$1 Internet - Exploiting Limited Bandwidth in Developing Countries

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ABSTRACT

INFONET-BioVision.org is an freely available internet based knowledge-management system, funded by the Liechtenstein Development Service (LDS) and the BioVision Foundation for Environment and Development, that offers Kenyan farmers information on affordable, effective and ecologically sound technologies in crop and livestock production as well as environmental and human health. One of the challenges faced by the project is the secure provision of information to the rural areas that would most benefit from advice on crop pests and productivity [Avallain, 2008] . Bandwidth is sometimes available in these areas, but is limited, unmanaged and relatively expensive. This paper discusses current work in the development of a novel system that brings together hardware and software to make better use of available bandwidth, whilst offering a financially viable and sustainable method of extending internet provision to these hard-to-reach areas, providing rural farmers with access to the INFONET-BioVision platform and other internet based sources of information.

The system currently in development is premised on the fact that some internet based applications require more bandwidth than others. Moreover, their real-time requirements differ greatly. Although it is conceivable that a number of users can share low-bandwidth connections, the multiple bandwidth requests created can easily overwhelm the connection due to the way in which these are managed by protocols developed for bandwidth-rich countries. This results in virtually no bandwidth availability for the user applications themselves.

It is clear, therefore, that to maximise the number of users on one low-bandwidth connection, allocation should take place before applications actually make the bandwidth requests. Indeed, similar bandwidth management exists on a larger scale, with domestic broadband providers controlling the amount of data provided through existing channels to a home user at the exchange, based on a tariff system.

The system effectively applies a scaled down version of this scenario to available connectivity, be that GPRS, satellite or wired. An inexpensive single-board computer acts as a hub between users and internet, allowing software management of bandwidth and connectivity to users mobile devices through Wi-Fi, Bluetooth and wired LAN. The allocation of bandwidth to each user is based on a voucher system that effectively splits the cost of the connection. Users purchase these vouchers, which are priced according to usage, ranging from very low, none real-time e-mail access to more expensive web-browsing, prior to accessing the system. The proposed system is intended to provide communities with inexpensive connectivity through shared costs which is scaleable, such that, should there be a requirement for extra provision of bandwidth or number of users, subsequent devices can be added or moved simply, easily and at low cost.

The system is scheduled for testing later in 2008, at which point a full evaluation will be undertaken.

Avallain, “Organic Farming–a vision for Africa?”,http://avallain.blogspot.com/search/label/Africa, 2008