Episode 539 John Burwell KI5QKX Transcript

Eric 4Z1UG
Okay, cool. Okay, here we go. KI5QKX. This is Eric 4Z1UG. Are you there? John?

John KI5QKX
Howdy. 4Z1UG. I'm here. Good afternoon.

Eric 4Z1UG
Good afternoon, John. Thanks for joining me on the QSO Today podcast. Can we start the beginning of your ham radio story or maybe even your story? And how did it all come about for you. At the beginning? Where were, where were you born? What was the hometown?

John KI5QKX
I was gonna say? Yeah. So I grew up in a small town in Texas, nestled a bunch among some rice farmers in Angleton, Texas, south of Houston, about an hour close to the Gulf coast. There were population 14,000 when I was a kid. And there was a little bit of radio going on. I didn't know much about it, but there was, you know, some of the mcoms activity that we would recognize today. I was in the Scouts and came across a little bit of radio there. But, you know, honestly, it stayed kind of in the back of my mind for many years. I was aware of it and following along, but I didn't get licensed. There wasn't a strong community immediately around me. I was getting pulled into. We had a Commodore 64 when I was in kindergarten.

John KI5QKX
And, you know, I was keeping up with computers as went along.

Eric 4Z1UG
And.

John KI5QKX
Just kind of kept doing the.

Eric 4Z1UG
Were your parents kind of techie? I mean, to. To have a Commodore 64 in your house when you were young? It seems to me, Mike, there might be some either older sibling or parents that were into. Into the technology.

John KI5QKX
Yeah, I was the oldest of two, but my mom, she was a shark cookie, and she picked up the Commodore 64. She was teaching herself basic programming, and I would follow along and, you know, write little programs for myself. And I remember once I was trying to impress the girl down the street with my programming prowess. I don't know if she took an impression from that or not, but yeah. So my mom was there. She was very supportive. And my career kind of started following the. The computer and later networking path, which turned me into something of an IT guy. I was in high school working for the first ISP in town, Master Data Systems. They Had a rack of modems hooked up to a big UNIX server, you know, with a slip connection, and you dial in and do all of that.

John KI5QKX
I discovered that you could log in and look at everybody's home directories, and somebody happened to notice, and they're like, who is this kid? What are you doing? Get out of my computer. Also, can we talk? So that was the kind of path that I was on. It wasn't really until, oh, 2015 or so much later that I had been following. I've been looking into 44. Net, believe it or not, and thought, if I'm reading this correctly, there's a whole block of IP addresses that are available for hams to use at no cost with a license. And I thought, well, this might be something interesting. Maybe it's time for me to finally go get my license.

Eric 4Z1UG
Let's back up there a little bit, okay? Because I don't. I don't want to, like, jump, you know, 40 years in your story.

John KI5QKX
Well, I don't want to bore you with 40 years of my story either.

Eric 4Z1UG
No, no, but. But I think. I think, you know, we're. We're laying a foundation here in terms of, you know, where this is going. The fact is I think that the majority of listeners to this show probably don't even know what 44. Net is. I am registered on 44. Net, but I, when you. When I did the research, I didn't actually know what 44. Net was until I went over there again and took a look at it. So it's really there. It has a story, and let's tell that story a little bit later. But what I wanted to know was that you started with a Commodore 64, and your mom had an interest in learning how to program in basic. But it seems to me then that. That as your mom got better and more computers were starting to become available.

Eric 4Z1UG
I remember that whole computer age myself, that you had the Commodore 64 and then you had the Tandy series of computers that were suddenly available through the Radio Shack stores. And then in the. Luckily in the late 80s, early 90s, everybody wanted to be in the computer business. So there, you know, the. So the PC clones were, you know, all over the marketplace. How did that evolution happen? We'll get to amateur radio, but I think it's important, you know, for the listeners to understand, you know, the impression and the, the depth that you were plowing into computers before you got to 44. Net. So how did that happen? How did that evolve at your house and what Were you doing as you're even as a boy Scout on computers? Yeah.

John KI5QKX
Well, you called it. After our Commodore 64, we picked up a Tandy 1000 series machine. My sister would play rogue on it, and I would tinker with bat files and had a 300 baud modem that I would dial into. I want to say it was CompuLink, which became. Or no Q link. Q Link, which became CompuServe. And that just blew my mind that you could, you know, over a phone line through this modem, have my computer access other machines. There was really something magical about one machine talking to another machine over unseen networking. And I just loved it. Unfortunately, at the time, right, this is the early 80s, so. And Angleton being a small town, we didn't have any points of presence in Angleton. Everything was a long distance call at like 40 cents a minute.

John KI5QKX
So I didn't get to spend as much time online as I had hoped. But my mom was pretty patient. We had a few minutes each month that I could get on without making the bill go crazy. Spent some time with the Tandy. Then eventually, in seventh grade, the school got a bunch of Macintosh LC computers. And there was a sort of computer literacy class. And it was typing and floppy disks and, you know, basic stuff. And I was getting kind of frustrated. So I asked Mrs. Patton, is there something more we could be doing here? Because I see we've got all of these Apple iis and we've got all of these Macs, and I see that they're networked. They all share a printer. I want to learn about this stuff. She was like, oh, yes, absolutely.

John KI5QKX
Let's put you in, you know, some more advanced stuff. Which led to, you know, upgrading the network to the local talk, Apple Talk, or the little two pair of phone wires, and then doing a little bit of work with the. The school district. Actually, a fellow named Jeff was sort of the entire school district's IT guy. And like all IT guys, was maybe a little overworked. So he was happy to have the extra set of hands. And they had just put up a fiber optic network just by leasing 6 inches on telephone poles all over town to staple up their own fiber and link all the schools to an AS 400 mainframe system. At the main administration building, they had a 14.4 modem that connected to a network called TNET, which was the Texas Education Network.

John KI5QKX
So you could dial up and hit gopher servers and FTP and that kind of thing. And I was just steeped in this stuff. It was all I could do to spend as much time networking as I could, which meant crawling around in 50 year old drop ceilings to run ethernet cables in classrooms and stuff. Because that's what they had me there for, right? The spry young manual labor. But I was happy just to, you know, plug in cables and see the lights blink. But that was me up through like 8th grade, early 9th grade when I got into journalism. Journalism was my elective in

high school. And here my story bifurcates just a little bit because we had all the max in the journalism lab. This is where I learned Photoshop, Illustrator and I mean 1.0, right?

John KI5QKX
The black and white, not even grayscale and writing, which is the other thing I really enjoy doing. So lots of, you know, doing the editorial and the graphics just to use the computers. But it was also like, hey guys, I don't know if you know this, but we can network all of these and we can hook them up to the same printer and we can use this, you know, to access other parts of the school district. And there was a little bit of that, that I could bring in as well. And that kept me kind of one step after the other. A little bit of journalism, a little bit of tech. I mean I can tell you my whole story because it goes on from here.

Eric 4Z1UG
So this is good, this is very good because I think we're getting a sense of, you know, more about you and you know, how this, there's always a story behind, you know, an outcome. So, so thanks for telling it. What, so what happened after that? You're. Did, did you pursue a, a degree in IT or electronics engineering or software design or journalism? How did it go from here?

John KI5QKX
Yeah, so from high school I went into college in and was way into it there. Again, if I look back on my life, one of the fun things about it is that I was landing right as new stuff was landing. I was right there as for example, the university got its first T1 connection. And that was also very exciting. So they had all of the residences wired up with T1s and at 1 and 10 base T Ethernet to every cla, every dorm room. We all had the Windows network neighborhood that we could look at and all of that kind of thing. My suite mate, lifelong best friend now was also into the same kind of stuff. He was running an FTP server on his little desktop at his desk in his room.

John KI5QKX
And we got an interesting phone call from the school IT guy saying that they were hearing from somebody about less desirable activity happening, sharing software and whatnot and could he knock that sort of thing off. And so we got our first complaint about file sharing, which was kind of a thrill because it was all kind of a wild west at that point. Right. We didn't really know what the boundaries of this whole thing were going to turn out to be. And so, yeah, when I was in at the university, I was doing computer science and communication, which was more the journalism side, did a little bit of advocacy for policy at the school as far as what they were and we're not allowing students to do with their computing resources. Again, knocked on some doors people didn't expect me to knock on.

John KI5QKX
I kind of discovered that they had enabled Apple Talk across the whole campus network and I don't think that they had intended to do that. So I brought that to their attention and they were like, oh yeah, thanks for telling us. And also, can we talk? Can we do a little bit more of this kind of thing? So that was fun. While I was doing communication, which again was at the dawn of HTML and the World Wide Web and what does it mean? And I was working with a professor who was trying to understand how HTML and this hyperlinked communication medium would change storytelling narratives and how it would change news gathering and this kind of thing. So we did a little bit of work there. Again, manual labor. I'm an undergrad. The professor got the name on the paper.

John KI5QKX
But I was in there too, doing all of that. And at this point, I had worked for newspapers. I had been working with the Galveston County Daily News and the Brazosport Facts before that, and the New Braunfels Herald Zeitung before that to sort of bring these things together. I had the HTML and I had the communications experience and I had the networking and the server experience. And at this time, this is roughly 99, 2000 or so, the Galveston County Daily News had a pretty strong web presence, but was still trying to automate their workflow from the newsroom to the web because they were very good at the press side. But the pipeline to the Internet was still kind of being formed. We didn't have really an advertising platform. We wanted to run classified ads. We wanted to run display ads, all of that.

John KI5QKX
And so were cutting this from whole cloth. There weren't off the shelf things for this. We were using FileMaker Pro and what was originally FileMaker's web publishing platform that got spun off into a scripting middleware language called Lasso. And that was my job, to sit there and write Lasso code to move stories from Quarkxpress onto HTML files and FileMaker database. And ultimately we migrated to MySQL. And there's a great picture of

me somewhere standing in front of a wall of power. Mac G5s, the big silver machines, because that newspaper was running the Galveston paper and 13 other newspapers that were part of the same family of companies, and were doing the code and the publishing for all of them. That was fun. When Hurricane Rita came through, this was right after Katrina that everybody knows about in New Orleans.

John KI5QKX
Rita came through Houston, and the. The Galveston Daily News is an island newspaper, right? It's on Galveston island, and the newsroom is on the island. So as part of preparing for the storm, I was actually working remotely, living in Austin for a summer there. So my boss Greg was like, let's move all of this to your place in Austin out of the storm zone. And I'm like, well, okay. So we quickly, you know, set up a very light version of all the papers so that something could keep running while we physically move the servers. He loaded them all up into his Honda crv. I drove down from Austin in my Jeep Cherokee, and we met in a grocery store parking lot and in the middle.

John KI5QKX
And I took him back to my house in Austin and hooked them all up to the cable modem I had there and spun the whole operation back up. I had cables and servers everywhere, all over the place. My girlfriend thought I had lost my mind. But with that, were able to maintain the Galveston Daily News. We kept it online, and it has not missed a day of publication. I'm getting rusty now. I think in its entire existence, it has been continuously published, even through the 1900 storm, and now online through Hurricane Rita. So that was fun doing that kind of stuff.

Eric 4Z1UG
Oh, that's a great accomplishment, too. I mean, that was a real problem that you solved and, you know, kept the paper online. And what happened to Galveston from Hurricane Rita?

John KI5QKX
It took some damage, and there was some recovery. It was nowhere near as catastrophic as Katrina. Right. So there's really no comparison, but it was, you know, the number two storm that year. And Galveston and Houston took. Took a. Took a hit.

Eric 4Z1UG
That.

John KI5QKX
That was the. What was catastrophic was the evacuation.

Eric 4Z1UG
Right.

John KI5QKX
If you look this up, you'll hear about all the challenges that they faced, communicating about evacuating and getting people out of the area and the roads being clogged and, you know, miles and miles of cars stalled out on the highway. That it was very potent learning opportunity for local officials in terms of how we manage evacuations going forward. But the paper was Fine. It recovered. I trucked all the servers back and we plugged them all back in and just did the same process in reverse and kept it going.

Eric 4Z1UG
Oh, amazing. So has your career actually been with the newspapers then, you know, to date or what happened after that?

John KI5QKX
So after that I was, you know, for personal reasons, trying to find, you know, other places to go and found an opportunity working with a startup that was producing biodiesel, renewable fuels from, at the time, soybean oil. They were developing technology to go into poultry fat and then ultimately algae oil. So I went to join them because they were looking for somebody who knew Mac and PC and servers and networks, but they were a startup, so they were looking for people who could wear multiple hats and they were hoping to find somebody who could help with the marketing as well. I'm thinking that like, maybe somebody who knows Max probably has some experience in communicating. So I was like, hey, that might be me. And they're like, we can't believe we found you. You might be the one person in this area.

John KI5QKX
So I worked with them for a while. The economics of soybean oil and renewable fuels and food versus fuel, right. That made the market really volatile. And ultimately I think the investors learned what they wanted to learn and wound up spinning that thing down. But through that I was, you know, that was when the xserve came out. So I was setting up an X serve for them later. That's when the iPhone came out. So I was helping them like first run their blackberries and then migrate to iPhones. And at the time, you know, also keeping up their website and working on their branding and their identity and the materials that they would, you know, brochures and stuff that they would send out to prospective customers. And that was a great opportunity. Everybody I met there was wonderful.

John KI5QKX
I worked with more than one of them. After that business wound down, they spun it off into an algae focused concern that ended up working with the University of Texas. So I kind of stayed on as a contractor with them, stayed on as a contractor with some of the other fragments that went on to do other things and kept that going. And at this point I'm doing websites.

Eric 4Z1UG
And.

John KI5QKX
Brochures and databases and networking for small businesses, law firms, healthcare, dentists, and then some local artists who were, you know, running galleries and events and showings and things. And this was all a really exciting time because I got to see all kinds of ways that people did business, all kinds of ways that people dealt with their technology and, you know, helping people communicate is always something I enjoy doing.

Eric 4Z1UG
Were you a one man show or did you have employees?

John KI5QKX
I was a one man show. The.

Eric 4Z1UG
Yeah.

John KI5QKX
The challenge for me was to stop doing what I'm doing, to start trying to get help to do what I was trying to do.

Eric 4Z1UG
Right, right.

John KI5QKX
You know what I mean? I was just, I couldn't put it down. And so I, I wasn't good at recruiting help, which is something that I'm still trying to get better at.

Eric 4Z1UG
Yeah.

John KI5QKX
And that turned into. One of my clients was seeing me a lot and they sort of said, what would it take to just see you all the time and come on full time with us? And so I did that and that brought me to the oil industry in Houston finally. Right. All roads in Houston lead to oil. So there I was in the oil supplier side. So this is a company that made a technology that went into refineries and there again, they had multiple sites, they had partner integrations with the big three, lots of security concerns, lots of business software and enterprise stuff. And that was a chance to, you know, I've been working with artists and hippies, Right. For a long time now.

John KI5QKX
I'm, you know, in a button up world and getting that side of things and seeing how these big corporations handle stuff, which was great for learning, you know, the enterprise way of doing things. Lots of policy work, lots of automation work, lots of fleet management work, wide area networking, there was some long range wireless.

Right. So again, I'm bumping back into the RF side of things and learning how to manage a much larger plant, as it were, while also doing the marketing.

Eric 4Z1UG
Right.

John KI5QKX
Because again, it was the guy that I had worked with at the biofuels place who was like, you were good at both of these, let's keep you good at both of these. And I was still wearing multiple hats there. It was kind of a very successful startup sort of environment. Right. We were 14 people, I was employee number 12 and. But it was flush with resources, you know, which was a rare luxury and a privilege so that I could really dive into things and gather a lot of experience and, you know, solve a lot of interesting problems. Things like, oh, there was a company were working with that wanted to get real time analysis on data coming from their operating refinery. And so I was like, okay, we can figure this out. Again, it's machines talking to machines.

John KI5QKX
I'm sure we can make this happen. So a refinery has this whole system of process automation where computers are controlling the valves and the pumps and the heat exchangers. They're also collecting all of this data streaming all the time from thermocouple temperature sensors, flow rate, you know, everything you can imagine. And they said, we want your product that you sell back to us, your technology that you give us to be designed as up to date as possible according to our process conditions. So this was me working with their chief of it security, their chief of process instrumentation, right? And then this third party who is trying to like get their business off the ground.

John KI5QKX
And between the three of these entities, were able to set up a system so that all of this real time data was getting dumped to the third party who was processing it and putting it into nice graphs and charts and building an API for it. And then were designing our tooling to consume that data so that we could show them charts and say, this is moving this way, which is why we're adjusting our system this other way. And we could log in at any given moment and see what their refinery was doing. That was just a thrilling project because it ended up being a huge success for them. It was a great boon for us, obviously. And then this third party was able to say, hey, look, we're good at this. We got this great success story between, you know, these two other companies.

John KI5QKX
We can do this for others. And that was it. Touched on everything, right? The IT security, the software, the networking, this, you know, the whole bit, to say nothing of dealing with corporate enterprise IT security types, which, you know, they're not the loosest bunch anyway, so.

Eric 4Z1UG
So this is a great lead up to 44. Net then. So here you are, it's 2015. It seems to me that you're unbelievably busy on the one hand, and yet you have this interest in 44. NET. First of all, explain what 44. NET is for the listeners who don't know and then why you haven't had an interest in it outside of the 18 hour days you're already spending.

John KI5QKX
Well, so I didn't know this at the time, but 44. Net is a. At the core, it's a block of IP addresses that were set aside for amateur radio use in 1981, 46 years ago. 40, 45 Years ago. The time when I was encountering it was kind of mysterious, but I was very interested in different approaches to networking. I know the Internet, I know local networks, I know wide area networks. But what's this 44net thing? As I looked into it and then learned A little bit about it. I discovered that in 1981 and again rewind all the way back to 1981. There was no Internet as we know it. There were a few dial up 56k links. You know, maybe somebody had ISDN and this guy Hank Magnuski, KA6M.

John KI5QKX
But well, there's an awful lot of IP stuff happening in other parts of the community. If we're going to do this as hands, we probably want some IP addresses. So he phoned up John Postel, who at the time was the person who had a list of everything happening on what was the Internet at the time and said hey John, we want to get some IP addresses. We're not exactly sure for what, but you know, hams want to play with this and can you give us a network? And John said okay, you're the 44th person to do so. So you get network 44, a whole class A block of IP addresses. And 44 net was published in RFC 790 shortly thereafter, giving it life.

Eric 4Z1UG
Now remember how many IP addresses was that? 44.

John KI5QKX
Yeah, that's a class A network. That is 16 million something IP addresses. The way they did networking at the time, we didn't use classless Internet domain routing until a little bit later. So it was Class A's, Class B's and Class C's. Class A's were the biggest and that would be 16 million IP addresses, all of which start with 44. And at the time, you know, it was way more than anybody could imagine anybody needing. And then there were 44 out of 250. Right. So the sky was still the limit. There was no reason not to assign this much to, you know, whoever came along. And there was also this budding packet networking activity happening more or less between Southern California and Vancouver, Canada where they were building the first, what would become the terminal network controller or terminal node controller.

John KI5QKX
The is kind of a combination modem and server. You know the, to use the modern lingo, people used it for point to point, just typing to each other, turned it into a little BBS where you could leave messages for each other. And all of this was happening between stations that were one by one putting up a packet node up and down the west coast until we had sort of a backbone at 1200 baud over VHF and HAM frequencies. And people were getting a sense of what the potential for this might because you're not having to deal with phone lines, you're not having to pay long distance. You know, you build your own network, your own resilient network that's sort of under your own control that you're developing.

John KI5QKX
Your hands are on the hardware, your hands are on the software, and then you're talking to other people who did the same thing on the other end. And I think that's when people said, we see how this technology can be used to connect people across longer distances and kind of independently of the telecom providers or, you know, the defense contractors or whoever else is running these networks at the time. And with these IP addresses, they said, okay, we need a way to distribute them. We'll, we'll help people find ways to use these IP addresses to do IP over packet. And networks kind of sprang up in the Northeast where people like BDL Garvey and Phil Karn were, and people in the, you know, Southern California where Hank and John Gilmore were and countless others, of course, all over the country.

John KI5QKX
And that was sort of the first layer, the first incarnation of what is now 44 net. These, these packet stations, they're within geographical range of each other and they're using IP to talk to one another.

Eric 4Z1UG
Okay, so by 2015, when you got this interest, obviously Class A IP addresses were beginning to become a valuable resource. And so you might tell the story of what happened to some of those 44 IP addresses and how they spawned the ARDC. Right?

John KI5QKX
Yeah. Well, so that early group that was building packet networks kind of loosely maintained an affiliation and retained control of this block of IP addresses over the decades. And you're right, by the time, you know, we have these big cloud providers looking for IP addresses and the price of an individual IP address has come up very high. We have this affiliation which had established an organization. It was run mainly by people affiliated with Brian Cantor, who was kind of.

Eric 4Z1UG
The.

John KI5QKX
Keeper of record of 44 NAT activities there for a while, was getting phoned up all the time from these large companies who were saying, look, we'll give you resources for these IP addresses. And there was a lot of hand wringing over it. There was a lot of, is this right? Is this the right thing to do? There are people using them. We don't want to pull the rug out from under them. But gosh, what an opportunity to, you know, build an endowment that we could use to, you know, make some immediate impact in projects in science and education and ham radio.

Eric 4Z1UG
Right. So.

John KI5QKX
Calling everybody they could and kind of maintaining the person to person nature that 44net had always been said, hey, how do we feel about this? And they're like, we hate to pass up A chance like this. So the sale was made and a block of IP addresses, the upper slash 10, was converted into the endowment that is now used to fund these grants, and very quickly formed an organization around it. Brought in Rosie, our executive director, to help put the wheels on the cart, got Chelsea in to really help manage the charitable aspects of it. And, you know, today we have, I don't know how many grants going out, but we're funding five or six million dollars a year in the schools and research and development and clubs upgrading their towers, high school kids launching cubesats.

John KI5QKX
It's all kinds of great stuff, but that happened around, I think, 2018.

Eric 4Z1UG
I see. So, but let's. Okay, just. So to put, you know, a handle on the money in order, or at least the way that this worked is that they sold these blocks of IP addresses for, I know, 20, 30, $40 million. The idea is that, that the money that then is being doled out every year is actually the interest or on the, on the money so that the, the original endowment is not touched. Is that how this works?

John KI5QKX
Exactly right. And I, you know, I'm not privy to all the details. I'm, I'm on the nerdy side. There are smarter people than me handling the money side. But, yeah, you, it's invested, it's maintained in a very conservative way so that, you know, as the market fluctuates, there's more or less in a given year. But typically, like I say, I know we disperse 5 or 6 million, but that's just on the proceeds from the investment. That's not, we're not drawing down that amount.

Eric 4Z1UG
Right.

John KI5QKX
Because if we did, then we'd have less to give out.

Eric 4Z1UG
Right.

John KI5QKX
And we want to do as much as we can.

Eric 4Z1UG
Yeah, but this is an amazing resource for the amateur radio community in order to, you know, pump some new life into maybe old ham radio clubs. I think one of the most exciting things I think I see in, at least in the States happening with ham radio clubs is that they get themselves a ham radio station that maybe they can remotely control. And all of the people that are stuck in hoas can, you know, have some opportunities to operate ham radio. All of the new technologies, all this stuff we can talk about. Okay, so you're, you're interested in. In 44 net that leads you then to what? I mean, you've got your hands around it. And if you had an amateur radio license, you could get yourself some IP addresses What happened there?

John KI5QKX
Yeah, at the time, let's see. This was right at the beginning of, I guess the pandemic was when I really started digging into it. And I think we all started looking for interesting things to do it around that time.

Eric 4Z1UG
Right.

John KI5QKX
So I started exploring first alternative networks. And I came across a project called DN42, which runs a BGP routed network on top of the Internet. And it's really just a playground for bgp enthusiasts. And I thought, well,

this is interesting a little bit in that BGP is the border gateway protocol. This is how the routers of the Internet talk to each other to learn who can reach what. So if I have a router in Houston talking to a router in New York, my Houston router will use BGP to tell New York I have these networks and these IP addresses on my side. And then New York will tell me, you know, I have those networks on that side. And they. They know to send traffic to each other when they want to go from one. One network to another.

Eric 4Z1UG
Right, I see. Okay. Yeah.

John KI5QKX
And I was interested in that. I was able to do a little bit of that where I was in the enterprise world, but it was a very tight, you know, very constrained environment. And here was a chance to, like, really play with it. And then I kept coming across 444.

Eric 4Z1UG
Net.

John KI5QKX
I was like, oh, yeah, 444 net. Always wanted to know what that was. And I've always wanted to get into amateur radio. So I started reading the how tos and a lot of the outdated documentation at the time. And I said, well, it seems like I can put up a station here at my house and potentially make contacts with others in the area over ip, over rf. So I guess it's time. And here we are in Covid. And online exams were becoming a thing. Like, there were some clubs figuring out how to do the certifications via Zoom. I was like, great, I'll sign up for that. And finally got a chance to take my tech exam. They were very. They were very concerned about cheating. Right.

John KI5QKX
They wanted to make sure I was being honest, and they wanted to make sure that I was in a room that didn't have, like a big poster up of all the answers or something. I didn't have such a room because every room in my house is filled with some, you know, technology of some kind. I was like, well, what's the room? What's the one room I can go to where it's guaranteed to be, you know, clean and secure? And that's the bathroom. So I'm in the bathroom taking my exam, which I thought was amusing to my examiners. Anyway, got my license and it said, great, now what? Got my assignment for some 44 net IPs from Chris Smith, who at the time was helping keep the lights on up at ARDC and managing a lot of the assignments in the networks.

John KI5QKX
I neglected to mention that Brian Cantor had passed right after the sale. So, you know, he didn't get to see the benefits of, you know, the transaction and what it was doing for all of the amateur radio community. But there were plenty of people who stepped up to pitch in, and Chris Smith was one of those. Got my subnet, hooked it up and started playing around and said, this is great. Now I have a chance to play with IP in the public Internet, like the real public Internet, without having to pay ATT a gazillion dollars so that I could get my own sort of business class connection and route, you know, a slash 24 for my house or something like that.

John KI5QKX
It was just a big IP sandbox and it felt a lot like the way the original Internet felt back in those days when I was dialing up 144 and the Internet was sort of a wide open field. Fast forward today when everything's a platform and it's all vertically integrated through these big cloud apps and social media. You get back on 44net and you're like, this is how it used to work. This is the Internet that I know and love, right? This is, you know, people setting up systems, talking to each other, hooking them up over the network and yeah, just started really having a ball.

Eric 4Z1UG
Okay, so let me, let me interrupt here. So, so what I'm thinking in my head because, you know, I know a little bit about all this stuff to be dangerous. Okay? So by having some 44 NET IP addresses and this background in BGP, essentially what you've done is you've, you've backed your tailgate right up to, you know, right up to the edge of the Internet where no one goes right? You're, you're at the beach, you know, and looking at an ocean of this is what's the image that's coming to my brain. You're at the beach looking at an ocean of IP addresses of all of these routers talking to each other over the Internet without the filtering of layers and layers of servers and routers and everything else. Right? So that's what it sounds like to me, what you have now, it doesn't say.

Eric 4Z1UG
It sounds to me like the ham radio license gave you the access to these IP addresses. And so we'll all want to

know how they served amateur radio, you know, after that. But, you know, is this what I'm seeing? I mean, like, you're now standing with this amazing resource right on the edge of the world there.

John KI5QKX
Yes. Especially if you imagine that to your left is, you know, Facebook looking like Atlantic City. And, and to your right is a big commercial shipping port. And you don't really have access to either of those without buckets of money. You're standing on the beach and you can put in your boat, you can get on your boogie board, and it's you and, and the IP addresses, and it is, it's what you want to do with it. This is the, this is the crux for me that I love trying to express at these ham fests and all. It's just like with rf, you have these frequencies that are set aside for you to use, and people do all kinds of different things with them, but it's not any one thing, right? You're not like, connecting to ham radio. You do ham radio.

John KI5QKX
Ham radio is what you do. And it's very much the same with these IP addresses. You're not joining a network. You're not dialing into aol. You're not getting an Internet connection. You are getting the raw materials of the Internet that you can then assemble into what you want to do with it. And that can be one thing or another thing, but it's for you to tinker with. And that's the biggest, most exciting thing about me with 44. Net is seeing all the different things that people are doing with these resources.

Eric 4Z1UG
So what did you do with these resources? Now that you're connected, you have this BGP background, what did you do? What did you build?

John KI5QKX
Well, I mean, you. You start out simple, right? And put up a little web server and say, oh, hello, world. I can access myself at a real public IP address that isn't filtered by, you know, my upstream ISP provider. And then it became, well, remote access. If I travel, I can connect back to my 44. Net IP address without having to do crazy tunneling or port forwarding or any of these kinds of things, because my devices at home that have 44. Net IPs are on the Internet. It's, it's so. It's so awkward to try to say because it's so rare at this point to say that on the Internet means right there on the Internet with all that entails. There's no filter, there's no firewall. But what you put.

John KI5QKX
And you can see the actual routing infrastructure, you can see how your network talks to Verizon or MCI or, you know, any of these other big network operators. You're, you're right in there, elbows deep in the, the actual underpinnings of the Internet. And you're not mediated by, you know, some commercial provider or some application stack. You're not running through Google, you're not running through, you know, Amazon. You are right there. It's just you.

Eric 4Z1UG
Feeling. I, I do have some 44. Net IP addresses. I've had them for a while. I can't say that I use them. And I'm sitting here feeling guilty that I should release them back into the network. But the idea was, event at what at one point was, is that maybe we connect all the all star nodes that we had in Israel, you know, on 44. Net. But, but now you've got me intrigued because I, now I have a better, I think, understanding of where this could go. How do, how do you get a line in Texas or anywhere else, an Internet connection that isn't routed, that allows you to be right there on the beach? Who do you call?

John KI5QKX
Yeah, well, so my first call at the time was to Comcast, which was my Internet provider. And they were remarkably accommodating. I don't want to speak for Comcast, you know, your mileage may vary, but I said, here's what I want to do. And they, yeah, I think I can put you in touch with somebody here who knows how to do that. And they did, and it was great. But then they wanted lots and lots of money and I ended up having to leave the Comcast family for a different ISP a year or two later. But I discovered that cloud providers also will hook you up if you have an account with Vulture or some of these. Oh, my mind's drawing a blank. I've had Snare maybe and can announce the subnet for you.

John KI5QKX
So you give them the subnet, you give them the IP addresses. We provide a letter of authorization from 44. Net when they ask for it and then they add it to their router and you're announcing through their router directly over there. Upstream. There's also data centers, Hurricane Electric being a good example. A lot of folks have Rack space and Hurricane Electric on the west coast and they've got you Know, a place like this is going to have

multiple huge Internet connections, like 100 gigabit Internet connections to all the major backbone providers. So when you go to a place like Hurricane Electric and say, I want. I have a subnet, I want to announce it's, you know, updating a router configuration. And now that subnet is announced to all of those upstream providers.

Eric 4Z1UG
So if you have a Vulture, I have Vulture and Hetzner, you know, because I'm one of these crazy people now playing with AI agents to. We'll see. We'll. I'm spending a lot of money, you know, right now I'm figuring out how this can affect my life. But, but if I've got a Vulture account, what you're saying then is I could take my 44. Net IP addresses, I could have Vultr put that on the. I'm assuming the server, the one server that I'm using and that. That's becoming. That'll be the, My. My network router or the other things that I'm going to do, you know, perhaps on Vulture or somewhere else. Is that right? Is that what you're saying? That, that's the, the gateway or the, you know, between my computer and the rest of the Internet through my 44 IP address.

John KI5QKX
Exactly. So I have something very similar going with a Vulture node in Dallas, and That's where my 44. Net IP addresses are announced from. So anybody who tries to reach my44.Net IP addresses is going to find their way across the Internet to that server in Dallas. And then from there I have that node configured to send part of it to Houston and part of it to Atlanta and part of it up here to Canada. And I've broken that subnet down into smaller subnets, and then that router in Dallas knows how to connect to each of those other sites and directs the traffic to each of those locations as appropriate. And then it gets even more complicated, right, because once you start being a real network nerd, you can't stop.

John KI5QKX
And now I've got a router in Houston that is further subnet, dividing the subnets into, you know, the front of the house and the back of the house and stuff like that, which is, like I say, it's just a plant. If you like to play with routing and networking, this is a place that you can do that.

Eric 4Z1UG
Okay? So it's a great learning environment too, because it seems to me that the number of people that, you know, go down this deep into the weeds is becoming maybe less and less because we assume, you know, when we go and consume our Internet service from whoever we're getting it from, that all that other stuff has been taken care of for us. Right. So we're not even thinking on this level anymore. That's too deep. How does wireguard play into this? Because I, in doing some research, it seemed to me that I should be asking you about Wireguard and how it's used in 44. Net, or at least in your 44. Net. So I guess say what that is first and then explain what your use of it is.

John KI5QKX
Oh man. So this is our most exciting thing recently. There are, there were for a long time two ways to connect your systems to a 44. Net subnet, and that was BGP, as we've discussed, if you have a friendly ISP or a cloud provider that would let you do that, or the IP mesh, which is an overlay network that kind of traces the topology of that early RF packet network where there's different regions around the world interconnecting and connecting to each other over an overlay network on top of the Internet. These are both kind of difficult to approach, right? With BGP being hard to access because you need a friendly ISP and IP mesh increasingly being impossible to use because of the way the Internet has evolved in the past few decades, such that it's no longer a point to point system.

John KI5QKX
There's routers and firewalls in the way, so you can no longer like assume you have a direct path to another computer. So how do we solve this? Well, there are, there have been a series of what we call VPN technologies which allow you to set up a connection between two points on the Internet. Traffic between those two points is encrypted and then those two points behave as if they're directly connected, no matter what the topology is between them. So one of those technologies called WireGuard recently developed, I guess a few years ago now, anyway, it makes it very easy to reach out to a server, establish a wireguard connection, and now you've got a two way path. So we. I say we. It's actually a team of volunteers. Zachary Sequin, Adam Lewis, the late John Hayes. I'm sorry, got five johns in my head.

John KI5QKX
The late John Hayes and Adam and Zachary and several others involved with 44. Net came together and designed this system so that a ham with a portal account could log into a web interface, request a WireGuard endpoint, a tunnel and Get a configuration that they could put on their equipment so that between the wireguard

server and the wireguard endpoint, there was a tunnel that allowed you to put a 44. Net address directly on your client device. This ended up being called 44. Net Connect, which we launched back in November.

John KI5QKX
And it has already seen tremendous uptake because people are finding that it's useful for remote stations that are maybe connected via starlink or a cellular connection or a marginal, you know, backwoods connection somewhere to the mountains where otherwise you couldn't get in the ISP or the technology would not allow you from the outside to access a service on the Inside. With the WireGuard tunnel that 44. NET Connect provides, you punch through that and you establish a permanent outbound connection that works both ways with that 44. Net IP address on your Raspberry PI or on your ICOM or on your server. Now you can use that 44. Net IP address to bypass all of the chicanery and shenanigans that go on in a modern Internet connection and get direct access to that system.

Eric 4Z1UG
I'm sorry, if you have an All Star node or a, a digital repeater or something like this where you're using lte, for example, an LTE modem to connect to it, and obviously lte, by the time you've got an LTE IP address, you're six layers below the, or more, you know, below the Internet itself, then having this 44. Net Connect Wireguard solution, then this means then that you now have a permanent tunnel to, you know, wherever it is you need to go in the 44. Net universe. And, and you always have the connection reliably without worrying about being multiple natted. I apologize to all my listeners that aren't up to speed on this or think we're not talking ham radio, but this is a way to create huge reliability.

Eric 4Z1UG
If you're using an LTE modem, for example, to connect your remote base that happens to be out in the middle of Nevada somewhere. But that was the only connection you could get for a startling connection, for example.

John KI5QKX
Yeah, yeah, I talk to people every time I go to one of these hand fests in Dayton or Friedrichshafen. People are, you know, they're using it with All Star. They're using it with irlp, the Internet Repeater Linking Project. They're using it just to remotely administer their stations. If they have, you know, whether that's a Raspberry PI or directly to a radio or in some cases to a computer that is connected to a radio and then you do kind of a screen sharing thing because with a 44 net IP address, you can use any port, you can set up your own firewall rules and you are in full control of that. So if there's something you need to do, 99% you're going to be able to do it. And that's really freeing to somebody like an amateur radio operator who, you know, is inevitably tinkering.

John KI5QKX
Right. But also running all of these different types of applications and protocols and Echo Link and, you know, WinLink and, you know, you name it. There are, there are solutions here to problems that hams have been banging their heads against for the last ten years or so.

Eric 4Z1UG
Interesting. John, what are you doing on rf? Do you actually have any radios?

John KI5QKX
I do have radios. I am, I don't mean to pick,.

Eric 4Z1UG
You know, pull your legs, but I,.

John KI5QKX
You know, I mean, got.

Eric 4Z1UG
Yourself a ticket so you could get to 44 net. I hope that you have radios. Although frankly, you're such an amazing resource. I, my brain is going wild right now thinking about, you know, the possibilities of, you know, what I could do with my own stuff.

John KI5QKX
Well, yeah, I have not neglected the rf. I am a poster child for what I keep saying. If we want more new hands, we have to talk to non hams, right? And I was very much a non ham. And I have found my way into this world and I've just been loving it. Right now as we speak, I have four SDRs plugged into a little NUC, a little four inch

square computer and I'm already logging ads B and I'm setting up the other two to listen to VHF and HF. I've got A, I've got a down converter or an up converter here. So I'm looking forward to listening to what's happening here in Nova Scotia when I get back home in Houston.

John KI5QKX
And then at home, yeah, I've got my, nobody has connected to it at all, but I do have a VHF node and it does have a 48,44 net subnet IP address on it. So if anybody were to happen to wander by and hear my little, you know, beeping out, I'm here, I'm a 44 net packet node. They could certainly connect. But really the things that I do are more about supporting other amateurs. When were in Germany, an incredible opportunity to go up to a mountaintop where Hamnet had a station. Hamnet is this project in Germany that is using microwave links like 5 and 10 and 60 gigahertz I can barely even say it, to connect point to point among mountaintops and tower sites all across Germany and beyond. And one of their Raspberry PI nodes up on this mountaintop was misbehaving.

John KI5QKX
And I had asked Jane, I was like, hey, can we go do some nerd stuff while we're here? And he said, I have an idea. Let's hike up this mountain and go fix this Raspberry PI. So we got up there and he's got, you know, there's a station pointing to Austria, there's a station pointing to different parts of Germany. They've got webcams. And, and that is really exciting for me to see. I don't have quite the resources to put up 60 GHz equipment and in Houston, it's flat enough anyway that I would need more of a tower than I'll ever be able to put build. But seeing what people do with it. Yeah, I, I just love hearing the stories and, and seeing it in action.

Eric 4Z1UG
Yeah, I think that I, I mean, I, I think about that here in Israel that, you know, we could connect all of our radio sites together, you know, with microwave and IP addresses. And so whether it's, you know, whether it's digital or it's all star or maybe it doesn't even have to be those things. It could be, you know, an asterisk telephone service, you know, for hams or something like that. That seems very exciting. And it seems to me that's an opportunity in every country. And there's still, Are there still enough 44 NET IP addresses for all the hams in the world to, you know, build up these resources?

John KI5QKX
Yes, we have plenty. And, you know, you were saying you feel guilty having one, that maybe you feel like you need to give back. Totally get it. You can give it back at any time. But at the same time, I think we all understand that the nature of a ham is often tinkering, trying something for a little bit, maybe on a weekend, or maybe you, maybe the dog finally catches the car for a couple of weeks, and then you play around with it and move on to something else, and then you come back. But what we're looking to do is grow the overall number of users, by all means. So, yeah, don't worry about scarcity. We want to see shining faces. We want to see people get in and get connected.

John KI5QKX
And if we do run into a capacity problem, we'll figure out how to solve that some other way.

Eric 4Z1UG
Now, what kind of resources are available to people that want to take advantage of say, 44. Net Connect, for example. I mean, is there, I mean, obviously with AI, we could, you know, scrub the, you know, 44. Net website for, you know, this information and stuff. I mean, we have some tools now that we didn't have last year. But what kind of resources are available for somebody that wants to, you know, to connect themselves now to 44. Net and talk about what we've just talked about, and that is, you know, they've got something sitting on the end of an LTE connection or of a satellite connection. What resources are available?

John KI5QKX
Well, the first place I point people to is our wiki. Wiki.amper.org that's wiki ampr.org if you looked at it a couple of years ago, you would be surprised at what's there now. We've been adding a couple hundred articles. We added half a dozen just this week. How to's to connect a Raspberry PI or Open WRT or PF Sense.

Eric 4Z1UG
Right.

John KI5QKX
Common equipment that people have. How to do single endpoint connections or how to do routed subnets like I was talking about earlier, where you have multiple IP addresses you want to. That's a great place to start. The next one would be probably ARDC Groups IO. We have a mailing list, we have several mailing lists there.

There's a web interface you can sign up via email. There's a lot of good discussion that goes on and there's a lot of helpful people who are, you know, interested in seeing others succeed. So if you have a question or if you just want to browse, there's a lot to learn there because turns out we have some talented, knowledgeable people in this whole community that would be number two. Recently we also lost, launched our Discord server, trying to go where the people are.

John KI5QKX
And that has seen hundreds of people join just since we launched it a couple of weeks ago. I believe you go to discord.ardc.net and it'll give you an invite link that you can go hop on the ARDC server there. And that's been an exciting place where people have been sharing all kinds of things that I didn't know were happening. Those would be the three main resources. And then you can always reach out to me if you want. John? Yeah?

Eric 4Z1UG
Do you have an all star, say an all star room, all star destination where people can, you know, just talk about this stuff? 44 Next.

John KI5QKX
You know, we do not as a matter of fact. And that's a great Question. That's probably a good idea, something we should look into. I know that there are loads of other.

Eric 4Z1UG
It's a Raspberry PI at this point. Until you start getting.

John KI5QKX
Yeah, I, I have been negligent in setting that up. It's, it's one of the many projects on my long list of things I'm going to get around to one day, you know.

Eric 4Z1UG
Okay, and what are you doing at ARDC?

John KI5QKX
Yes, right. Well, I am the 44net program manager. I joined in November of 24 as a kind of moving from a volunteer and a participant to, you know, trying to help the organization get 44 net, you know, on the right track to move forward because we all want to see greater participation. There's a whole lot of potential, a whole lot of interest here, and I'm just, you know, doing what I can humbly do to try to, to move that forward.

Eric 4Z1UG
So what can we do to find more people like you who would be attracted to amateur radio and getting a license because of these opportunities that you found? Probably more by mistake or by accident than from some promotional.

John KI5QKX
Well, I have been seeing great opportunities for outreach when I go to these conferences. Certainly in the ham community, there's a lot of interest still to be captured among existing hams, but other industry conferences as well. I was at nanog a year or so ago and meeting other networking guys who, like me, were sort of like, yeah, I knew about amateur radio. I didn't know really what it was. I thought it was a thing. And. But you mean, I can do all kinds of things with it. I'm like, yeah, check it out. Hacker communities. I'm trying to get lined up to go to DEF CON in Las Vegas here in about a month and meet with some folks there. I know there's a very active ham radio village. We have a couple of ARDC alumni participating in that.

John KI5QKX
So that's an opportunity to reach out to the hacker mentality that I think a lot of hands absolutely have and things like makerspaces. I was talking to some folks who have a very active community makerspace in Germany. And, you know, they've got 3D printers and raspberry PIs and stuff. But they're also working on setting up a statement and, you know, it's an opportunity to show people how to use it. And then through our grants, we're supporting a lot of projects like in schools to, you know, get kids hands on a radio so they can see what it really is like, and experience it and then run them through the exam so they can get their tickets. Clubs, a lot of clubs doing outreach for 44 net are bringing people in.

John KI5QKX
I was talking to a fellow scout a couple of weeks ago saying, you know, it would be great if we could get, you

know, some of these larger organizations like Scouts of America or you know, some of these groups that touch a lot of, you know, younger demographics that have an interest in this kind of thing. So anybody who has, you know, opportunities to connect to any of these communities, again, you know, we got to talk to non hands to make new hams and there's a lot of people interested in this kind of stuff. So spread the word far and wide.

Eric 4Z1UG
All right. One of the podcasts I follow is Mike Rowe there in California. And Mike Rowe is the guy that did dirty jobs on the.

John KI5QKX
Yeah, yeah.

Eric 4Z1UG
And so Mike Rose has been talking for the last few years about that. There are millions of college graduates who are living in their parents basements because they can't find opportunities on the one hand, but there are millions of jobs now for people to do work with their hands, like in the electric industry. Apparently there's a website called buildasubmarine.com because the United States needs to build two submarines a year to be at the same rate of build as the Chinese. But they don't have the welders and they don't have the pipe fitters and they don't have the stuff. And so he's always talking about eighth.

Eric 4Z1UG
If you can get them in the eighth grade, you know, if you can create that interest in these jobs in the eighth grade, then you have an opportunity to have the workforce that you need in order to be able to create at home the things that you need. So it also seems to me that this is, this 8th grade idea is also where you're going to find your hands and your IT nerds and your, you know, whatever it is that if you can somehow get in there just before they get into high school, then you have the greatest opportunity of success for creating the workforce that you need. But also maybe the amateur radio operators.

Eric 4Z1UG
So from a marketing standpoint, you know, maybe that middle school, middle school is the time, you know, where you get, where you catch them before they get too embedded in the path that they're. Yeah. Sets their life. So anyway, that's just something I'm sharing with you, but from a marketing standpoint. But.

John KI5QKX
Well, it rings through, right. I was probably in eighth grade when I, you Know, briefly thought about being an electrician, and I spent a lot of time with my uncle, you know, learning aspects of that trade. And yeah, Mike's point is also well taken. The trades are very important and there's always need for talent and professionalism in the trades if we're going to be building things and, and building, you know, places to live, places to work and equipment to do it with. Absolutely. And, and I am a little bit partial to electricians myself without being.

Eric 4Z1UG
Dependent on potential enemies for, say, pharmaceuticals, for example. Yeah, right.

John KI5QKX
Yeah.

Eric 4Z1UG
You know, so there's a need and I am so everything that I. When I'm listening to Mike, it seems to ring true that, you know, where was I in the eighth grade? Well, yeah, I was. This is where I was getting enraptured by amateur radio and electronics and, you know, all this stuff. And that's what I've been doing now for over 50 years. Yeah. Yeah, go ahead, John. I'm sorry, I didn't mean to.

John KI5QKX
Oh, I was just gonna. To whack some more poetic. You know, I, I have great admiration, you know, again, for the trades. You'll find fewer, you know, smart and driven and, you know, conscientious people than the guys who want to make sure that your air conditioner is working when you hit the month of August. You know what I mean? And that's where a lot of, you know, I know we find amateur radio people too.

Eric 4Z1UG
Right.

John KI5QKX
As people who love to build things with their hands and see how things work and know how to fix something on their own without just throwing it away and buying a new one. Right. That we like those people.

Eric 4Z1UG
That's right. Is there any advice that you would give? I mean, obviously you're a new ham. And as a new ham, is there advice that you'd give to new hams that might make the journey easier? And maybe as interesting as it has been for you,.

John KI5QKX
If you haven't gotten your ticket yet, you know, get it is. I won't say it's easy, but you've got it. You can handle getting your tech ticket at the very least. So don't be intimidated by that. Don't be intimidated by the naysayers either. Right. Everybody has an opinion, and you'll hear some things positive and some things negative, but you don't need to pay attention to the negative opinions. There are more people than not who are interested in helping and bringing you along and sharing what they know. So don't let that be a turn off at all. And then, yeah, get a radio. Don't be ashamed of a little bow Fung.

John KI5QKX
That's a great way to get started and to hear what's on the air or to pick up an SDR and start listening, plug it into your Raspberry PI and run a cubic SDR or GPRX or something and see what people are doing because that'll give you a sense of just the vastness of the world that's out there and start playing with it. Don't be afraid to key up that's the, those are the last, those are the things that I struggled with, was being a little bit intimidated and a little bit nervous about hearing my own voice on the air. But once you sort of break that seal and get over that hump, it's nothing but fun.

Eric 4Z1UG
Well, I think that's a fine way to, as Mike would say, land the plane. So I want to thank you so much for joining me, John, on the QSO Today podcast. 73.

John KI5QKX
Oh, thank you so much for having me. It's a ball. We'll do it again. I've been enjoying it. 73 To you and all your listeners.