

# Network Design Best Practices

Planning broadband infrastructure for remote and challenging terrain

Good tribal network design starts with community needs and terrain reality, not with a technology preference. With BEAD now technology-neutral and TBCP Round 3 open, credible engineering choices matter more than ever. These are the practices Numu applies on every project.

## 1. Design from Demand Backward

Count households, businesses, and anchor institutions; map where people actually live and gather; and set a capacity target that clears the FCC 100/20 Mbps benchmark with headroom for growth. A network that meets the minimum on day one is obsolete by year three.

## 2. Match Technology to Terrain

| Technology                    | Typical speeds    | Strengths                               | Watch out for                                     |
|-------------------------------|-------------------|-----------------------------------------|---------------------------------------------------|
| Fiber                         | 1-10 Gbps         | Highest capacity and lifespan           | Cost per mile in low-density terrain              |
| Fixed wireless (Massive MIMO) | 100 Mbps - 1 Gbps | Fast deployment, strong rural economics | Line-of-sight planning, spectrum access           |
| Hybrid fiber + wireless       | Varies            | Fiber backbone with wireless last mile  | Integration complexity                            |
| LEO satellite                 | 25-350 Mbps       | Immediate coverage anywhere             | Ongoing cost, capacity limits, no local ownership |

On the Red Mountain Networks project, Skylark Wireless Faros Massive MIMO base stations delivered 100/20 Mbps service across high desert terrain at a fraction of fiber's build cost, reaching 100 homes and 7 tribal buildings.

## 3. Secure Your Spectrum Position

Licensed spectrum is an asset. The 2.5 GHz band offers a strong balance of coverage and capacity for tribal fixed wireless and future 5G; Numu led FCC Auction 108 acquisitions for multiple tribal nations. Evaluate your license position before finalizing any wireless design.

## 4. Engineer the Backhaul First

Last-mile speeds are only as good as the middle mile behind them. Identify fiber interconnection points, negotiate transport early, and design redundancy into tower-to-core links.

## 5. Design for Operations on Day One

Every design decision should answer: who monitors it, who fixes it, and what does it cost per subscriber per month? Plan the network operations approach, spare inventory, and local workforce training as part of the engineering package, not after construction.

### Design Review Checklist

- ☐ Demand model and capacity target documented
- ☐ Technology choice justified against at least two alternatives
- ☐ Spectrum and backhaul secured or under agreement
- ☐ Coverage prediction validated with field survey
- ☐ Operations cost model covers years 1 through 5

## References

National Telecommunications and Information Administration. (2022). *Tribal broadband planning toolkit*.

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DRAFT FOR REVIEW. Prepared by Numu Communications LLC, July 2026. Federal program rules, deadlines, and funding levels change; verify all details against the current notice of funding opportunity or agency guidance before relying on this document. Contact: [info@numu.tech](mailto:info@numu.tech) | +1-888-686-5830 | [www.numu.tech](http://www.numu.tech)