

ICT managers and implementation staff

Strategies for optimising and managing bandwidth in institutions in low bandwidth environments

Background

Many universities and research institutions in the South are faced with major obstacles in their use of networked information resources. The price of bandwidth is disproportionately high and it is costly and difficult to improve international network connectivity. Effective management and optimisation of bandwidth is widely recognised as being the easiest way in which institutions can improve their access to networked information resources and yet this is rarely the case ...

“...the majority of the respondents [sampled African universities] reported that they did not practice bandwidth management, or seldom did so, thus indicating a critical need for skills training in this vital area. Improving bandwidth management is probably the easiest way for universities to improve the quantity and quality of their bandwidth for educational purposes.”
[African Tertiary Institution Connectivity Survey 2005, <http://www.atics.info>]

There is an urgent demand for institutional development in the areas of bandwidth management and optimisation.

The importance of ICT staff

ICT staff play a vital role in developing and implementing technical tools and solutions, but need to work in partnership with executive and senior management to ensure success. ICT staff must develop appropriate skills and working practices so they can provide their institutions with the tools they need to achieve their academic goals.

Skills and tools that need to be developed by ICT staff may include some or all of the following: • effective monitoring of network traffic and usage • network control, firewalls, good security and anti-virus practices • institutional Email services to remove the use of bandwidth-hungry free webmail services • content caching and filtering • authentication of users and usage to provide a policy enactment environment • network traffic shaping and optimisation • efficient scheduling of downloads • network design and re-design to maximise bandwidth management and optimisation.

Tools and resources, training and skills development

INASP are providing the following resources and support for this programme:

- Briefing packs for senior institutional managers and ICT professionals.
- Online community portal for resource distribution and information exchange
<http://www.bmo-community.org/>
- Training materials and support for workshops in the following areas:
 - Policy development.
 - Network traffic monitoring and analysis.
 - Network control and network traffic shaping.
 - Content caching, filtering and authentication.
- Materials for standalone training in (i) Bandwidth-friendly Email service provision and (ii) scheduled download strategies and techniques.

Participation in bandwidth management and optimisation events

Technical training workshops, management seminars and capacity development activities will be run during the period October 2005 – March 2007. Initially, funding has been secured to run institutional, local, national or regional level workshops in the following countries:

- Congo, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Rwanda, South Africa, Senegal, Tanzania, Uganda, Zambia, Zimbabwe.

Institutions within each country will be invited to participate within the proposed activities and are encouraged to contact INASP for further information (see below). Participating institutions will be identified by local partners, after national level consultation. The group above represents those countries in which large-scale electronic information resource use is current and in which network congestion is a key issue, and requests for assistance and support in this area have already been forwarded to INASP.

Countries not named above are also invited to participate, as alternative sources of financial support will be sought to extend the activities to countries that have sufficient demand and need for development in this area.

Recommended actions for ICT staff

- **Install good security** and adopt anti-virus practices that prevent situations where malicious actions cause bandwidth to be used up.
- **Track all relevant aspects** of the network, bandwidth and Internet usage. Regular reports help all concerned to understand usage patterns and trends, to pinpoint problems, and to signal potential bottlenecks.
- **Implement content filtering** to block undesirable web content such as gaming, pornography and commercial streaming media. Email can also be restricted, to some extent, to exclude certain types of files or files that are very large.
- **Use proxy servers** and local caching DNS servers to keep local copies of previously retrieved web pages and Internet addresses. This prevents a situation where the same page (or address) is retrieved from the Internet several times per day.
- **Use the network to locally manage upgrades** and updates. Updates, fixes, and patches for software and systems (as well as commonly used software readers etc.) can be downloaded once to the network and then made available to individual workstations. This avoids situations where users are using international bandwidth to update their computers. Such downloading can be done at night when demand is low; updates to individual workstations can be automated.
- **Make sure all user activities can, if necessary, be traced.** This is only possible where the network has an authentication system (users must log in before they can do anything). A usage policy should spell out which data on users is collected and how it can be used.
- **Consider implementing a bandwidth manager** product that allows you to give bandwidth priority to certain protocols (such as web), and to throttle others.
- **Discourage and control** certain types of 'peer to peer' networking. Hungry applications like Kazaa need to be 'rate limited,' using a bandwidth manager, or prevented via network layout changes.
- **Offer email addresses** and web based email facilities to users, allowing them to access their emails from anywhere if necessary. This reduces the need for staff and students to set up hungry web accounts like hotmail and yahoo.
- **Configure the network** to avoid open relay hosts (mail servers that will accept connections from anywhere) and open proxies (proxy servers that will accept connections from anywhere). These can easily be abused by outside interests and can lead to the 'blacklisting' of your network. Ensure that these servers only relay mail or accept connections from the University network.
- **Train all users** to use the Internet safely and efficiently. They should especially not reply to spam, and not launch unknown programs they receive via email. Encourage bandwidth-conserving behaviour. All users should be aware of the impact they can have when competing aggressively for bandwidth, for example by downloading music. They should realise the potential consequences of their actions to the whole network community.
- **Consider outsourcing** and mirroring options. Depending on which audiences the institution wants to reach, separate strategies for internal and external (international) users can be followed. For example, consider directing international users to an international site or server, guarding local bandwidth for local users and applications.
- **Charging for bandwidth** may help encourage users to use bandwidth sparingly. Charging should be based on the amount of traffic generated on the international link (and not per hour of use, for example).

Thanks

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IDRC: This programme is undertaken as the "Supporting training for the optimization of university bandwidth in Africa" undertaken with financial support from the Canada Fund for Africa.

Further information, and how to participate

<http://www.inasp.info/bandwidth/>

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