

“Tune In” with Michigan’s Public Safety Communications System

Engineering Tech Talk with Greg Farrer, MPSCS Engineering Services Manager, 2/10/2023

Judy: Hi everybody, and welcome to our podcast Tune In with MPSCS. Today we are going to feature our Engineering Services Section at Michigan’s Public Safety Communications System, or MPSCS. Engineering performs a wide range of support functions in areas requiring engineering expertise to ensure MPSCS public safety users have the best possible coverage and connectivity. They are integral to the planning and design of MPSCS's 800 MHz radio system and the MPLS Backbone Network.

Our special guest today is Greg Farrer, Engineering Manager. Welcome to the show, Greg.

Greg: Thanks for having me.

Judy: Could you tell us a little bit about yourself? Where do you live, your family?

Greg: I live in Charlotte, Michigan. I'm married with one daughter.

Judy: Any hobbies? What do you do for fun?

Greg: I'm into model railroading, video games, and lately playing games and doing puzzles with my little one.

Judy: How old is she?

Greg: She is three years old.

Judy: Oh, she's play size.

Greg: Yes.

Judy: Well, what gauge railroad do you have?

Greg: Both N and HO.

Judy: Okay. Could you tell us a little bit of what you do at MPSCS and how long have you worked here?

Greg: I currently, as Engineering Manager, oversee a team of engineers that supports the operation and growth of the MPSCS. I've worked here for over ten years now.

Judy: You were part of the engineering team before you became the supervisor?

Greg: Yes.

Judy: When and why did you enter this type of work at MPSCS?

Greg: Well, while I was in college, I ended up getting my amateur radio license, which got me interested in radios.

Judy: Do you mean ham radios?

Greg: Yes.

Judy: Oh, okay.

Greg: So, from there, when I was looking for jobs, when I saw that this was the posting for an engineer in the radio industry, I figured why not, I'll give it a shot.

Judy: So, we got you right out of college?

Greg: Pretty much.

Judy: Okay. What does the Engineering Section do?

Greg: The Engineering Section provides quite a diverse range of expertise, which includes anything from IP Networking, MPLS, to RF propagation, and FCC licensing. We even help our field staff troubleshoot more complicated projects.

Judy: What are some of the specific engineering functions in your section?

Greg: The more specific ones are we assist with integrating local agencies in their dispatch centers and RF sites. We implement design changes that optimize both the backhaul and RF sites, such as changing antennas for better coverage, and adding new microwave paths to increase redundancy and resiliency. We perform GOS analysis of usage on the radio system, which makes sure we have enough capacity for our current users and any new users that are looking to come on to the system.

Judy: So, before somebody can come onto the system, they have to figure out what's needed, what kind of space we've got for them.

Greg: Yeah, we have to make sure we have enough channel capacity. We take a look at how many users they're bringing on. Add that to the existing traffic at the site and determine if additional infrastructure is needed to support their usage.

Judy: Greg, you mentioned Grade of Service (GOS) a second ago. What can you tell me about that? What does that mean?

Greg: A Grade of Service (GOS) is a measure of how busy the system is. It measures whether a user will be able to talk right away or will have to wait until the system has capacity to take their call.

Judy: So, you are kind of getting a busy signal when there's too much traffic on that channel?

Greg: Yes.

Judy: Okay. What all goes into obtaining FCC frequencies and why do we need those? Is there a process or legal requirements?

Greg: FCC licenses are required to be obtained to transmit on most frequencies, regardless of radio service, whether it's public safety, or the TV you watch, or the radio you listen to. For us, the frequency searching is the first step of obtaining the license. First, we have to find an available frequency using specialized software that makes it a lot easier to see what's out there.

Greg: Then we go to the Regional Planning Committee to obtain their permission, and the Committee is made up of representatives from public safety across the state of Michigan. Once we have a letter from the Committee saying that they consent to our use of the frequencies, then the frequency needs to be coordinated by APCO. And once that coordination is done, then the application gets submitted to the FCC for review and their approval.

Greg: And once that's been approved, we have the license to transmit on that frequency.

Judy: And then we can move forward.

Greg: Yes.

Judy: Okay. We're going to take a little break right now and we will be right back.

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Judy: Welcome back to our podcast, everyone. And our special guest today is Greg Farrer. He's our Engineering Manager. Greg, could you tell us about some of the MPSCS engineering projects you've worked on?

Greg: I've worked on a couple of antenna changes, quite a few integration projects, and several system upgrades.

Judy: Okay, a couple questions. When you talk about changing out an antenna, that means Engineering does its background research first of all, and then that goes to our Site Maintenance guys, our Steeplejacks, and they physically do the work. Is that correct?

Greg: Yes. So, before Site Maintenance goes out and does the work, Engineering will pick out an antenna and run coverage simulations using both the existing antenna and the selected antenna to see whether there's a benefit to changing out the antennas first. If we determine, yes, there is a benefit to changing out the antennas, Engineering will first perform a coverage test before, then Site Maintenance will go out and change the antenna, and then Engineering will perform another coverage test to see what the actual changes consisted of.

Judy: Now, what is involved in a coverage test? Is that done on the tower or is it done on a computer?

Greg: So, a coverage test involves sending a test signal out of our tower sites and there's specialized software on a computer hooked up to a radio that takes that signal and eventually after driving across the affected area will show a map of what the coverage looks like, whether there's any coverage holes or an increase in coverage. And we can adjust the output of the software so we can view what on street coverage or in-building coverage looks like, or portable coverage on the street versus in the car.

Judy: So, it's not like you just sit at your computer and you can tell where the coverage problem would be. You would have to get in the car and actually travel the area physically.

Greg: Yes, there is a difference between theory and reality.

Judy: Noted. Greg, you mentioned system upgrades. Why do we need upgrades?

Greg: Well, we need to keep our system up to date to mitigate any known security concerns. We also tend to get new features as a result of some of these upgrades that many local agencies or even the MPSCS itself can take advantage of. System upgrades will often refresh equipment that have become obsolete due to expiring warranties or features that no longer exist.

Judy: So, it's like upgrading your cell phone for a better cell phone when the need arises.

Greg: Exactly.

Judy: Okay. Some have equated MPSCS upgrades as changing out parts of an airplane mid-flight. Could you tell us about remediation and how we recently upgraded the system while keeping it operational with minimal impact to our users?

Greg: This five-year project started in 2014 and ended around 2019. It involved replacing our outdated network and RF infrastructure with modern technology. For example, we replaced T1 based infrastructure with modern networking technology, and this was all done while minimizing downtime to our users.

Judy: So, Greg, during the Remediation, what pieces of equipment were replaced or what was touched? What was upgraded?

Greg: Well, during remediation, we upgraded our power systems to modern power systems. We also upgraded our 700 / 800 RF systems with newer technology, console sites were touched, microwave radios were upgraded. We also touched some infrastructure, including LED tower lighting, HVAC units, generators, antennas, and dehydrators.

Judy: And all of this could have been a big disaster, but we kept most of the sites on the air almost all the time during all of this.

Greg: We did have to schedule some outages, but we did our best to keep as many sites on the air during this project as possible.

Judy: And that means keeping the dispatch centers up and running and keeping emergency services running.

Greg: Yes, exactly.

Judy: Excellent. Greg, do you have any favorite memories at MPSCS? I know you've been here a little while, so what did you get into?

Greg: One of the memories that stands out is performing the first coverage test years ago with one of my coworkers at that time. We were driving the back roads of Lenawee County with the coverage test computer.

Judy: A road tripping day.

Greg: Oh.

Judy: You had good company, though. He was all right?

Greg: Oh, yes. We had great conversations that spanned work and family life, especially his kids at the time.

Judy: We get to know somebody when you're locked in the car with them.

Greg: Yes, you do.

Judy: Okay. What advice would you give a student looking to get into engineering as a career?

Greg: Study hard is the typical trope, but my recommendation is stay curious and keep that desire to learn because the world is always changing and is always in need of unique viewpoints.

Judy: And we could use a few good engineers. We're always looking.

Greg: Yes, we are always looking for new engineers.

Judy: Good.

Greg: For those engineers interested in supporting public safety, there are many opportunities in both the public and private sectors to look at.

Judy: That's all we've got for today, and we would like to thank Greg for being here to tell us all about himself and Engineering Services.

Greg: Thank you for having me.

Judy: We hope you've all enjoyed the show and we will be back soon.

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Judy: We'll see you the next time. Thank you.