TFTC 435

**Marty:** [00:00:00] Cody, Marty, it's a pleasure hanging last weekend. It's a pleasure hanging.

**Kody:** Yeah. You know, it's like all, all always fun to meet your heroes, especially when they live up to it, you know? So,

**Marty:** oh, stop that. I know. It was, I mean, I've heard a lot about you and all the work that you're doing at Fetty and incorporating Bitcoin and the AI and Yeah.

You did live up to the hype man.

**Kody:** Oh, oh, well you did too. Barney. If anyone is, uh, listening to this instead of watching this, Marty's been packing on a lot of muscle recently, and, uh, it's one of the most surprising things that you beat him. You're like, whoa, like, Marty, you're a lot like stockier, but like, like much bigger build than you are on It comes through my headphones.

I,

**Marty:** I come from a family of mongolo. Uh, it's all, it's all natural. I do try to supplement it with some, with some weight lifting. It was leg day today. Excellent. Uh, did some box dead lifts. Felt good. Yep. Um,

**Kody:** yeah,

**Marty:** sorry for, if you [00:01:00] can hear the rain in the background. Torrential downpour here on the back studio, back Porch Studio here in South Jersey.

But I'm extremely excited for this conversation because the convergence of Bitcoin and ai, particularly Bitcoin over the lightning network and AI is something I think could be massive for Bitcoin adoption and just, The usability of the internet overall. I think AI is just one particular use case.

**Kody:** Yeah.

Yeah.

**Marty:** The Gods agree. The Gods agree. They're sending us a message right now that we're onto something here. But before we dive into all that, uh, we were chatting a little bit before we hit record about your background in the military and how you came to understand Bitcoin a bit intuitively. Like how'd you go from being a Marine to working at Fedie on the cutting edge of Bitcoin, the Lightning network and

**Kody:** ai?

Uh, yeah, sure. Thanks Marty. So like, uh, give feel, like two min, two minute [00:02:00] summary. Uh, so I was an infantry officer in the Marine Corps, um, when I was finishing up active time, uh, it was when Coronavirus happened. And so one of the, because we were like very, this was like very, very early when it first started, uh, was we.

Were on deployment and we were getting stuck in these like, Hey, you, we got like two weeks stuck in your room, or we were on these, uh, like while you're on watch, you have to be like, Hey, you've got 12 hours on watch or 24 hours on watch while you're in the tackle operation center. And normally you're like waiting for the phone to ring and we're gonna jump on a bunch of birds, we're gonna fly to Syria or wherever it is.

And um, but because Coronavirus was happening, like not a lot of, uh, stuff was going on, not a lot of phones were ringing. And so, um, what I ended up doing was, uh, like start, started reading a lot more and found Bitcoin was one of the things that I wasn't blocked on government computers, like bitcoin.org.

And so my first kind of like intro into Bitcoin was like, this is one of the few things I can read while I'm on watch, sort of waiting for, uh, stuff to happen. And so started going down the Bitcoin [00:03:00] rabbit hole. One of the things that. But it's kind of immediately intuitive to me and why I kind of went down Bitcoin versus like alt coins.

Cuz after you read Bitcoin, you start talking to people about it, they bring up all the alt coins and you sort of look at it was the proof of work aspect of it. And I know that you've had some conversations with Jason, Larry, and, uh, while like I don't just, uh, agree with him on everything and I think that there's some, um, there's some really valuable stuff that he's been doing in terms of framing Bitcoin's proof of work in language that can, uh, like really appeal to people with sort of military backgrounds.

And so that was one of the things for me, like I like wasn't able to exactly identify it, but once you kind of came on the scene being able to see that, yes, the same maneuver warfare language that we use in the Marine Corps like sort of applies within Bitcoin as the importance of proof of work, right?

Like the way that Bitcoin establishes like, hey, you actually have to work in order to. Um, uh, combat it, those sorts of things. And then, um, coming outta the Marine Corps, I started working on Bitcoin development because one of the cultural aspects of the [00:04:00] Bitcoin, uh, Bitcoin, sorry, of uh, the Marine Corps I really enjoyed was, and that made it really like such a great organization was because, um, every Marine was a rifleman, right?

Is that if you look at the ranks for Marines, like one of the differences between us and the other services is that you've got cross rifles on it. Cuz first and foremost, every marine is a rifleman. And the reason why is because insofar as you're in this organization, insofar as you're a war fighter, it's because you exist to serve the rifleman, is that there's gonna be an 18 year old jumping in a hole.

And if you're a cook, if you're a pilot, if you're a jag, if you're, um, like anything in this organization, the reason why you're here is to support that guy. And so, coming into Bitcoin, I knew that it was important. I knew I wanted work on it. And so I knew I needed to become technical and become a coder because insofar as we're here is because we're building open source software and creating environments to do that.

I think you've done a lot of work with that, with 10 31 and just generally the podcast, right? Of like kind of putting open source developers, um, front and center. And so working on open source and working on Bitcoin, um, like I just kind of did that for like a year where I was sort of teaching [00:05:00] Bitcoin through, um, likes, you know, first through POS crypto course, I was like the Bitcoin guy for it and the technical Bitcoin stuff.

And then, um, through. And then, uh, uh, kind of, I was one of the first guys with Lisa Nige. We did, um, base 58 and then I was helping her teach that for a bit. And then, um, just kind of o working in open source. Eventually I come across Fedie Mint and I meet Justin actually at Bitcoin, uh, Bitcoin comments in, um, Austin.

And after meeting him and sort of seeing that, hey, Fedie Mint is actually something that's, I think is a really interesting sled of trade offs for scaling Bitcoin in a privacy focused way. Um, started working that on that for about a year. And then afterwards, uh, like I joined Fedie and so now Fedie Mint the protocol, right?

Worked on that for about a year. And now working for Fedie, the company, which is building off of Fedie meant,

**Marty:** I mean, that's pretty impressive to go from covid lockdowns board scouring bitcoin.org to understand Bitcoin [00:06:00] better, to contributing to open source projects, contributing to Base 58, and now working at Fetty, how, how were you able to sort of scale your knowledge and your ability to participate so quickly?

**Kody:** Yeah. Um, I'd say a couple things, and I talked to, when I talked to like newer developers and like also, you know, I'm very junior, right? I've been here for like two and a half years about in, within the Bitcoin space, right? And, um, that's how long I've been doing development stuff for is that the things I normally talk about are like, you know, start building, right?

And so like just pick up open source project and start contributing to it is that like everyone within Bitcoin is extremely welcoming and looking for new contributors. Like one of the things that Fedie Mint that we do really well is onboarding new contributors. And so, um, like I did this for a while.

I've kind of had to like, it's become more intermittent, but like when I first started joining with Fedie Mint, I knew that there was a bunch of stuff that I have to learn, right? And so there's like a stack of white papers on my desk that apply to Fedie Min because Fedie Min sort of, you get like the most difficult of everything, right?

Like you do bitcoin at the base layer, you do [00:07:00] lightning, you do distributed consensus, you do all sorts of fancy cryptography with blinded signatures and musig and all that sort of stuff. So I had this sort of stack of white papers that I knew I needed to get through. And so what we started doing was like white paper Wednesday, right?

Where me and a bunch of other Fed contributors, like, we would go through these things and we would be teaching each other and um, kind of making it more approachable so that new contributors coming onto the protocol. Could, um, sort of get upskilled faster, right? And so I think that was actually, if you kinda look at the development of Fed Min, right?

Was there was basically Eric for a little while and then, uh, he worked on it for about a year and then Justin comes in and a couple other contributors. And then, um, there's sort of like this explosion after Bitcoin plus plus in, um, Austin. And that was when, um, it was, uh, like me, Justin, a couple other guys who were there, like we did the first implementation of Simin, which was using simplicity, blockstream scripting language that they've been developing for Bitcoin as a Fed module.

And then after that there's this big explosion out. And I think part of the reason why for that is because FET became much more approachable for people to come work on, right? And so [00:08:00] as you're like a new contributor coming to the project or anything like that, like there's a bunch of developers now who've, uh, like they're very, we're very good at onboarding new guys.

And so this same thing with like Core Lightning, which um, like, you know, working with Lisa of course, like you end up working on Core Lightning stuff a bunch, right? But I think Bitcoin generally has just gotten very, very good at taking people who are new and if they're willing to put in work and they're willing to kinda like, take on new projects, then onboarding them into the ecosystem so they can start contributing more.

**Marty:** Yeah. And I think what you just described is a great example of the breadth of the space. Uh, get in, Lisa will teach you like transaction constructed. At Base 58 you'll learn a little bit about C Lightning. And now we have this other second layer, third layer protocol. It's actually something I'd be interested to learn.

How do you refer to Fatty as a second layer or third layer? Um, that people can then learn about and contribute to. So there's many different areas. Not everybody has to be a core developer these days. It's getting easier and [00:09:00] easier to apply your skills at different parts of the ecosystem. Yeah. Build apps on top of that.

**Kody:** Yeah. And this is something kind of going back to that um, philosophy I was talking about before, right? Of like every Marina rifleman is that one of the things I really think is coming out within Bitcoin is this sort of concept that I've been calling like every Bitcoin or a developer, right? Is that within Bitcoin?

Like it's like, it was very surprising to me looking at cuz like, you know, when I was working at K X for a while, is that when you look at some of these other con um, ecosystems, there's a lot of people working on them who don't really understand the core protocol. A lot of people who work on them who don't really understand like the fundamental computer science behind it.

Right? So like they can't explain for example, or just, it's not everyone, right? But it's like if you talk to a Bitcoin or generally he can give you a rather good explanation of some the underlying technology, even though he might not be technical himself. Right? And so I think this is coming out more and more is that within Bitcoin, everyone's kind of building up some development shops and building up this technical background for it.

And so for [00:10:00] example, like I think you just brought up for like Fedie mint, right? So maybe we can like start talking about like the technicalities behind that is that for Fedie, like in terms of talking about layers one and two, it kind of gets a little confusing when you talk about Fed Min that way. And the reason why is because the fed min ash claims are against base layer Bitcoin, right?

So I peg in or I peg out at the federation and when I do that I get e cash. And so, but that's against underlying on chain Bitcoin. And then we use lightning gateways as an interface of trading those e cash notes between people within the federation in order to be interoperable with the wider Bitcoin network.

Right? And so talking about fed min as layers gets a little confusing, right? Because the ECA that you're holding is a claim against the layer one, but the interface that you're using for it is like using the lightning gateways of layer two, right? And so it gets, it gets a little confusing when you do that one, right?

**Marty:** Yeah, I guess you could, I mean, I guess you could call another [00:11:00] layer two that's complimentary. I. To lightnings layer too. Cause if you take a sec for,

**Kody:** um, yeah, maybe we could take a sec for just sort of like the layers analogy. It comes from like sort of Bitcoin, uh, so Bitcoin and the internet, right? Is that the internet?

When we think about it, we think about it in terms of layers. And part of the reason why we do that, and this is like, sorry, if you go to school for computer science, normally you end up learning about this of like the Ossi model. And it's this very, I'm sure like, you know, if you just kind of look around on the internet, you see this stack of like, hey, there's seven different layers and things start up here at the application layer.

They go down to the transport control, uh, protocol layer, which is tcp and like intermediate is, um, ip. And then it passes over to this way, and then once it's over here, it goes back up the application layer, right? And so that's sort of like the analogy that we're trying to go for within Bitcoin when we talk about layers.

But this is something that like, I only learned because I like kind of did a deep dive down the, um, like original ARPI net protocols, uh, protocols and um, like the sort of design philosophy [00:12:00] that they had was that if you look at them, they're kind of like, it's kinda like Bitcoin and eth, right? Where you had these original DARPA guys and then the os I were like some corporate guys who broke off from them and tried to reinvent the internet protocol.

And that's, they're the guys who came up with this stack thing that people learn about. That's not actually how the Internet's run. That's how like they kind of like portray it to people. The way that it's actually run using the original DARPA layers is that there's basically four layers where IP is the only thing that's important for doing that, um, connection layer between them.

And so the whole point of internet is that it's inter networking. And so you can have like these networks where at rest they kind of work differently between each other, but as long as they speak IP, then they can communicate across each other, right? So it's not this clean start from the top go all the way down.

Everything has to be sort of mirrored and then it goes across. It's that you can kind of think about it as more of an hourglass. And what's cool about Lightning is that lightning is kind of becoming this IP layer for Bitcoin, right? So you see lightning being the bridge between a bunch of different things.

So there's all this new stuff about like [00:13:00] drive chains, space chains, like different ideas for different ways we're at rest. At like the base layer. You can hold your Bitcoin in different ways and then also at the application layer having like all sorts of different interactions. But the rail between all of those, the kind of inter, like the inter networking part of it is lightning, right?

And so that's one of the really cool things about fed mint where cuz fed mint, like the thing that you're holding at rest are these ash notes. But we don't expose a lot of that to the user, right? And so that's a little different than cashew, right? Where you see the ash notes up front, the experience that you have using Fed is you're just paying lightning invoices and on the back you're like, basically like the thing that's happening is that you're using the ash and you can get into a little bit more of like the ash and the privacy benefits, the scaling benefits, that sort of thing.

But the thing that's going on in the background that you're not exposed to, like this is sort of like the. Man behind the curtain is the ash notes, but the experience that you have is just using lightning. And so that's like, if you look at the way the internet actually works, that's kind of the same experience of that.

The thing that gets exposed and the thing that kinda like connects everything is the single IP [00:14:00] layer, right? And then like at rest you can have different networks that kinda operate differently, if that makes sense.

**Marty:** Yeah, makes a lot of sense to me. And that's, I think, because I went to your demo in Nashville last Friday and you explained a lot of this and I think it'd be a good time.

I mean, we've talked about Fedie Mins and Fetty particularly on the show a few times in the past, but I think the way you articulated it during your demo was very concise and made it very easy to understand. So just, I guess, refresher on Fedie mins, generally, what Fedie does on top of Fedie Min, uh, the Fed min protocol, and then diving into the lightning gateways and how they, they work with the, uh, the invoice creation and what's going on with the ASH tokens when those invoices are getting paid.

**Kody:** Yeah, totally. So, uh, let's kinda like build up from base principles, right? So you've got Bitcoin at the base layer, there's a block every 10 minutes. The blocks have transactions, the transactions have inputs and outputs, right? [00:15:00] On layer two, which is lightning, on those base layer transactions, you have an output.

And instead of just me sending it to somebody, it's me opening a channel, which is gonna be a two of two multisig, so I can sling payments back and forth, right? So at the base layer, we're optimizing for security and robustness at the lightning layer. We're trying to optimize more toward, there's some trade offs associated with it, but the thing we're trying to do is instant final settlement of, uh, payments, right?

And so that's what you can do on Lightning that you can't do on Bitcoin. And some of the things that kind of emerge out of this is that there isn't an extremely good solution for privacy, right? So like I know you've had Tony on the show and like, uh, in Austin, like Tony talks about this stuff all the time, right?

Is that like on the base layer and on lightning there's still significant tri privacy concerns, but there's also concerns for, at the lightning layer is that that's not something that scales to billions of people. Right. And so while we have a really good base layer of the optimizing for the 21 million at a block every 10 minutes while we have lightning, which lets us do the interest, like the instant final settlement for payments, [00:16:00] it's like we still don't have like a really good, robust, scalable custody solution.

But it does, doesn't involve like a third party eventually running lightning nodes, for example. And we also have some privacy concerns as we go up that, right? And so Fedie Mint, when Eric Sirian originally came up with it was that he didn't have the lightning component. It was just a privacy and scaling solution for Bitcoin, which was you run a traian ash mint.

And so this is back in the 1980s when David Chaum comes up with his blinded signature scheme so that you can basically run a bank where there's no concept of a user, there's no concept of an account, there's just notes, there's just dollars basically. And the dollars, it's impossible to correlate the inputs and the outputs.

And so anybody who uses the bank is com, the bank is completely blinded to the use, uh, to the use of the users, right? And so off of that, the problem becomes, hey, well the mint is centralized. The mint's like one guy, right? And so Fetty mint is what if we took this accounting system, this, [00:17:00] uh, this sort of bank system with blinded signatures and stuff, and we federate that mint and we put it on Bitcoin.

And so the way that that works is that you deposit Bitcoin, you get e cash notes that are signed by the, um, that are signed by the bank. You unblind the ash notes so that when you use the ash notes back at the bank, they have no way of correlating the inputs and the outputs. So you achieve like great privacy.

Your anonymity set is every single note of that denomination that's ever been used by the bank or, or the mint. Sorry. We'll, so we'll use mint just to kind of clear things up. Is that, but used by the mint, but for Fetty mint, we're gonna take that centralized mint who's doing the signatures and we're gonna federate him, right?

And so now you get the privacy solution for this, but you're trying to, uh, you're trying to lower the trust assumptions by federating him, right? So we can do like a three of four or a five of seven, or a seven of 10, or like whatever we wanna do it for such that somebody for, for example, be malicious and they could try to steal all the funds, but there's nothing they can do, right?

Because they would need to coordinate [00:18:00] across the larger federation in order to do it. And so when Eric first came up with this, this was just a privacy and scaling solution for on chain Bitcoin. But so he solved one problem of that, Hey, what if we federate the mint? But then this is sort of like where Fetty Mint becomes this larger scaling solution and being able to kind of address a bunch of the concerns that now you had at Lightning, right?

Is that you can, the E the problem with the Mint is that you're only going back and forth with the ash to that single mint. And so. It's not very useful unless everybody's in the same mint and that becomes a problem, right? Cuz we don't wanna have this centralized solution for it. And so what's cool about Fedie Mint is that we came up with this concept of gateways.

And the gateway is just somebody using the mint who also runs a lightning node. And so you pay that node in E cash, which is the claims against the Bitcoin and the men, and then they complete the lightning payment or vice versa. And so now this becomes like a really good scaling solution for a community [00:19:00] where we can show up at a community, we get seven to 10 to however many people within that community, or like technical enough that they could run a node and have a Fed Damon run alongside it.

And then anybody in that community who's running an e, uh, a lightning node can com provide lightning services for the community. And so now within the community, you've got ash notes going in, ash notes coming out. So you achieve very good privacy. You've got the ash notes. They're highly scalable, right?

Because you have like multiple people leave within you when you deposit into the um, Went to the, um, into the Mint, then you're not having like a single U T X O or multiple UT XOs for individual people, right? Like you can consolidate the reserves within the mint. And so now it becomes a scaling solution for like on chain Bitcoin.

But so you have privacy, you have scaling on the on chain Bitcoin, and you have interoperability with the wider lightning network by swapping e cash to, uh, lightning. So the experience that people have of using Fedie Min is that they're just paying lightning invoices, but what's on the background is that they're settling, using the [00:20:00] EAC notes, right?

And so that's kinda like the fed min protocol, how that works for that one. If you got any questions or I didn't cover something specifically, like that's sort of the big overview there and then we can talk about Freddy after.

**Marty:** I mean, you touched on it. I think we should elaborate on it because I think after having listened to the last session of the Lightning Summit in Nashville with Tony, Lisa, um, and Alex from River, is that light lightning in and of itself probably isn't like the end all, be all scalable solution unless you want it to centralize amongst large third parties who, who can become targets to government regulation and scrutiny.

Uh, and I think you said like, if we want to avoid that, adding fed to the mix is, is vital to ensure that we have sufficient, uh, distribution of lightning nodes at that layer. Why does Fed Mint help this.

**Kody:** Yeah. So here's, here's a couple elements for it, right? So one is that [00:21:00] when you're servicing a federation as a lightning node or you're providing lightning services to them, is that you're basically balancing the liquidity across everybody within the federation, right?

And so this is something, if you've ever run a lightning node, is that you want to basically have your lightning transactions represent a ton of economic activity and not just be linked to hey, one person, like a hundred channels, right? And so like we kind of get there a little bit with splicing, right?

Which is pretty cool. So now like, I don't know if you saw it recently, is that Phoenix? Like they announced like their version of splicing, where now as a mobile user, I have a single channel that I'm resizing. With the async node, uh, with the async node, which, uh, connects me out to the broader Lightning Network.

So that's like one way of kind of getting much more efficiency from Lightning. But what's cool about using Fed Mint is that now you can have like these communities that are all using the, uh, the Fed mint, right? In order to do the custody of the Bitcoin. And so you can balance the interactions with cost.

Maybe they have like five or six or seven different people across a community servicing maybe like a hundred or [00:22:00] 400 people within it, and they're going through those different lightning nodes. And because they're using the ASH for the transactions, they're achieving privacy from the lightning nodes, privacy from the Mint, and the Lightning service providers and the lightning nodes.

They really like this, uh, this model because now I can have a single Lightning channel that I'm using to service maybe like 200 or 300 different people, right? And so that's why it becomes like a scaling solution for Lightning is, and this is something else that we've kind of like figured out of people running lightning nodes for this stuff.

The tendency is for lightning nodes to kind of become service providers, right? And the reason why is because you need the economic incentive to run the node and like become a good router and stuff. And the thing that you want, the ideal person on the other side of your channel is somebody who represents a ton of economic activity, right?

And so that's like one of the ways that through Fed Mint you can kind of scale out that part of lightning. But like the simple solution for scaling it out right, is you just have everything be custodial. This is an option where there's sort of a natural limit to the size of these federations because of the trust assumption required for like, hey, there's five of seven people, or six of 10 or seven of [00:23:00] 10 people.

We're running this federation, if they're not close enough to you that you can socially sanction them and that like, uh, you know, NDK likes to call this proof of punch, right? Like they're close enough to me that in the event they tried to rug me, then it's like, Hey, this is Bob from down the street. He's part of my community.

Or this is like, you know, like John from the va, right? Is that they're close enough to me that I can hold them socially accountable for these things. But the, like, the guys running the, uh, the ment, like they're not being paid for what they're doing. The lightning service providers who are providing services to the fitment, right?

Those are the ones who are making routing fees, right?

**Marty:** Yeah. So this provides a clear economic incentive for people to spin up and maintain lightning nodes.

**Kody:** Exactly. Right. And you an ideal partner on the other side of it, right? Because this is the issue for anybody running an lsp, right? Is like, and I know Async for example, they're like the, like the poster child for this is that you spin up all these nodes, they lock up liquidity, right?

And so somebody, they, uh, do a transaction into Phoenix or whatever, in order to have to like have them receive or have like a good UX on that, you [00:24:00] have to lock in some inbound liquidity for them as well, right? And so this is one of those ways where, well, now you just have like an individual who maybe uses Lightning wallet like 1, 2, 3 times a day or something like that, right?

Like he's locking up a ton of liquidity as it goes to that. The ideal party that you'd want on the other side is someone who represents a ton of economic energy. So is slinging payments back and forth, or is just using the channel much more, right? And so when you're a lightning node providing lightning gateway services for a federation, That's like an ideal partner is something that's very good for scaling out and, um, having lightning be like a good rail between everything.

Remember that analogy we were talking about before Of that lightning becomes like the IP layer connecting these separated networks. That's sort of like the image you can have in your head of how Feds sort of scales this out. You've got all these different feds, you've got hundreds, thousands, millions of them potentially, right?

Um, and then all connected via each other via lightning. Mm-hmm.

**Marty:** And to be clear, it's not the federation members that have to run the Lightning Notes. It could be a [00:25:00] user within the Mint that's providing service. No,

**Kody:** maybe, maybe we can talk like specifically about what the Fedie Mint is doing. Right. So basically, and this is why Fed Mint, it starts off as just a way to custody Bitcoin, but it becomes this wider building solution for federating any application.

And why fetti we, we can move on eventually is, uh, fetti is talking. Uh, the way that we like to talk about it is that it's a way to create a, a federated operating system for managing your money, your data, and your digital life across all of these different federations. Right? And so let's kinda like take a step back of like, why do we need the federation at all?

And so one of the issues like I'm, I'm sure that you've run into this, and I'm sure everybody in Bitcoin has run into this of that, when you go from third party to first party, That when I take self custody, right? If I'm like technically capable of like, absolutely we should do that. Right? And this is an issue that a lot of Bitcoiners run into, is that you start thinking through the consequences of self custody, which is that, okay, well now it just exists on my phone or my hardware wallet or wherever it is, I need to make a backup, right?

I need to make a backup such that in the event that I'm in an accident [00:26:00] or something specifically happens to me, that I can have a recovery mechanism for it. And so kind of like the gold standard for this right now is that you wanna have, um, something like Unchained or Casa, right? Where you have a threshold multisig backup.

So in the event that something happens to you or you lose your keys or your specific hardware wallet, you can go get a quorum of people like my wife, my mom, my lawyer, and uh, you know, like my friend who's also very technical or something, and they can come together and they can help me recover my funds, for example.

Right? And so like, just kind of the, uh, little nugget that I keep in my head for this one is that any self custody solution resilient to you being in an accident. Implies some sort of threshold custody, uh, threshold recovery mechanism. And so that threshold recovery mechanism could just be a one of one, which is that I have a copy of my seed words on like a steel plate and my wife knows where that is, and I've like hidden it somewhere or something.

And the problem becomes, well, now what if I like get a divorce from my wife or something, right? Or my wife just like does something where [00:27:00] to own Bitcoin is to know how to spend it, right? And so the moment that she holds onto those, uh, seed words, she owns it just as much as I do, right? And so kind of the next step for that is, okay, well what if we split that up?

We can either like shard it using streamer secret sharing, or we can do a multisig or something like that. Well, now this is something that people run into when you try to do, uh, like a multisig solution. If you only, you say, Hey, I move this stuff into a multisig. Well now in order to do any spending, I need to get signatures from everybody, right?

And so people are like, okay, we'll move the cold storage funds into the multisig and then we never touch the cold storage funds, right? And so what's really cool about Ash for this one, and this is like look, first like the federation, is that you can think about the federation as we're going to formally set up this threshold backup mechanism, which is that.

I go through this process of setting up the initial guardians for this. And so this is like a threshold backup in the event that I lose my phone or in the event that I lose any, uh, anything or whatever I can recover by, um, using this threshold backup mechanism of the federation. So that's like called social recovery, which like we put into Fed as well.[00:28:00]

And so you have this threshold backup mechanism, but on a day-to-day basis I'm using the ECA notes. And the ECA notes are single sig. And so you get the experience of using something like wallet satoshi of just like, Hey, I just scan it. It doesn't have to go talk to anybody else. It just does the e cash payment or, uh, by the lightning gateway and it just gets completed.

And the lightning gateway, because it's a larger node servicing a bunch of people, the routing is more reliable, right? So you get the experience of using a third party, uh, third party custodial app, but you also get the additional privacy and you get this threshold backup mechanism outta the box, right?

And so that's sort of like why we arrive back at a federation once we start thinking about like, oh, self custody, right? But in the event, like you can't self custody, absolutely do it, right? But this is like if we wanna scaling solution for example, that we can bring to like the global south, there's not even the infrastructure for getting them hardware wallets, for example.

This is one of the things that from working at Fedie, I've kind of learned for this is that like for me, right? I, I can get five cold cards, I can split 'em up, I can like get steel backups and all those kinds of things. Like if you don't even have the supply chains in place in order to reliably get someone a hardware wallet without it having being tampered with, right?[00:29:00]

You need some sort of uh, like different solution and fed's kinda an interesting tradeoffs for those solution sets, right? And so that's kinda covers the federation side of things. And so we can kinda move on to. The other stuff later, but like if you got any questions there, like, I think I covered a lot, so

**Marty:** No, and I like how you guys classify it as second party custody.

It's in the middle of that spectrum between first party full Bitcoin and cold storage and third party full. You just completely rely on an exchange or a custodial wallet like wallet to Satoshi. And then it is a bit controversial. Like, uh, there's definitely the, the hardcore hold ut XOs on chain in a wallet that you control or run your own lightning node where you actually don't own Bitcoin.

But if we're being honest with ourselves, like it's not gonna be possible to scale Bitcoin at the pace layer two billions of people, um, there simply [00:30:00] will not be enough. UT XOs, you cannot create an individual u t XO for every, every human, even a billion humans if you want it to. Not even the whole world, just a small percentage of it.

Um, which then leads people to the question of, well maybe Bitcoin's not for everybody. Maybe it's for, um, the hardcore people who just want to, um, do stuff out of the perver purview of the state. But I'm not. Under the impression that that's, that's where we're going with this. I do think everybody should have access to Bitcoin and the value it provides.

And we do have to weigh those trade offs and sort of find out where that, that happy medium is. And I think the ment and fe fetty solution, um, is a very creative way to solve the scaling problem. Because again, if we want to get as many people as possible, access to the best money on, on earth, there are gonna be some trade-offs made along the way.

And it's just evaluating those trade-offs and making sure you don't go too far in one [00:31:00] direction.

**Kody:** Yeah. And that's something that's like a real motivating factor behind a lot of the work that we do at Fetty, right? Which is that for like that initial reaction that you get where people say, oh, hey, well maybe Bitcoin can only be for like a couple people or something.

Right. Well, it's kind of hard to do that. That's kind of hard to have the conversation with somebody. Like for example, one of the things that I did after I finished up my active duty time, I got reactivated as a reservist to go help resettle Afghan refugees after the Afghanistan withdraw. Right. And one of the things over there, that's something that really taught me that like, Hey, Bitcoin is something that people need, not just something that like.

Certain privileged people want, for example. Right. And so, like, when I was there, one of the really valuable things I was able to do was help teach them how to use stuff like, uh, cuz like OK Coin was still operating in both Afghanistan and the us So after they closed off TransferWise, they closed off Western Union, they closed off everything.

The State Department, like shut down all fiat flows from the United States into Afghanistan, like in entire its entirety. Like the only way to get [00:32:00] money in there was using some sort of permissionless protocol. So like Bitcoin, which would, they would go over there and then normally they would end up swapping it to a stablecoin or something.

And just figuring out a solution in Afghanistan for just getting money to people, right? Because like they needed to like pay in order to get people to airports they need to pay in order to like pass checkpoints and those kinds of things. Like, you know, it was a huge wake up experience for me where, you know, if the, the answer can't be, Hey, we're really sorry but we've got this amazing money, but we just can't like, like do, like fix it in such a way that you can use it, right?

Like when we're talking to somebody who's living under like 30% inflation or 70% inflation, or who's like governments or like stopping them from, you know, just like living their life generally, right? Like we need to build out tooling so that we can scale this out to everybody else. And I think Fed Mint is like a really interesting trade-off space, just like you said, uh, between first party and third party custody where we can create a scaling solution or privacy solution that allows us to bring Bitcoin to a bunch more people than if we were just using like base layer Bitcoin or Lightnings, um, on [00:33:00] its own.

**Marty:** Mm-hmm. Yeah. And that. Again, the trade off is you're getting access to Bitcoin, but you're trusting a federation of individuals or companies, maybe institutions, whatever it may be. I'm not exactly sure how this pro will progress. I could see it going down a nu number of different paths and Yep. I guess that's just being aware of how the federation could rub you and, well, that

**Kody:** I think kinda leads us into Fedie, right?

And so for Fedie, Fedie, we're calling like a federated operating system, but the idea behind Fetty is that you have a frontend application that on the backend is coordinating all of your data, your money, digital life across these different federations. So the, like, the world that we see is that you're gonna have many, many different, uh, ones of these federations because like you said, there is this trade off of yes, you are trusting the federation, right?

But we already have existing communities that are high trusts or that like, you know, it depends on how you define your community. You can define it as your local community. You can define it as your larger [00:34:00] diaspora. You can define it as like social groups. Like I know you have, uh, Bellagio on the podcast recently.

You can kind of think about it in terms of the network state and the different scales that you grow out to there, right? And with Fed Mint, basically you give them this out of the box solution where you can take the existing fe the existing community and you can equip them with really, really, really good bitcoin, lightning privacy technology, right?

And this is like where we kind of get beyond, because what Fed started as was just a scaling solution for Bitcoin and uh, eventually lightning, right? And a privacy solution, but. When you think about it conceptually is what does it mean to own Bitcoin? Is it means to own and manage the data associated with Sable to spend that bitcoin.

And so basically managing secrets. And so what you can do is, because originally when we built Fein is Fein's all written in Rust. It's like a very complex code base just in order to organize it kind of for ourselves. And like Eric, Eric and um, uh, dpc who, uh, both, uh, femine contributors, uh, like Major Femine contributors.

They kind of like split, took the lead on this of that, splitting it up into this module system. [00:35:00] And so the initial modules that you get outta the box with Fed Mint, we call 'em the default modules. Are Bitcoin, lightning, e cash. And so the federation is just running this distributed consensus and you're plugging in these modular capabilities to it.

And so the same way in Bitcoin, we have inputs and outputs. Amphetamine, you have a distributed consensus just like Bitcoin where they have different, uh, current, we're moving away from this, but, uh, for using a different distributed consensus mechanism. But the way to think about it is, let's we call 'em Yeah, epics, right?

And epics contain transactions. The transactions have inputs and outputs, and you as a developer can define those inputs and outputs. And so for example, when like, uh, the normal transaction, when you peg in. The input is Bitcoin, the output is ash. When you're doing a payment, then the input is ash. The output is some like an advertisement to anyone in the federation who, if I'm out running a lightning node, I can complete this payment in exchange for e this lightning payment.

In exchange for Ash, when we built that simpy mint module, which was simplicity, [00:36:00] which is against the scripting language that Blockstream has been developing, which is gonna like hopefully, uh, be like fork into Bitcoin so that we can, um, use like much more advanced like base layer scripting is that the input for that was Ash and the output was execution of a smart contract as defined in simplicity.

And so you start building with this fed module system. Well, you can build out a module for basically any application that you'd like to run in a federated manner. And so one of those might be something like a password manager. And so you get an outta the box federated backup of all of your locally run passwords.

And so now you don't run into like a LastPass situation. Right, because like all of your data is, uh, run, run within like people that you trust, which is like your local community never goes outside of that third party or something else. Like you could do a stability pool, which is another module that's been developed for Fed Min where because you have this larger pool of liquidity, you can do stuff like synthetic dollar trading strategies.

And so you can lock in the price of Bitcoin to a dollar. It becomes this sort of [00:37:00] really modular platform for building out federated applications. And fetti is the front end application for interacting between all of these different federations. So maybe you've got one at like the VA level, like, I don't know.

I think about them for like the federations that I'll be setting up probably, right? Uh, with other people is like at the VA level, at like a state level or a city level, like my local federation that's just like people within like my, uh, like local area or then maybe like a larger Bitcoin or federation or something is that fetti is sort of the front end for interacting across all of those.

How do I manage all of my life and my data and my money across these things? So for example, if I have too much in like a larger federation where they're kind of further away from me, well maybe I can immediately sweep that into like my local federation and then from there, like immediately sweep that to cold storage if I wanted to or something like.

Right. But it becomes this really, really cool way we're thinking about, hey, I only have to expose as part of my identity, those parts of my identity that I want to be exposed as part of this like community that I'm within. Right? And so I can use money which is Bitcoin, right? And I can [00:38:00] use my data which is managed across these different federations, right?

To make sure that I'm only exposing those parts of my identity that I want to be exposed in those ones. I don't have to like tell them everything about myself in order to just be part of a community.

**Marty:** Yeah. The modularity of what you guys are building at Fetty is extremely exciting and I don't think anybody listening this can really grock it until you see it.

Like last Friday during your demo, we went from the Fetty alpha fed mint to the AI for all fed mint. And it's really crazy when you join a new Fed feint, like they have a suite of apps that are specific to that mint. Um, like yeah, Fetty alphas pretty vanilla. You can find out where people are accepting Bitcoin as payment, do a couple other things.

Um, and then you get into the AI for all Fed Min and they have stack work, which makes sense for them cuz they're doing AI hackathon and they wanna leverage stack work to help out there. You have Ellen chat, which I'm sure we'll talk about [00:39:00] mm-hmm. In a bid here. But like, that was the first time I joined another mint outside of the, the fatty min alpha or the fatty alpha, excuse me.

And I was like, whoa. Like this is really personalized.

**Kody:** Yeah, exactly. And that's one of the things for, basically what we've been talking about is like the fed min protocol layer of that at the protocol, when you initially set up the federation, you can configure it with certain modules. So for example, if you want people who use the mint to be able to lock in a dollar price of their Bitcoin, they could be running the stability pools module, right?

Um, if you want them to be able to have like a threshold backup mechanism, so this hasn't been built out yet, but you know, if you're a rust developer out there and you'd like to give this a shot, like we're doing a hackathon this month, and so this would be like a cool submission for it would be, um, like a password manager, right?

Where the threshold backup of all the passwords is managed across the different federations, right? And so for each federation you can configure like at the, uh, protocol layer, like what you're running, so what, like the ment transactions are gonna look like, right? But on the Fetti side, what we also allow you to do is like, [00:40:00] we've got kind of three phases that we're gonna be rolling this out in, is that the first phase is just like web L and interactions, right?

And so you can take a website and you can run it inside of Fetty. And so when you're running it inside Fetty, then it gets direct access to, um, like the uh, the Lightning wallet. It's not the lightning wallet, right? But it's like the E cash. Paid over lightning. And so you can do something like run stack work or you can run Stacker News or you can run like, uh, you know, like, uh, a no client or something like Primal, right?

And you can have the experience of it that's very clean because it's able to directly talk to, um, Fetty, right? So that's what it kind of starts off that way. And that's what like, just like in the initial alpha release that we've developed out for of that, you can make like really clean web outline applications that play with Fetti very well, right?

And then phase two of that is going to be, okay, well now I have this federation aspect of it. Anything that you want to pool community resource wise, like for example, if you in a community have like a couple people who have access to graphics cards or something and you wanna pool access to that and make like a tiny little graphics, uh, card form and like gate access to it, [00:41:00] that's something that works really well in a federated um, context.

Building on top of Fed Min is a module. And so the phase two is gonna be okay, well now the federations and the different Fed mints, they're gonna be able to host different applications and stuff on behalf of their communities, right? So maybe they host like a Nora Relay that's like extremely well run and they can manage access to it based on lightning payments or like membership in the Federation or something like that.

They can manage like encrypted chat applications and stuff. They can do anything like that. You can host it at the federation level. And then phase three for Fetty mods is going to be, okay, well now I've got the web l n application running inside Fetty. I've got these resources on the backend and I've got the Fed min protocol underneath it that's got running these different modules.

Well, how do we pipe through and allow somebody using fetti to be able to access the resources of the federation? And the different fitting protocol configurations through modules that they've done and expose those to the application. Right. And so if I'm running on like a web L Insight, for example, like go on a website, I could have like a chat bot.

This is just like an example for this. If you wanna [00:42:00] build this out, like, you know, please like submit to the hackathon or just contact me, like happy to work on this with you, right. Um, is, uh, maybe they have like a, um, an AI chat bot that is running against graphics cards along road locally in their federation.

And so every time they want to interact with a website on the AI side of things, so with the open up a chat bot that can expose it, but they don't wanna like have their data get passed over to third party, like open ai, then they can have that passed back run at the federation level that maybe they're running the new LOBIN two that just came out today.

Right. Like a 70 billion parameter. You need like big beefy graphics cards to run that, right. So you can have anybody in the feder, in the, uh, anybody using Fetty as part of that federation, they can like pipe that back in, run it at the federation level and pipe it back out. And so it's kind of like very ambitious, like we're moving toward that right now.

It's more just the web L side of things, but like very soon, uh, after like after the main net releases and stuff, um, we're gonna be trying to build out the, allow the feds to also be hosting resources for the fetti mods and then also having the fetti mods be able to directly access those resources via Fetti.

Right.[00:43:00]

I think I'm on mute. Marty

was on

**Marty:** mute there. I mean, you said it's early days and you got big ambitious goals, but I mean, it's just the stacker news example. Like in the Fetty for all, uh, fed meant I jumped in there and used web LN to sign in and then boosted a post or upvoted a post. And that was a beautiful thing. The first time on iOS for me doing a lightning payment on a site like Stacker News, I didn't have to leave the app.

It literally just popped up. It was like, pay now done. Yep. And just that UX improvement alone is massive for making the barriers to entry much lower for people.

**Kody:** Totally.

**Marty:** Yeah. Yeah. And the, um, in the, before we jump into ai, cause I, that's actually why I hit you up. I was like, I need to talk about Bitcoin and ai.

You're on [00:44:00] the cutting edge, I would say. Um, but just to wrap up, like the, the trade-offs with the federated model and diving into the individual guardians, the federation members, I mean, I did ask this question on the panel after mm-hmm. Your demo last week, which is what are the hardware requirements for an individual guardian?

And it's, if they're running a umbrella, a start nine, whatever it may be, just have Bitcoin core downloaded and you download ffe Min right alongside it and boom, you could be, um, a guardian. Within a, within a federation. The follow up question I wasn't able to ask but wanted to able, wanted to ask you now is what are the liveliness requirements for each individual guardian?

Like say one of their servers goes down temporarily. Yep. What's the process for that to get back, back in the swing of signing these token transactions?

**Kody:** So this is a Bitcoin or podcast, so I can talk a little bit technically about this, right? Which is [00:45:00] the ideal configuration that you want to have when you're setting up these fitments, is you want it to be Byzantine fault tolerant, right?

And so that's like fancy computer science. Um, Byzantine fault tolerance is when you're talking about a distributed system, it's very hard to distinguish between somebody who's lying to you and somebody who's actively being malicious or somebody who just hasn't been connected, right? And so in terms of, there's like certain distributed, uh, consensus protocols that require you to be online continuously, right?

So if anybody drops out, then like everything stops and like you have to do this whole restart mechanism. And like, sometimes you can't even restart depending on the, uh, different protocol that you're using, right? So the thing that we're using is we're using an asynchronous byzantine fault tolerant consensus mechanism.

And so what does that mean? It means that, Feder, like different federation guardians can go offline and if they go offline, as long as they're above, like the number is three m plus one, where m is the number of malicious, uh, peers. So if you have a three of four, then that's three well, uh, [00:46:00] M of one. And so one person can go offline or be actively malicious trying to steal the funds and there's nothing that they can do is that the protocol will just continue because you have the three signers who are able to continue going, right?

If you have a federation of um, like five of seven, then two people could be actively malicious in trying to steal the funds or just go offline completely and there's nothing that they'd be able to do. And so now it's like, okay, well what if two people, if you have like a three or four, and what if two people become actively malicious or something?

Is that the specific one that we're using right now is called H B B F T, which is Honey Badger Byzantine Fault Tolerance, which is like, you know, like little Bitcoin joke about it. Right? And the one that we're moving to, there's a different one that we're moving to called, right, but one of the properties of both of these is that in the event that you've got less than two thirds of the guardians who go offline or actively malicious, the protocol just stops.

And so because you can't get the three of four or the five of seven because you've got additional people who are malicious, you can't sign additional transactions in order to [00:47:00] continue with the protocol, but they can't steal the funds. Is that you're just stuck there? Is that, so for example, if we're doing a three or four federation and one person goes offline, Nothing like the user experiences, nobody notices that.

Right? But like, you know, on the fetty side, we'll probably do like a notification that it's like, hey, you've got a guardian who's been off for a while or something like that. Um, like maybe you wanna sweep your funds to a different feder, to a different fedie Min or something. And then, but if two people go offline, so you've got two of the four who are offline or actively trying to uh, like, you know, be malicious and rug or whatever, like they can't do anything.

And the reason why is cuz it requires three of four in order to do anything with the protocol. And if you don't get three of four, it just basically stops where it is. And once you get three of four it continues. Right? And so that's like a little bit technical on those things, but I think, uh, we covered each of those, right?

Is that if you've got less, if you got one third up to one third of people can be malicious and they can be like actively malicious guardians or something like, you know, one of the guardians is, or just, or just goes [00:48:00] offline. Cuz in a distributed consensus system, it's very difficult to determine, distinguish between people who are actively trying to be malicious, people who are just offline.

And so the way that you solve for that is you build a protocol that doesn't distinguish between those, right? Is that we treat you if you're offline as being malicious and we solve for it anyway. Right?

**Marty:** Yeah, that's what I was gonna ask. Cause my assumption is that a lot of guardians are just gonna have problems every now and then with their servers.

Like I've seen this with our lightning note at t FTC goes down every once in a while. If our disc requirements aren't enough to snuff, we have to upload. Upload the amount of data we're buying from our cloud provider and well, so the

**Kody:** process of running a guardian node, right, is that if you're running the ment Damon, you just run it alongside a Bitcoin node.

Like a Bitcoin. No, you don't have to have a lightning node for it. Remember the guardians are just running Bitcoin and so you have a Bitcoin node, you just run the ment Damon alongside it and you just keep it watered with electricity and hard drive space and you don't have to touch it and that it [00:49:00] just sits there and it's just running this distributed consensus with everybody else.

Right. And so this is another benefit of it, right? Is that because we have this distinction between the guardian nodes and the lightning nodes, because the lightning nodes are extremely sort of like intensive to like go back and forth with this. Like I think Callie just a couple days said like, you know, um, something that people don't really talk about is the PTs D associated with running a large lightning now is that it's very hard to do and very hard to do effectively.

Right? And so like, yeah, there's like some of these solutions that are coming out which are like breeze and um, like Phoenix or whatever that like make it a little easier but kinda like abstract that away a little bit, right? But just generally speaking, it's very hard because lightning, you have to be live all the time, right?

And so what's nice about Bitcoin core node, right? Normally, and this is why people can just kinda like have them run and sit in the background, right? Is that it doesn't really require you to interact with it. Fein would just be something you run alongside your Bitcoin node. And you can just like have it sit there and you don't have to touch it, you don't have to, um, be doing anything crazy about it.

You know, just keep it, make sure that the, uh, electricity is still running, [00:50:00] that you have enough hard drive space and it's not too much, uh, additional hard drive space versus just running a Bitcoin cornet.

**Marty:** Yeah, I'm really excited for what Breeze is doing. Things like Blockstream Greenlight, uh, v Ls, like those solutions that separate the private keys from the node and allow, allow you to run the private key in one piece of hardware that can always be on and just allocate everything else to the cloud on the node side of things.

I think that's gonna be massive for usability. I could be wrong, but that's just my assumption.

**Kody:** Yeah. I mean, I've even seen it. Right? And just in terms of like kind of being doing lightning stuff for the last two or so years, right? Is that the ease of use of doing this stuff? I mean, like the Breeze SDK is really beautiful in terms of making like a good developer experience for um, like running a lightning node for this stuff.

But like, this is also just another issue that we have and this why we talk about this like kind of spectrum of first to third party custody, where there's this big spectrum in the middle of second party custody, right? Is that there's an interesting set of trade offs [00:51:00] within there that we're exploring, right?

Which is that, and like even with, uh, like Running Lightning does, right? Like you can be like very close to the metal. You can also be, okay, well Phoenix is running on my, uh, note on my phone, right? And like I don't really have to interact with it or touch it in any, any way, right? There's kind of spectrum between those is that you can use that same spectrum when you're developing different lightning applications, right?

So for example, one of the like easiest ways to get started building lightning applications if you're just a front end developer is using lightning addresses where you don't have to manage any of the node stuff. You don't have to touch any of the node stuff. You just do normal HTTP requests and like on the backend, like there's a lightning address server, which is serving this stuff up, right?

So I found that a super effective way for getting new devs to start building on Bitcoin is just using lightning addresses. And then once they realize, oh hey, I'm actually making a bunch of money in terms of doing the lightning address stuff, um, uh, Sorry, I'm just letting my dog in. Um, once I start realizing I'm getting a bunch of money, well, okay, well now I'm trusting the Lightning service provider who's running the lightning address server, so maybe I wanna move to doing my own node and I can kind of move [00:52:00] that way.

And it's the sort of same sort of thing with Fed Mint, right? Where maybe you start with a very close to you federation, maybe you like, join some like further away federations. The money and data that you have associated with that larger federation is like, okay, this is getting a little bit too far away from me.

Maybe I'm like not as close with those guardians anymore, so that you can roll it back to something closer to yourself or you can, um, so you move it back to something closer to yourself or you can sweep into cold storage or like, uh, um, first party custody for example.

**Marty:** Yeah, I mean, I think having that optionality is very important and at the speed of lightning as well, because like equating it to something like a Binance where you have that full custodial relationship and at some point they thrust KYC on you and if you don't fill it out, you're not gonna get your Bitcoin.

Yeah. The federation at the speed of lightning, if you begin to worry that that's gonna happen with your guardians, you just get it off right away. And then, um, since they don't know who you are individually, it's much harder to do all that.

**Kody:** [00:53:00] Yeah. And for that privacy aspect for it, right? Like, let's talk about that for a second of that.

When I'm talking about like some third party over there who doesn't know me, who doesn't know my family, who doesn't like, not very close to me in terms of the private, there's different privacy, privacy trade offs associated with it where like I'm not very concerned that they like see some of my like personal interactions and those kinds of things.

Like I'm not like the most, like generally speaking, when people are using big, um, when people are using money and using credit cards and stuff is that they're not as concerned that like, hey, some random person may or may not be able to, sorry, my dog is digging. Um, may or may not in the background, uh, transactions.

Um, like, but once you're talking about like, hey, very, very close to me, like this is Bob down the street. This is like a community leader. This is somebody who's like very, very close to me, like my wife even, right? Is that you need to have that baseline of privacy, right? Of that like, or maybe I'm like living in a government where a lender under government that doesn't like approve of what I'm doing.

If you're running these local federations with second party custody, you need to kind of start from the building off of like, hey, you have really good privacy. And then after [00:54:00] that, like maybe you can make an opt-in module, like this is something that's a couple people have been working on is like making an accounts module for example.

So you wanna do something like, if you wanna run like the VM as part of the contracting system for fedie mint, then like you need some like account model for it. And so an accounts have persistent identity. You don't have this good, um, uh, you don't have as good, uh, privacy associated with it, but the default outta the box options for Fed min are that you achieve very, very good privacy.

And that's reason because you're like, you're running in these local communities, so you wanna be able to opt into it. It's kinda like the cipher ethos, right? Of that like, privacy is not secrecy. Privacy is the ability to selectively reveal yourself as part of a transaction. And that's sort of like the design decisions associated with Fed of that, like outta the box.

It's that, hey, we're using the e cash system, we're using Lightning, we're using Bitcoin. Right? But then you can add additional modules and configurations for say you wanna have like a persistent identity, like you wanted to do something like lightning addresses. So we're actually coming up with some pretty cool solutions for doing lightning addresses that maintain your privacy.

But like if you wanted to do a lightning address, normally you'd have to do, um, you'd have to have a persistent identity for something like that, right? Because it's, you know, I'm marty@getalbi.com or [00:55:00] something, right? Hmm.

**Marty:** That is my lightning address if you guys wanna send me some sets. Oh, ok. But, um,

**Kody:** yeah,

**Marty:** that's one of my lightning addresses.

What do you think the first killer module or killer app or use case of, or within Fetty particularly is

**Kody:** gonna be? Um, I've been extremely bullish on synthetic dollar trading strategies, and so this was actually back when I was at kx. Um, so I, I was like originally just kind of, that was like my first software engineering job, so, And so, um, but like while I was there, I was like running these like weekly sessions on like, this is how Bitcoin works, this is why it's important, this is why like Bitcoin not some of these other coins, right?

And so one of the things that while I was there was, um, they had the collapse of, uh, all the banks, like the crypto banks, remember that we had like Silicon Valley Banks, silver Gate Bank, and um, signature Bank, like they all collapse within like a week of each other or so. And like in the days before that and the weeks before that, I had been like, Hey, this is not a question [00:56:00] of going from, uh, you know, like one bank to another.

This becomes a question of what if there are no banks? What if we can't get a banking license at all? Right? And I think that a lot of people are running into these issues. And so one of the really interesting solutions for that is using synthetic dollars. And so the way that that works is basically I go, I hold some, I take my Bitcoin and I deposit, and I like hold my Bitcoin here.

I take some percentage of it and open up a short, short position against that Bitcoin. And so now the price of the sh if the price of Bitcoin goes up, then the, some of the Bitcoin that I'm holding goes up. But the short price, the position that I'm holding is the short goes down. And the net between those is a stable US dollar price, right?

And so this is a way that you can do without having to touch a bank because all you need is Bitcoin in a place to trade it. You can lock in the price of Bitcoin to dollars. So for example, this is what, um, Galloway is doing in order to give us dollar bank, uh, US dollar accounts to everybody who uses Galloway, right?

On the, the Blink wallet is that [00:57:00] they, because it's a custodial solution on that one, then they have a sufficient liquidity associated with it. They can do these hedging strategies in order to create synthetic dollars so that they don't actually touch banks at any level of the stack. They're just shorting Bitcoin on an exchange using perpetual inverse swap contracts.

And they're holding and they're going long. So maybe I have like a million SATs or something. I take like 600,000 of those and then I keep them, uh, like segregated off and then 400,000 go to the exchange or the defi pool or whatever it is that I'm using to short the instrument. And so I open the short position and say like, the price of Bitcoin goes up, well then the price of my SATs goes up, it's over here, but when I close the position on the exchange and I get it back instead of the 400,000 SATs, now I have like 200,000 SATs or whatever.

Right? And so I haven't been exposed to the price volatility of Bitcoin. The net between those two is always a stable US dollar price. But in order to do that, you need sufficient liquidity because like in order to get like good order book depth, you need sort of like larger than like in order to not get like killed while you're um, [00:58:00] uh, doing these trades in order to like hedge out the position properly.

And so what's cool about Fed Mint is that we've got this stability pools module that like fed like federations that it's not that one of the default modules, but it's something that federations might be able to run, is that now because you have additional liquidity and you have additional depth. You can basically create an API for locking this in.

Locking in the price of it. Because you can have liquidity providers for the federation or like, Hey, I want a short Bitcoin or I wanna go long Bitcoin or whatever it is. And like they can be the other side of that trade in order to, for people in the federation lock in their price of Bitcoin. So the experience they have is just using dollars.

Like the thing that shows up in their app while they're going back and forth is like a dollar price, but they can still scan lightning invoices. They still get the advantages of the Akash uh, claims and those sorts of things. Right. So I think that's like a huge um, unlock for that. Cuz something that I've seen personally is that like the price volatility of Bitcoin is a huge deterrent for a lot of people who otherwise would join in, right?

Like they want the rails of using Bitcoin, they want the instant finally settled micropayment over lightning. They wanted to be able to like, you [00:59:00] know, like I know you were talking about this, I actually started this, I haven't finished it up yet cuz I was a little bit busy this morning, but making like basically do a lightning payment and then get like a stable diffusion 2.0 generation or something that costs 0.10 cents, but you can pass that cost that'll costs long in SATs.

They want that experience, but they don't want to be exposed to the price volatility of bitcoin. Right. And it's not something if you're like in the global south and like your net take home at, uh, into the week is like 50 bucks or something. Like you can't be exposed to a 25% price swing, for example. And so I think that adding in a stability pool module where even if you're in a place that doesn't have a banking relationship, you can set up one of these federations and then on the, like the people within the federation, they can lock in the price of do, um, Bitcoin to dollars.

So that gives them a really cool strategy for now I get the permission listlessness and advantage advantages of Bitcoin, but I can don't have to be exposed to the price volatility associated with that. I think that's like a huge unlock. I completely agree.

**Marty:** I could see that being the first killer use case.

Not to answer my own question, but no, [01:00:00] Peter McCormick was tweeting about it the other day, like, ah, I had to pay somebody in Argentina and they asked me for stable coins over Bitcoin. Like there's obviously a use case over here for this. It was running over Ethereum like, are we doing enough in Bitcoin?

And again, I think there's, in order of operations to all this, we will get to that point where you can exchange stable value using the Bitcoin rails. It just took some time to get things settled at the protocol layer to enable lightning and get lightning mature. And then have Eric and a bunch of others come up with this idea.

Really Eric come up with this idea of fed mint. Uh, leveraging lightning and then bam, we can do it. Like stability pools won that hackathon in the fall,

**Kody:** correct? Or Yeah. Where I came on Fetti, that was a hackathon, I think it was January-ish. Right. But, um, they were the ones that built that one. And stability pool.

You can kind of think about it as like a defi pool, right. But like without all of the problems associated with doing that, where you try to support like all of these crazy [01:01:00] multiple currencies and have like all of these weird issues associated with the liquidity providers, right. Is that it's just a very clean interface of the reason why this thing exists.

The exclusive thing for this module is that you have people on one side of the trade, we're trying to lock in their price of Bitcoin and people on the other who need liquidity provisions in order to like put on a long or short position or whatever. Right? It's like a very limited set for that. But because you're just limiting that set out of it and because you have the additional liquidity of the federation versus like an individual where normally, like the batch sizes for these hedging positions is normally updates of like a hundred dollars ish, right?

Is that in order to like, make this thing work, you need the additional liquidity and depth of an order book of a larger group. Right? And so the federation becomes like a good intermediate layer between, hey, you don't have like this third party, um, who's like, you know, like Kraken or something like that, right?

Where um, but you, it's not like an individual. And so in that intermediate layer you can get, still get the good execution, um, costs in order to make it so that uh, you're not like losing all, losing your shirt on all of the trade costs associated with doing the hedging.

**Marty:** Yeah. And then liquidity [01:02:00] providers are incentivized, provide that liquidity cuz they're gonna make some money on the fees for Yeah.

Holding that liquidity in there. And yeah, and another thing too, like you can abstract all that, like per swap, taking a short position away where it's like, Hey, how much Bitcoin do you wanna lock up?

**Kody:** How much did you, it's super simple, right? And this is one of the really cool things. I actually did some initial work on this, I haven't gotten time to finish it up, but of taking stable SATs as it exists in Galloy and it's just an open source rust implementation of that.

Taking that and turning that into afe module, right? So that you could literally, if you wanted to, then the strategy for it, for doing the liquidity provision for it is that you could use a third party exchange if you wanted to. And this is something like, you know, it'd be better to use stability pools where you're just doing it locally within the federation.

But like the whole point of fedie meant is that it's an opt-in system, right? So like outta the box, you get really good privacy, you get Bitcoin, you get on chain, you get ash. Right. But you can opt in using these modules to additional stuff. Like maybe I wanna have an account system. Maybe I want to [01:03:00] use an e bm, uh, the smart contracting system.

Maybe I want to like run simplicity, right? Or maybe I want to have like space chains or something like this. Like what's really great about this is you can just take any application that you could run in this federated context through, cuz you already have the, like the ment system set up there where they're running a distributed consensus.

You've got access to Bitcoin, you've got interoperability with lightning, you've got the ash abstraction in order to do sort of like the bearer instruments of moving between, uh, between different modules and between different inputs and outputs as the, on the transactions. And so it becomes this really, really cool layer for, you can just opt into these different layers of like, you know, for this one I, maybe it's, I want to like, maybe we can start moving onto AI with this stuff.

Is that one of the cool applications I really think is gonna be, um, another really cool one for vet is going to be hosted access to GPUs, right? And so for a lot of these like communities that we're thinking of launching in, you don't have a bunch of individuals who have graphics cards themselves or the ability to access graphics cards at a cloud level, right?

So like one of the issues that, um, like this is what [01:04:00] kind of prompted me to start going further down the AI side is that they really have serious monetization problems. And the reason why is because, like I show up at your website, I hit a GPT four call that cost two to 7 cents. Right. And so the cost is gonna go down, but the quality of the models is gonna go up.

And so whenever you want to get access to the most recent stuff, most like cutting edge stuff, it's going to be uh, like, you know, a couple cents or a couple fractions of a cent or something. It's not something that you can just amortize out your cost because it's basically free. Right. Which is what kinda like the previous computing paradigm that we were in with like, I don't like the web two, web three thing, right?

But like web two is that, you know, it doesn't cost Facebook much to just have me show up at the Facebook website a bunch. But if I showed up at Facebook and the first thing that happens is I do an interaction with their new LAMA two model, right? Like Replicate, which is one of the companies that's like exposing APIs to a lot of these things.

They don't even let you hit the 70 billion, uh, parameter one, which is like the biggest, like most performant version of the model. And the reason why I think is because it's too expensive and they can't just like let people hit against that. And even if you wanted to pay for it, the mechanism they currently use for [01:05:00] paying for it is credit cards.

And so that limits the number of people that you can have access to and it requires them to docx themselves to give their information, to give all their credit card stuff. You have to work through Stripe. It's like this whole thing, right? And so what I really think is gonna be cool is Fedie mints running basically hosted access to graphics cards for people within their community so that you can run something locally that you can't just run on your phone.

Right. But you don't have to reach out to a third party in order to do the execution for

**Marty:** Yeah, I mean you provided the jumping off point for the AI discussion, but before, like, cause that I do have some questions around that particular use case. Mm-hmm. Specifically is like, will you be getting access to the best AI products in that model?

And before you answer that, maybe we just start pretend like I'm the idiot. I am, don't know anything about ai. What is the AI landscape? I mean, I'm sure everybody's heard about LLMs, generative ai, uh, the compute [01:06:00] necessary to make it all work. AI agents, like what's the base of artificial intelligence in the industry growing around it and like the iterative process getting built on top of it.

**Kody:** Yeah, sure. So let's kind of do like a brief overview of why this stuff has exploded recently, right? Is that the specific things that we've been kind of working on and that have sort of like been developing are these large language models. And so basically a language model uses, well, let's like make it even more simple, right?

Is that basically with large language models, what you're doing is you're basically training it over a giant data set, which is think about like the entire compendium of human knowledge. And we're just taking all of that, and we're just saying, okay, based off of everything that has ever been written, which is like, you know, the data sets associated with doing this are scrapes of the entire internet, giant code bases.

Like, you know, I think like for like Microsoft's models and open eyes models that use like the entirety of GitHub, for example, right? Like all the [01:07:00] open source stuff available there for, um, not only the LA language models, but for the diffusion models, they're training him on like billions and billions and billions of different, um, like pictures, right?

And uh, images and videos. And so you're just taking all of this stuff and then you're saying, okay, based off of everything that I have there, I can predict what the next letters are going to be in the input that you're giving me. And so this is something where like, if you've been playing with chat g, pt, or any of these chat interfaces for this stuff, the big thing for this was now you have these new chat models, which are trained over instruct data sets.

And so what does that mean? Is that normally what the language model is doing is it's just predicting what the next token is and based off of the entire. Like corpus of history. The next token is probably just a continuation of the sentence or a continuation of the paragraph, right? Is that the interface of chat has been super useful because the way that they model the data sets for it, and they specifically fine tune it over it, which is basically you like take the larger corpus of information and you say, Hey, [01:08:00] specifically I want you to like have a higher probability associated with, um, answering in these ways, right?

Which is like the smaller dataset that's more refined dataset that I'm training you over of like an instructor data set where it's more question and answers is that instead of like, you know, I post a question and based off the entire compendium of human history, it's just ask more questions, it's, I pose a question and it can give me an answer.

Right. And so that interface has been extremely useful and extremely intuitive. And this is kinda the first time that users has been able to see like just for themselves that like, this stuff is really useful and powerful and can, I can do a lot of stuff right? So like everybody's had like probably a couple like weird experiences with chat G P T but also some great experiences, right, of like, these are things that I didn't think it would be able to do.

And so that's like sort of on the large language model side. And so one of the really cool things about this is that you get access to intelligence, access to like, you know, I can, instead of having to do like search and I've got like the 10 blue links or whatever, I can just ask a question and get an answer And like you have this problem of hallucination and the [01:09:00] reason why you have these hallucination problems is cuz the model itself is just saying based off the entire compending of human knowledge and the fine tuning parameters that you put into here, I predict the next couple se couple letters to be this and then I predict it to be this and then I predict it to be this.

So when it's hallucinating, it doesn't like have complete context of everything that's going on inside of that sentence. It's just predicting what the next token is, right? And so the, this is kind of like a bunch of different stuff, but in order to run these models and have access to them, these are very expensive and you think about every single time that you hit against Chad G P T or every single time that you hit against stable diffusion or anything like this, stable diffusion is like an image mo, a text to image model or like any of these other stuff, right?

They've got like the whisper models where you can take audio and turn it into text. All of these things is basically every single time you're doing that, you're setting a graphics card on fire. Right. And so that is expensive and that's costly. And so like there was a period when chat G P T first came out where everybody was using it, where open AI was burning millions and millions of dollars a day.

And the reason why was because hey, we [01:10:00] wanna give people an access to this stuff and we want to see it and get the initial response for it. But you run into these issues. And so one of the big issues in this last couple weeks has been that the quality of Cche, of Chet PT for the GPT four models has gone down enormously.

And you see like, Hey, it's faster, but all of the like things that I really like it for of that it was able to do all these amazing things. Like now the quality of the answers is going down significantly. Well why is that? Well, it's because they're basically cutting back on their burn is what I think is going on.

And so this is extremely expensive. The whole model of, oh hey, I've got 10% of my users who are going to pay for the 90% who don't pay at all doesn't work. Where every single time somebody shows up my website, they cost between like five and 20 cents, right? So this is why I was so excited about Lightning because a lot of the stuff we've been building in Lightning is this instant, finally settled micropayments.

Specifically some of the stuff that I was working on and like this is sort of the space that I've been spending a lot of time in is over the web. And so basically you hit an api. The API returns a 4 0 2 8 payment [01:11:00] required code, and you complete the invoice and then complete the call. Right is that this is the first place where, okay, well API calls beforehand, basically were free.

And so when we said like, oh, hey, you can monetize an API call, you can have someone cost like 1 cent to show up at your website. That wasn't the very appealing thing to tell people because they were like, Hey, my API I costs called basically cost nothing, right? Like this is not like a big expense for me.

But now it's becoming this huge expense and there is no better solution than the Lightning Network. And specifically just doing this, Hey, I hit against the payment, I hit against the endpoint, it gives me back a payment required code. I pay the invoice and now I can continue the interactions with the website as my authorization code.

There is no better solution than Lightning in terms of the speed and in terms of the final settlement of the bearer instrument. And that's like another kind of side thing for this of why AI is like such a good opportunity for monetization on the Bitcoin side is because the issue a lot of these guys are running into is that they're using credit cards.

And so if somebody shows up on my website, it cost me 4 [01:12:00] cents, right? And then they swipe their credit card and then, okay, well the minimum transaction I can do is $2. And so now I can't just like open up this act, I have to have 'em got credits. I have to like do this whole thing. I have to get their information, I have to get, so that in the event that they do a chargeback, I can like contact them and all those sorts of things.

This whole mess, right? But with lightning, when you do a lightning payment, you as the sender achieve very good privacy. So I as a developer can make a lightning gated website and then users can show up and I don't have to know anything about them except for the fact that they paid me and I can pass along the costs to the user as they're using my website.

So this is like a really cool use case for Lightning where for a lot of the other stuff that we've been doing, it's like, yeah, sure I could do this with Lightning, but I can also do it with dollars and there's a whole infrastructure for dollars and all that sort of thing. Right? Is that, I think we first started seeing it with Noster where it's Zaps where like you really can't do that with um, like a fiat system.

This is another example of this where there is no mechanism to do this with fiat. You're not gonna be able to pass the cost along to the users in that way. The only way that everyone's doing it right now is basically with credit cards and that becomes [01:13:00] huge, like, huge issues. Like one of the things I made was a like, uh, basically wrapper around chat sheet PT that you can pay with Lightning for.

And like the initial contacts that I got about it were like, oh, hey, I'm in Nigeria or I'm in Brazil. Like I can't get a credit card and I haven't been able to use any of this AI stuff. This is the first thing I've been able to do because I can like use bit knb or I can use um, like whatever in order to swap my money into Bitcoin and just pay for you guys are using it.

Like I had no idea that that's where they're coming from because I don't know anything about them except for they paid me. Right. So that's kind of like a big overview of like AI and Lightning, sort of the intersection between those two. So hopefully it's kinda get good starter.

**Marty:** That was a great starter and I think that last anecdote they just shared really shows the power of this, like opening up these tools to markets that don't have access to them because of the incumbent payments infrastructure, which when you think about the impact that could have not only those individual communities, but the world overall.

If you get smart people who are just. [01:14:00] Limited by their access to technology and services. Mm-hmm. You finally get them access to that stuff. It's crazy to think what could, could come of that. Yeah. Um, but as you were, uh, prefacing that, I think to dive more deeply into what's going on in the lightning side of things specifically, you mentioned L 4 0 2.

Um, and so let's jump into that. Obviously. I mean, LSATs, they had to rebrand to L 4 0 2. Ryan Gentry was telling me the, the law, the legal apparatus here in the United States, really the tests that lawyers take to become lawyers, the, the, the LSAT had to say, Hey, you can't call your protocol lsat, unfortunately.

So they've renamed it to L 4 0 2, it's been around for a while. Lightning Labs has been utilizing it in a few of their products, but it seems like, um, they had a major release last week which implemented it into a popular AI development kit Lang Chain. [01:15:00] And so what's going on? It's L 4 0 2. What is Aperture and why is it really big that it's now in Lang

**Kody:** Chain?

Yeah, sure. So Lang Chain is basically, so like now we can kind of go into like the specifics of like how people are using these models, is that one of the things that we figured out is that you can take the models and you can feed them back into each other and you can feed their outputs to each other.

And so what agents are, and that's what people have been working a lot with. There hasn't been a lot of production deployments of them yet, but like it's something that people are experimenting with and I think is a really good use case for Lightning, is that you basically have one model that's operating as like a planner, and then he takes your task and splits it out into subtasks, and then that agent, that model output can be fed into a bunch of different agents beneath it.

So this one is like an an agent that can access the internet. And so maybe it does a web browse, like it interacts with the web, and so it gets some information from there. It goes back, and then it has an A, you have an [01:16:00] agent that when you're, basically, the way these agents work is that they're just larger language models that you're passing in specific personas and like, Hey, you are this, these are your capabilities and this is how you access the APIs that you have available to you.

Right? And it can output code, which you can then execute, for example. And so what these agents is that you can create an agent and then have it go do stuff for you, right? And so what's really cool about the L 4 0 2 integration with Lane Chain, which is like Lane chain Bitcoin tools, if anyone looks, look it up, I think it's like github.com/lightning Labs slash lane chain Bitcoin tools Is that lane chain is this kind of framework that people are using in AI for building out these applications where it's like, Hey, I want to take an input.

And feed it into this large language model and then clean the output and feed that into another model, and then have it browse to the web and then give the output as we're calling what people call that is chain. And so Lang Chain is a way to chain these different large language models together with just the rest of your code and your [01:17:00] application that you're doing.

And Lang chain Bitcoin tools is a way to have that agent and have that model. One of the tools that you're giving it is tying it into a lightning node and saying, this is the capabilities that you have of being able to access it so it can output code and execute that code in order to send and receive Bitcoin payments, for example, on your behalf.

And so currently the way everyone's kind of playing around with agents is maybe they exist for like, you know, seven, 10 seconds or whatever it is, right? But if you wanna have longer running agents, like something that's just sitting in the background doing stuff for you, one of the things that people have found with building out these agent models is the agents using these models is that the more specialized you make the agent, the better the performance is, right?

So like, you know, back to military terminology, I think about it as like weapon to target match, which is that you make a very specialized agent with specialized skills. And when you ask it to do something, it's very good at doing that thing right? But the problem that people are running into is, okay, well if I make all these specialized different agents, right?

How do I have like an orchestrator agent across them? And how do I like host access to all of those things? [01:18:00] And this is just kinda like going back to economics, is that. The way that you coordinate value transfer and the way that you get things done in an economy with very specialized agents, with very specialized actors is that you have money as the intermediate value transfer layer between them.

And so this is like the thing you can do with line chain Bitcoin tools is you can give the initial planner agent a wallet and say, Hey, these are the things you have access to. This is how much money you have. You can go hit against services, you can pay for them, you can give these things to those. And so this is what we think is, and that I'm very excited for it.

I've seen a lot of cool projects that are getting started built out for the hackathon for this is that Lang chain bitcoin tools and just like giving agents access to Bitcoin wallets is going to be sort of the best interaction layer for using agents because you can have all these specialized agents that get paid in Bitcoin or like this is something that's really exciting and Stack Work's, been doing some work on this.

I've seen a couple projects working on this. But the hackathon is that the agent can identify, oh, I don't have the tools to complete this. I'm gonna post a bounty using that Bitcoin that you gave me to get a human to [01:19:00] complete this part of it and then feed that back into myself so I can continue with what I was doing.

Right. And so sort of just agents specifically are one of these places where Bitcoin is like a very, very useful tool that you can give them in order to make them do the things that you want. Yeah.

**Marty:** It's mind blowing and I, I mentioned this to Ji before I recorded with him last month, is it seems like via the emergence of the Lightning network and now L 4 0 2 and these Lang chain.

Bitcoin tools that lightnings produce, like the machine payable web is finally viable. Like it makes sense to go after that particular, um, I don't wanna say use use case I guess you can say, but that particular market of machines paying each

**Kody:** other and Yeah. Well this is something I've up and realized was that because I'd exposed my a OpenAI key via these Bitcoin payments, right?

And so I woke up and I had like a [01:20:00] $2,000 bill from uh, OpenAI, right? Cuz I was like, oh hey, like a bunch of people are using this thing now cause I just left it on GPD four, right? And so each one of those calls is between three and 6 cents, right? And depending on how many thousands of tokens that you're doing, and like a bunch of people have been using it.

Like I had it running for the entirety of Prague when we did the pop-up federation as like one of the fetty mods. And so people were able to like click into that and just ask some questions and stuff. And when they were doing that the entire time it was like, Hey, you're just passing along Bitcoin payments to me, right?

And so I see my open AI key as like, oh hey, my expenses are like, I've got 2000 bucks in expenses or whatever. And then I look at my Bitcoin wallet and it's like 2020 bucks, right? And I'm like, okay, well this is like something that becomes really cool with this is that once you have. Payments for all of these APIs.

And this is something that people are running into because everybody's scraping everybody else's data for training sets and stuff, right? Like Twitter, if you remember last week, they were like, Hey, we're gonna gate access to this stuff now and you can only hit a certain number of times. And the reason why is cause everybody's trying to like scrape [01:21:00] against Twitter in order to get generate training data and those sorts of things, is that when you gate something behind a payment for the api, then the concept of spam kind of goes away, right?

And the reason why is cuz every single time someone's hitting me, I'm passing the cost along to them and I can add like a small profit to that or whatever I can do. Like, you know, if it's costs me 10 cents, then I can have 10 cents convert that to SATs and then add like, you know, like half a SAT or add like two SATs or something, right?

Is that I can pass that cost along to the user. And so I just don't care about how many people are hitting my service cuz I'm always profitable. Is that just hit me more, right? Is like, hey, show up at my website, interact with the chatbot, right? Like you're passing along the cost as you do it. And so it becomes this really cool like kind of change of pace for it, right?

Because this is something talking with some of the like more like AI focused guys who they've run into this issue or the moment that they deploy something with GPT four in it and it becomes popular. Well they wake up the next day and they've had, Hey, I've got like $2,000 or $20,000 worth of open AI expenses.

But [01:22:00] then the problem is they don't have a monetization mechanism for it. Or if they do have a monetization mechanism, maybe it's Stripe and maybe like, hey, 20% of those things become chargebacks or something. Right. And so it just becomes a super, super cool abstraction layer of whenever you wanna do any of these AI calls is that you can pass along the cost along to the user.

And so people start taking in and they start using Bitcoin for all of this AI stuff. And then as you're passing those payments along and stuff, the reason why they're doing it is because of the speed associated with it and because it's a bear instrument with final settlement. But we sort of backdoor in is that hey, a sender on lightning achieves perfect privacy, well, not perfect privacy, right?

But very, very good privacy, especially relative to current solution, which is, this is my name, this is my credit card information, this is my address. Right. Um, so like that's the, that was what initially was really excited about the, and it's been really cool seeing people building out projects for the hackathon that kind of like, show this works, right?

And so, yeah.

**Marty:** Yeah, [01:23:00] no, I mean, it's gonna be massive, I think. And like I kept positing this at the summit last, last week, like how, how long is it gonna take before a large percentage of, or if not a majority of transactions at the Lightning Network are machine to machine payments of agents going around and completing tasks on behalf of humans or maybe even other agents if things get really heady.

But like it really does open up this. Digital economy, that was not possible, like you said before. And the use case that you brought up in terms of giving access people, giving people access to your GBT four key, you made 20 bucks on that. Like, and that's another thing, like if you're providing the service of access to the key, which is giving others privacy, like you could charge a little premium on that and probably make a bit more money on top of that, which [01:24:00] mm-hmm.

Is a great economic incentive. And then on top of that, like, I guess the big question is like that will open AI ever get to a point where like, Hey, we don't like this, this is, this is weird that you're paying on behalf of thousands of people, or is that sort of how it works anyway? If you're building apps

**Kody:** on open ai, yes.

Normally build out applications, right? And so like I have an API key and I hit against the service and you know, I pass along for my users or whatever and like I'm a client of that person. And so then, you know, if it's like over smaller than micro transactions or something, then like maybe I would've to do, maybe I'd have to know some more about them depending on the service that I'm offering them.

Those kinds of things, right? But um, like the thing that I, I think that the. It like, I mean this is still at like, nothing's really in production in terms of like the agents, there's like some stuff that's like starting to roll out. But the big thing for it, and you'll notice this when you're start playing around with these applications, is that they're all like, Hey, bring your own API key, or they're, this is how you run this yourself, [01:25:00] or it's sign up with a credit card in order to get access to any of this stuff.

And the reason why everyone's doing that is just because of the cost associated with doing this. And so it's been super exciting for seeing this and I think we, we can talk about Aperture for this is that Aperture is something that Lolly built and Lightning Labs put out and they just did a new release for it.

Where it's called a reverse proxy is that you hit against Aperture the exact same way you would normally hit against the api. But the only difference is that you just don't put the authorization key basically is that you don't have an API open AI API key, but you hit against the aperture reverse proxy exactly the way that you would hit against OpenAI as api.

And what happens on the Aperture side is what that's doing is gating it with a micropayment on the lightning side and then attaching whoever the developer who's running the aperture proxy, attaching his API key and then completing your call for you and passing it back along. And so that's just been that concept of that like, you know, I can take my API key and then I can just wrap it with, um, Bitcoin so that anybody can hit [01:26:00] against it and then hit against using that API key.

They can hit against whatever service they want. Right. Um, using the other one, that becomes a really cool abstraction layer for developers who want to start using this technology. But they can't get access to credit cards, they can't get access to open AI keys or like, maybe they live in a country where they're not even allowed to have those services.

Right. And so that's, that's been super, super cool to see. Yeah. Like

**Marty:** I've played around with God mode, that space, which is an AI agent tool. Mm-hmm. To try to do it, try to get an agent to do something simple like, Hey, I've got this website, feed 'em tftc.io. Like look around and see how I can improve the SEO strategy.

Like what tags can I be adding to, to improve the SEO and get it in front of an audience of Bitcoiners or people looking to learn about Bitcoin. Um, and it's been about a month or two since I last tested. It really wasn't able to complete the task. [01:27:00] Uh, it was probably because I'm not that good of a prompter quite yet, but you can see it's there.

Like I was watching this agent, like going to Google, scrape certain websites for keywords, scrape my website. Like it was insane to watch it go and do things on command. But like, yeah, like you said, I'd get an open api, open ai, excuse me, get my, um, get my API token, put it in there. It was like a very clunky process.

It wasn't really straightforward.

**Kody:** Yeah. And this is, I mean like just yesterday I was at a meeting with someone and they were proposing that, hey, I think the thing is gonna happen is people are going to have single sign-ons with their a p i keys. Right. Of like, Hey, you log into the website and then it passes along to this.

And I was like, no, like the solution for this is that you just pay for stuff as you use it. Right? And so the, so because like, just like think about it from the developer perspective even right? Of that it's like, oh, hey, I have to go hit against somebody else's API key and I have to [01:28:00] like, go along there, or like they're passing their API key to me so that I can complete a call for them or whatever.

And it's just like, this is one of those issues where, I mean, it's crazy. Like this is like what people basically do with credit cards too, right? Where like when you swipe a credit card, you're basically giving that dude rude access to whoever you're like, wherever you swipe it to be able to charge whatever they want, right?

And it's, uh, it's a bigger problem with debit cards, right? But, um, like that's not the way that we should be doing this. The way that we should be doing this is that you provide me an invoice and I pay the invoice for the service that you're pro, um, providing for me. And so I can do that. Like I can do that and I can do it with lightning.

So it's an instant, finally settled micropayment. And because of that, I don't have any risk of a chargeback. I can charge down to a couple milli satoshi like I probably do over a milli Satoshis because those aren't real. Right? So that's the joke. Right. But, um, like, you can do it that way or you can do that.

Like, this is like what the um, L 4 0 2 specification like normally recommends, and that this is, I've seen a lot of success, successful people implementing this, is that you just have them [01:29:00] initially do a call. They do a payment for like 1 cent or something, and that might be up that, that gives them credit for doing like 10 or 15 different calls to stable diffusion or something.

But because you have this really cool infrastructure built out with Lightning, where this is like, I don't think we've talked about this yet, but this isn't 2018 anymore, right? Is that Lightning is reliable. Lightning has infrastructure around it. Like you can spin up a voltage node in a couple minutes, right?

And start connecting out to channels if you're a developer. If you wanted to self ho, if you wanted to host via, um, voltage, if you wanted to host like a core lightning node, like I've got templates set up for that. You can just like run a temp, run a core lightning node out of a ripple. Right? Is that, this is not 2018 anymore where like, hey, 90% of the payments were failing and like all that sort of thing.

Is that like the, it's a really clean user experience of like having the payment just be done in the background or just like you do the initial payment for like 0.01 cent and then do you just do the payments in the background as the user is navigating around your site with like Albi or Fetty or whatever, like the things that we've kind of been building out for the last two years?

[01:30:00] I think I have a really cool intersection with this new computing paradigm of ai. Where we can take all the stuff that we've already built and because we were focusing on payments, we weren't focusing on like web three stuff of putting real estate on a blockchain or whatever. Right now we have this really robust payments infrastructure that we can take and we can apply to this where this problem where everyone is running into of how do I monetize this stuff effectively?

Right.

**Marty:** Yeah. I had, I mean I had this epiphany last week at the summit as well is cuz like a lot of people in Bitcoin are like, ah, the shit coins are gonna come back, next wave's gonna be crypto and ai, some tokens specific for AI functions. And I was pushing back on the people saying this cuz I don't, I don't think the dev tool ecosystem, it will be, obviously it won't be as robust if you're spinning up a token and trying to smash it into ai.

Like the tooling around lightning specifically that's been built out over the last five year, I think has a significant headstart in terms of actually providing utility and value to these AI [01:31:00] companies at the end of the day.

**Kody:** Yeah, and this is the kind of like why Bitcoin and like this is something, a universal reaction that I would get like as a Bitcoin or working at like, okay, coin and okay x, right.

Was that. The reaction I would get is like, Hey, why are you focusing on payments? Why are you so focused on money? Right? There's all this other stuff you can tokenize, right? The reason why is because money is like the single most valuable thing out there. It's like half of every problem, right? Of like, Hey, there's the problem and there's the relative value of that problem compared to everything else, and the money is what we're using to make that relative valuation, like in a larger economy, in this economic model, right?

And so the fact that we've been focusing on making really, really good payments and using a money that can't be corrupted is like really starting to pay off. Because now when people are saying, Hey, how do I monetize this thing? I wanna use the best payment technology, which is, has the best user experience like Lightning currently is like there's all sorts of hard edges on user experience, but specifically around like the dev experience of, Hey, I have a lightning address I can hit against it to get an invoice, make sure that [01:32:00] invoice is paid, and then complete the service that specifically.

I've seen tons and tons of people who know nothing about Bitcoin, not very interested in Bitcoin, and they can be like, oh wait, I can do this. And then I can immediately start getting payments and I don't have to as a web developer, like sign up for and like take all the information from all my users and pass it along to Stripe, right?

Like I can just have a transaction with them. Like it's a really great experience for them. And I think that's something that there's like a lot of hard edges around lightning still and stuff that's like getting ironed out. But that's something that works. That's something that can be done at scale.

That's something that we can show up to different dev communities for and say, Hey, this is immediately how you can start getting paid and monetize your existing applications. Yeah, Stripe

**Marty:** better keep, keep their head on a swivel because it seems like this could disrupt them rather quickly if, if Bitcoin catches on and if it does catch on, or you might wanna get some just in case it does catch on blundered, that one.

But no thinking heady here, just like as you're describing this, like having ideas, maybe [01:33:00] you're, you know, a company that doesn't wanna take on the volatility risk of Bitcoin. Uh, could you like auto forward the paid lightning invoices to something like a fetty stab stability pool and

**Kody:** automatically Yeah.

For, for right now, that's not, that doesn't exist, but that's clearly like I think I, me, me personally, like working on this is something that I want to build and something that I think would be very useful and something that um, yeah, like I think that that's, cuz we were just talking about that earlier of that the price risk associated with Bitcoin is like an additional factor that kind of gets in the way of some people who would otherwise be more open to adopting Bitcoin.

And that's one of the things that I think that was the big unlock that Galloway proved was that for the Gallo Bitcoin Beach Wallet and now Blink Wallet is that once you added in the stable dollar price, that was a big adoption mechanism for merchants. Because merchants, they have a [01:34:00] hard enough time, just the operational side of their business.

They also don't wanna have to be investors. And like this is like one of the great evils of fiat, right? Is it kind of turns everybody into an investor is that they have to constantly be thinking about like, okay, well I can't just hold money so I have to go speculate on like whether stock is gonna go up or buy some real estate.

And hopefully that goes up and that sort of thing Is that if you can get rid of the price volatility of Bitcoin as part of the adoption process for it, like that's a huge unlock for a lot of people where, hey, I don't have to also do the price volatility. Like, I, I, I can't emphasize that enough in terms of like, I saw this a lot with like, um, like trying to get Afghan refugees initially when I started with them.

Cuz like, you know, I'm a hardcore coiner and like I didn't have a lot of like, uh, empathy and experience when I like first met them, but like seeing the problems they were running into, which was that, hey, I just need to get like money from here to here, right? And like, I need it to be worth the same just because like, I know I need to get this amount and I need to get that to that person.

And then he has that amount. But like in the intermediate process of like two days between like, hey, when they receive the payment and when they have to do the pay, uh, like get the service on the other [01:35:00] side or whatever, right? If the price moves by like 5% or 10% or whatever, like that's not something, that's something that just gets in the way.

It's like it's not something that people need and it's something that kind of complicates the interactions and the process of like being an operating business. And so if you can lock in the US dollar prices of Bitcoin and use Bitcoin just as the rails for all these payments, right? Then operating businesses, they don't have to also add the Bitcoin price volatility as part of like the complexity of running a business anyway.

**Marty:** Yeah. Yeah, I completely agree. It's. If you can create a user experience where they're able to use Bitcoin. I mean, obviously Strike is working on this and others, but that's what's really cool about this space is there's different experiences at different parts. Obviously strike's connection between Lightning and the incumbent banking system, what you guys are building at Fedie with these stability pools and using the Lightning Network as a, as a gateway.

I think it really does show how dynamic Bitcoin can [01:36:00] be and how it can be utilized in many different ways. And the fact that many people think Bitcoin isn't innovating is mind blowing to me. Cause you describe everything you just did, whether it be at the ment level or the interaction between Lightning and ai, like it's increasingly becoming very obvious that this is gonna be one of the most disruptive payments and savings technologies that's ever existed on the planet.

**Kody:** Yeah, well this is something for specifically within Bitcoin, right? Of that, there's a lot of stuff I think when they're talking, when people say, Hey, there's nothing happening in Bitcoin or whatever, is that normally what we're working on, right? Is we're just making better payments mechanisms, right? And so when people are like, oh, hey, you made it so PE payments are faster.

Like that's not like a huge thing for a lot of people or something like that, right? And so I think that's kind of where they're coming from. Like, Hey, why are you spending all this time on payments? There's like all this other stuff you could be doing and that sort of thing. But now it's kind of really coming to show of that all of the work that we did on making this really robust payment [01:37:00] structure, That was the thing that is missing on everything else.

Right? And so because we have that and we can like, I mean it's a crazy experience, right? It's like you show up at somebody with somebody and you say, Hey, you know that whole monetization problem that you have, like this is an outta the box, incredibly good solution where you can instantly get paid for the cost that you incur and pass those along to your user, right?

And you don't have to like store their information. Like they don't have to do, you don't have to know anything about them except for the fact that they paid you. Right? And so that's something that we can do that none of these other, like crypto projects and stuff can, and the reason why was cuz they weren't went off and were doing all sorts of other things, right?

And now it's really coming to show that, hey, like just having the better money is a very important aspect of this, right? It's like, yeah, sure you can do and maybe we can maybe, I don't know if. Yeah, uh, well we, we can talk about this too, right, of that the differences between Bitcoin and crypto and like some of the, all this other stuff that they're doing where Bitcoin at the base layer is turning incomplete and something that you can analyze and that you can know the security behind.

You can actually [01:38:00] analyze this at rest, right? This is actually something with ai, which is getting pretty interesting, is that George Hotz is working at Tiny Corp and he's like, Hey, we're trying to like get turning completeness outta the stack. Just like sort of how Bitcoin at the base layer doesn't have turning completeness, because then we can sort of like analyze it and we can actually make it, uh, like use it as a building block for building other abstractions on top of, without being worried about, oh, there's this crazy stuff going on underneath.

And if you go back to sort of the history of Bitcoin, like one of my favorite things is going back through all of your um, uh, Ethereum move to proof of stake sort of tweet history is, um, if you go back to there, like the big thing that they wanted at the base layer for Ethereum and a lot of these other coins is they wanted turn completeness.

And the reason why was because they said, Hey, we're not gonna build in layers. The way we're gonna build is plugging everything on the base layer of that. You get turn completeness, you get smart contracts, you get all that sort of stuff, right? And now that's really starting to show, and the reason why is because now that you have this really robust payment infrastructure, which we were able to build on top of in a secure way because Bitcoin at the base layer optimizes for security at the lightning layer.

It's optimizing for [01:39:00] like, like I said, like there's trade offs associated with it, right? But it's like trying to do like very fast payment mechanism or instant final settlement of a bearer instrument, right? Is that a lot of these other chains, so they're like, okay, well now we want to add in the payment stuff or whatever.

So, Well now we're getting to the point where we can't do that at the base layer, so we're gonna do a layer two. And the problem with some of a lot of these layer twos is that they're not mutually compatible, right? So it's not like we have a rail between them like lightning, like you know, the, if you've got like one roll up section on like using optimism or whatever, right?

And you've got like a separate type of rollup, those things are incompatible and they have to result back to the base chain in order to move across, right? Not like an instant finally settle payment like lightning where you can just like zap in between the two. And so this is something that people are running into.

And so what's the other element for it? Is that because we've got inscriptions now, right? And I know that there's like different opinions about inscriptions is that you can now use Bitcoin as a data availability layer. And so even though some of these other chains, they're like, oh, hey, we've got, well now we're building our own layer twos.[01:40:00]

Well, the thing that the layer two needs the base chain for is for data availability and as like an arbitration mechanism, right? And so you can take some of these layer two stuff. This is already starting to happen. Eric Wall's been working a little bit about this, right? And um, is like taking Sovereign Rollups and eventually ZK Rollups, right?

And taking those and just using Bitcoin as the data availability layer for it. And so now all of the other stuff, like all the other cryptos where they're realized that, hey, you should be building in a layered model. Now they have all these problems at the base layer because they have Turing completeness inside of there and like other like complexities and difficulties.

And so they try to build a second layer. But now, because Bitcoin can operate as the data availability layer, well you could just take that same second layer, move it onto Bitcoin and then put it there, right? And then if you wanna move from that second layer to a different layer to, or whatever, like, you know, zapp into liquid or zap into aide or whatever, right?

That as long as you make compatible with lightning, you can instantly move between these different sort of [01:41:00] like top levels, right? And so I, it's got a big, big can of worms I just opened there. Right? But that's, uh, it's, I mean this is like, I've heard a couple of people say this, right? Is like there's never been a better time to be a bitcoin dev, right?

Because there's a long time where we were thinking, oh hey, like are we wrong? Like our, a lot of these crypto companies are getting a bunch of money and they seem to be getting like a lot of more developers there and stuff. Like there's never been a better time to be a bitcoin dev because we've got the infrastructure, we've got sort of like the roadmap of like, this is what we can build now.

This is where it's going in the future. And we can start, start building in that direction for it.

**Marty:** Yeah. Lightning's the connective tissue between all this stuff, which is

**Kody:** fascinating. Yeah. Like, I don't know if you've used it yet, but the bolts exchange is like, this is kind of like the first time where people have been able to use liquid in like a productive way, right?

I mean there was other stuff they were doing, but just like on a day-to-day basis Right. It was like kind of annoying. Cause I'd have to like swap in order to get back into, uh, back into liquid or like off there or something. But now, because I can use lightning. As like the rail [01:42:00] between those two, I can instantly go in and OutCo uh, bitcoin to liquid.

Right. And so now like, uh, you know, like Tiros companies and Barack and those guys, like they've been doing a bunch of liquid stuff for a while, but in order to get over there, if you wanted to actually do the movement of Bitcoin onto liquid, like it was kind of annoying to do, right? But now, because I can use lightning to instantly move between the two, uh, networks, right?

All of a sudden it becomes super interesting of that, oh, maybe I do want to do something with like on the liquid side using like their more advanced smart contracting. I wanna try something out with like check sheet from Stack or anything, right? Uh, some of the more advanced scripting sort stuff like that, because I've got the lightning layer to move in between those.

I, I can do it instantly. It works really well. But, so if I'm on like one of these separate chains, right? Well I can't instantly and finally move between the two different layer twos over there, right? Cuz they don't have this like kind of connective tissue between them on light. The lightning that we, that we do.

Yeah.

**Marty:** Woo. Doggy

**Kody:** seems like it's happening. It's always been happening, Marty, is that we're in this slow process of high colonization [01:43:00] and you know, it's uh, you know, it moves in fits and spurts, but like the important thing that's going on, right, is that like we kind of have an answer now for how do we make great money and how do we bring that to a lot of people?

And what are the next steps that we need in terms of ushering in. Kind of more adoption of Bitcoin. Like that was, I think those were very unclear for a lot of devs for a long time. But I think we're getting to the point where we kind of like see it in the mirror, right? Of, we see it in the distance of like, hey, this is like something, if we continue along this path and we continue operating in this way, then we can continue making incremental progress there and eventually like we'll get there.

Right? Yeah. And

**Marty:** that's why I've been so obsessed with ai. I mean, I was playing like an idiot earlier, but I have been paying attention to ai, its growth and the convergence with Bitcoin, um, over the last few months, over the last six months now. But like, it solves such a massive problem for them with the amount [01:44:00] of CapEx they have on the backend and needing to know that they're gonna be able to pay that while offering a service to their end users.

Um, that it, I, I could see the AI industry being like the first massive adopters of lightning outside of like Bitcoiners just who have been playing around with it for the last five years. Like it solves such a massive problem for them that it's a no-brainer. Which gets into like the last question. What do you think is needed to tip that industry over the edge?

Cuz obviously a lot of people in artificial intelligence have been very hyper focused narrowly on what they've been doing. Understandably so, because it's such a, a. Cutting edge technology and it's gonna change the world in ways that probably can't imagine right now. So they've been hyper focused on that and probably view Bitcoin as lumped in with the broader crypto industry and something of a scam.

But again, [01:45:00] after everything you've described, everything we've been paying attention to, everything we've been seeing being built at this intersection, it's a no-brainer. Like, what do you think we need to push some of these AI companies over the edge?

**Kody:** Yeah, the big one, and this is like the reaction that I've had and why we did this hackathon, which is, I, I know we, like you always wanna make podcasts evergreen, right?

But so specifically, and this is, this is 2023, is that, uh, running through the end of July from when this comes out, um, we were running this hackathon called AI for All. And the idea behind it is to use Bitcoin with AI to build out a bunch of projects that kinda show Bitcoin doing this, right? Because this is the, one of the things that I think a lot of people run into is we, when we say Bitcoin fixes this, is that maybe we're talking about this in the future or talking about it abstractly, right?

When people talk about like, oh, hey, Bitcoin fixes war or something, right? It's like, yeah, we're talking about it like in the abstract and eventually, like once we're on a hyper Bitcoin as standard and people become like they lower their time preferences, then people will be less inclined to go to war in order to just like keep the fiat machine moving and [01:46:00] stuff.

Right? But when you say like, Bitcoin fixes this, that applies to, as it applies to ai. This is. There's very clear applications of this that we just need to build it out. And so the, we are running this hackathon called AI for All. And what we're really hoping comes outta this is a bunch of Bitcoin and AI projects that kind of also just, you can be related to either if you wanna do a submission, but like, like really hope that you kind of like see both of them of like tying Bitcoin payments in and tying some of the privacy benefits of using Bitcoin, um, to ai.

Cuz that's like another big issue. We didn't talk too much about it, right? But, um, that's why we're running this hackathon. And so any devs out there, um, who wanna contribute a project, like we've been doing a bunch of, uh, workshops and stuff on like how the AI tools work, how to tie Bitcoin payments in, how to use the ELLP 4 0 2 specification and stuff.

And so anybody who's, um, like building anything, like I know there's a bunch of no devs who have been playing around with AI is, um, like definitely submit a project for that. And, uh, at the end of that, for the judging for it, that's gonna be our, like, this is, because again, this is the reaction I've been getting when I go to these AI events and I talk about how [01:47:00] Bitcoin fixes this.

They say, okay, show me. Right? And so I can like show them in the abstract, right? Or I can show them like little demos and stuff. I can show them, hey, well this is aperture, this is just a reverse proxy. You can run it against here, you can do that. But like the biggest uh, the, uh, the biggest way to do that is to just build out a bunch of cool projects that are doing this and are solving this problem and show them, right?

And so we can show up at the. Like, you know, the, uh, the guys running the bar, uh, bar team at Google and say, Hey, like, this is a way that we wrapped Bard into lightning payments and we are entirely like in the, uh, in the black when we deploy these models and because we're always getting paid for them, stuff like that, right?

And so I really helped that people can, uh, con help contribute to that one just because this is one of those, um, like Bitcoin fixes this, but it's, Bitcoin fixes this. If we build out a bunch of projects that like actually show that it does and then that can get people excited about it and say, okay, yeah, sure Bitcoin does fix this problem.

And here's an example of it. And this is something that we're gonna scale out and do within our own company as well.

**Marty:** Yeah. When this podcast release, which will be [01:48:00] tomorrow, July 19th, 2023, just have 11 days left to, to contribute to the hackathon,

**Kody:** a bunch of mentors, right? So on the AI side and the Bitcoin side.

And so just like hop in the discord and, uh, we're also running on pulled out fund and so, Um, just like anybody who wants to, like, even if you just wanna like learn and become like, this is something before doing, like being the head of developer, sport of fetti, like, one of the big things that I've been doing is that I've been very active in like teaching Bitcoin and teaching programming and teaching like people who like want to be devs, like how they can start contributing.

It's like, this is a really great first opportunity for it because with all of this AI tooling, especially chat, G p T and like similar instruct models for it that can do code generation, it's never been easier to become a developer. And so a lot of people have been talking about this where we need more devs in Bitcoin.

One way to do that is to take existing devs and move them to Bitcoin. The other way is to take Bitcoiners and turn them into developers. And I think that that's the better model for it because I think that we're getting to the point where we have the tooling that we can build out that it doesn't [01:49:00] take a lot of effort, especially if you're using something like Repli, like the time between idea and deployed product is like nothing, right?

Like you can make a cool fatty mod or you can make a cool web l and enabled website and you can wrap in lane chain with it or something. And you can do that in like half an hour, even if you don't know anything about coding, right? And so if you do wanna learn to code or you do wanna learn like, how do I start using this stuff?

Um, like this is, I think a really good opportunity for it. And so I really hope people, uh, come out and join,

**Marty:** answer the call freaks. Answer the goddamn call, please.

**Kody:** Yeah. And this is, uh, but you mentioned it on the website a little bit apparently, was that it's like AI and Bitcoin, right? So even if you're just working on like cool Bitcoin projects or no projects and stuff, right?

Is that like we wanna see those too just because, you know, like when we talk about Bitcoin fixes this and no fixes this and like AI fixes this and stuff, um, this is sort of like the opportunity to show that, right? And uh, yeah.

**Marty:** Yeah. And I know you mentioned we didn't touch on it, but maybe we should touch on it before we wrap up here, which is the privacy [01:50:00] benefits that paying over Lightning.

I mean, you mentioned it a couple of times, but I don't think people realize some of the privacy pitfalls that are out there, particularly for companies leveraging other companies, LLMs.

**Kody:** Yeah. So here's a couple things for it, right? So one of 'em is that, so let's, let's talk about the privacy that you get on Lightning, right?

So there's basically two ways that Lightning gives you good privacy that you can apply to these large language models and stuff, right? One of 'em is that you can do a login with Lightning, right? And so that actually doesn't touch Lightning, but it's just that when I do a login with Lightning, I can also show that I can make payments, right?

So it's a very useful way to do that of like having a persistent user identity as a developer, making websites where I can want the user to have like an they can leave and then they come back and all their chat history is there. First example, right? Logging with Lightning is a way that they can log in.

They're just a public key. Right. I don't have to know anything about them except for the fact that they have a private key associated with that public key. They can sign messages. I can encrypt things based off of those public keys so I can have encrypted copies of all of like their chats or [01:51:00] like, I don't have to store anything unencrypted.

I don't have to store any information about my user if I don't want to. Right? So that's one element of it. The other other element of it is sender side privacy, is that when you're sending on the lightning network, you achieve very good privacy because of the onion route associated with it. So if people dunno who, what onion routing is, like if you've ever heard of Tor Tor as like a, oh, it's a private way of using the internet tour stands for the onion router.

And onion routing is that when you're using the internet, you have multiple hops. So it's me. And then I hit off a router at this place, which hits another router, which is another router, which finally lands at Marty. Right? And so normally that's a clear net route. And so you can just see the packet moving along, but with onion routing, every single hop along there, you can think about it like an onion where every layer of the onion can only see the layer underneath and the layer on top of it.

And so when I'm sending a payment on lightning and um, I'm onion routing that payment, and so I'm hitting one hop and then another hop and then another hop. And each one of those hops doesn't know where it ends up. They just know [01:52:00] where it came from and where the next hop is. And when I'm receiving on lightning, I can't see where it came from.

I can just see the final hop that it came along with. So as a sender on Lightning, I achieve very good privacy as a receiver on lightning. I have worse privacy. And the reason why is because I have to tell you what node to send it to. And so now you can go look at that nodes, channels, you can see what their balances are.

You can probe against that node in order to figure out what its, its side balances are and those kinds of things. All the work that Tony's been doing, um, uh, he's at Muni now, but before that, when he was doing all of his lightning privacy research, all of those things of that on a sender, as a sender on Lightning, I achieve very good privacy as a receiver on lightning.

I don't have very good privacy. And this is like a joke with enlightening, right? Is that the slowest part of the Lightning Network is all of the chain analysis API calls from all of the nodes you're hitting along the way, right? So like, so like separate from the protocol is that the guy's running the nodes, if they're like, um, you know, industrial level operators or whatever, like they're hitting against chain analysis in order to do the know your transaction for it and stuff, right?

And so, but as a sender on Lightning, I have very good [01:53:00] privacy. And so even though they're doing those calls or whatever, and even though I'm, uh, hitting along that route is that I have really good privacy and I can do a login with Lightning. So I can log into a website and I can send you payments and you don't have to know anything about me except a public key associated with me, right?

And so that's like on the why Lightning is good on the privacy solution for these. So now we talk about on the AI side of what are the privacy implications of doing this stuff is that everybody is scraping everybody else all the time for training data. And the other element for it is that every time that you hit against a third party, like they have some agreements that say, Hey, we're not gonna use you for this training data and stuff.

And like, you know, you're just trusting them that they're not saving a copy of this or they're doing that, but people are already running into these issues where you're hitting against a third party model, like open AI or cloud or anything like that. And when you're just copying stuff over, you're also copying like.

Customer information or you're copying like API keys or you're top copying the code, which is not open source. This is like held behind your company and stuff, right? Is that you really want to be able to run these models locally, right? And so then, cuz if they're running locally, nothing leaves your computer.

[01:54:00] But the problem becomes of, okay, if I'm running it locally, then I need access to a graphics card. And most people are, well, you know, some people have access graphics cards, right? And they just find this very easy, but there's no very good way to do that. Right? And so this is like kind of where Fed comes back in of that at the federation, you can host some of these like GPUs and stuff that you can run local models for.

And it doesn't go all the way to open AI or like a third party or some like host, uh, some host in like a country that's entirely separate from you is that you're hitting it against a locally run model at your federation level. And so in the event that like something happens or like your data leaks or anything like that, right?

It's like, you know, they're still within the federation, they're still within your community. They're close enough that you can socially sanction them, right?

**Marty:** Yeah. Which is fascinating. And in that Fetti model where you're crowdsourcing GPUs, the GPUs are getting access to like the best

**Kody:** LLMs. Yeah. So I mean that's the, that's the idea behind it, right?

Is that at the federation level when you're com, when you're pooling community resources, right? Is that you can do things that you as an [01:55:00] individual might not be able to. And so like, if you wanna get access to like a bunch of a 100 s or whatever, right? Like those are like three to $5,000 graphics cards.

And so like, there's a lot of people who can afford that. There's more people who can. And so you wanna be able to have like, maybe one person buys that, or the community buys it and they host it in someplace, and then they just get access to it at the fitting level, right? And so, mm-hmm. You know, within the federation, like they can sign up and maybe like the federation's, gating the API key or something.

There's different implementations you could do for this, right? But, um, then you can gate access to the hosted community resource and then maybe like the person who's providing it or whatever, they get a cut or you get like a discount if you're doing it. There's a bunch of different ways you can do it.

The whole point of Fed is that it's just like a, you know, like create your own optimized, federated application, right? Of that you're running this fitment and you're run choosing the modules that run with it. And when people join in, you can choose like what they have access to and those sorts of things.

**Marty:** Yeah. I guess what I'm trying to get at is running a GPU similar to running an ASIC where [01:56:00] yes, you may have three asics or 30,000, but you're still contributing to the, the open Bitcoin protocol with, on the GPU side of things, like can you point your GPUs at OpenAI or,

**Kody:** uh, you can't do that specifically, but what you can do, you build your own m well, so basically the, the large language model consists of two things, right?

There's like, basically the configuration of this is like the parameters that we're using for this thing. Right? Mm-hmm. Of like the neural network that we're using, basically like this is like the description of like the general outline of this thing. And you have the weights, which is the specifics of, okay, well now you combine like the general outline and you apply the weights to it and then you can run this model locally of like, this is what the graphics card is doing.

Right? And so like just today, Lama uh, LAMA two came out, which is like the newest version of Facebook's, uh, model. And like that's entirely open source available for commercial use. So that's gonna be very exciting. Cause LAMA two is kinda the closest thing that people have on the open source side to something like ache bt, right?

And so that's something where you [01:57:00] would run that locally on the graphics card. And so the graphics card in way, it's not like hitting out against a, a separate service. It's just everything is happening on that graphics card. Right.

**Marty:** And it makes sense because a Fetti community would be smaller than the over the overarching universe of people calling open APIs.

They don't need as many cheap GPUs.

**Kody:** Okay? Yeah. Now I got it. Right? And yeah. And also the benefit you get there is that it's like the data that you're pushing over them is only what, so this is why we say fetty is like allocating your money, your data, your digital life across these different federations, right?

Is that I can say, okay, these are the passwords you have access to. These are the identities you have access to associated with me when I'm in this federation, right? And then I can go hit against this separate federation. I could like strip out all that identity stuff in order to use the more powerful model that they're using and then get the output, feed it back into what I'm doing over there, for example.

Right. Oh yeah.

**Marty:** So this is actually a good way to bootstrap open a open source AI versus

**Kody:** closed source. And this is everyone's running in this issue of like, [01:58:00] how do I run this stuff locally? Right? And like there's some people who are like, oh, hey, well how do I run this stuff locally consists of how do I get it running on my $5,000 MacBook, right?

But then how do I run this stuff locally when you're talking to somebody in Nigeria, for example, or to like toga or talking to somebody in like, um, like Mexico or talk, even talking to somebody who's like not a developer in Silicon Valley right now, right? Is that how do I run this locally becomes, okay, how do I even afford the infrastructure or like do the setup in order to get the GPUs set up such that I can do this cuz like, I can't afford like the 3000, $5,000 graphics card.

I want to amortize that across. Um, like a bunch of use, uh, uses. I have like one person running a graphics card for a bunch of people, that sort of thing. Yeah. Wow.

**Marty:** This's gonna be massive. Gotta keep building though.

**Kody:** Yeah. Well this is actually something I've really enjoyed of that I, I love this perspective.

I think you were the one who first started doing this within Bitcoin of that. Um, you know, when people critique Bitcoin from the environmental perspective, it's like you chuckle to yourself and you [01:59:00] plug in more Asics. Is that mm-hmm. The exact same thing has kind of been going on within ai. There's all the safety stuff within ai and then there's the guys who kind of chuckle to themselves and plug in more graphics cards.

And it's been really cool to see that sort of like parallel and sort of like the same attitude. There's like this whole crew of AI guys who are sort of take the same approach as like the Bitcoin of like, Hey, we're just gonna keep building this stuff, right? And so like, you can critique it and you can try to stop us, right?

But like, you know, anybody with a graphics card is gonna be able to do this stuff, right? Some people say, oh, we're gonna gate access to AI and all these things, right? It's like, yeah, well everyone has access to it and you know, you've got federal integration so that even people who don't have access to like graphics to themselves can also like access these things at like a community level, that sort of thing.

It's like, it's very, it's very fun. It's very cool seeing the culture kind of mirror across the two. Yeah.

**Marty:** It's almost like there should be like a conversions, you know? Yeah.

**Kody:** AI for all hackathon through the end of July.

**Marty:** Go check it out. Um, I've been keeping it for like two and a half hours now. [02:00:00] We were a half hour late in, in hitting record here, but time flies and you're having fun.

Yeah. This has been an incredible conversation.

**Kody:** Well, it's been really cool to talk to you, Marty. I mean, like, you've been someone, it was very instrumental in my Bitcoin journey and so this is, uh, big for me as well.

**Marty:** Well, um, I'm flattered that. You consider me instrumental in your journey, as you may have told, may be able to tell from this conversation.

I'm just, uh, curious, dun, trying to learn more about what

**Kody:** the hell's going on here. Yeah, I mean you're, this is like another, I know, I know we have to wrap up and I keep adding these things, right? But it's like, you know, like getting the ego outta the way of like the conversations that you have with new people, like being able to onboard new guys.

Like you got people on the podcast who don't know anything about Bitcoin and like, you're able to kind of like effectively onboard them. Like that's like a good scaling experience for everybody else who kind of cos into these, uh, Bitcoin conversations and like, maybe they're coming from a different perspective.

You had like a guest on who's not related to Bitcoin, but the perspective that you're getting is not like, oh [02:01:00] hey, I mean, you know, sometimes you do this right? But everybody does this. Right On the Bitcoin side is like, well, yeah, you guys are wrong. Right? This is why I'm gonna, I'm gonna explain why you're wrong, right?

But like, something I think is really cool within Tftc and like a couple of these other Bitcoin podcasts as like kinda like a onboarding mechanism for people is that there's a lot of like ego that kind of gets in the way of a lot of people. And like one of the big things that this was like, kinda like the big takeaway from my time in the Marine Corps is that it's like, it's not about you.

That the moment you start thinking about stuff in terms of like me being right or like me having to be like, this person needs to walk away from this conversation understanding that I'm correct about Bitcoin or whatever. It's like the moment you start thinking in that way is just absolute poison, right?

It's like it's not about you, it's about the Marines. Like it's not about you. It's about like the future that we're leaving for our kids, right? Of that do we want have them grow up on a sound money standard or do we want them to like grow up under fiat, right? And so like when you think about it from that perspective and like it comes out a lot in these conversations that you have as that like, you know, people will like do things and you'll be like, okay, well, you know, like ego aside, like let's do the answer, right?[02:02:00]

**Marty:** Yeah. I think I've developed that skill slowly but surely over six years. I was one of those. I'm right. You're wrong. Have fun staying poor guys for, for a bit

**Kody:** there in the beginning. And then Matt got you to stay humbles sense. So yes. Yes.

**Marty:** I mean, if you, if you say it incessantly for five years straight to somebody, it'll begin to internalize.

**Kody:** Uh,

**Marty:** Cody, thank you for doing what you do, sir. I mean it's honestly very impressive. Going back to, um, you finding Bitcoin in 2020, getting to the point you are now with Fedie and being able to explain this stuff with breadth and debt, um, pretty clearly and succinctly. That was the one thing I was really impressed, um, about your demo in Nashville last week is number one, you can tell you're a Marine.

You can control a room. Uh, and really force people to hone in and listen. And then you did a very good job of just explaining everything and making sure everybody was keeping [02:03:00] up. And I think you're a massive value add to the space. I'm extremely pumped for the Fed team that they have. They have you working for them.

**Kody:** Yeah. Well, again, like not about me, right? Like this is about Bitcoin and so Exactly, exactly. That's true. Mind stay humbles sat. It's not about you. All right. All right. Get back

**Marty:** to work.

Peace of love freaks, Dicky.