 universities and research and engineering institutions
 - ❖ 12 national points of presence with DS-3, OC-3 and OC-12 links
 - ❖ deployment of many novel network technologies including IP multicasting, quality of service and IPv6.

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Historia de Internet: Línea de Tiempo



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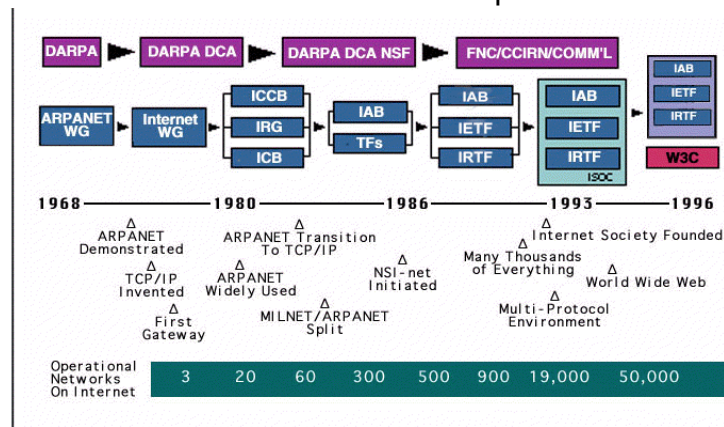
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Situación Actual

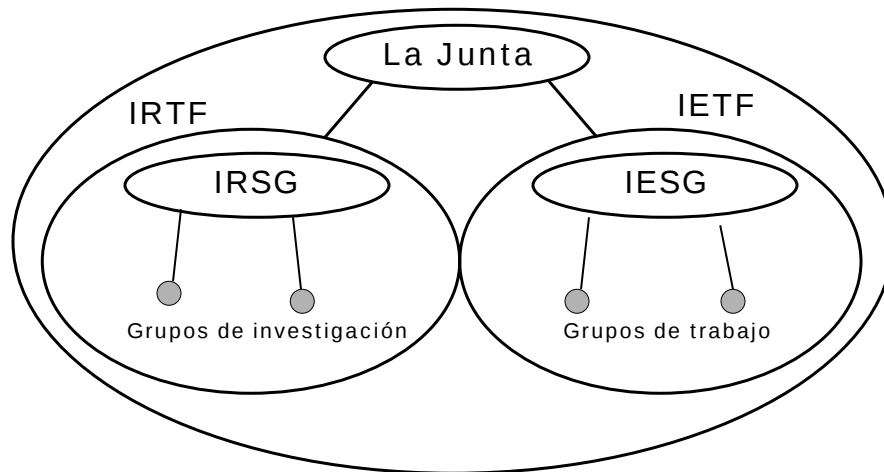
- ❖ 1977:
 - ❖ 22.5 Million Hosts (Bellcore June 1997)
 - ❖ 190+ IP countries (VC est. June 1997)
 - ❖ 50 Million Users (NUA Jul 1997)
- ❖ 2001:
 - ❖ 115 Million Servers (NW/TC Jan 2001)
 - ❖ 218/246 IP countries (NW Jan 2000)
 - ❖ 513 Million Users (NUA Aug 2001)
- ❖ 2008:
 - ❖ 2.000 Millones de Host
 - ❖ 1.300 Millones de dispositivos móviles

Administración de Internet

Línea de Tiempo



Organización de la IAB



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Components of the IAB Organization

- ❖ **IAB: Internet Architecture (Activities) Board**
 - ❖ Board that oversees and arbitrates
 - ❖ URL is <http://www.iab.org/iab>
- ❖ **IRTF: Internet Research Task Force**
 - ❖ IERG: Internet Research Steering Group
 - ❖ Coordinates research on TCP/IP and internetworking
 - ❖ Virtually defunct, but may re-emerge
- ❖ **IETF: Internet Engineering Task Force**
 - ❖ Coordinates protocol and Internet engineering
 - ❖ Headed by Internet Engineering Steering Group (IESG)
 - ❖ Divided into N areas (N is 10 plus or minus a few)
 - ❖ Each area has a manager
 - ❖ Composed of working groups (volunteers)
 - ❖ URL is <http://www.ietf.org>

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ICANN

- ❖ Internet Corporation for Assigned Names and Numbers
 - ❖ <http://www.icann.org>
- ❖ Formed in 1998 to subsume IANA and INTERNIC contract
- ❖ Not-for-profit managed by international board
- ❖ Now sets policies for addresses and domain names
- ❖ Support organizations
 - ❖ Address allocation (ASO)
 - ❖ Domain Names (DNSO)
 - ❖ Protocol parameter assignments (PSO)

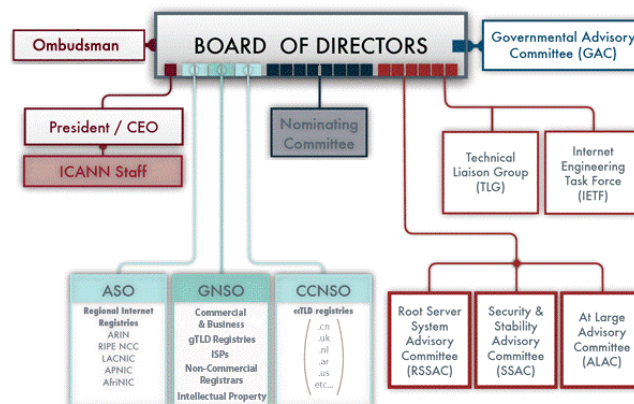
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ICANN

Structure



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World Wide Web Consortium

- ❖ Organization to develop common protocols for World Wide Web
- ❖ Open membership
- ❖ Funded by commercial members
- ❖ URL is <http://w3c.org>

Internet Society

- ❖ Organization that promotes the use of the Internet
- ❖ Formed in 1992
- ❖ Not-for-profit
- ❖ Governed by a board of trustees
- ❖ Members worldwide
- ❖ URL is <http://www.isoc.org>

Internet RFC's

- ❖ La DCA (Defense Communication Agency) (1983) funda el grupo SRI International para mantener y distribuir la información y documentación sobre TCP/IP y de la Internet. Se conoce como el NIC (Network Information Center).
- ❖ Standards de protocolos, documentación y mejoras futuras se distribuyen por medio de las RFC's (Requests for Comments).

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Internet RFC's con't

- ❖ Series of reports that include
 - ❖ TCP/IP protocols
 - ❖ The Internet
 - ❖ Related technologies
- ❖ Checked and edited by IESG
 - ❖ Edited, but not peer-reviewed like scientific journals
- ❖ Contain:
 - ❖ Proposals
 - ❖ Surveys and measurements
 - ❖ Protocol standards

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Internet RFC's con't

- ❖ Numbered in chronological order
- ❖ Revised document reissued under new number
- ❖ Numbers ending in 99 reserved for summary of previous 100 RFCs
- ❖ Index and all RFCs available on-line

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Internet RFC's con't

- ❖ Host Requirements Documents
 - ❖ Major revision/clarification of most TCP/IP protocols
 - ❖ RFC 1122 (Communication Layers)
 - ❖ RFC 1123 (Application & Support)
 - ❖ RFC 1127 (Perspective on 1122-3)
- ❖ Router Requirements
 - ❖ Major specification of protocols used in IP gateways (routers)
 - ❖ RFC 1812 (updated by RFC 2644)

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Special Subsets Of RFCs

- ❖ For Your Information (FYI)
 - ❖ Provide general information
 - ❖ Intended for beginners
 - ❖ <http://ietfreport.isoc.org/fyi-index.html>
- ❖ Best Current Practices (BCP)
 - ❖ Engineering hints
 - ❖ Reviewed and approved by IESG
 - ❖ <http://ietfreport.isoc.org/bcp-index.html>

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TCP/IP Standards (STD)

- ❖ Set by vote of IETF
- ❖ Documented in subset of RFCs
- ❖ Found in Internet Official Protocol Standards RFC and on IETF web site
 - ❖ Issued periodically
 - ❖ Current version is RFC 5000 – STD67
 - ❖ <http://ietfreport.isoc.org/std-index.html>

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Internet Drafts

- ❖ Preliminary RFC documents
- ❖ Often used by IETF working groups
- ❖ Available on-line from several repositories
 - ❖ <http://www.ietf.org/ID.html>
- ❖ Either become RFCs within six months or disappear

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Obtaining RFCs and Internet Drafts

- ❖ Available via
 - ❖ Email
 - ❖ FTP
 - ❖ World Wide Web
 - ❖ <http://www.ietf.org/>
 - ❖ <http://ietfreport.isoc.org/>
- ❖ IETF report contains summary of weekly activity
 - ❖ <http://www.isoc.org/ietfreport/>

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Lecturas Recomendadas

- ❖ Vinton G. Cerf, “A Decade of Internet Evolution”, The Internet Protocol Journal, June 2008 Volume 11, Number 2
- ❖ Geoff Huston, “A Decade in the Life of the Internet”, The Internet Protocol Journal, June 2008 Volume 11, Number 2
- ❖ Dave Thaler, “Evolution of the IP Model”, IETF Journal Volume 4, Issue 3, February 2009
- ❖ NRO, “INTERNET NUMBER RESOURCE STATUS REPORT As of 31 December 2008”,