



# The Nigerian Society of Engineers

PORT HARCOURT BRANCH



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## Interview with Leonard Kleinrock on the History of the Internet

*Dr. Leonard Kleinrock pioneered the mathematical theory of packet networks, the technology underpinning the Internet. For his enormous contribution to understanding the power of packet networks he was honored with the Charles Stark Draper Award as one of the fathers of the Internet, along with Vinton Cerf, Robert Kahn, and Larry Roberts. He is a developer of ARPANET, the seedling that grew into today's global Internet, and his laboratory's UCLA Host computer became the first ARPANET node in September 1969.*



Leonard Kleinrock

*A month later, he directed the first transmission to pass over the blossoming network. He received his Ph.D. from MIT in 1963. He currently serves as a Distinguished Professor of Computer Science at UCLA. He has published over 250 papers and authored six books on a wide array of subjects including packet switching networks, packet radio networks, local area networks, broadband networks, nomadic computing, peer-to-peer networks, and intelligent software agents. He is a member of the National Academy of Engineering, the American Academy of Arts and Sciences, an IEEE fellow, an ACM fellow, an INFORMS Fellow, and an IEC fellow. Among his many honors, he is the recipient of the Ericsson Prize, the NAE Draper Prize, the Marconi Prize, the Okawa Prize, and was further recognized when he received the 2007 National Medal of Science, the highest honor for achievement in science bestowed by the President of the United States.*

*The E-Newsletter team interviewed him recently in Geneva, Switzerland after he gave the Key Note address during the Internet Society 20 years anniversary where he was inducted into the Internet Hall of Fame Pioneer (<http://www.internethalloffame.org>).*

**E-Newsletter:** *Sir, in a nutshell we want you to tell us the history of the internet.*

**Prof. Kleinrock:** Sure. The internet history really goes back over a hundred of years. With some other early visionaries imagining what could

be, if the technology could support it. Most notably Nikola Tesla, in 1908 anticipated a lot of what we have today. The real emphases came when technology capability was available and the cost of communications was basically going up compared to the cost of processing. So the idea of using intelligent switches to save our communication cost was the critical pressure that allowed technology step in. Before that, telephone networks were willing to waste communications in order to save on our high switching cost. Around that same time I was doing my PhD in the University of California, Los Angeles (UCLA) and I decided that computers needed to talk to each other. There was not a way to do it but developed technology can allow that to happen. That was in the early 1960s. In the mid 1960s, ARPA (Advance Research Project Agency) of the Department of Defense in the United States recognized they needed a network to connect together all the computer science research facilities around the country. So what better network could you use than an ideal Packet-Switched network which I helped to developed? So they started to ponder the idea, they put together and steer principle investigator and program managers out of ARPA and they funded this development. First of all, they gathered a bunch of us together to identify what should be the specifications. They requested for proposals from industries and the industries responded and a company in Cambridge, Massachusetts won the contract. The company name was Bolt, Beranek and Newman. It was their job to deliver the first switch on Labour Day weekend in 1969. UCLA, my laboratory was chosen to be the first node showing up whenever the weekend shows up. A day after the Labour Day we connected it to our host computer Sigma 7 and the network wasn't there because it was only one node only. Months later, Stanford Research Institute, funded the project and got the switch.

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Engr. Otunte Otuneh & Prof. Leonard Kleinrock



**Photo Left:** L-R: Rep. of Chairman of NDDC, Engr. Denis Dania MNSE (NSE PH Branch Chairman) with his spouse and Engr. Prof. Y. O. Beredugo FNSE.

**Photo Right:** Engr. Gershon Ogbulujah FNSE and his spouse during the NSE PH Branch Fellowship celebration, membership induction and dinner at Hotel Presidential Port Harcourt on Saturday 2 June 2012



**Interview with Leonard Kleinrock ... continued from page 1**

They connected their computer to it, and then we had a high speed line from Stanford Research Institute down to UCLA. Now we had a two node network and high speed line. The first speed is the backbone Network Administration. In October 29, 1969 we decided to send the first message of the internet and we did it by logging in from our machine in UCLA to their machine in Stanford. It turns out that to log in you have to type "LOG" and the other machine types the "IN". We typed the "L", we type the "O" and the Stanford Research Institute machine crashed. This turns out that the first message ever sent on the internet was "LO"; as in Lo and Behold. Now we didn't plan such a small message. Think about it, short, prophetic and unplanned. We don't have a camera, we don't have a picture, we don't have a sound recording but we had an entry in our log book memories.

**E-Newsletter:** *Thank you sir. What advice do you have for individuals that are yet to connect to the internet?*

**Prof. Kleinrock:** So those who are not yet connected to the Internet have a terrific advantage. They have all the available technology built up over the last forty three years (43 years). Wireless technology, smart phones, inexpensive devices, applications, apps stores and the experience of the way the internet is used. So the young people who are going to be connected can step into basically a machine that has been moving ahead for over forty years and then to help create their own future. There is so much yet to be done. Sometimes young people feel all the good works has been done already. Not true. As I said the internet is in its teenage years. The applications that are yet to be developed, you and I cannot imagine but these young kids can. So they are the ones that will come up with surprising, delicious and seductive applications. So there is a world of opportunities out there. I wish I was young right now so that I can play the games with them.

**E-Newsletter:** *Thank you very much sir.*

**NSE PH Branch General Meeting: Thursday 31st June 2012**



L-R: Engr. Kombo Johnson MNSE (Vice Chairman), Engr. Denis Dania MNSE (Chairman) and Engr. Emmanuel Idoniboye MNSE (Secretary)



L-R: Engr. Chief Mark Derefaka FNSE, Engr. George Okoyo FNSE & Engr. Fyne C. Ogolo FNSE during the branch general meeting.



Some inductees during the dinner at Hotel Presidential on 2 June 2012

The Society of Petroleum Engineers, Section 1003, Port Harcourt Chapter on Thursday May 17th 2012 paid a courtesy call on the NSE Port Harcourt Branch Chairman and some of the Executive Committee members. The 6 member delegation was led by the Section Chairman Dr. Saka.



**“World IPv6 Launch” 6 June 2012**

The Nigeria Society of Engineers in partnership with the Internet Society Nigeria Chapter, IEEE Nigeria Section and Digital Sense Africa (part of NIRA) will host “World IPv6 Launch” on 6 June 2012 in Lagos, Port Harcourt, Abuja and Kano. Be part of it. For details please contact: **Lagos:** Remmy Nweke 08023122558, **Port Harcourt:** Otunte Otuneh 08037048430, **Abuja:** Funso Adebayo 08074172133, **Kano:** Tunde Ige, 08035910471



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**NOTICE! NOTICE!! NOTICE!!!**

All members of NSE PH should pay their **Annual Branch Dues of N4,500 for Corporate Members and N6,500 for Fellows to UBA ACC. NO: 0234-031-0000962 (Port Harcourt Main Branch)**. Also pay **National Annual Subscription of N7,500.00 for Corporate Members & N9,500 for Fellows** directly to **AFRIBANK ACC No. 1420202215613** & forward all tellers to the secretariat for reconciliation. All payments should be made at the Bank