Introduction

Problem Statement

There is a need for wireless technologies that provide affordable, high-capacity connectivity to rural communities and industries. Or more specifically:

- Increase wireless connectivity, especially in rural areas
- Provide advanced wireless coverage for locations within about 6 miles range from any of the ARA (Agriculture and Rural Community) sites
- Enable the research and development of rural-focused wireless technologies
- Cross community collaborative research, education and innovation

For the purpose of our project, we hope to provide resources and educational advancement for those who are in need, or for those who are interested in utilizing resources of the ARA project.

Intended Users and Uses

Those who are interested in 5G networking or may be involved with the ARA project and products are the target audience and intended users for our case. While specifically intended for Iowa State undergrads and perhaps owners of the ARA user equipment, it may be beneficial to understand the basics and procedures for understanding and applying 5G network fundamentals.

This will allow for a more streamlined process for getting introduced to 5G networking and allow for users to start experimenting and testing 5G network applications much faster compared to being self-taught and trying to find resources online to learn from.

Those who will use the ARA product who may benefit from our documentation process are located in Iowa State University (ISU) campus, City of Ames (where ISU resides), and surrounding research/producer farms as well as rural communities in central Iowa, spanning a rural area with a reach of over 60km.
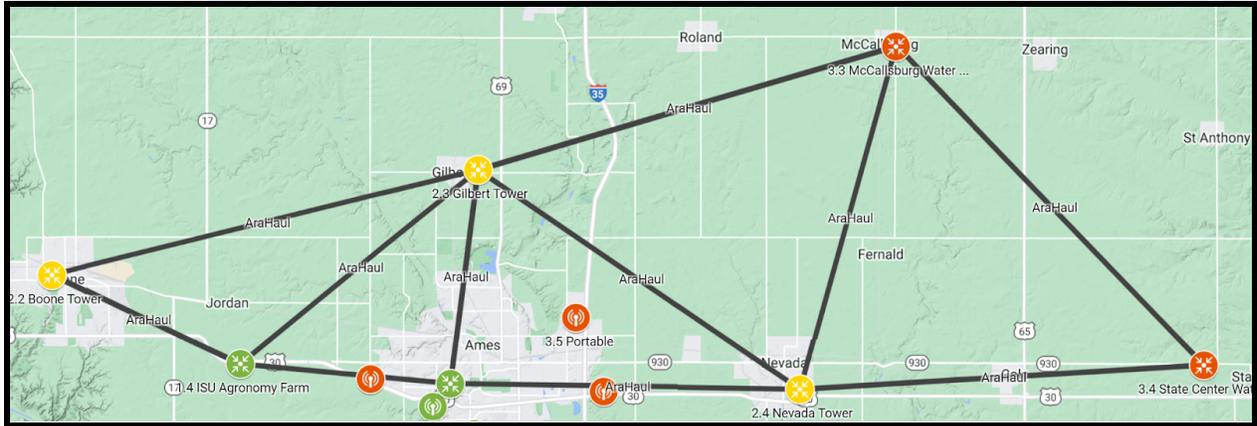
Figure 1. Map of deployed towers and ARA connections

Who benefits from or will be affected by the results of your project?

- ARA
  - Local place for learning and refreshing knowledge
    Provides a shared area for definitions
- Senior Design Students
  - Students need a way to quickly learn as ARA will likely be worked on by many more SD teams
- SD Advisors
  - SD Advisors can better assess students by looking at the experiments from the website that SD students have completed
- National Science Foundation
  - NSF does periodic assessments of the projects they fund. Having documentation about what is achievable and what isn't is valuable to this foundation

Who cares that it exists?

ARA - First and foremost, the ARA team members. In our experience there are tons of resources available, but organization, and access to these resources is difficult. A central location for knowledge with priority given to provable methods in 5G innovation is a crucial resource

Cellular Network Companies - As ARA members work on bleeding edge Wireless Com protocols and strategies, Cellular Network Corporations will need tools to learn about the ARA Engineers projects, hence the desire for documentation and learning exercises

Senior Design Students - This may seem narcissistic, but SD students will greatly benefit from this resource as this project aims to onboard undergraduate students in 1.5 months to work with 5th Gen Tech