
Will the future Internet look like what we have today?

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Agenda

- ◆ the Internet of then
- ◆ the Internet of now
- ◆ half a decade of TSV
- ◆ the Internets of future?

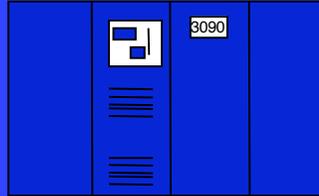
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What was the Internet?



or



Dest Addr	Src Addr	payload
-----------	----------	---------

- 0/ multiplexed utilization of **existing** networks
- 1/ **survivability** in the face of failure
- 2/ support **multiple types** of communications service
- 3/ accommodate a **variety** of network types
- 4/ permit **distributed management** of resources
- 5/ **cost effective**
- 6/ **low effort** to attach a host
- 7/ **account** for use of resources

!security
!Qos
!efficiency

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e2e!

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What did **They** think the Internet was?

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and



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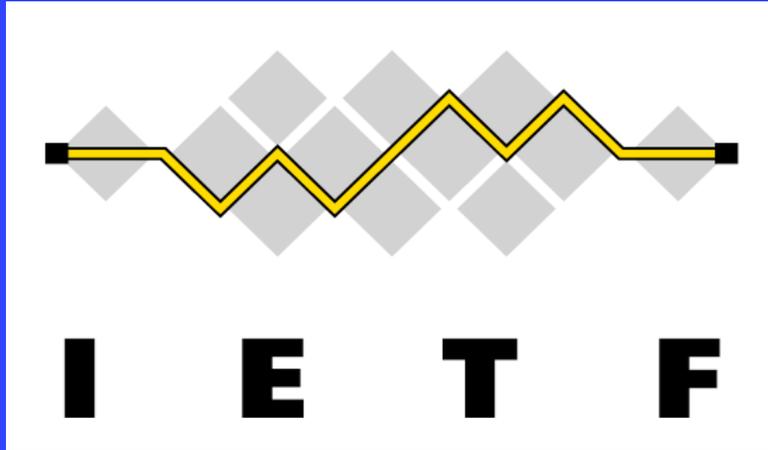
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Today's Internet

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Internet Engineering Task Force



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What is the IETF?

- ◆ since 1986, Internet standards R us
- ◆ does not exist, **no** members, **no** voting
- ◆ “*rough consensus & running code*”
- ◆ 1,200 to 2K at 3/year meetings, **NK** on mail lists
1,570 & 1679 last 2 meetings, next mtg: Vienna in July
- ◆ 132 working groups (where the stuff happens)
- ◆ 8 areas (for organizational convenience) with ADs
APS, GEN, INT, O&M, RTG, SEC, SUB, TSV
- ◆ management: **IESG** (ADs, chosen by community)
- ◆ architectural guidance & liaisons: **IAB**
- ◆ produces **standards** (defined as such by use)

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What is the IETF?, contd.

- ◆ IETF documents - all open
- ◆ Internet-Drafts
 - anyone** can submit - expire in 6 months
 - some I-Ds are working group documents
- ◆ RFCs (stands for “RFC”)
 - archival publications (never changed once published)
 - different types: (**not all RFCs are standards!**)
 - informational, experimental, BCP, standards track, historic
- ◆ 3-step standards track
 - Proposed Standard, Draft Standard, Internet Standard
- ◆ interoperability not conformance

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Hot IETF Topics

- ◆ SUB-IP
 - MPLS, GMPLS, IPO, TE, VPNs, L2 over IP/MPLS
- ◆ base Internet protocols
 - IPv6, TCP enhancements, SCTP, DCCP, RMT, mobile IP
- ◆ Internet emergency use
- ◆ location-based technology
- ◆ security
 - IPSec, secure email, etc
- ◆ routing
 - BGP update, IS-IS, routing futures, multicast

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Hot IETF Topics, contd.

- ◆ management
 - SNMPv3, XML-based, policy-based
- ◆ applications
 - LDAP, iCal, IM, FAX, email, webdav
- ◆ transport area stuff

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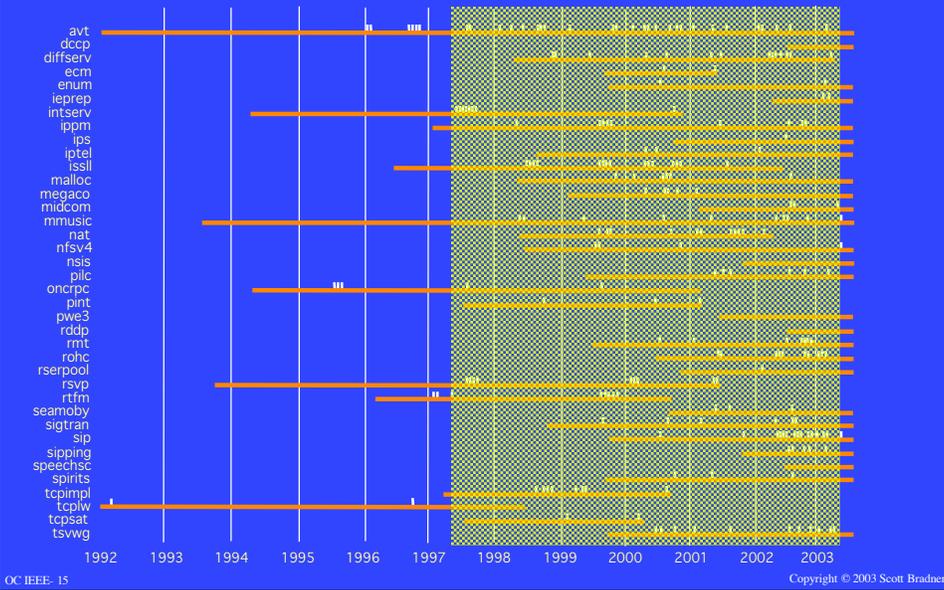
Transport Area

- ◆ AD from March 1997 to March 2003
- ◆ 39 working groups during that time (currently 26)
- ◆ 233 RFCs (92-03), 216 (March 97 - March 03)
- ◆ 126 Proposed Standards
- ◆ 1 Draft Standard
- ◆ 10 BCPs
- ◆ 18 Experimental

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IETF Transport Area 1992 to 2003



TSV Key Technologies

- ◆ QoS
- ◆ multi-media
- ◆ telephony
- ◆ storage
- ◆ layer 4
- ◆ network measurement
- ◆ emergency preparedness
- ◆ pseudo wires

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TSV PS RFCs

- ◆ RPC, NFS, iSCSI
- ◆ RTP plus payloads, RTSP
- ◆ RSVP, intserv, diffserv
- ◆ SDP, SIP plus extensions, PINT, ENUM, MEGACO, TRIP, sigtran
- ◆ IPPM metrics
- ◆ SACK, SCTP, TCP retrans & loss rec, CM, TCP-friendly rate control
- ◆ ROHC, ECN, STUN

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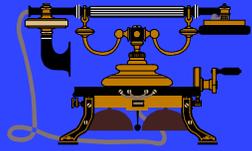
TSV BCPs

- ◆ tcpsat
- ◆ congestion control principles
- ◆ pile
- ◆ inappropriate TCP resets harmful
- ◆ SIP-T
- ◆ SIP over 2.5G & 3G wireless

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IP Telephony or Internet Telephony?



IP

“make sure it stays good”

or

voice

IP

“it is good enough”

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IEPREP

◆ Internet Emergency Preparedness WG

◆ significant disconnect between parties

regulators: must have way to prioritize emergency traffic

ISPs: no need in backbone, can not have problem that this will fix

regulators: any place, any time

enterprises: you are not coming in here!

regulators: only “official” emergency workers

ISPs: also need to support emergency communications for customers

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QoS

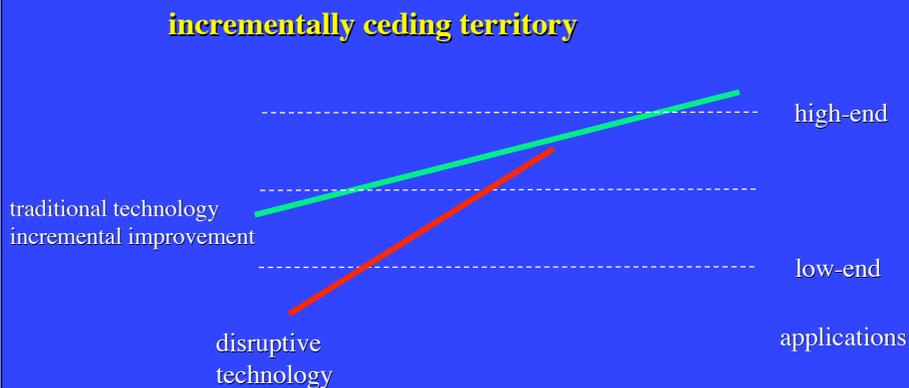
- ◆ unfair allocation of resources under congestion conditions
 - Bill pays to get Fred's traffic dropped
- ◆ latency, drop rate, jitter
- ◆ implies priority or special handling
- ◆ technology needed or is bandwidth enough?
- ◆ the Internet in the U.S. is not reliably crappy enough for a ISP QoS business model
 - but telcos still dream of "biz net"
- ◆ very different story in enterprises

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IP Storage

- ◆ Innovator's Dilemma personified?



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3 pictures of the future

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Regulator Centric Model



we built it!

too important for the geeks



Internal Revenue Service
DEPARTMENT OF THE TREASURY



**U.S. Department of
Homeland Security**



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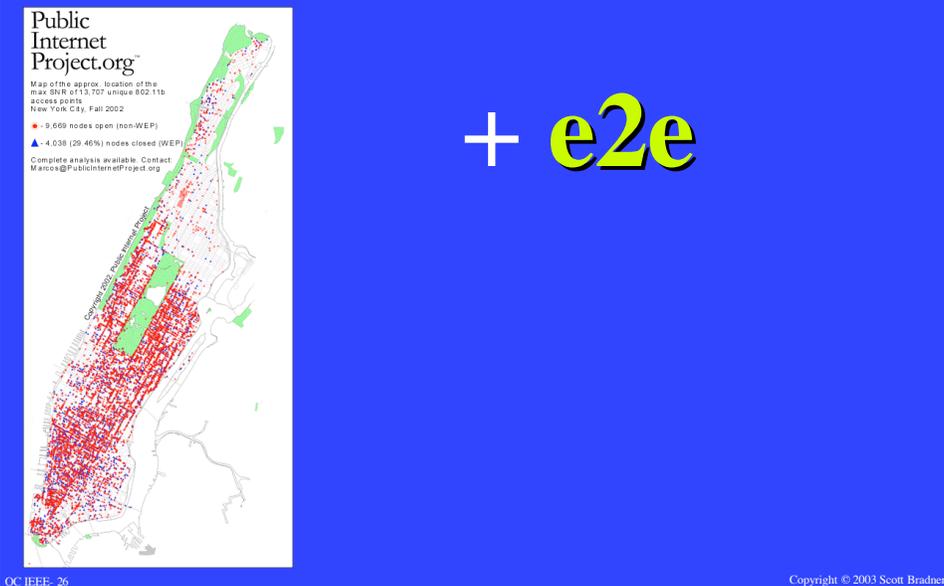
Telco Centric Model



A collection of logos representing various entities in the Telco Centric Model. The logos include Verizon, content (in blue stylized font), BT, a bell icon, Qwest (Spirit of Service™), games games (in green), SBC, france telecom, a red circle with a slash over a yellow figure, VoD (in yellow), and Bellsouth.

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The Internet Model



A map from Public Internet Project.org showing the location of access points in New York City. The map is titled "Public Internet Project.org" and includes the following text: "Map of the approx. location of the max. 80k of 15,707 unique 802.11b access points. New York City, Fall 2002." The legend indicates: "● 9,669 nodes open (non-WEP)" and "▲ 4,038 (29.46%) nodes closed (WEP)". Below the legend, it says "Complete analysis available. Contact: Manica@PublicInternetProject.org". To the right of the map is the text "+ e2e".

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But

But who is going to make money on **that**?

John McQuillan

(i.e., is there a business model for the Internet as Internet?)

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Next Time? (or is it now?)

support existing networks

datagram-based

creating the **router** function

split TCP **and** IP

DARPA fund Berkeley to add TCP/IP to **UNIX**

CSNET and **CSNET/ARPANET** deal

NSF **require TCP/IP** on NSFnet

ISO **turn down** TCP/IP

NSF Acceptable Use Policy (**AUP**)

minimal regulation

**10 decisions that
made a difference**

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it is **NOW**
(and it is us)

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