Global Communications Newsletter

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Internet Hosts Approach 20 Million As Growth Shifts from Exponential to Linear

By Anthony M. Rutkowski, Center for Next Generation Internet (CNGI)

The following is an invited article from the Center for Next Generation Internet (CNGI).

The latest results from the Internet's most basic and longest continuing measurement of its size were just released by Mark Lottor of Network Wizards at Menlo Park, California. The Domain Survey attempts to discover every host on the Internet by doing a complete search of the Internet Domain Name System (DNS).

Since the Internet is basically an open network of networks designed to allow access to application ports on hosts, the number of theoretically reachable hosts is the Internet's most fundamental metric. By definition, however, this measurement does not account for independent "intranets" or hosts not included in the DNS that might be located, for example, behind firewalls.

Lottor began conducting these measurements in the late '80s at SRI International, and has continued them at regular intervals. The latest results were gathered during July 1997. This continuing work provides invaluable trend information. The raw data plus some Network Wizards charts are available at ftp://ftp.nw.com/zone or http://www.nw.com. The latter also provides important reachability information for each top-level domain, and explains why some counts indicate lower numbers of hosts than actually exist.

For nearly the past seven years, the author of this note has further processed and analyzed Lottor's data to produce biannual strategic notes and graphs freely available via the Internet. These are available at ftp://ftp.genmagic.com/pub/internet/ (*files beginning with "trends"*).

Highlights

• Lottor's measurements show that the Internet currently consists of countless distributed networks, representing 1,301,000 domains, with 19,540,000 "advertised" connected computers in seven global and 214 country domains. Because of the unknown and potentially unlimited numbers of multi-user computers and network or application gateways, it is not possible to correlate any of this information with the number of end users.

• The figure of 19.5 million hosts represents a current annual host growth rate of 52 percent. On the basis of this latest number, by analyzing the growth curve over the past seven years it now appears that the Internet host growth metric has made a significant transition from exponential to linear. An almost perfect least-squares-fit analysis shows that since the January 1996 count, the host growth rate has been linear at 18,339 hosts per day.

• On the other hand, the proliferation of Web servers, as measured by www-prefixed hosts, appears to manifest continuing exponential growth, increasing by 256 percent annually to a new high of 755,000 hosts.

• The growth rate transition is likely due to fundamental shifts in the architecture of the Internet, its applications (especially the Web), and usage patterns. This would include the increasing tendency to hide large numbers of hosts behind firewalls, outsourcing, and shared use of common hosts. It also includes possible disincentives arising from second-order factors like sufficient very large numbers of people who can maintain hosts, as well as the attractiveness of pooling resources at common sites for bandwidth sharing and other considerations. As the Internet scaled through its seventh order of magnitude, it was apparent that the growth could not remain exponential indefinitely.

• The largest single domain is .com with 4.50 million hosts, which now constitutes 23 percent of all hosts. This relative percentage is down another two percent over the past six months, meaning there is a continually growing preference for country domain use being demonstrated worldwide.

• Among country and global top-level domains above the 10,000 mark, the most rapidly growing included Malaysia, Turkey, Russia, Korea, Russian Federation, Ukraine, China, Indonesia, Argentina, Hong Kong, Thailand, and New Zealand.

• In absolute numbers, the most rapidly growing domains were .net, .com, .edu, .US, Japan, Australia, Germany, .org, and .UK with six-month increases in excess of 100,000 hosts. Among the major countries outside the United States, the host growth rate in Japan is consistently the largest.

• The domain counts can be roughly attributed to countries by assuming that 75 percent of all the three-letter domain hosts are located in the United States, and that the country domain numbers represent most of the hosts in the country. Without subsequent processing to attribute the three-letter global domains to a country, previously done by John Quarterman of MIDS, http://www.mids.org/, it's not possible to determine precise country figures. However, it appears approximately that the same 60–40 percent balance between U.S. versus non-U.S. proportions remain. Quarterman should be contacted regarding the availability of this information.

• Hosts in 214 country domains appear to have connectivity. The domains of a record 27 countries or territories appeared on the host count for the first time, apparently connecting since January 1997. Increasingly, some very remote places are achieving connectivity. However, it is possible that some of these hosts may not be actually physically located in the country.

The author's home page can be accessed at http://www.chaos.com/rutkowski.html; his e-mail address is amr@ngi.org

Grow Regional Technical Conferences!

By Tomonori Aoyama, Chair, Asia Pacific Committee

ICC and GLOBECOM are world-scale technical conferences sponsored by the Communicatinos Society. There are, however, not so many people from outside North America who can participate in these conferences and present their papers there. Although the numbers of communication engineers are rapidly increasing in the Asia Pacific (AP) region, only a small percentage of engineers there can get an opportunity to present their papers at these conferences. Other growing conferences like INFOCOM, ICUPC, NOMS, and so on, are held around the world, but still the opportunity to participate in these conferences is not so high, because the number of papers accepted is limited, and the travel expense is usually very high. One good solution to expand the opportunity to attend international conferences is to establish high-level regional conferences which travel within the region.

There exist some good regional conferences in Europe and North America, such as ECOC (European Conference on Optical Communications, sponsored by each national society) and OFC (Conference on Optical Fiber Communications, cosponsored by OSA, LEOS, and ComSoc), for example, while the AP region has not had such high-level regional conferences in the area of communications. A number of volunteers in the region have recently made substantial efforts to start new regional conferences, and the Asia Pacific Committee (APC) of ComSoc is strongly supporting them.

One example of the new regional conferences started in the AP region is APCC (Asia Pacific Conference on Communications, co-sponsored by local societies and ComSoc), which is a regional version of ICC/GLOBECOM and covers awide range of communication technologies. APCC was first held in Taejon, Korea (in 1993), then in Osaka (in 1995), and will be held in Sydney (this December) and Singapore (in 1998). Several hundred people from all over the world have participated in APCC each time.

The second example of the new regional conferences in the AP region is OECC (Opto-Electronic Communication Conference, co-sponsored by each local society, ComSoc, and LEOS), which covers optical communication networks, systems, optical fibers, components, and devices. OECC corresponds to OFC in North America and ECOC in Europe. The first OECC was held in Makuhari, Japan, in 1996, and the second OECC was successfully held this June in Seoul. About 700 people from the AP region as well as North America and Europe attended OECC '97. OECC '98 will be held again in Makuhari, Japan, and in 1999 OECC may be hosted by China.

The third example is ISPACS (International Workshop on Intelligent Signal Processing and Communication Systems), which focuses on advanced signal processing technologies for communication applications. ISPACS started in Taipei in 1992, and then was held in Sendai, Japan in '93, in Seoul in '94, in Singapore in '96, and will be held in Kuala Lumpur this November.

The last one has just been born. It is APNOMS (Asia Pacific Network Operations and Management Symposium, cosponsored by local societies and in cooperation with ComSoc and NMF), which focuses on network management technologies, and corresponds to the AP version of NOMS.The first APNOMS will be held in Seoul, November 8–10, 1997.

The above four regional conferences in the AP region have only a short history, but are growing steadily so that they can provide ComSoc members in the AP region good opportunities to participate in international conferences. Of course, they are all open to the world, and in fact a number of members from outside the AP region have participated in them.

I do encourage you to submit your papers to such regional conferences so that their level will become higher and higher. You can access detailed information on them in the APC home page (http://onlab.tas.ntt.co.jp/APC).

Leading-Edge Research in Canada: Passage Into The 21st Century

By Javan Erfanian, Canada

The federal government in Canada has given the Networks of Centres of Excellence program permanent status, but has structured it to ensure rigorous competition for the available resources. It is an innovative R&D program, jointly managed by academia and industry, allowing distributed research teams in Canadian universities to pursue leading-edge research in areas of strategic importance to Canada.

The Canadian Institute for Telecommunications Research (CITR) is focused on research in telecommunications and information technology. CITR encompasses 18 universities and two specialized research institutes. It presently has 17 industrial affiliates, including most of Canada's leading telecommunications and information technology companies. Coordinated projects now being undertaken by CITR involve nearly 400 research and support staff.

Dr. Birendra Prasada, President of CITR, describes its mission and role in the latest issue of the CITR newsletter as follows: "CITR's mission is to enhance the competitiveness of the Canadian telecommunications industry by increasing the flow of people and ideas to its R&D activities.

"That role becomes more crucial with each passing month. With the globalization of telecommunications markets, Canadian companies have unprecedented opportunities before them. But to compete in the fierce global marketplace, companies must focus on short-term R&D in the ever-more-frantic race to launch products.

"As companies have to pull in their time horizons, an R&D gap opens up. The stock of medium- and long-term research that will be the foundation for tomorrow's products diminishes.

"This reality creates the unique role of CITR. In a hyper-fast sector preoccupied with short-term imperatives, CITR is an instrument for generating sustained R&D that industry deems timely, important, and relevant.

"CITR also is changing how university people, particularly young professors, approach research. Our insistence on relevant research, planned in collaboration with industry, has instilled in academe a greater awareness of industry's needs. As well, we have shown that university researchers, in partnership with colleagues in government laboratories, can address complex, large-scale projects. In sum, we are a catalyst for cultural change within our research community.

"The result is timely and relevant R&D, and a stream of people well-trained in the skills and technologies that companies require. These are critical elements contributing to the success of Canadian industry in the highly competitive global marketplace.

"These are the values that have guided us in planning our research program. Everything is in place to ensure CITR provides its unique and very necessary value to Canada's telecommunications sector in what is sure to be an exciting, fast-paced passage into the 21st century."

The IEEE ComSoc European Operations Corner

By Jacques Kevers, Brussels

During the summer period, discussions with IEEE Service Center and IEEE Communications Society headquarters resulted in the following action plans for the Brussels office.

IEEE Service Center

Membership Applications

Together with the IEEE Regional Activities Department, IEEE Member Services initiated an Application Processing Pilot Project, where Brussels staff is partially processing Affiliate applications received from Region 8 (R8) applicants in the Brussels office. The processing is online, directly on the Oracle system. Under this project (started on 4 August 1997):

1) Brussels staff receives Affiliate applications in the Brussels office, mainly from Computer Society promotions in R8 featuring the Brussels return address. ComSoc Affiliates could be considered as well.

2) On the same day as receipt, Brussels staff fist checks on the system in case they are existing members, then enters name, address, customer type, and class onto the Oracle database. This enables the system to generate a new member number for the Affiliate.

3) An Acknowledgement Letter is generated immediately and automatically by the Oracle system in Piscataway, which allows for substantial time savings.

Once Phase 1 successfully completed, in November 1997, A&A staff will determine whether additional application processing functions could be provided by Brussels office staff.

Order Entry

Up to now, the office was "selling" Computer Society Press and IEEE books, utilizing a local computerized order processing and accounting system. Orders were shipped directly from the office to local customers.

Under the pilot project, Brussels staff will process orders for IEEE products and services online, directly on the Oracle system. In doing so, many benefits would result for the R8 member: the office no longer needs to stock IEEE products; back-order situations will be reduced; standardization of sales terms, as no VAT has to be charged on an U.S. invoice; alignment of (lower) U.S. handling & shipping charges.

The final stage whereby IEEE empowers Brussels staff to migrate from their standalone order entry system to processing incoming orders on Oracle is starting in October 1997.

IEEE Communications Society

Up to now, the Brussels office supported the IEEE Communication Society by:

- Providing information/telephone support over a dedicated ComSoc phone line
- Updating/maintaining local ComSoc volunteer database & e-mail alias
- Developing local mailing lists, mail local membership promotions
- Providing local banking services for society conferences
- Providing support to local chapters (mailing labels)
- Promoting Society at selected ComSoc conferences
- Stocking/distributing ComSoc membership forms and committee rosters

The following activities are now being added to these functions:

1) Distinguished Lecturer Tour — After preliminary contacts with the VP Membership Affairs, local chapters/volunteers will be proactively contacted in order to organize these tours in 1997–1998.

2) ComSoc Chapter Chair updates — Contacts will be organized periodically, with reminders being sent automatically to Chapter Chairs whose terms are expiring. Updates will be transmitted to HQ.

3) Chapter creation — R8 sections with more than 100 ComSoc members will be listed. Chairs of these sections will be contacted and provided with chapter formation information, and creation of a chapter will be suggested.

4) National societies — R8 societies having sister society agreements with ComSoc will be listed and contact info (chair, executive director, secretary) updated.

5) Chapter Coordination — An e-mail alias for R8 chapter chairs will be set up and maintained.

For more details on the above, reactions, or suggestions, you can contact:

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Israel Opens Its Telecommunications Network to Competition

By Jacob Baal-Schem, Israel

As in most countries, the telecommunication system in Israel was a governmental monopoly, and for many years this system was operated by a department of the Ministry of Communications. Several years ago Bezeq was established as the government-owned telecommunications company and succeeded in a short time to bring Israel to the advanced level of over 40 telephones per 100 inhabitants, and to the provision of advanced services (e.g., ISDN).

On July 1, 1997, Israel opened its international telecommunications to competition. Each subscriber can now choose among three companies for making international telephone calls. The companies are Bezeq International, Barak, and Golden Lines. Each of these providers is connected to one or more international telecommunications companies and has invested large sums in preparing for the provision of advanced services.

The opening of competition drastically lowered the prices of phone calls. From about U.S. $1 per minute, the fare for a call from Israel to the United States was set to $0.20–0.26, depending on the company you choose and the time of the day. During the next six months, each subscriber will have to get connected to one of the international communications providers, as is usual nowadays in the United States and other countries. Therefore, these companies are actually active in convincing the Israeli population of their specific advantages.

As an additional step in liberalization of the Israeli telecommunication system, the Israeli Government has recently sold shares of Bezeq to outside investors. This will further advance the privatization of Israeli telecommunication systems and hopefully provide for additional development of the already advanced telecommunication system of Israel, on the verge of its 50th anniversary.

Electronic Communications: The Internet

The following article is extracted from the 1997/1998 edition of the "Regional Activities Department Program Resources Guide," a source book for IEEE Section and Chapter Leadership.

The online population is growing at a phenomenal rate. This "information revolution" will effect the way every IEEE member will communicate professionally and personally, buy products, evaluate decisions, and find entertainment. We experience all this through the Internet. There are many Internet service providers (ISPs) to choose from. IEEE does not endorse any particular ISP. Recently, there has been a trend of companies springing up solely to provide space on the World Wide Web, as opposed to the traditional ISP.

When choosing an ISP, here are some things to consider:

- Local, national, or international provider
- Price
- Type of account
- Does this provider allow commercial activities?
- Network availability
- Domain name — Does this provider allow you to have your own domain name?
- How much will they charge to register your name?

Remember, you can always change your provider at any time. Once you are connected to the Internet, you can access the IEEE.

IEEE Internet Services on the World Wide Web

Have the IEEE at your fingertips by accessing the IEEE homepage on the Web at http://www.ieee.org/. You will find current IEEE news, news archives, IEEE background and history, and a public relations area specifically designed for Sections, Societies, Chapters, and Student branches.

Specific hot spots include Member Services, The IEEE Store, Technical Societies, Student Activities, Local Activities, IEEE Publications and Standards — including *IEEE Spectrum* at http://www.spectrum.ieee.org and OPeRA, the IEEE Journals and Transactions Online Periodicals Research Area (formerly JOLLY) at http://www.comsoc.org/opera. There are also many hyperlinks to assist you.

E-mail

E-mail communication is quick, convenient, cost-effective, and efficient. Every IEEE department and Region, many Sections, Councils, IEEE Boards, and other entities are accessible via e-mail.

While IEEE is not an ISP, as an IEEE officer/volunteer you are eligible to obtain your own IEEE e-mail address alias that automatically forwards e-mail to your actual account. For example, email sent to d.shell@ieee.org is automatically forwarded to don_shell@engine1.ee.duke.edu. IEEE staff members can be reached in a similar manner, usually i.name@ieee.org, where the "i" equals the first initial and "name" equals the last name. This makes communications between volunteers and staff so convenient. To request an IEEE e-mail alias, send an e-mail message to info.aliases@ieee.org, or see the Electronic Communications Web page on the IEEE home page under Member Services. Aliases are also available for Sections/Societies/Chapters by sending a message to info.startup@ieee.org

E-mail Coordinators

Many regions also have an e-mail or electronics communications coordinator who can help you get started. To find out who your coordinator is, send an e-mail message to info.email.coordinator@ieee.org, or check your Regional Roster.

Information Files

IEEE has an extensive group of information files that can be accessed via email or anonymous FTP. For a list and descriptions, send an e-mail message to info.index@ieee.org. For access via FTP, connect to ftp.ieee.org. The current IP address for ftp.ieee is 199.172.136.1.

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www.comsoc.org/pubs/gcn

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TETSUYA MIKI
Chapters Corner

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http://www.comsoc.org/opera

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