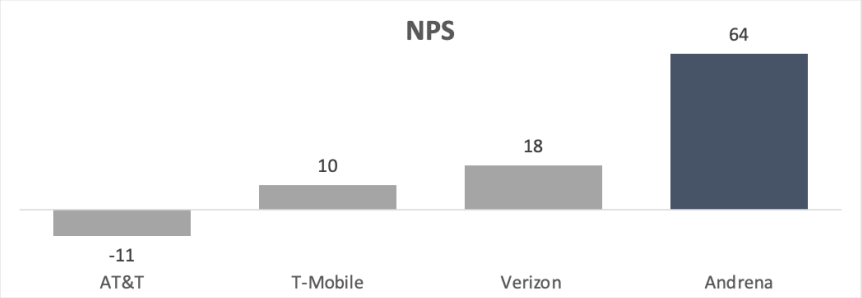
Andrena - Series A (Oct'22)

Andrena is building a decentralized bandwidth network, starting with fixed wireless.

Brief Overview

- Andrena designs and operates network infrastructure for delivering wireless internet services. The company currently serves 3.3K subscribers in its beachhead market - managed WiFi for multifamily residential buildings in the tristate area - and generates $1.1M of ARR. Over time, Andrena plans to expand across suburban markets in the US and into other types of wireless internet services.
- Andrena delights its customers with simple, fast, cheap home internet. In as little as three minute, customers get their own high-speed private WiFi network for $25/mo with no long-term contracts. Meanwhile, T-Mobile, Verizon, and AT&T customers have to install clunky physical routers, get locked into punitive annual contracts, and pay twice as much—if not more—for the same underlying service. It's no wonder NPS scores look like this:



Source: Comparably.com, Andrena

- Andrena's core ISP business can be massively valuable in its own right - but we see it as a trojan horse for bootstrapping the world's first **decentralized backhaul network**. By leveraging Andrena's proprietary radio software, the network can programmatically adjust to changes in weather, equipment malfunctions, and other network interference in real-time.

- Andrena was founded in 2016 by Neil Chatterjee, a Princeton-trained electrical engineer, and is now a team of 20 employees. Neil is supremely sharp with a compelling vision about the future of the telecommunications industry - and Andrena's role within it. While the round is later-stage than our typical mandate, he's a founder we feel we have to back. [redacted]
- The company is raising a [redacted] Series A [redacted]. The round is led by Dragonfly with participation from Castle Island, CMT Digital, and Olshan Properties. [redacted]

Key Stats: 16 cities | 1M homes passed | 3.3K ISP customers (+15% MoM) | $1.1M ARR (+4x YoY) | $[redacted]M bookings | [redacted]% gross margin

Napkin Math: 10M homes passed (x) 20% penetration (x) $35/mo (x) 80% gross margin (x) 15x gross profit multiple = $10B EV

Top 3 Reasons We Have To Invest

1. Andrena's proprietary radio/deployment technology drives software-like margins that other ISPs can't match.

Andrena's network infrastructure drives unit economics reminiscent of a technology company rather than a traditional ISP:

- At the inner/transport layer, Andrena creates local micro-networks connecting multifamily buildings via rooftop point-to-point radios. This allows Andrena to extend a single wholesale fiber endpoint ($2-3k/mo) throughout a local area (3-mi range). Andrena's network runs on high-frequency mmWave spectrum allows for high throughput and avoids interference from cellular networks.

- At the outer/access layer, Andrena installs proprietary WiFi6 access points throughout hallways & common areas. This drives both a cost advantage (because access points are shared by 3-4 units) and a UX advantage (because tenants never have to see/touch a physical router). Andrena's typical build requires $1K of rooftop hardware plus $40 access points every *third* unit; compared to Starry's disclosed cohort data indicating >$60K of rooftop hardware plus $250 access points in *every single* unit.

Both of these have allowed Andrena enjoy best-in-class margins relative to other ISPs, with gross margins expanding from [redacted]% to [redacted]% YTD. We expect these margins to hold up during the company's aggressive growth phase and approach 80%+ at scale. Long-term, Andrena has a path to deepen its structural cost advantage even further:

- At the inner/transport layer, Andrena will seed a **decentralized backhaul network** that enables ISPs to share fiber/datacenter connections. By enabling ISPs to trade 'atomic units' of backhaul, ISPs can become viable businesses with as little as a few dozen subscribers (vs 1k+ subscribers needed today), driving an explosion in the number of active ISPs.
- At the outer/access layer, Andrena will build the first **programmable wireless network** that can expand modularly into new wireless services (commercial/mobile/IoT). This vision is the dream for every telco executive, but existing efforts at developer APIs are unusable in any meaningful sense. With no technical debt from a legacy network, Andrena is best positioned to open up its infrastructure to support an ecosystem of third-party connectivity providers.
- Fixed wireless is Andrena's beachhead product. However, the company is already experimenting with offering **adjacent wireless services** over its infrastructure. Two notable products are fixed wireless for single-family homes (beaming internet from rooftops of apartment buildings to nearby single-family homes) and commercial internet. Each segment generates $10b/yr+ of revenue for US ISPs, and Andrena already has a few dozen pilot users on its single-family home product and is in talks with its first commercial internet customers now.

2. Owning an at-scale ISP provides an unfair advantage in DeWi.

Andrena is the best instantiation we have seen of our hybrid-ISP/miner thesis:

- Andrena has effectively ~zero marginal costs to deploy Helium/XNET/Pollen radios on top of its existing wireless infrastructure to earn crypto mining rewards — effectively a new 'product' (crypto mining) built on top of Andrena's modular network infrastructure.
- The only incremental costs Andrena incurs is hardware, which means they can mine tokens at a 30-50% cost advantage to pure-play DeWi miners. The cost advantage means Andrena is able to raise capital on preferential terms from investors seeking exposure to early-stage networks with low circulating supplies. This is reminiscent of Bitcoin miners like Crusoe Energy who converted differentiated access to a low-cost mining input (gas flaring) into a capital markets advantage (raised $750m from VCs). In fact, Andrena's mining outperformance vs the median miner will likely be even higher than in Bitcoin given the location-based nature of DeWi: deployments on tall buildings in suburban markets will tend to earn outsized rewards.
- Andrena is already the second largest miner on Helium's 5G network (earning [redacted]. As an early, scaled miner across the ecosystem, we believe Andrena can capture up to 1-3% of DeWi market cap.

DeWi Deployment Costs			
	XNET	**PCN**	**HNT**
Model	*Long-Range*	*Buttercup*	*Nova436H*
Hardware (up-front)	$20,000	$7,500	$5,700
Install (up-front)	$1,500	$750	$750
Rent (annual)	$5,000	$3,000	$3,000
Backhaul (annual)	$1,800	$1,800	$1,800
Labor (annual)	$500	$500	$500
Total 1-Yr Costs	**$28,800**	**$13,550**	**$11,750**
% Non-Hardware	*31%*	*45%*	*51%*

Source: feedback from DeWi mining community

Mining tokens is a good business, but Andrena's moonshot opportunity is leveraging the momentum from its 'web2' growth to seed a decentralized backhaul network. Instead of competing with other DeWi networks over the

access layer (LTE vs WiFi vs LoRa), Andrena's protocol aims to commoditize the *transport* layer of the internet by enabling ISPs to trade atomic units of backhaul. The vision is to enable ISPs to share access to their biggest cost driver - fiber - thereby unleashing a wave of innovation in the ISP business model. We expect to work closely with the company over the coming quarters to design the protocol and recruit early partners & advisors.

3. Missionary leadership team who we'd be proud to back for decades.

We've built a close relationship with Neil (founder/CEO) over the past four months after being introduced by our friends at Zigg Capital. We like that he is: 1) a first-principles thinker with strong perspectives on the future of telecom (and Andrena's role within it); 2) an execution machine who is diligent enough to scale an operationally-intensive ISP; and 3) an founder who's proven himself capable of recruiting high-caliber talent and raising capital in tough markets.

The leadership team Neil has recruited at Andrena has decades of experience deploying and scaling ISP businesses. This includes many key execs who helped scale Starry and left post-IPO including Anthony Ontiveros (CRO), a 25+ year ISP veteran across RCN, TimeWarnerCable, and most recently head of subscriber services at Starry; Michael Weiss (VP of multi-family), a similar 25+ year history in the ISP industry across RCN, CableVision, and most recently as a commercial development manager at Starry; and Davian Litchmore (Network Ops).

Top 3 Things That Keep Us Up At Night

1. Andrena must tap non-equity financing to avoid the dilutive spiral that traps most ISPs.

ISPs have a long history of incinerating shareholder capital, even (especially) when growing quickly. Startup ISPs must compete with tech brands for customer eyeballs while competing with incumbents on price. In the former, they're bidding against fintech/social apps with >90% gross margins, and in the latter, they're bidding on contracts against incumbents who can borrow at rock-bottom rates (VZ/T pay a ~1% credit spread over US treasuries). The industry's most recent

victim, Starry, raised $250M to reach 100k subscribers and looks to be headed towards bankruptcy.

> Like MVNOs, prior attempts at scaling WISPs have resulted in unenviable outcomes for investors. Clearwire - a company founded in 2002 by telco legend Craig McCaw - raised $3.4B for its fixed wireless and grew to 200K subscribers, but made some regrettable architecture choices (WiFiMax > LTE), never reached profitability, and eventually sold to Sprint for the same amount as it raised; Starry - a fixed wireless provider using mmWave spectrum founded in 2014 - raised $250M+, grew to 50K subscribers, and SPAC'd at a $1.6B valuation earlier this year, only to miss their growth projections and see the stock price fall >75%; Shentel - a cable company with 100+ years of experience - tried and publicly failed to build a profitable WISP business, which they are now in the process of shutting down; Tarana - a hardware company that builds specialized non-line-of-sight radios for fixed wireless - raised $495M, filed 25+ patents, and took twelve years to reach $10M in quarterly revenues; Cradlepoint - another fixed wireless hardware company - raised $205M and sold to Ericcson for less than $10M. We're not saying these are bad companies or poorly-executed ideas: just that the WISP business has been exceptionally hard to make money on.

EV3: Beyond Networks

While Andrena will be much less capital-intensive than the median ISP, it will be more capital-intensive than the median venture-backed startup. In order to generate compelling shareholder returns, the company must find other ways to finance buildouts — for example:

- As Andrena grows in scale, they can negotiate 'pass-through' contracts where buildout capex is funded by property managers rather than off the company balance sheet.
- Andrena can raise debt secured either by future revenues from signed contracts and/or by the collateral value of installed equipment. [redacted]
- Andrena can raise token SPVs from crypto investors to fund the purchase of DeWi mining equipment, keeping a meaningful portion of the upside. [redacted]

2. Competition from telco fixed wireless offerings.

Fixed wireless is the only double-digit growth business within major telcos. Theoretically, telcos should be able to bundle home internet to existing customers at zero margin, just to drive higher retention in their (more profitable) mobile business.

> Similar to the dynamic in MVNOs, the only truly successful entrants into the WISP business have been incumbents: not cable operators, but telcos. In part to strike back at cable MVNOs stealing their mobile subscribers, the big telcos launched WISP businesses that have amassed 2M+ subscribers across T-Mobile + Verizon + AT&T. The former two are leaning into the model, promising shareholders that their fixed wireless subscriber base will grow to 11M+ by 2025. AT&T is instead focusing on extending its fiber footprint, with the rationale that customers prefer fiber's lower latency over fixed wireless (Verizon points to the fact that their own fiber customers almost never use its full capacity).

Escape Velocity: Beyond Networks

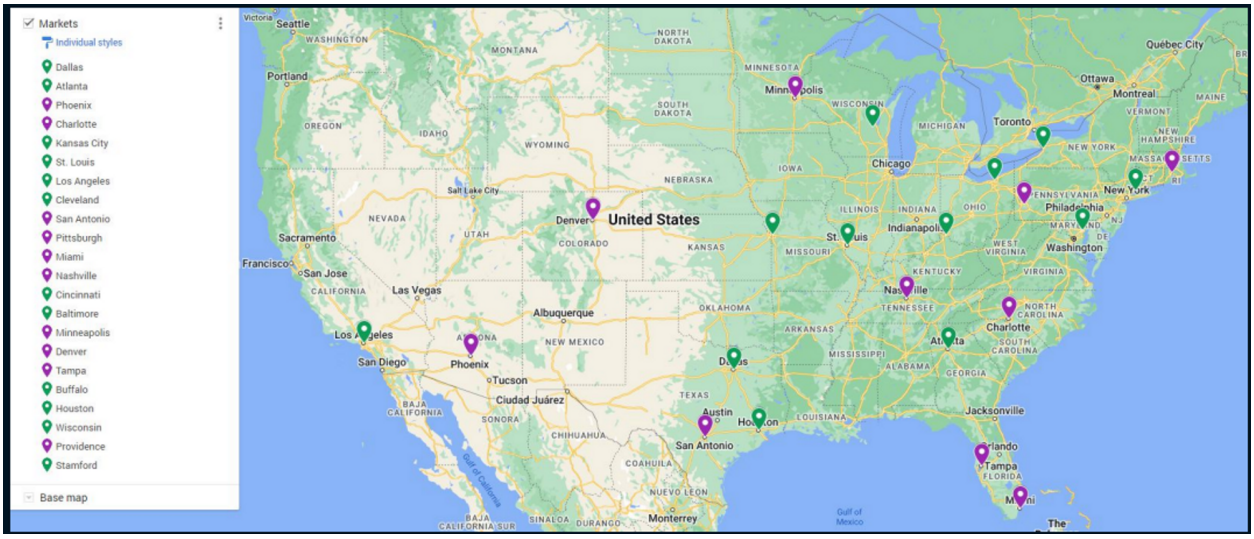
However, reality is more complicated, and there are several reasons why we think the leading fixed wireless provider is more likely to be built outside a telco than within one:

- Andrena charges half the cost of telcos today while generating [redacted]% gross margins. The only telco that comes close to matching Andrena's pricing is Verizon's "$25/mo plan" which requires customers to lock-in both their mobile and home plans with Verizon. We do not believe this is profitable for Verizon and wouldn't be surprised to see price increases in the near future.
- Telco fixed wireless offerings are built on licensed mid-band spectrum, which has two major disadvantages. First, in urban/suburban areas mid-band spectrum is already crowded with mobile traffic — since mobile pricing per-GB is ~50x higher than fixed, profit-maximizing telcos almost always prioritize mobile traffic (e.g., self-imposed caps on fixed wireless customers in a given area). Second, mid-band spectrum has an order of magnitude lower throughput/frequency than mmWave and therefore is structurally limited in the speeds it can provide.
- Lastly, there are room for multiple winners. There are 125M+ households in the US, all of whom need internet, and telcos are promising shareholders 12% market share by 2025. Andrena needs 2% share to become a $10B+ business.

3. Execution risks from becoming a regional → national network.

Andrena is currently live in 8 cities across the US and going live in 8 more imminently. Following the round, the company will expand nationally across the 25 cities. In each city, Andrena has to build relationships with datacenter/fiber providers, sign a critical mass of multi-family properties to provide sufficient density for the point-to-point mesh network, hire an installation team to buildout

networks at each property, and bootstrap Andrena's brand among competing internet providers. As with any location-based business, operational complexity grows super-linearly to number of locations.



Andrena's planned geographic expansion

We have confidence in the Andrena's team ability to expand nationally. The team has the economic levers of their business dialed to determine when to double down and when to retreat. While not every market will be a success, we believe in the aggregate Andrena will be able to create a footprint of extremely valuable wireless networks.