Traffic Characterization and Internet Usage in Rural Africa

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ABSTRACT

While Internet connectivity has reached a significant part of the world's population, those living in rural areas of the developing world are still largely disconnected. Recent efforts have provided Internet connectivity to a growing number of remote locations, yet Internet traffic demands cause many of these networks to fail to deliver basic quality of service needed for simple applications. For an in-depth investigation of the problem, we gather and analyze network traces from a rural wireless network in Macha, Zambia. We supplement our analysis with on-site interviews from Macha, Zambia and Dwesa, South Africa, another rural community that hosts a local wireless network. The results reveal that Internet traffic in rural Africa differs significantly from the developed world. We observe dominance of web-based traffic, as opposed to peer-to-peer traffic common in urban areas. Application-wise, online social networks are the most popular, while the majority of bandwidth is consumed by large operating system updates. Our analysis also uncovers numerous network anomalies, such as significant malware traffic. Finally, we find a strong feedback loop between network performance and user behavior. Based on our findings, we conclude with a discussion of new directions in network design that take into account both technical and social factors.