

EE/CprE/SE 491 WEEKLY REPORT 1

1/25 – 2/5

Group number: 12

Project title: Application Exploration of 5G-and-Beyond Wireless Systems and Rural Broadband

Client &/Advisor: Hongwei Zhang

Team Members/Role:

Caleb Kitzelman - Undefined
Cristofer Espinoza - Undefined
Andrew French - Undefined
Jake Roskopf - Undefined
Samuel Rettig - Undefined
Vibhu Dhavala - Undefined

Weekly Summary

On the date of 1/30/23, we met for the first time with our client/advisor Dr. Hongwei. We introduced ourselves, explained our backgrounds, and got advice on how to start learning about 5G. As such, each of us has read a book he recommended, and our goal is to come up with ideas for the application by the next time we meet Dr. Hongwei.

Past week accomplishments

Samuel Rettig: As I have had no prior experience or expertise in 5G networks, I took several steps in order to understand the broad topics that impact 5G. This was from several sources, primarily the book that Dr. Hongwei wanted us to read. Similarly, I looked up videos online to ensure make sure that my understanding of the concepts is correct.

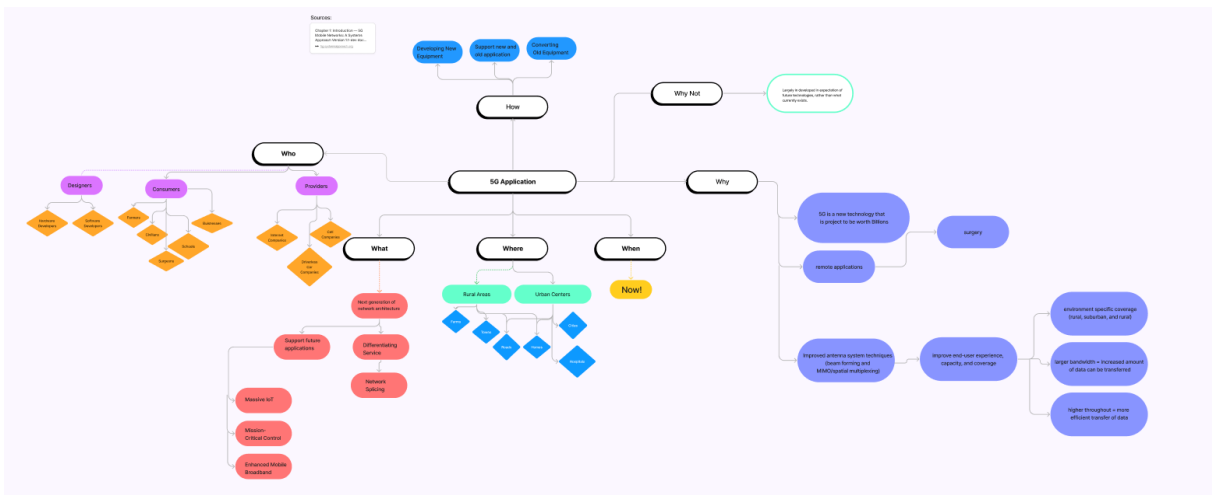
Cristofer Espinoza: After meeting with Dr. Hongwei, whom I had researched for last semester in the ARA project, I had a better idea of what I would need to focus more on when it comes to aspects of wireless communication. With this information I, along with my team members, did some individual research from resources provided by Dr. Hongwei to create a better foundation for wireless communication architecture and techniques. I also watched videos on beam forming simulation via MATLAB. Simulation will be an important part of the design process and ensuring we have appropriate signal strength and direction for any User Equipment (UEs) that we may use.

Jake Roskopf: I began researching background information about 5G. I was able to find out a lot about how the data is transferred through different modulation and scheduling schemes between UEs and data centers. I also reached out to Dr. Sang Kim to see what other kinds of 5G applications are being researched and if there are other routes to take our project.

Vibhu Dhavala: This week I spent time reading the book provided, Private 5G: A Systems approach. I previously had no knowledge of 5G network technologies and minimal knowledge on wireless network communications in general. Along with this book I also read articles about how 5G can be used within various industries to upgrade IT ecosystems.

Caleb Kitzelman: Began research on the basics of how 5G works and the differences between newer 5G technologies vs old 3G and 4G technologies. After getting some basics on 5G and how signals interact with the tower, I looked more into the scheduler and how it works. With little background in software, I found a little out about slot based and mini slot-based scheduling. I also looked into the 5G spectrum and how information is carried across the frequencies. Finally, I dug into the ara wireless website to find out more about the lab.

As a group, we began our Figma page to help direct our research and gain background information about 5G networking and its uses. Although it has not been fully completed, it has provided us with further goals and questions we need to answer before beginning our project.



[Discover | Empathize | Research \[Team 12\] – Figma](#)

Reference page provided by Dr. Hongwei Zhang: <https://docs.google.com/document/d/13IR-8zwkiUcjAJ-IBZ4p2xflygXDRrI8/edit> (for internal ARA project use only)

Pending issues

We need to still create the scope of our project. Since Dr. Hongwei Zhang’s original proposal was deemed out of the realm of our skill set, we need to decide if we are going to redefine our project goal or go above and beyond and teach ourselves all the software and networking background that is required to fulfill the original project. This was not expected since the project was proposed as open to all majors was more focused to CprEs or SEs.

Individual contributions

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Jake	Read background information on 5G networking and emailed a couple other EE professors for input.	3-4	3
Samuel	Read the required book, as well as other sources of information such as youtube videos.	3-4	3
Cristofer	Read provided resources from client/advisor and looking into MATLAB beam forming simulation.	2	2
Caleb	Research on the basics of 5G technology through suggested readings. Video research about scheduling. Looked into ARA wireless lab.	3	3
Andrew	Read through the 5G systems approach textbook.	8	8
Member 6			

Comments and extended discussion

We have not yet met as a complete team due to illness. We are hoping to meet up this Tuesday during our original ECpE 491 class time or next Wednesday at 5 PM to touch base.

Plans for the upcoming week

The team is planning to meet Wednesday 5PM to go over assigned documents as well as possible project ideas. All team members are required to come prepared, ready to discuss findings and possible areas of application for 5G.

Summary of weekly advisor meeting

The team met with the advisor Dr. Hongwei, who is also our client, on Monday 1:30 PM January 30th in Durham Hall, where the ARA project labs are located. After familiarizing ourselves with each other and discussing previous relevant experience, we learned that there is no specific defined project for our team. We are able to define the application of 5G for this project. At the end of the meeting, we were provided a reference sheet with supplementary textbooks and documents to have a better foundation for networking and possible applications.