

A DESIGN OF A CACHING STRATEGY FOR RURAL WIRELESS MESH NETWORK (WMN) DEPLOYMENT

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ABSTRACT

Wireless Mesh Networks (WMNs) have high potential to provide broadband access for rural communities in developing countries. However, existing networking concepts used to build WMNs are not designed to take specifics of these deployment environments into account especially a high degree of the topology variation and bandwidth limitations. Further, equipment deployed has to be very cheap, often battery powered and operated by non-experts all leading to frequent node failures and resulting in availability constraints.

Data availability for the outlined scenarios can be improved employing data caching. Topology changes and link outages have far less effect if a cache can provide the data. Users of a rural community tend to access similar data sources and, thus, caching can be highly efficient given the small scale of rural deployments. Recent technology advances also make it possible to include large amounts of storage space (in the form of flash memory) in even cheap network devices as found in rural areas of developing countries.

In this paper, we present a data caching strategy for rural WMN deployments in developing countries. Different to many existing strategies we exploit the fact that every node in the network can cache data, and we exploit the wireless nature of the network and use overhearing of transmissions to populate caches. Finally, we present a design for a Distributed Over-heard Object Caching Approach (DOCA) while the future work will evaluate the capability to increase data availability under a typical scenario in developing countries with severe budget constraints.

KEYWORDS: Distributed Caching, Data Availability, Network Reliability, Over-Hearing and Resilience