Developments in the Internet

A Consumer View

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Internet @ Karrenberg's

- 1990, 1995, 2000, 2005, 2010

- A somewhat personal story.
- Take your own conclusions for economy/region.
- Much is from memory,
- … but some from my mail archives.
- All is generalised, not an effort to be 100% exact.

1990

Date: Fri, 05 Jan 90 05:41:43 GMT
From: Greg Satz <satz@cisco.com>
To: Daniel Karrenberg <dfk@cwi.nl>
Cc: cisco@spot.Colorado.EDU

Daniel,

You found a bug in our reporting of the IP Accounting information via SNMP. It will miss certain sequences of entries when asked to do the Get-Next operation. To answer your other questions, we only return the current IP Accounting table and not the check-pointed version. It wasn't clear at the time what information would be necessary to obtain via SNMP. What other IP Accounting information would be useful to you via SNMP?

Greg

1990

Date: Thu, 11 Jan 90 12:47:58 PST
From: tli@phakt.usc.edu (Tony Li)
To: cisco@spot.Colorado.EDU
Subject: Time to start a newsgroup...

It looks like traffic on this list is increasing, and it seems like it's a good time to start a parallel USEnet newsgroup. Attached is the posting that I've already made to news.announce.newgroups.
.....

Tony

Service 1990

- 9600 bit/s dial-up
- 200+ $ / month
- No IP

- IP to the home/office is hard to obtain.
- Total cost for IP connection is 2000+$ / month.

- ***“Who needs IP to the house or small office ?”***

Service 1995

- Only 10 years ago!

- Typical is 19.2 kbit/s or ISDN @ 64kbit/s
- It is still expensive and charged by time …
- … but it is availabe in many many places.

- The web is starting.

- ***“Who needs always-on?”***

Service 2000

- Only 5 years ago! Remember Y2K?

- ADSL 768 kbit/s down & 64kbit/s up
- $80 / month
- Becoming commodity for any household.

- Always-on is here.
- The web is here.
- Search engines make a difference.

Home Network 2000

- 802.11 installed in the home.
- Both parents have laptops with 802.11.

- Internet used regularly by all household members.
- Mainly e-mail and some web browsing / search.
- Always-on has become a given.
- Downtime becomes minor nuisance.

- ***"Who needs VoIP (Radio, TV over Internet) ?"***

2000: SPAM is here

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Date: Sat, 1 Jan 2000 14:11:05
From: <technicalinfo01@earthlink.net>
To: <dfk@ripe.net>
Subject: We can list your website TO THE TOP

We can list your website in all
major Search Engines and achieve Top 30 positions.
GUARANTEED!
...

We key on the following 10 major search engines:
Yahoo-AltaVista-WebCrawler-Lycos-Excite
AOL Search-Netscape-HotBot-MSN-Infoseek
And 600 more.
...
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2005 Service

- DSL 8000/1000 kbit/s + Cable 750/250 kbit/s
  ~ $80.-
- 768/64 is no longer available
  - smallest is 750/250 @ ~ $19.- (sometimes cheaper)
- Connectivity everywhere!
- 802.11 is very widespread

- Mobile: GPRS/UMTS, Hotspots

New Things 2005

- New services:
  - VoIP, extensive chatting (kids), radio, tv, podcasts,
  - purchasing music

- VoIP:
  - Readily available POTS interconnection.
  - Lots of hardware to connect to existing phones.
  - “Phone should have the usual UI”.
  - “VoIP should be transparent.”
    - (no Skype @ Karrenberg’s).

2005 @ Karrenberg's

- all household members use Internet routinely for work and leisure on a daily basis
- all: mail, tv, VoIP, searching information
- adults: reading national paper, finding commercial information, researching things
- kids: chatting, gaming, researching schoolwork

- adults: essential tool for work related comms
- kids: becoming a requirement for secondary school children

2005 Steps

- ***The Internet has become an essential utility.***
  (Hence the dual-homing @Karrenberg's.)

- ***Internet availability assumed socially and economically.***

- ***"Disenfranchised if not connected".***

1990 … 2005 … Trends

- Commoditisation of bit-transport:
  - Revenue / customer falling rapidly.
  - Bandwidth increasing.
  - Internet has become a utility like electricity and water.
  - Needs to be easy and ***reliable*** !
- Services come from specialists:
  - Not from the bit-pushers.
  - Start small and innovative.
  - Peer-to-peer.
  - Concentration of commodities: google / e-bay / amazon

1990 … 2005 … Trends

- Internet is becoming a general-purpose bit-pipe:
  - radio, TV,
  - new forms: streams on-demand, podcasts
- Services trend to specific small target groups
  - blogging, small communities
  - customised services: “My …”
- Resources “on the Network”
  - Server hotels
  - Back-up space
  - Personal web service
  - Targeted bundles

2010

Remember: Predictions are easy …

- 10s of Mbit/s to/from the home @ $20-50 / month
- 100s of Mbit/s wireless in the home

- Appliances on the home network:
  - phone, TV, radio, surveillance/security, climate
  - Storage servers
  - New Internet driven appliances, new HI devices !?

2010

Remember: Predictions are easy …

- Internet connectivity will become more ubiquitous
- A real utility like electricity and water
  - Reliability !!!
  - Security !!!
- Service Bundles
  - Well targeted
  - Well integrated
  - Not from the bit-pushers

What we need to do !

- Provisioning: make it ***very very easy*** and cheap.
- Routing: remove unnecessary complexity.

- Seamless mobility.

- Security:
  - Easy / built-in,
  - Identification / Authentication / Authorisation
  - Identify persons …. while maintaining privacy.

Routing 1995

From: Jessica Yu <jyy@merit.edu>
To: bgpd@merit.edu
Subject: CIDRD minutes
Date: Mon, 02 Jan 1995 11:37:18 -0500

Hi,

Happy New Year!

...

Routing 1995

Erik presented his data characterizing Internet routing table size at three distinct time points corresponding to the three IETF meetings held in 1994.

	Seattle 4/94	Toronto 7/94	San Jose 12/94
Total networks (active)	18808	19758	22148
Class As	22	24	26
Class Bs	4383	4143	4475
Class Cs	14403	15591	17647
ASNs announced	--	403	525

Routing 1995

Total networks (active)	18808	19758	22148
CIDR routes	113	925	1512
ASNs announcing CIDR	35	118	169
% of ASNs announcing CIDR	--	29	32
ASNs with only 1 active net	--	84	105

Routing 1995

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There was some general discussion of the possibility that the NSFNET AUP might be abandoned during the final months of the NSFNET transition. This would help several large ASs (e.g., AS 701) implement CIDR.

Routing 1995

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Jessica listed commonly cited issues that prevent CIDR implementation:

- "Routing table explosion isn't my problem"
- Expensive hardware upgrade to run BGP4
- Lack of documentation on CIDR implementation
- Lack of in-house staffing within ISP to implement CIDR
- CIDRization breaks MED
- Not all router types support CIDR
- CIDR-capable software distribution lags outside U.S.
- Artificial policies prevent aggregation
  - -- NSFNET AUP, but others

Routing 1995

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III. Yakov Rekhter (IBM; yakov@watson.ibm.com)

Yakov discussed the motivation for proxy aggregation:

* Routing information consumes resources (e.g., memory, CPU, bandwidth, people).

* These resources cost money.

* Current Internet-wide connectivity is provided by a collection of independent, sometimes uncoordinated, and often competing ISPs.

Routing 1995

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Also Geoff Huston advocated that ISPs that Produce unaggregated advertisements around the net should face higher settlement charges from other providers.

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Questions