

Mesh Networking

What it is, how it works, and why it matters when infrastructure fails

Background reading for the AI Learning Partners proposal | Anna R. Key Publishing

What Mesh Networking Actually Is

Standard internet works in a straight line: your device connects to a router, the router connects to an ISP, the ISP connects to the internet. It's centralized. If any link in that chain breaks, you lose connectivity.

Mesh networking is different. Every device on a mesh network is also a router. Devices communicate directly with each other and pass traffic along, hopping from node to node. There is no single point of failure.

Analogy: The internet is a highway. One closure and you're stuck. A mesh network is a city grid. You reroute through side streets.

How It Works

Each node broadcasts a signal and keeps a list of its neighbors. When data needs to travel, the network finds the most efficient path through available nodes automatically. Nodes self-organize. If a node goes offline, traffic re-routes within seconds.

Two main types:

- Infrastructure mesh -- dedicated hardware installed in fixed locations. More stable, longer range.
 - Ad-hoc mesh -- phones and laptops form the network on the fly using apps like Meshtastic or Briar. Zero hardware cost, shorter range.
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How You Start One

Minimum viable mesh (hardware):

- Get compatible routers -- GL.iNet or TP-Link EAP series work well and are affordable
- Flash them with mesh firmware -- LibreMesh is turnkey; OpenWRT + Batman-adv is community standard
- Place nodes within range of each other (roughly 150-300 ft indoors, further with external antennas)
- Configure once. Nodes find each other automatically after that.

Community or neighborhood scale:

- Map your coverage area first
- Identify anchor points: rooftops, community centers, libraries, high ground
- Each node needs power -- or solar and battery storage for true resilience
- Target roughly one node per 2-3 blocks in urban areas for solid coverage

Phone-based emergency mesh (no hardware required):

- Meshtastic on LoRa radio devices (~\$30-60 each) -- works miles without infrastructure
- Briar -- Android only, Bluetooth/WiFi mesh, shorter range but free

Emergency Use: Where Mesh Genuinely Shines

A mesh network does not need the internet to function. It is a local network. When ISPs go down, when cell towers are overloaded or destroyed, the mesh keeps running. Most of what people desperately need during a disaster is local information -- and local information does not require the internet.

Situation	What Mesh Provides
Hurricane knocks out ISP	Neighborhood communication still works
Cell towers overloaded	Direct device-to-device messaging via LoRa radios
Partial power grid failure	Solar-powered nodes keep the network up independently
Need to share local emergency info	Local servers on the mesh: shelter locations, safe water, first aid

The Bigger Picture: Infrastructure Sovereignty

Mesh infrastructure owned and maintained by the community it serves represents a fundamentally different relationship to communication than commercial ISPs provide. No one can throttle it, price communities out of it, or shut it down. It belongs to the people running it.

For libraries, community centers, and public institutions in particular, locally-operated mesh infrastructure is an extension of the public commons -- communication infrastructure that serves the public without extracting from it.

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