

# Achieving Open Accesses of Information for Ethiopian Universities: A case of Hawassa University.

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**Abstract:** The successful handing of teaching and learning as well as research activities by Universities is greatly impacted by the extent of getting open access information from the global community. Joining the global research and education community requires preparations in infrastructure and policy work both locally at University level as well as nationally. This paper reports on what is on ground in Ethiopian Universities, taking the case of Hawassa University that could enable them to join the global research and education community.

**Key words:** Ethiopia, Hawassa University, HUNET, EthERNet, UbuntuNet Alliance.

## 1. Introduction

Hawassa University network, HUNET, is the network of Hawassa University. Hawassa University (HU) is one of the higher institutions in Ethiopia. It was established on 25th of April 2000 merging three colleges [1]. Today HU has four campuses: Awassa College of Agriculture, Main campus, Medical College and Wondo Genet College of Forestry. The Awassa college of Agriculture is the oldest of all which has a history of more than 30 years. This college is also the first to own a network and connection to the Internet. Currently, the Main Campus, the Awassa College of Agriculture and the Medical College are connected to the Internet and to each other. This is what is currently considered as HUNET. Wondo Genet College of Forestry is directly connected to the Internet.

Hawassa University is also part of the Ethiopian Educational Research Network, EthERNet. EthERNet connects the networks of public Universities and Research Institutes in the country. It operates under the Ministry of Education and the Ethiopian Information and Communication Technology Development Agency (EICTDA). It exists as a Multi Protocol Layer Switching Virtual Private Network (MPLS VPN) in the infrastructure of the government owned Internet Service provider, the Ethiopian Telecommunication Corporation (ETC). Currently, about 9 public universities are connected to it. About 12 newly emerging Universities are expected to join EthERNet when the building of their local area network infrastructures is finished.

The aim of EthERNet is to connect Ethiopian Universities and Research Institutes to each other and to International Universities and Institutions for collaboration in academics and research. To this end

EthERNet provides video conferencing service. The video conferencing service is controlled from the data center in the capital, Addis Ababa. Also, plans and preparations are under way to provide an E-Library service to the members of EthERNet. The video conferencing service is used to transmit lecture videos from one University to another with in the country and also from some universities in India. Although these services are very important in meeting the aims of EthERNet, there is still room to tap the potential of a National Research and Education network (NREN) to have open accesses of information from the global Research and Education community. One of the ways to do this is by connection of EthERNet to UbuntuNet Alliance.

UbuntuNet Alliance is a regional Research and Education Network (REN) in East and South Africa. It is established in November 2005 in Tunis. It is working to interconnect NRENs in Africa with high speed backbone among themselves and with the rest of the world. It is strongly believed that this should be done with a reasonable price. Currently, the participating members have grown to 10 from the original 5 founding members and application for membership is open for any emerging or established NREN in Africa. The fact that NRENs in Africa come together like this has great implications for reducing cost for transiting traffic to other RENs else where in the world because in such cases NRENs will transit each others traffic. The move is towards enabling all the UbuntuNet Alliance members to be connected to Géant, the European Research and Education Network, which will also be a gateway for other RENs. In Order to be a beneficiary of such opportunity, an NREN should be and autonomous network with its own Autonomous System Number (ASN) and IP-address

space. In Africa, AfriNIC is responsible for allocating these numbers to networks. [2]

EthERNet is an observing member in the association of UbuntuNet Alliance. As a network, it does not have its own ASN and IP-address space. This prevents it from connection to the UbuntuNet backbone and hence its member universities to the global research and education community. In this paper, a discussion of the available infrastructure and services in members of EthERNet is discussed taking the case of Hawassa University.

## 2. HUNET Physical Infrastructure

HUNET is a network that spans over three campuses: the College of Agriculture (ACA), the Main Campus and the College of Medicine. All the three campuses have their own LANs where the inter-building connectivity uses optical fiber links. Connection with the machines is using UTP cables. Wireless connectivity is only available in a few lecture halls in the Main Campus.

ACA serves as the distribution centre for the three campuses. It is connected via ADSL to the ISP and gets a 2Mb/s downlink and 1Mb/s uplink. The main campus is also connected with the ISP via a fiber link to get a 1Mb/s symmetrical bandwidth. ACA is then connected to the main campus and the college of medicine separately. The link with the main campus is used for a redundant link in case of Internet failure. Currently, the college of medicine does not have its own Internet connection. ACA gets a separate 20Mb/s (symmetrical) link from the ISP separately for a separate video conferencing application that runs under a separate VPN (see Figure 1). The connection with college of medicine is just for this application. [3]

## 3. Network Services

HUNET has a few functional network services. Currently, the LAN is used for network file sharing. Services running on the network include web service, DNS service, DHCP services, Antivirus service.

The network is also equipped with video conferencing solution. This video conferencing service is part of the nationwide video conferencing service provided by the Ministry of Education in collaboration with the ETC. About 9 universities are interconnected in a separate VPN in the ISP's network forming the Ethiopian Research and Education Network (EthERNet) [4]. This network provides video conferencing for all the connected universities. HUNET is connected to this

network with a bandwidth of about 20Mb/s (see Figure 1).

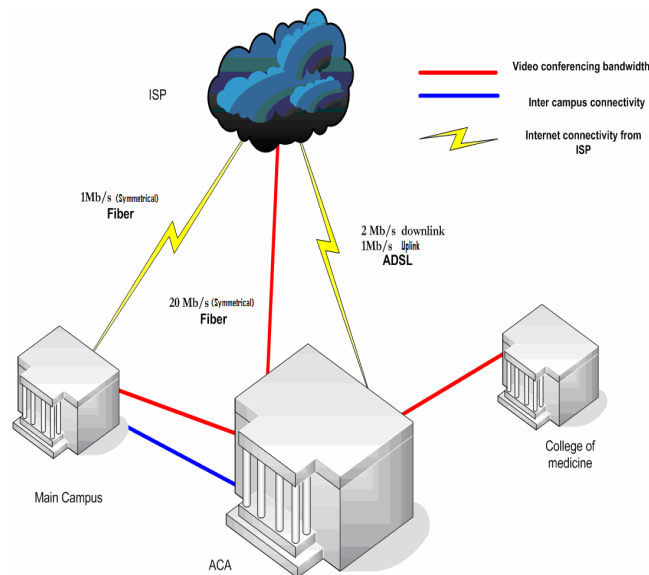


Figure 1: HUNET Internet Connectivity and Video Conferencing bandwidth.

## 4. Network Management

HUNET uses a combination of different open source and commercial tools to manage the network and the bandwidth so that the network provides its services properly. To manage the security of the network HUNET uses a Cisco PIX firewall. The firewall is built with the construction of the network and the rules are updated with input from network monitoring tools.

The other functionality that is needed in the network is bandwidth management. Considering the scarcity of bandwidth in the country and the limited budget of the University, different tools are used to prevent bandwidth wastage. In this regard, tools for monitoring incoming and outgoing traffic, for showing utilization of links at different times of the day, for viewing heaviest network users, bandwidth usage per switch port, by protocol or by MAC address, Internet bandwidth use by host and protocol and point to point traffic were necessary. These demands were met by NTOP and MRTG. In addition, in order to prevent wastage of bandwidth due to failure of devices, Nagios is used. Squid is also used to do web caching.

There are also some other tools and functionalities that are necessary for bandwidth management that are not yet implemented due to the short life span of the network. Some of these are traffic shaping and quota system. Moreover, spam control is not incorporated in

the bandwidth management system as there is no operational mail server.

## 5. Impacts of the Network

The existence of HUNET in its present form as well as University networks has some visible impacts on the functioning of the University. The Awassa College of Agriculture and the Wondo Genet College of Forestry are colleges that play a vital role in research in the field of agriculture and forestry in the country. The connection to the Internet has served to establish and facilitate communication with the native and international researchers. In previous years, researchers have had hard time to have email communication with their partners outside of the country, to access information from the web or to share information amongst them. This problem is now alleviated to a large degree. Moreover, sharing of research findings and journals with in the country has been possible. One such example is access to the IPMS (Improving Productivity and Market Successes) portal that is made available to researchers and students in the country by International Livestock Research Institute (ILRI). This portal helps to share research findings and get access to journals.

The network also contributes to the teaching learning process of the University. Students and teachers get more access to teaching learning materials. One such example is the Knowledge Management System implemented in the Department of Computer Science. This system puts course materials for students in the local network. In addition, a local e-library system is in construction.

Moreover, the network has provided a means for staff members to study in foreign universities contributing to the human power development of the University.

## 6. Conclusion

Recently, most Universities in Ethiopia either already possess network or they have a network in construction. This has assisted teaching learning as well as research in the respective universities. This is a sign that a further growth and development of these networks would play a vital role for achieving the missions of the University. Such a development may be done by buying more bandwidth to provide a faster and more reliable Internet access and providing more services to the users. To this end, upgrade of infrastructure and securing of power supply are key issues that need attention. The back stage players for these are finance and qualified human resource in the area.

The NREN, EthERNET, has interconnected the already established University networks and is giving them a video conferencing service among each other and the rest of the world. It has a future plan of starting e-library service. With proper planning and action, the local infrastructure in Universities as well as the interconnection could be utilized for the betterment of research and education in the country. One such door is the connection to the UbuntuNet backbone. With such a connection, EthERNET will enable its members to be connected to Géant with a high speed backbone to share resources. Considering these benefits, EthERNET should work on fulfilling the requirements, namely owning ASN and IP-address space. Moreover, preparations in handling security issues that come along international connectivity and selection of appropriate business models to fund EthERNET should be thought of.

## 7. Reference

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