Northern New Mexico Wireless Internet Study

Students: Adrian Baca, Nathan Torrez, Florian Castillo  Mentor: Sadia Ahmed, Ph.D.
Northern New Mexico College
Department of Engineering

Abstract

Internet speed and bandwidth are an issue in Northern New Mexico. This is due to many factors. The tall mountains and hills make it difficult for Internet Service Providers (ISPs) to lay fiber to provide a faster connection. Another factor is the presence of Native American Reservations in the area which prohibit ISPs from laying fiber or the fact that these tribes demand more money than the ISPs can afford to pay to install these fibers. The third factor is whether or not ISPs want to invest in Northern New Mexico. Statistically, Northern New Mexico is one of the poorest areas in the United States. If an ISP decides to install faster lines, would it be worth it? If people in the area cannot afford to pay for fast internet, equipment sits nearly idle and the ISP loses hundreds of thousands of dollars. This poster provides a summary of our research on Wireless Point to Multipoint Networks as a possible alternative to the issues mentioned above. Point to multipoint communication is accomplished via a distinct type of one to many connection, providing multiple paths from a single location to multiple locations.

Goals/Procedures

- The goal of the team is to conduct research on wireless networks including factors such as cost, effectiveness, possible requirements, and success rate. With this research conducted, a study within a 30-mile radius of the City of Espanola will be initiated. This study will obtain information about area ISPs, such as maps, topology, datacenters, existing networks, security protocols, and bandwidth within villages and towns.
- Conduct background research on wireless point to multipoint wireless networks.
- Survey and assess the environment within a 30 mile radius of Northern New Mexico College.
- Conduct interviews with local Internet Service Providers to gain knowledge and insight on internet networks with in a 30 mile radius of Northern New Mexico College.
- Simulate wireless point to multipoint wireless network using Cisco Packet Tracer and NS-2.

Data Collection and Simulation

The team conducted interviews with local ISPs to gain knowledge and insight on networks within a 30 mile radius of Northern New Mexico College.
- The interviews were conducted with Windstream, Black Mesa Wireless, and REDI Net. The most critical information was the network type and data rate.
- Windstream: DSL and Fiber, speeds up to 100 gbps depending on what the customer wants and/or needs
- Black Mesa: Wireless, speeds anywhere from 2 mbps to 160 gbps.
- REDI Net: Fiber, speeds from 10 mbps to 10 gbps.

Challenges

- Establishing line of sight between wireless equipment. Due to many different types of terrain, establishing line of sight has been proven to be difficult.
- Cisco Packet Tracer does not support the simulation of Wireless Point to Multipoint networks. Because of this, the team had to learn a new software, NS-2, to conduct the simulation.

Materials

- Ubuntu OS
- Windows 10
- Microsoft Excel
- Microsoft Word
- NS-2: An event simulator targeted at networking research.
- Vim Text Editor: Used to edit TCL scripts generated by NSG-2:1
- Google Earth
- Cisco Packet Tracer: Originally used to try and simulate wireless point to multipoint network.

Acknowledgements

The team would like to thank Dr. Sadia Ahmed for her guidance and assistance while research was conducted on this project. The team would also like to extend a special thanks to the Internet Service Providers (Windstream, REDI Net, and Black Mesa) for providing detailed information regarding their networks. This gave the team helpful insight on the network topology in the area.

For additional information, please contact:
Sadia Ahmed, Ph.D.
Interim Chair, Department of Engineering
Northern New Mexico College
sadia.ahmed@nnmc.edu

Interviews

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