



MAIN COMMUNICATION NETWORK

DEPARTMENT PROFILE
2006-2010

UNIVERSITY OF KARACHI

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Prof. Dr. Pirzada Qasim Raza Siddiqui
Vice Chancellor University of Karachi



Message from the Vice Chancellor

It gives me immense pleasure to mention that Department of Main Communication Network, University of Karachi is functioning satisfactorily since the completion of HSFBLAN project in 2006. It has been providing seamless internet facility and related services for over five years now and that the quality of service will further improve in future.

I congratulate the Prof. Dr. S. M. Aqil Burney, Director MCN and all the staff members for their tireless efforts in ensuring smooth and round the clock functioning of the network. The department heavily contributes towards the academic excellence of the university by providing internet access as well as providing digital library facility to the faculty and students of the university and thus connecting them to the global world of research and development spread throughout the world. Moreover, the newly installed video conferencing facility is helping to create an environment that is conducive for research and development in cooperation with foreign universities as well as higher education institutions in other parts of the country.

I hope that in future, MCN will develop, plan and maintain networks according to the needs and requirements of University of Karachi. I also expect it to incorporate latest hardware equipment and upgrade the infrastructure according to the advancements in technology. I also assure that university will provide appropriate financial resources for maintaining the current Quality of Service and enhancing the services provided by MCN.

Prof. Dr. Pirzada Qasim Raza Siddiqui

Message from the Director

The very first Computer Network at University of Karachi was developed in the Department of Computer Science in 1995, which was later upgraded in 1998. In the year 2001, a 326 nodes network was developed under my supervision and the patronage of the Vice. Another Campus Wide Network was developed in the year 1999 for limited use only.



The idea of the University wide High Speed Fiber Based LAN Establishment with Wireless Computing at University of Karachi (HSFBLAN) was conceived in the year 2001 to provide the Internet facilities to all the departments, research institutes and Administration units of the University. A proposal in the form of PC-1 was submitted to the Ministry of Science & technology, a very first proposal was transformed to Higher Education Commission (HEC) when it started.

The PC-1 of this project was approved in the year 2003. All the 62 Departments (Academic & Administration) and 18 Research Institutes of the UoK were connected via Fiber Optic Cable with eight Access Switches, 62 distribution Switches and One Core Switch. This network was providing Internet, Intranet, VoIP, Video Conferencing Wireless Hotspots facilities to the students, staff and faculty of the UoK. With the passage of time different administrative IT based facilities developed and deployed according to the growing needs & requirements of the University. HSFBLAN has been continuously providing network facilities to the entire University of Karachi since 15th April 2006. This network has been deployed using 22km fiber optic cable with 12km single mode and 10km multi-mode fiber optic cable. To ensure uninterrupted internet and intranet facilities, Electric Generator with 32KV power has been installed to provide electricity in the situation of electricity failure.

After the completion of the HSFBLAN project the syndicate upgraded it to a fully functional department named 'Main Communication Network'. Under this department, the official website of university of Karachi was completely redesigned and its beta-1 version was published over the internet. This website published the latest news updates, results and all information pertaining to the UoK. Additionally, MCN also provided new network solutions to the departments which were not previously connected to its network such as National Center for Proteomics, Food and Science Technology and Bio-Technology.

In the end I would like to once again thank the Vice Chancellor, Prof. Dr. Pirzada Qasim Raza Siddiqui for his unconditional support as well as HEC for their financial support, in making this dream a reality.

Meritorious Prof. Dr. S. M. Aqil Burney

MAIN COMMUNICATION NETWORK

Introduction

HSFBLAN PROJECT

- Project Idea conceived in 2001 by Prof. Dr. S. M. Aqil Burney
- PC-I developed in May 2002 by Project Director with the help of Project Engineers.
- Proposal Presented to the Vice Chancellor - September 2002.
- Proposal accepted in DDWP- August 2003
- Approved Cost of Project Rs.35.432 million
- Revised Project Deadline – 30th June 2006

MCN

- HSFBLAN project completed in July 2006 and upgraded to a full flash department
- Syndicate named the department as ‘Main Communication Network’
- Prof. Dr. S. M. Aqil Burney became the first Director of MCN



Vice Chancellor presenting a shield to Dr. Burney at the inauguration of HSFBLAN

Evolution from HSFBLAN

When the HSFBLAN project was conceptualized, its initial goals were the interconnectivity of the whole University of Karachi and its adherence in the form of a single domain. Additionally, the connectivity to the global world’s World Wide Web of research, knowledge, and data archives.

Milestones along the way

Right after establishing and achieving the primary purpose of the department, some of the remarkable milestones achieved by the department are as follows:

- 90,000 ft. Fiber based largest network in Pakistan.
- Video Conferencing facility.
- IP Based Phones (HiPath4000), no location dependency in IP phone.
- High end Cisco Router and Core Switch.
- More than 80 departments and Institutes are using internet facility from MCN.
- PIX firewall with NAT/PAT configuration to increase IP efficiency.
- 96 Mbps Bandwidth (highest in Pakistan)
- Technical Support for whole University by daily complaints.
- Fire suppression System in Data Center.
- Video Conferencing room established at Dept. of Computer (UBIT) by HEC.
- Daily backup and monitoring.
- University of Karachi Official Website
- University of Karachi Official Email System (for faculty and staff)
- Certified Ethical Hacking training for staff
- Overseas training for staff in UAE and China

CURRENT STATUS

Main Communication Network has got into its fifth year and by the grace of Allah, the global connectivity of the university has never been better. With round-the-clock internet connectivity to the instantaneous availability and sharing of every news, information or results through the university's website, MCN team is always up-and-coming.

In just two years the originally allocated internet bandwidth has been increased from 2 Mbps to 96 Mbps, as a result of continuous and never-ending internet consumption by the university users. Currently there are over 5000 active nodes in the university and the number of internet connections is increasing continuously.

Technical Support and assistance is also given for the whole University. Our Technical Support team is working tirelessly to ensure the proper working of the university internet.

Dr. Burney at the inauguration of HSFBLAN-UoK



Technical Committee of UoK in a meeting discussing the performance of the Network

SERVICES RUNNING AT DATA CENTER

- Proxy service
- ADS
- DNS
- IpCop
- SNMP
- HTTP
- FTP
- VoIP
- VLAN
- H.323
- SMTP
- IMAP
- WiFi
- POP

Director MCN with the Network Technical Committee of UoK



DRIVING FORCES

Every department needs a brilliant and diligent work force for its proper and smooth functioning; the driving forces of MCN are a perfect example. For the MCN Team, every day is a new day, thus bringing new challenges and rewarding with new accolades.

DIRECTOR / ADVISOR

Both **HSFBLAN** and **MCN** are the brain child of Meritorious Prof. Dr. S M. Aqil Burney, who is the Director / Advisor of MCN. It was his vision (**in 2002**), that University of Karachi was able to connect to the global worldwide network of research and development (**since 2006**). It has been more than eight years that he is working on this project.

Dr. S M. Aqil Burney is Meritorious Professor and approved supervisor in Computer Science and Statistics by the Higher Education Commission, Government of Pakistan. He is also the Director (UBIT) & Chairman Dept of Computer Science, UoK. He is also member of various higher academic boards of different universities of Pakistan.

He is a member of IEEE(USA), ACM(USA) and fellow of Royal Statistical Society, United Kingdom and also a member of Islamic society of Statistical Sciences. He is teaching since 1973 in various universities in the field of Econometric, Bio-Statistics, Statistics, Mathematics and Computer Science. He has vast education management experience at the University level. He is also member of national curriculum committee on CS/IT and software engineering.

Dr. Burney has received appreciations and awards for his research and as educationist. He has been awarded best IT academician in the Country in 2003 by NCR.

Dr. Burney at the inauguration computing lab facility at the UoK



Dr. Burney (Director-MCN) in a meeting with MCN technical staff



Technical Committee

Mr. Nadeem Ahmed (MS, MCS, ICND, MCP, CEH) is the most experienced member of the MCN team with 12 years experience of Networking. He is currently the Network Administrator of the network infrastructure of the university. He has completed the training of CCNA, CCNP, CCIE, CEH, PERN2 Network Training (China), Video Conferencing Training (Dubai). He is involved in network management, research and development.



Mr. Zain Abbas (BSCS, CEH) has been working as a Web Developer in the Main Communications Network, University of Karachi since 2006. He has been actively involved in the continuous improvement of the official website of the university. Under the supervision of the director he has worked tirelessly to enhance the facilities offered by the website to its visitors. He is actively involved in R&D related to network simulation and web technologies.



Mr. Ammad Khalid (BSCS, CEH) joined the Main Communications Network as Web Developer Cum Network Support since 2007. Currently he is in charge for the video conferencing facility of the university. He has also been working along with the Web Developer and The Network Administrator, thus providing assistance as and when needed. He is also involved in research on network management.



Support Staff

Name : Muhammad Nadeem
Designation : Office / Store In charge
Expertise : Office Correspondence / Accounts / Network Complaints
(For complaints call Ext 2533)



Name : Syed Ubaid-ul-Hasan
Designation : Sub-Engineer(Electrical)
Expertise : Maintenance (Electrical /Generator)



Name : Rasheed Ahmed
Designation : Technical Support
Expertise : Network Complaint Troubleshooting



Name : Syed M. Hasnat Rauf
Designation : Technical Support
Expertise : Network Complaint Troubleshooting



Name : Syed Wahid Raza
Designation : Technical Support
Expertise : Technical Support



Name : Naseer Ahmed
Designation : Office Attendant
Expertise : Maintenance



Name : Shameem Ahmed
Designation : Daftari



STAFF IN ACTION



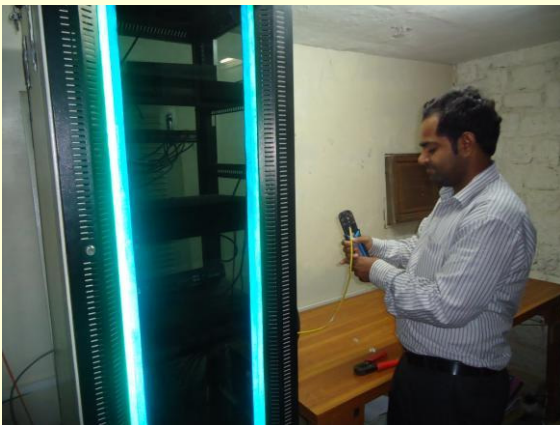
Technical committee working on the recent Network extension



Mr. Nadeem in the complaint office



Mr. Ubaid working on MCN generator



Mr. Rasheed repairing a patch cord



Mr. Hasnat working on a switch

MCN – NETWORK DESCRIPTION

For laying this network 10km single mode fiber optics and 12 km multimode fiber optics have been used. One core switch (Cisco Catalyst 6506), eight access switches (Cisco Catalyst 3550), and 62 distribution switches (42 switches of 2950SX and 20 switches of 2950) have been installed. All eight access switches are Catalyst 3550-12G, connected to core switch catalyst 6506 R via Fiber optic.

DATA CENTER

Data Centre in the Administration block (UoK) is the place which acts as a nerve centre for the entire university. This is the place where all network connections of the entire university in a highly available, robust, high speed CORE switch system. It centralizes and consolidates all resources. It is dedicated to providing uninterrupted service to data processing operations. The network Architecture is described in the diagram below. Each department is divided into separate VLAN(s).

MCN Data Center at Admin building UoK



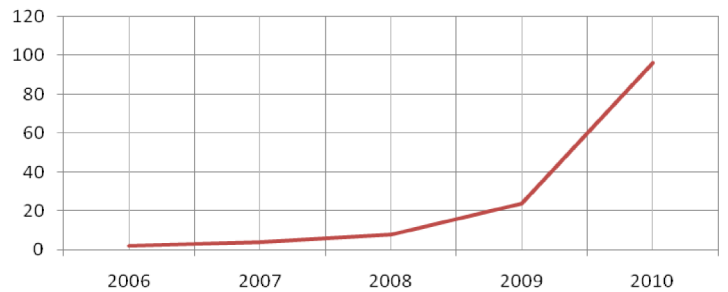
NETWORK ARCHITECTURE

The active equipment installed at the Data Center provides maximum uptime with redundancy and rapid 2-3 second failover across supervisor engine. The Cisco Catalyst 6506 Firewall Security System is a three-slot model providing a turnkey solution that integrates a Cisco Catalyst 6000 Supervisor 2 (with integrated policy and Multilayer Switch Feature Cards for system control, routing services, and dual-Gigabit-Ethernet ports); a Cisco Catalyst Firewall Service Module providing 5 Gbps of firewall services; and a single open slot for site communication.

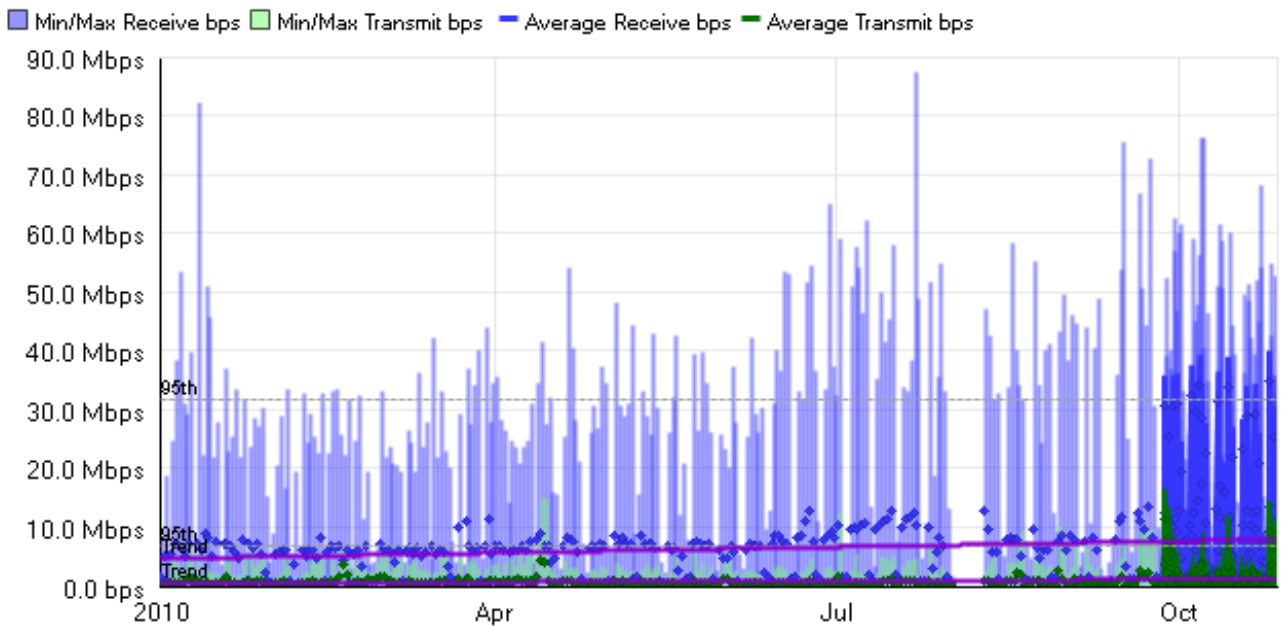
The Bandwidth Usage

The originally allocated bandwidth has been increased from 2 Mbps to 96 Mbps. The bandwidth has been increased to meet the bandwidth requirement as new educational and research opportunities have been created at the university.

Bandwidth availability (2006-2010) in Mbps

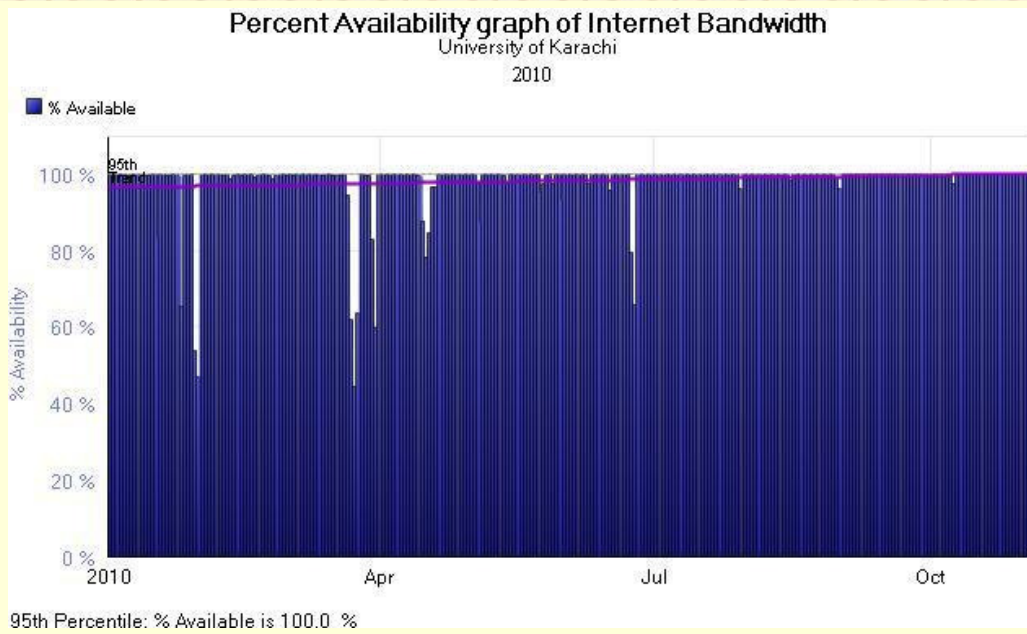


University of Karachi
Department of Main Communication Network
Bandwidth Graph 2010



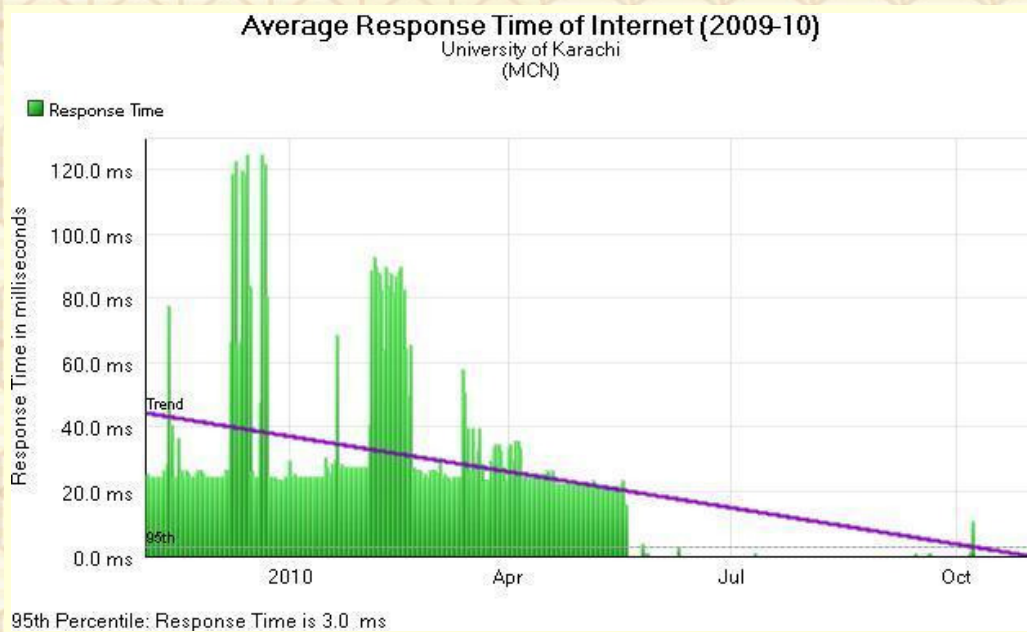
95th Percentile: Average Receive bps is 31.7884 Mbps, Average Transmit bps is 6.6785 Mbps

Bandwidth Availability



MCN-UoK Internet bandwidth availability is about 100%. This seamless service helps the faculty members, researchers and students in carrying out research and development and is proving to be a catalyst for the enhancement of academic excellence of the university

Average Response Time



Response time is the time taken by network server to react to a given input. The graph shows that the response time is exceptional (only about 3.0ms). Moreover, the graph trend shows that it is decreasing further highlighting the improvement in the network services provided by MCN.

OFFICIAL WEB SITE (UOK.EDU.PK)

As part of the project, new web architecture was designed and new website was developed. The new website contains all the information about the departments, the degree programs, admissions, institutes, and administration of the University of Karachi. The website spans well over 1000 documents features a wealth of information about the university, including a dazzling array of pictures of important events. Information on admissions, faculties, departments, research institutes, events, meetings and many more are just a click away.

Web site History

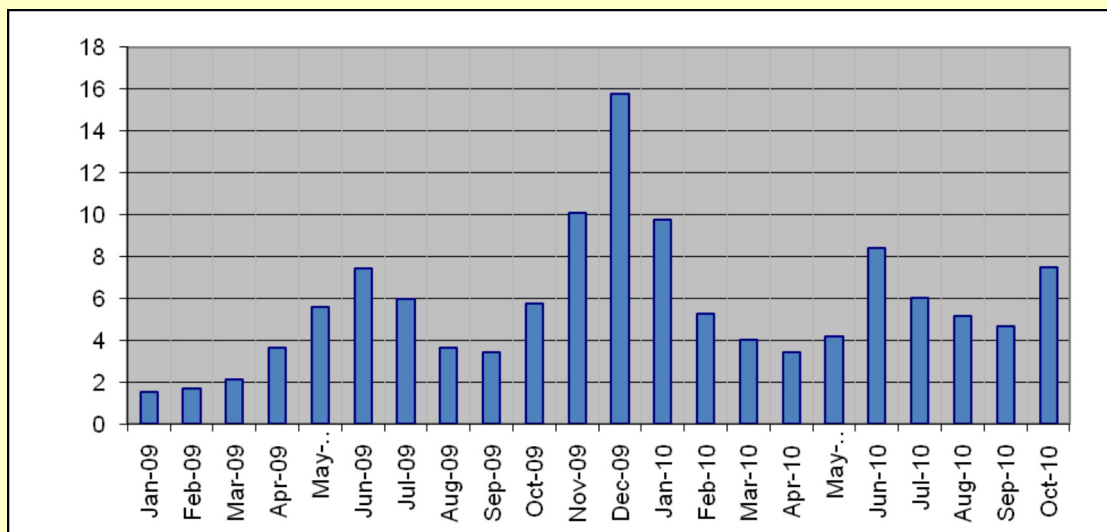
- First developed in 1998 under the supervision of Dr. Burney
- Refurbished in 2002 under Campus Wide Network
- Redesigned and developed in 2006 by MCN staff
- A new outlook designed and deployed in June 2010

The screenshot shows the official website of the University of Karachi. At the top, there is a navigation bar with the university's logo, name in English and Urdu, and links for Email, Credits, Campus Map, Site Map, and Search. Below this is a main banner for the 'Convocation 2008' featuring a photograph of graduates and the text 'Candidates gathered in the pindal for the convocation ceremony'. A secondary navigation bar includes links for Home, Admissions, Departments, Institutes, Library, Explore Uok, and Contacts. The main content area is divided into several sections: 'QUICK NEWS' with updates on postponed tests and exam forms; 'WELCOME to University of Karachi' with a historical message; 'ADMISSIONS' with a schedule for PharmD and other programs; 'LATEST RESULTS' for LLM and B.E.D exams; 'USEFUL LINKS' for affiliated institutions and various services; 'ADMINISTRATION' listing key roles like Vice Chancellor and Registrar; and 'Flood Relief 2010'. A footer at the bottom provides additional navigation links.

Web site Usage

After the redesigning and extension of the website in November 2006 by MCN and donning a brand new avatar, the official website of university of Karachi has shown a lot of dynamism. It is also serving thousands of Pakistanis across the globe, being their only direct link to the university. The statistics of the past few years vividly exhibit the exponential increase in the number of users (National and international) accessing the website.

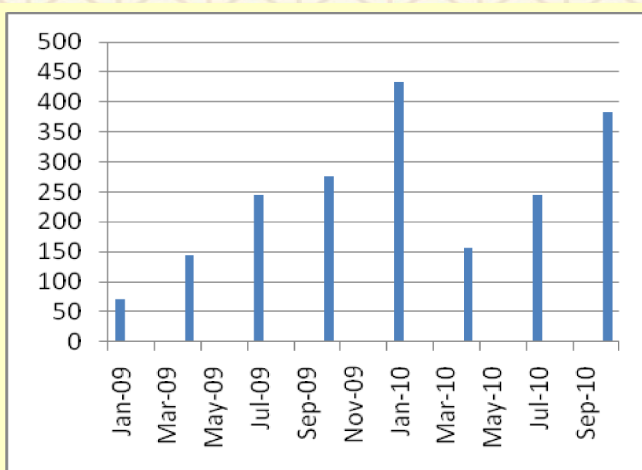
Number of Hits* (Millions) 2009-10



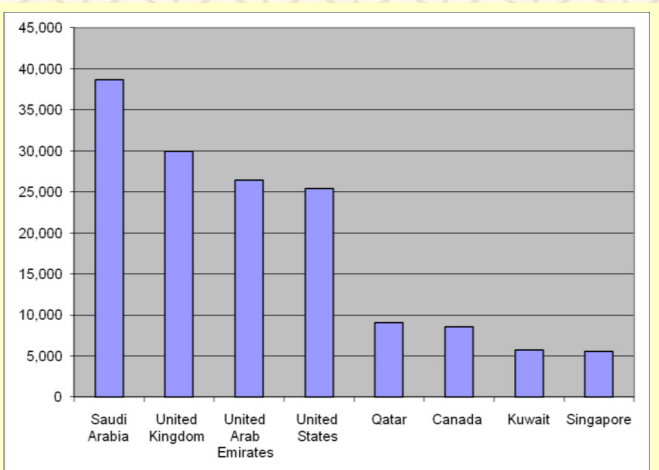
** Hits are defined as a request for a file from the web server.*

A single page-view typically consists of multiple discrete files (like image files), each of which is counted as a **hit** as the page is downloaded. Since the website is loaded with up-to-date information about every possible aspect of the university, the monthly huge number of page views from all over the world comes as no surprise.

Number of Page views (Millions) 2009-10



Average monthly visits from other countries



NETWORK EXTENSION / PROJECTS (2006-10)

1. Video Broadcasting and Conferencing

Research collaboration is a prime function for any university and it is through this collaboration that a university proves its value in the research field. UoK has successfully achieved the facility of Education Collaboration with all the leading universities of the world. This milestone was achieved after the completion of Video Conferencing Facility at University of Karachi. Through this, UoK will follow a path which will lead to new international and national research endeavors. The Video Broadcasting and Conferencing Center, located in the Department of Computer Science(UBIT) can house more than fifty research scholars at a time. The center was sponsored by the Higher Education Commission (HEC)



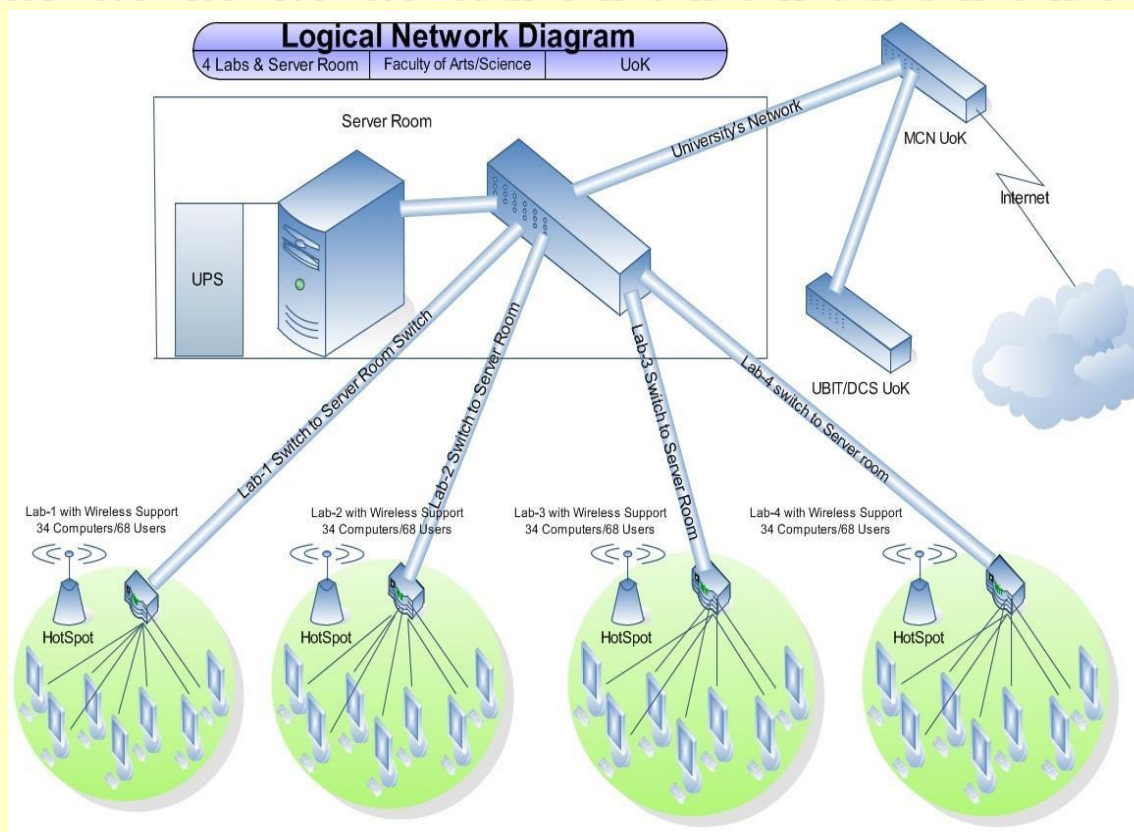
Video Broadcasting and Conferencing Center at DCS(UBIT)-UoK

Multipoint Videoconferencing

Simultaneous videoconferencing among three or more remote points is possible by means of a Multipoint Control Unit (MCU). This is a bridge that interconnects calls from several sources (in a similar way to the well-known audio conference call). All parties call the network ID number of the MCU unit or the MCU unit can also call the parties which are going to participate, in sequence. There are MCU bridges for IP and ISDN-based videoconferencing. There are MCU which are pure software, and others which are a combination of hardware and software. A MCU is characterised according to the number of simultaneous calls it can handle. Tandberg Edge-95 MCU is being used at UoK

2. Computer Application Laboratories (Arts Faculty)

The computing facilities for BS programme (Faculty of Arts) are provided by 4 Computer Labs that are maintained by MCN. Each lab is equipped with 34 PCs with 51 students seating capacity. Server room is equipped with four computers. In total, there are 150 nodes available with **wireless computing support**. More than 2000 students take benefit from these labs per semester. The Network was established on IEEE standard on gigabit backbone and 100Mbps speed available on each client. Internet Facility is available on each computer to access the Digital Library, research articles and other online resources needed for R & D. This computing facility was successfully completed under the supervision & guidance of Meritorious Prof. Dr. S. M. Aqil Burney Director/Advisor MCN and Prof. Saleem Memon Director Shah Latif Chair, UoK



Computer Application Labs at the Faculty of Arts



3. Dr. Mahmud Husain Library University of Karachi

The network at Dr. Mahmud Husain Library UoK has been developed during 2009-10 in collaboration with MCN. It is a 260 node network using optical fiber, copper cables on IEEE standard with wireless support. The network is based on 3COM switches. The data center of DMH-Library also provides services that are used by the DMH-Library staff such Kitabdaar etc.



Data Center of Dr. Mahmud Husain Library



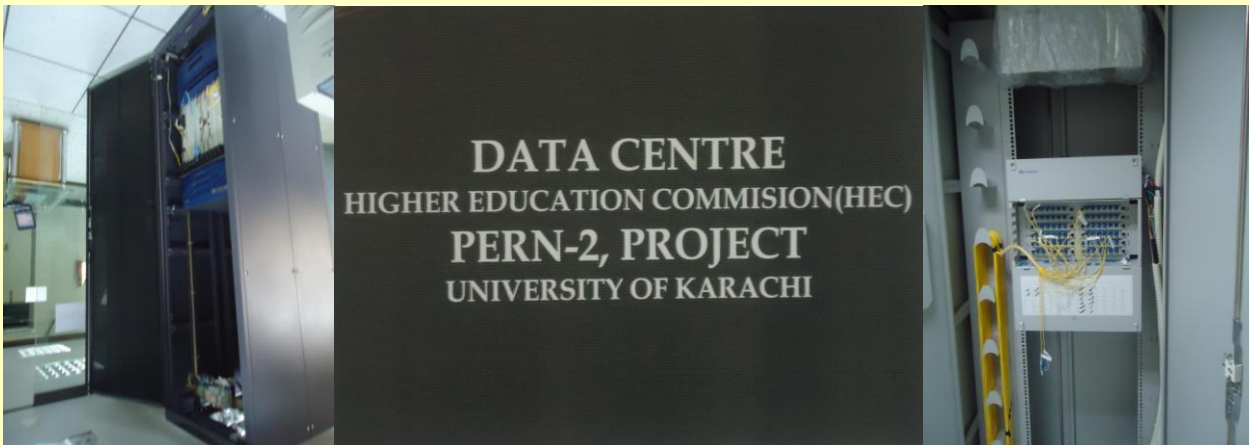
Inauguration of DMH-Library Network

Students in DMH-Library Network Lab

4. PERN2 Data Center of HEC at UBIT/DCS

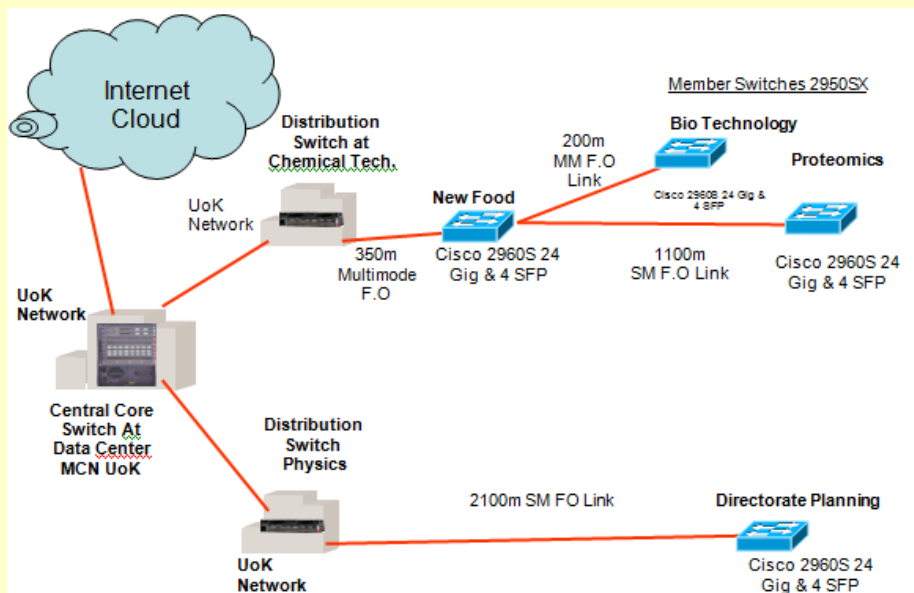
The PERN2 data center at the Department of Computer Science (UBIT) is a PoP (point of presence) site. It is one of the fifteen pop-sites of PERN2 across Pakistan. It is the Internet bandwidth distribution point in Karachi. It is running with the support of MCN-UoK. The Internet bandwidth is provided through fiber optic cable to the six different universities in Karachi.

PERN2 Data Centre at DCS (UBIT)



5. Network Extension at NCP, FST and Biotechnology

There was no Network and Internet facility in the newly established buildings of National Center for Proteomics, Food Science and Technology and Biotechnology. MCN extended services for them through giga-link from department of Chemical Technology using single mode and multimode optical fiber cables. Now they can use all networking/Internet facilities on high speed 96Mbps network of UoK.



Network Extension at NCP, FST and Biotechnology

FUTURE PLAN

These five years are just a beginning of a long march intended to facilitate each and every faculty member, researcher and student in the university. Among the many future plans, some are already achieved; some are in-progress, while some are being conceptualized. Some of the milestones being eyed in the future are:

MCN Data Center / Web Development Center at Administration Building



- Establishment of networked labs for research and development purposes at all departments and research institutes
- To extend the network infrastructure by increasing the number of network nodes and take the network to each and every room (where required) of the university.
- To provide computers for research and development to all faculty members of the University of Karachi.
- To enhance the network security of the Main Communication Network.
- To balance the load on the main server by inclusion of 4 sub-servers at the data center.
- To extend the VoIP infrastructure, already established with the MCN, to further 50 nodes with IP Phones Licensing.
- To enhance the features of currently available video conferencing facility.
- To establish a Telecommunication Lab at the university of Karachi.
- To develop an International Information Resource Center (with Digital Library Access), with the facilities such as video conferencing, digital library access, audio and video lecture recording studio.
- To expand the existing digital library services
- To build a complete MIS for the university