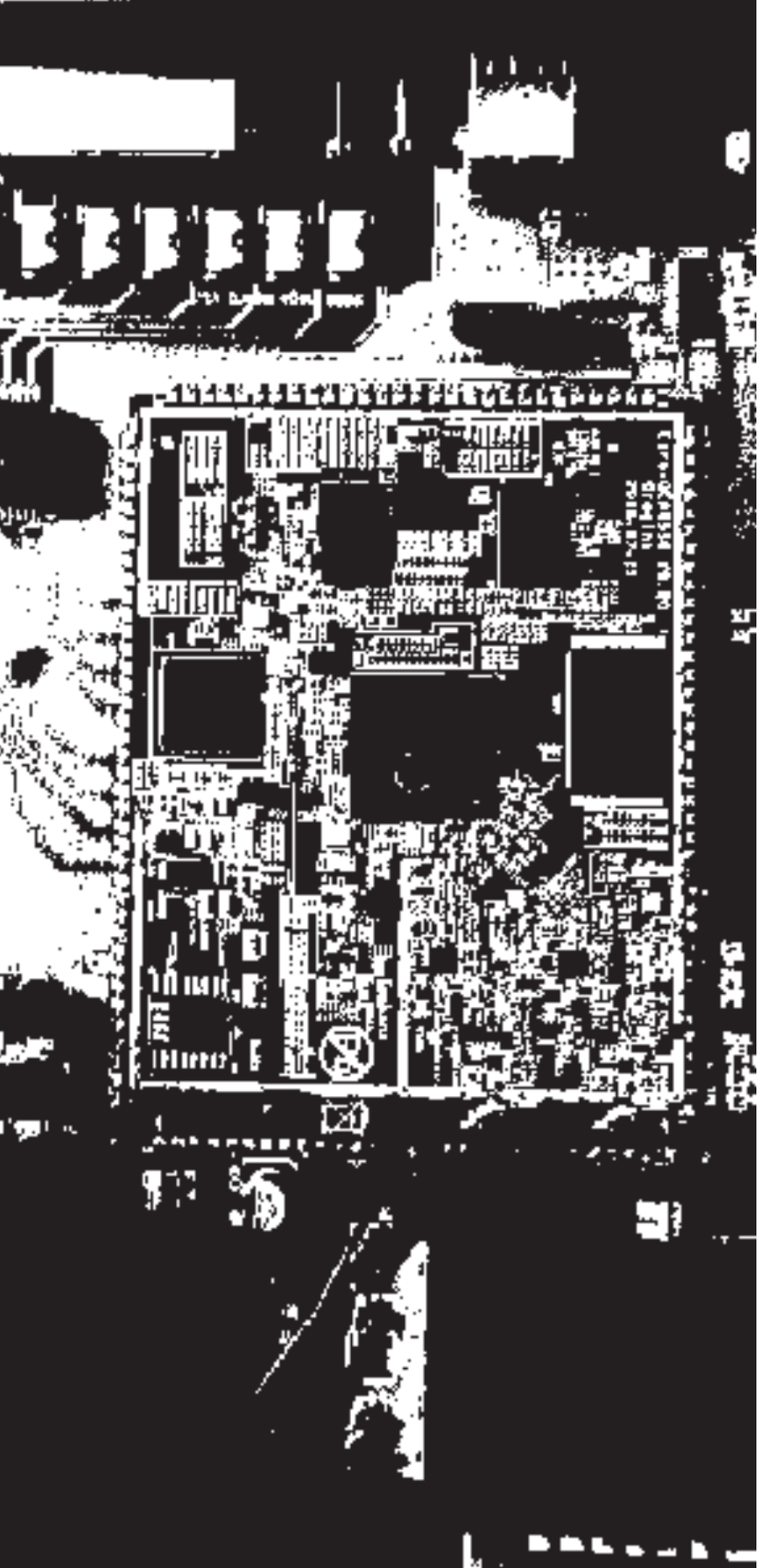
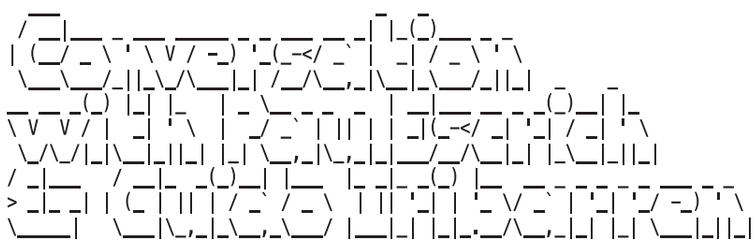


Conversation with
Pau Escrich & Guido Iribarren



23 January 2026

On the 23rd of January 2026, I managed to talk with the creator of *LibreMesh*, a free and open-source firmware that plays a central role within many wireless community networks. *LibreMesh* provides a shared software framework that simplifies the creation and maintenance of mesh infrastructures by integrating routing protocols, configuration tools, and community-oriented design principles into a single system.
The firmware is particularly relevant because it lowers the technical barrier for non-expert users, enabling communities to collectively build, manage, and adapt their own networks without relying on proprietary solutions. *LibreMesh* was also the firmware adopted by the Appennine network community in the Bologna area, where it became a key component in supporting a bottom-up, autonomous connectivity infrastructure grounded in local knowledge, reuse of hardware, and shared responsibility.
I managed to talk with two of the early developers of the software, Pau from Spain and Guido from Argentina. It was very interesting to hear from them about their direct experiences in building mesh networks and about how the firmware was originally conceived and developed. They no longer actively follow the project, as they are not working with autonomous networks anymore.
At the same time, Cristina Carnevali, who is based in the Apennine mountains, is currently part of the active development team of *LibreMesh*, contributing to keeping the software maintained and up to date.

LM:
When did you start working in the field of wireless commuities?

PE:
I started around 2009 or 2010 in Guifi.net, maybe you've heard of it? I was living in Barcelona at the time. There were these weekly meetings where people talked about random things related to mesh networks. I attended one, and it was amazing. I met a lot of smart people; it felt like a big family. My background is in Computer Science, so I was amazed by the technology, like how to build antennas.

...Oh, Guido is here! Hello! I was just telling Luca how I started getting involved in mesh networks, or "community Wi-Fi networks," as we usually called them.

GI:
Nice to meet you. I just arrived home and it's really late, so I can only join for half an hour. But yeah, I'm here. We started this "LibreMesh" thing with Pau, Gio, and Nico in Berlin, actually, in 2013. It's been a long journey since then.

PE: Maybe you can explain how you started, Guido. He was coming from Argentina and I was coming from Barcelona. We had very different stories and contexts. Guido, you were living in the Delta del Tigre, right?

GI:
Yeah. It's a place where the houses are floating houses. Your neighbor might be 300 meters away on another island. We started using these routers to connect to each other. In the beginning, it was a very different context because there weren't even smartphones yet; we were building a network for laptops. OpenWrt was already a serious project, but it developed a lot during those years.

I started developing this firmware with Nico and Jesse, but I was the main developer. I was discussing the design and requirements with them, but the coding was happening on one part of the world, Gio was doing the same on his project in another part, and Pau was in another. We all finally met for the first time in Barcelona.

PE:
Do you understand what "firmware" means in this context? Are you familiar with OpenWrt?

LM:
I have some of the basics, but feel free to explain!

PE:
OpenWrt is an operating system that is very, very tiny. It can be installed inside routers. At the end of the day, a router is just a small computer. So, a router runs a very limited operating system. This operating system is called "firmware." What we were doing was preparing our own custom firmware so we could install it inside the routers and make them behave exactly as we expected—like connecting to the next node automatically.

Nowadays, it's very easy. The routers are powerful, the antennas are high-quality, and you have plenty of frequencies to use. But at that time, we were dealing with small devices that were very poor in resources. We had to hack a lot to make them work and connect to a neighbor 300 meters away. We were even building the physical antennas ourselves.

That was the part I fell in love with, these people performing magic on these "stupid" little devices, turning them into smart devices. They were able to connect with others and, specifically, decide how to reach the internet through these crazy networks we were building. You could connect to one neighbor, who connected to another, and so on, but then you had to figure out: where is the internet actually coming from?

GI:
We were definitely pushing the limits of the hardware because of budget constraints, especially in Argentina. Equipment was relatively expensive, so we bought the cheapest routers we could find and pushed them to the limit with this custom firmware.

It was actually quite unstable. It only worked because we were deploying them in rural areas with very little interference. Things changed a lot during those first years because people started getting smartphones, which changed the requirements and the shape of connectivity. We eventually had to make the interfaces work for mobile phones. Today, everyone develops for mobile first, but at that time, it was technically difficult.

When we finally met me, Pau, Gio, and Isaac... Isaac is another guy you should reach out to; I'll share his contact info later, he's from the U.S., we realized we all had the same background and similar ideas. We were facing the same challenges regarding drivers that needed workarounds or ways to solve auto-configuration and distribution.

Everyone had a piece of the puzzle. For example, my group had focused on a DNS system that was technically very elegant, but we didn't have a solution for IP layer connectivity. Pau and Gio, on the other hand, had focused more on that layer. So, we basically merged our efforts.

Eventually, Pau moved on to other projects, then me, then Gio. Gio was kind of the last one, along with Nico, of course. At some point, the community took over, which was nice to see.

LM:
May I ask how did the group of developers you mentioned started to create?

PE:
Yeah, we were meeting at this wireless community meeting called BattleMesh. At the end of the day, BattleMesh is an event that happens every year where people from mesh networks all around the world come together. Everything was self-managed by the community—no sponsors, no infrastructure.

It was just people meeting somewhere, carrying routers from different sides of the world, and spreading them all around the place where we were meeting. Sometimes it was in a village, so we'd speak with the neighbors: "Hey, can you hold this router for a few days? We are 30 geeks and we want to run some tests; can you plug it in somewhere in your house?"

Yeah, all around the place — sometimes 50 routers or so — and then we ran tests. It was like: "Okay, let's see which community flavor or framework is the best." It felt like a competition, but in the end, no one really cared about competing. It was about the event, people meeting, hacking routers, having great conversations, and often sleeping in the same room, maybe six or eight people together. We became a big family. I still love many of the people I met at those events.

I met Gio first, then Guido somewhere else. We were family at that point, so working together just made sense. At that Berlin event, it was the first time we sat down at a table and started drafting: "What do we have? What do we need? How can we do it?" We made a diagram, "We can use this piece here, this piece there, we'll take this from you and this from me" and it all just fit. The design was very elegant. We all looked at it and said, "That's a great design. Let's do it." Then we started implementing it.

GI:
That's a key thing that shaped the project: it was born in this BattleMesh community. The protocols we were implementing — like BMX, B.A.T.M.A.N., and Babel — were all there, and the developers of those protocols were there too. We were all friends or having a good time together. For example, we had experience with B.A.T.M.A.N. before meeting the actual team, but that built a bridge with them. The developers were doing this for their own projects, but suddenly someone in Argentina was using it, and they were like, "Oh, this is a good thing!"

PE:
Just for context, these protocols are the core of the firmware we were building. They are the pieces that decide how to manage the network itself. In a mesh network, everything is changing all the time: new nodes appear, they disappear, links break, things move around. You need a smart piece of software to decide how to send information from one side of the network to the other.

This is what's called a routing protocol. The user experience for anyone connected to that network depends entirely on it. At that time, there were four main protocols: B.A.T.M.A.N., OLSR, Babel, and BMX.

GI:
We didn't have a good relationship with the developers of the OLSR protocol, so it was never adopted by our community. No one wanted to use software when the human relationship wasn't there. The Babel protocol was different; it was developed by a professor from a Paris university, and Gio was a big defender of it.

In the end, we were building "sugar" on top of that core technology. We created a wrapper that was flexible enough to accommodate all these different protocols. This allowed the three of us — Gio, Pau, and me — to work on the same code.

PE:
We designed it in 2013. We had the name, the logo, and that was the kickoff. We spent at least a year coding before we had the first working version that could actually be installed in a router. I think we started using it in Argentina and Catalonia around 2014.

Working together was challenging because we were in such different places, but we managed by meeting up whenever there was an event, or when a community invited us. When people heard what we were doing, they were very interested. They would host us in their homes, and we would work together for a few days to help the local community deploy their mesh network using LibreMesh.

GI:
Definitely. We became the "nomads of the mesh networks." You could invite us to your community, and we were very "cheap" to maintain, just give us some food and a place to stay, and we'd help you deploy your network.

PE:
That was actually my main motivation: meeting real people with real needs. I remember being with Guido in Nono, a little place in the Argentine mountains with no internet at all. It was a very long car journey to reach this small village. The people were so happy to have us there. When we installed a router in a house and it suddenly worked, providing that family with internet for the first time... it was amazing. That was the whole point: making people happy and experiencing the world.

LM:
This sound very interesting. How long did you spend working on it and continuing this sharing process?

GI:
We worked as the main developers for many years. I was involved until 2018, so about five years.

PE:
I was there until 2016 or 2017. But around 2015, we started another project called *LibreRouter*. We thought: "We have the firmware, now let's build the hardware." We wanted to stop using random commercial hardware and build a router where our firmware would fit perfectly, a router designed specifically for community networks.

It seemed like a crazy idea. We were just "hippies" traveling the world, how could we build a router? But we managed it. That was largely thanks to Nico in Argentina, who is another person you should definitely talk to. He got us in touch with a guy in China who had a small factory called *Dragino*. That contact actually came through the *B.A.T.M.A.N. protocol* team.

LM:
Are you still working on your *Librerouter* project?

GI:
The hardware project was also tied to the *B.A.T.M.A.N.* protocol. We used the same firmware, of course, but we had to make technical decisions specific to this new hardware. Because of that, we forked the project and called it *LibreRouterOS*.

It was basically the same as *LibreMesh*, and we merged many of our contributions back into the main project, but at that point, there was a clear split in terms of developers. A key difference was that we had a budget for the LibreRouter—we had paid developers, whereas LibreMesh didn't. Most of us who were *LibreMesh* developers simply switched over to the new project.

We received funds from the Shuttleworth Foundation (started by Mark Shuttleworth, the founder of Ubuntu), and from various other sources in Argentina and the U.S. That lasted for about two or three years. The hardware really started to take shape around 2016. I stayed until 2017, and in 2018, I dropped everything.

PE:
I was the last of the original group to move on. Other people like Idario and Nico "Patches" took over, but I've lost track of it recently.

GI:
No. As far as I know, the LibreRouter project as we knew it is mostly abandoned. Pau and I still work together, but on something completely different.

You have to understand that mesh networks as a whole lost traction. In Europe, they were already in decline by 2014, just as we were starting in Argentina. This happened because of new connectivity alternatives: smartphones, 3G, 4G, and eventually 5G.

In 2015, Argentina still had many rural places with zero cell phone coverage. People had to travel to the nearest town just to make a phone call. In that context, the router was a life-changer. But since 2018 or 2019, the problem it was solving — total lack of connectivity — mostly disappeared.

PI:
You're right. It started in Germany, which arguably had the largest community of mesh network developers in the world. But when fiber optic connections became standard around 2014, the "need" vanished.

But tell me, why are you interested in this? Which communities did you actually meet in your research?

LM:
I managed to meet a community near my hometown, close to Bologna in Italy. They built a community network in the mountains because they still didn't have reliable connectivity. This was the first time I encountered this reality in person. I talked with them just this year, actually. It was the first time I saw how everything worked "live," and they were the ones who told me all about *LibreMesh*. They even mentioned they are still following the current development of it. That's what made me curious to hear more.

LM:
I'm definitely interested. It's much easier to ask you than to scrape the web for emails! Thank you so much for meeting with me!

GI:
Nice! I know that team. I know Cristina from Bologna. She's great. I met her through Gio many, many years ago.

PE:
I love that the LibreMesh web page is still the same. I designed that page back in 2013! It's the same text, everything. Some things don't work anymore, and it's definitely not up to date, but there it is.

If you're interested, you should talk to Isaac from the US. He started the *Free Network Foundation in Kansas City*. He was the one who invited us there to help build a mesh network using *LibreMesh*. His experience in the US was a completely different world compared to Europe or Argentina. We can put you in contact with him.

And there is Nico in Argentina. He is still working on all of this; he's the "router guy." He knows everything about the current state of mesh networks in Argentina.

PE:
It was a pleasure. Send us your master's thesis when it's finished!