Microgrids Find Their Business Case with Climate Resilient Internet

Microgrids tap a new revenue stream, saving the internet from climate change

MICROGRID KNOWLEDGE

Written by David Theodore / Co-founder & CTO of Climate Resilient Internet (CRi)

Executive Summary

Microgrids are the future for resilient, sustainable energy, but cost is a stumbling block. ROI is hard to calculate and "even when a microgrid is cost effective, developing and proving a business case can be difficult."

This paper confronts that challenge with a stronger value proposition; one that taps a new revenue stream and maximizes client resilience. In this new vision, microgrids extend resilience to mission critical internet and cloud data, where extreme weather is causing blackouts lasting days and weeks; blackouts so consequential, they must be avoided at all costs.

Internet resilience isn't so simple, because data — even from your Wi-Fi or smartphone — relies on untold miles of fiber optic infrastructure, all of which is vulnerable to weather and dependent on the electric grid.

However, a new solution has emerged, called "Climate Resilient Internet." It's based on a new certification for climate change and operates on the same "resilience is local" principle as the microgrid. As such, it needs only local power and as a solution for mission critical data, nothing complements it better than a microgrid.

Introduction

In 2017, *The Economist* proclaimed that data is the world's most valuable resource. Most of that data resides on the internet, and access to that data is so vital that for many institutions, a total outage is unthinkable. Nonetheless, extreme weather marches in lockstep with the criticality of data, causing widescale internet outages, often lasting days and weeks.

The Economic Toll of Internet Blackouts

Power failures make headlines, but the cascading consequences of internet disruption seem to go unnoticed. Yet, consider the economic impact to major U.S. cities and thousands of businesses, literally dead in the water.

In 2012, Superstorm Sandy knocked out the internet for much of Manhattan and huge swaths of New Jersey. Far from a singular event, it was a harbinger. Irma left Miami without internet for weeks Harvey followed suit in Houston and Louisiana.

Now this year, Hurricane Isaias proved that it doesn't take a superstorm to obliterate internet access, as we saw in parts of Connecticut, New Jersey and Long Island. We haven't even touched on other threats, like heat, wildfires and the impacts of public safety power shutoffs (PSPS).

And apart from more dramatic cases, random weather events cause intermittent internet outages in every region, some lasting minutes, others hours. Set a Google alert for "internet outage" and your phone will hardly know an hour's peace. In the aggregate, the economic impact is enormous.

A June 2020 research report from Information Technology Intelligence Consulting found that the average cost of a single hour of downtime is more than $300,000 for 88% of mid-size and large enterprises. Forty percent of the organizations polled by ITIC indicated that an hour of downtime may cost from $1 million to over $5 million, exclusive of any legal fees, fines or penalties.

The Problem with our Internet Infrastructure

In short, internet infrastructure is vulnerable, because it's wholly dependent on the electric grid and ground-based fiber optic cabling. The latter part may surprise some readers, since it seems that we live in a wireless world, however data from your cell phone — and all other wireless devices — switches over to fiber before reaching the internet.

Typically, the switch happens at the nearest cell tower and the reason, is that only fiber can support the torrent of data coursing through internet hubs. A good analogy is a commuting to work in a bustling city, where you start your trip in a car and then board a train for the efficiency and scale of mass transit.

The vulnerability problem with fiber, is that it's all underground and strung across wooden poles. Like the grid that powers it, that infrastructure is fodder for extreme weather.

According to Paul Barford, professor of computer science at UW-Madison: "Much of the system was put into place in the '90s without much consideration of climate change. On top of that, much of the internet's physical infrastructure is ageing. A lot of it was designed to last only a few decades and is now nearing the end of its lifespan."

What's the Solution?

Surprisingly, the solution harkens back to a wireless concept from the 1950's. It formed the backbone for AT&T Long Lines, the coast-to-coast wireless network that carried our long-distance calls, TV news (NTSC video) and military data.

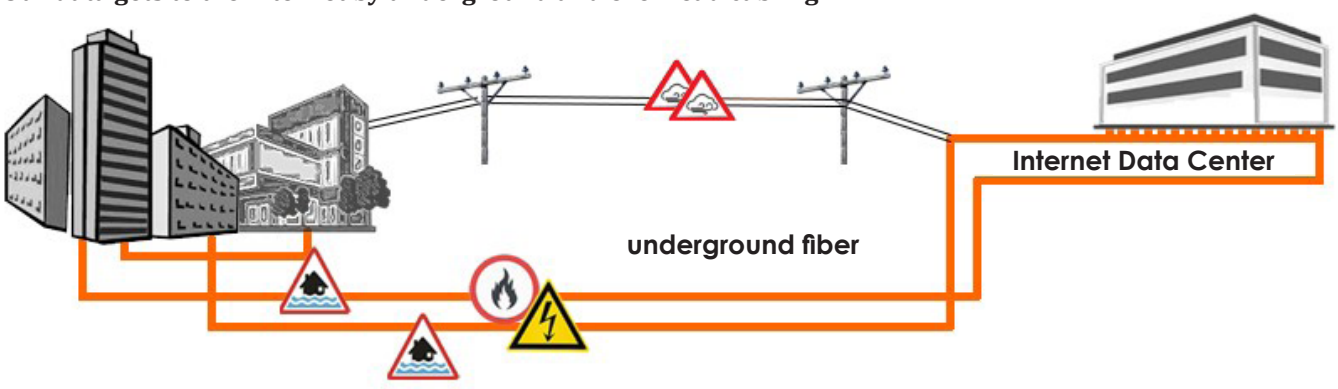
The purpose of that network was to improve resilience over copper wire infrastructure, which was prone to weather and difficult to maintain. AT&T's wireless backbone was so vital, it was backed by diesel generators, and the infrastructure — towers and antennas included — not only survived extreme weather, but was also designed to withstand nuclear attack.

AT&T Long Lines eventually petered out in the 1980's, giving way to all-fiber infrastructure. Concurrently, I had founded Microwave Bypass, where in 1987 we innovated AT&T's same microwave radio platform for the world's first wireless internet access.

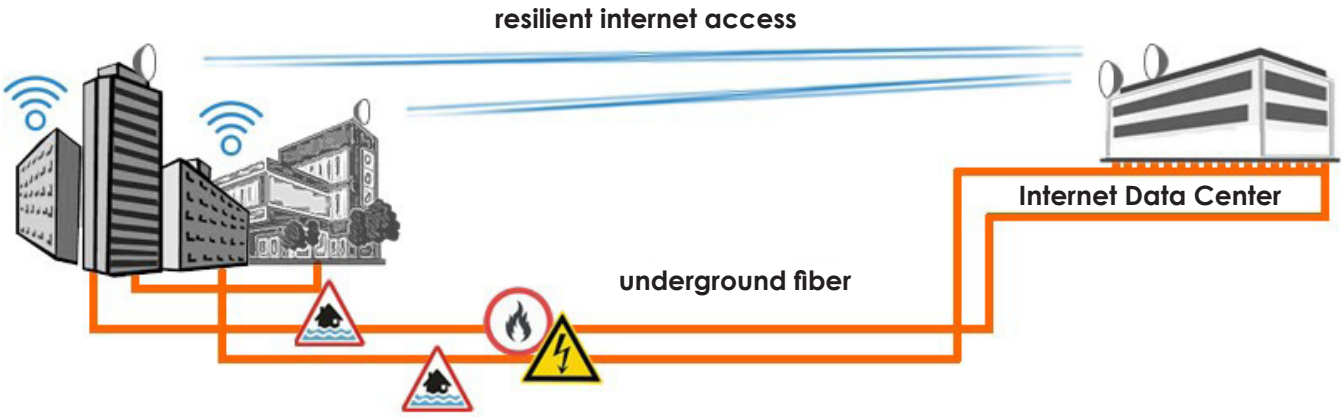
Like AT&T's Long Lines, our infrastructure overcame extreme weather of every kind. Yet every tech has its day, and so as internet speeds ramped up from 10 megabits to 100 gigabits, wireless lost the bandwidth race.

Enter fiber optics. Fiber was and is a great investment, however over decades there developed a false, wide-spread assurance that fiber could furnish its own resilience; for instance, with route diversity, network redundancies and north/south building entrances. The problem however, is that while these approaches are effective for localized events, like a backhoe encounter or vandalism, in the case of extreme weather, fiber is a single point of failure. Laying more of it in the ground is futile.

Our data gets to the internet by underground and overhead cabling:



Resilient internet overcomes power outages and terrestrial damage:



Therefore, internet resilience relies on independent power and carrier-class wireless — rooftop to rooftop — to the nearest, hardened internet data center (not in a flood plain and hazard zone). Once there, data can access available routes to its final destination.

Here, the concern about wireless bandwidth is not so relevant, because wireless is acting as lifeboats for the internet. It's not there to save incidental data, but to maintain critical operations when all else fails.

Cost and Delivery

The codependence of power and data argues for seamless, cohesive integration, and so for microgrid providers, internet resilience is as simple as reaching out to a certified provider. Installation time is typically 2-3 days, following a 90-day design and planning cycle. Thereafter, wireless resilience is a touchless service, maintenance-free, redundant and with a mean-time-between-failure well beyond 7-10 years.

Concerning payment, internet resilience dovetails with microgrid/energy-as-a-service models. It's billed monthly and devoid of heavy capital outlays. For many clients, it represents a net-zero expense, channeling funding from excess fiber toward more effective resilience. Think of balancing risks across an investment portfolio.

Lastly, internet resilience goes beyond idle "backup" propositions. In regular times, it pays for itself by carrying its share of the organizational payload. The extent of that data will vary by industry, but typically it's in the range of 5-15%.

What's yet to decipher is the business model for microgrid integration, and how the internet revenue stream may incentivize and accelerate ROI.

"In our work to design/build, own, and operate microgrids at customer sites where the microgrid continues to supply the necessary electric and thermal energy when the grid is down, we find a similar need for continuity of service from the Internet, namely cloud-based software services. So we view Internet resilience as an adjunct to energy resilience. We design our systems for the loss of the Internet, just like we design for the loss of the grid. But that doesn't mean the Internet is any less important to our long-term operations. Logically, if Internet resilience is an important adjunct to energy resilience, then from a customer perspective, Internet resilience is an important adjunct to their organizational resilience. This is especially true as more and more customers, like AlphaStruxure, turn to cloud-based software services.

"For our Network Operations Center (NOC), where we supervise all our customer-site microgrids, Internet resilience is key to all of our site performance optimizations, key predictive analytics, and management of all support services, business operations, and compliance metrics. For this reason, we are exploring several ways to make our cloud-based software services resilient, i.e., Internet resilience. As our business is benefited from a more resilient access to the cloud, so will all of our customers' core missions benefit from such an approach, namely Internet resilience."

Steve Pullins, SVP, CTO, AlphaStruxture

The State of Play

Climate Resilient Internet is advancing as a telecom certification ("Certified CRi®"). We find most clients to be on traditional generators, however early adopters from the microgrid sector include a community in Chelsea, Massachusetts.

The project is spearheaded by the City of Chelsea and neighborhood organizers at Green Roots Chelsea. It's one of 11 communities in Greater Boston that received initial funding from the Massachusetts Clean Energy Center. The microgrid will serve the community, including low-income housing, critical infrastructure and small business.

Other projects are queuing up as we align with microgrid providers and funding agencies.

Regulatory and Corporate Mandates

The DoE estimates that power outages cost the U.S. upwards of $150B annually. Hidden in that figure is a cost for data disruption that business leaders and policy makers need to reckon with.

The stakes are such that a myriad of future regulations will hold organizations increasingly accountable for the reliability of critical data.

For instance, we believe that the microgrid mandate in Puerto Rico is a bellwether. Similarly, House Democrats have floated bills to improve wireless resilience, fueled by the California wildfires. While their aim is good, at the same time, cellular carriers were lobbying to rescind rules for power backup at cell sites.

Notwithstanding public policy initiatives, corporate risk management will necessarily extend to critical relationships between climate change, grid vulnerabilities and data resources. We see shades of that with climate readiness starting to factor into corporate investment guidance, M&A processes and even municipal bond ratings.

Conclusion

Microgrids and resilient internet are the most symbiotic partners in all of climate adaptation. Their integration is a force multiplier that completes the resilience proposition and leverages a new revenue stream. Also compelling, is that the savings from a single prolonged internet outage could fund an entire microgrid deployment (typically $2-$4 million/MW).

If you're a microgrid provider, Certified CRi® will improve your business case, increasing margins as well as resilience. To learn more, email me at david@resilientinternet.com and visit our website: resilientinternet.com.

About the Author

David Theodore is co-founder & CTO of Climate Resilient Internet (CRi). He has a penchant for innovation that brought the world's first wireless internet solution. It started with the fixed wireless industry, putting millions on the internet in the years before Wi-Fi. It advanced teleradiology and distance learning, supported NASA and the Space Shuttle mission, and gave world leading institutions their first internet access.

David is a climate activist in Boston and a thought leader in the telecom industry. Email David or connect with him on LinkedIn.

About Climate Resilient Internet, LLC

We're climate activists and telecom innovators on a mission to climate-proof the internet. It's founded on a vision for new best practices, advancing as an industry certification for climate resilience.

If you're in a vulnerable region, we're already there. To learn more, visit our website or contact us.

We support sustainable, green energy and incentivize its deployment in CRi installations. If you're a microgrid provider or planning to deploy a microgrid, talk to us.