Solarpunk Computer/Communication Networks

What does the internet look like in the solarpunk future? For a brief while the Internet as we knew it fit pretty well - it contained huge amounts of information, interlinked vast swaths of the human population regardless of borders or language, and thanks to excellent search engines and indexing, you could learn just about anything you needed to know. There's some argument over whether this golden age even existed or when it happened, but there's fairly broad consensus that the web has gotten worse in recent years. The shape of the place has changed, becoming far more centralized within a few major companies, and even the search engines have deliberately enshittified their products, making it harder to find anything. Then LLMs became easier to operate, worsening an existing problem of bots and fake accounts with a deluge of genuinely incorrect, plausible-looking content search-engine-optimized to float to the top of the results. Between the endless wrong information, the technological bloat, the centralized ownership by a handful of terrible people, and increasing government surveillance, its fair to say that a writer preparing a solarpunk setting might look for an alternative.

So what does that look like? The easy answer is to look to the web from a decade ago for inspiration, but that's not a full solution because a lot of the flaws just hadn't been exploited yet (and it already had plenty of problems). The modern Fediverse is another answer, and should probably be at least included in the foundational design of any solarpunk internet - it's decentralized by design, moderated largely by the community, it's easy to migrate in and out of, frequently home-hosted, and broadly hardened against the sort of enshittification corporate services inevitably undertake.

All of that is a huge improvement but perhaps you're looking for something even further afield or more distinct for your setting, something scrappier, more DIY, or with some nostalgia for the jury-rigged networks and text-heavy, community-hosted feel of forums and BBSs. For that you might want an alternative system like a meshnet, something made to be set up and run by the community at the hardware and network level (there's a few examples further down this page).

More than that, it's possible that a solarpunk internet might actually look *lower-tech* than what we have now. There's a tremendous amount of bloat in our modern web, and much of it is there for aesthetics or capabilities we don't generally want. Those extra features increase the attack surface on both servers and browsers, which increase the bloat further with additional security to counter the attacks. Its possible that a more solarpunk internet would actually be a bit pared-down and simpler, even uglier, but easier to use and to secure, with security baked in better from the beginning than kludged-on as with many of our modern protocols. Lighter-weight software and simpler, primarily-text content can also run on much simpler, older, or lower-power hardware and and can be sent and received over lower bandwidth connections. This fits a solarpunk society by allowing for less new production and more tech salvage and reuse, and less elaborate networks (does a solarpunk society need to run fiber everywhere, or can it get by with a DIY meshnet?). And though you might be listening for trade-offs, this sort of text-heavy design can actually be more accessible for people with screen readers than our modern graphics-heavy web.

Changing the underlying technology certainly isn't a guarantee that people will be better behaved, or that convenience, security, and liability can't cause some centralization. It's also quite possible these alternative systems will remain a sort of side note beside the modern TCP/IP internet itself.

Just the same, I've gathered up a few examples which might give you some inspiration:

Meshnets

Meshtastic/Meshcore

These meshnets use inexpensive LoRa radios to run long-range off-grid communication platforms. Basically you set up these small radio devices, some of which look like a microchip with an antenna attached, others of which look like small walkie talkies, and use them to send texts (usually by connecting them to a cell phone with an app or similar). There's a ton of interesting things you can do with the network as long as you can do it by sending short text messages. People run Internet of Things -style devices using these networks, they set up Tile-style trackers with small GPS-enabled chips that shout out their location on the meshnet, there's all kinds of clever stuff. But it's not equivalent to the internet - you can't set up and visit web sites or anything like that.

How they work and how they're different:

This is obviously going to be an extremely simple summary because I'm a writer with a very light technical background. The big thing is that these networks don't use traditional infrastructure like cell towers, underground fiber lines, datacenters, or any of that when relaying these text messages. There's no big centralized infrastructure for a company to own and charge for. They run entirely on the LoRa hardware individuals and groups set up, and they're free to use.

In Meshtastic especially, there's no 'backbone' infrastructure at all. The node you're using to send is both the endpoint for your communications and the backbone for somebody else's. When someone sends a message all the other nodes in range see it and use a preprogrammed logic to decide who re-broadcasts it and who doesn't. To grow the network you need to balance adding more nodes with adding too much traffic. This strikes me as being a risky arrangement (seems like there's only so much bandwidth available, and Metastatic could fail from success if too many people try to use it at once - even though that's how it's supposed to grow. That said, there's a sort of romance in the idea that there's no infrastructure involved but each other - it's a truly democratized sort of system where the cost of using it is enabling others to also use it by relaying their messages.

Here's a neat example of a waterproofed, solar-powered meshtastic node set up just to hang around extending the network.

Meshcore is also off the grid, but it has a DIY backbone of dedicated repeaters that people set up (often on rooftops and hanging from tall trees). These repeaters are what relay your message and bounce it around until it reaches its destination. The endpoint node (“companion”) you carry around and use to text doesn't rebroadcast other people's messages. If you want to grow the network you add more repeaters. This gives Meshcore advocates a pretty concrete goal for building out a mesh - they can buy and rig up hardware and set it up in good locations (LoRa is line-of-sight) in order to make the mesh more effective and usable for more people. Someone in my local mesh is apparently using a quadcopter drone to drop solar-powered repeater nodes into tall trees and the group is pretty active in trying to get access to rooftops with good views.

To my uninformed opinion Meshcore seems to be better designed as a network. The ability to build out the infrastructure for this communications system piece by piece, in this plug-and-play sort of way feels like a good fit for the genre.

Reticulum Network

So this one is more complicated - it's basically a lot of the above but also it's a whole alternate internet. Reticulum is a whole cryptography-based network stack which feels like it was developed

from the ground up out of radio networking protocols. It can run over the same LoRa radio devices Meshtastic and Meshcore can use, but it can also use ad-hoc WiFi, data radios, modems, serial lines, amateur radio digital modes, and it can even tunnel through the Internet (meaning you could set up a local mesh of LoRa radios, old personal computers and laptops, and whatever wireless routers and other networking gear you can find, connect a neighborhood together using Reticulum as the underlying network, then connect that through the internet to Reticulum networks anywhere in the world. You can write software to run on Reticulum, and it already has a bunch of programs like NomadNet which can do encrypted messaging (same goal as Meshtastic and Meshcore) but also host and view text-based web pages and I think some other stuff. In a lot of ways, this one feels like the meshnet you'd see in a scifi book, an all-encrypted network stack that allows you to just link together any old hardware you can scrape together and rebuild a decentralized version of the internet grounded in much more secure protocols. (I'll admit I straight up don't understand how a lot of this works on the network/cryptography level, it actually seems similar to Tor in some ways but I don't understand that very well either.)

If you'd like to read more about this from someone who does understand it, there's a very good beginner's guide here: https://www.carstenboll.dk/reticulum-a-beginners-guide/

Real life Meshnets

Meshtastic, Meshcore, and Reticulum are real enough, they exist, but modern history has at least a few examples of DIY mesh/street networks that operated without a formal project drafted ahead of time. The biggest one I'm aware of was in Cuba:

https://gizmodo.com/cubas-illegal-underground-internet-is-thriving-1681797114

https://restofworld.org/2020/the-life-and-death-of-snet-havanas-alternative-internet/

Web Alternatives

Gemini Protocol

Gemini is a 'text-centric' web alternative designed for people who are stick of how complicated, surveillance-heavy, and generally enshittified the web has gotten. It enables you to set up and view text-based 'capsules' (the local equivalent of a website) and is actually pretty well hardened against adding the kind of new features and bloat which would cause it to follow in the web's footprints. It places an emphasis on reading without distraction, popups, ads, or unnecessary cruft, and allows the user to control how the sites look. It's a good fit for people who have low bandwidth, like simple tech, or appreciate privacy (it's encrypted by default). So while it's not a mesh network, you might see how something so bare-bones might be a good fit for one, given the low requirements on processing power and bandwidth. And there's even an implementation of Gemini on Reticulum! So if you want to get some ideas for what a solarpunk internet might look like, maybe wander around Gemini a little.