

Chapter 5

Northwest Towers in Action



How NWT Designs Wireless Systems



Distance

Throughput

Reliability

Mobility

Environment

When wireless systems fail...

- ▶ **Designed around a single technology**
Single-technology thinking ignores the tradeoffs that define every real deployment.
- ▶ **Optimized for best-case conditions**
Lab performance never matches field performance. Best-case designs fail in the worst case.
- ▶ **No redundancy plan**
When one path fails, everything fails. No handoff, no fallback, no plan.
- ▶ **Links, not systems**
Individual link performance is meaningless if the network cannot sustain the mission.

When wireless systems succeed...

- ▶ **Designed as a layered system**
Each technology has a defined role. The system is designed for the environment, not around a product.
- ▶ **Engineered for worst-case conditions**
Rain fade, interference, mobility, and congestion are designed for -- not discovered in the field.
- ▶ **Field-validated before go-live**
Every link is surveyed, measured, and confirmed before the system depends on it.
- ▶ **Clear roles, zero overlap**
No technology does a job that belongs to another. Tight, efficient, and explainable.

NWT designs complete systems -- not individual links or individual products.

- ▶ *The right design starts with understanding the environment -- then selecting the technologies that work together.*
- ▶ *Links don't fail—systems fail.*
- ▶ *NWT approach: survey the environment, define the layers, select the right technology for each role -- then engineer the system as a whole.*

The Layered Approach



1 Mobility / Access Layer

Rajant Kinetic Mesh(R), WiFi, CBRS, Sub-1 GHz

Handles moving assets, vehicles, personnel, and local device connectivity. The dynamic edge of the network -- the layer that stays connected no matter what moves.

2 Distribution Layer

60 GHz (V-Band), Short-Range Licensed Microwave

High-capacity point-to-point connections across a site. Replaces fiber for camera aggregation, equipment interconnect, and inter-building links without trenching.

3 Backhaul/Backbone Layer

Licensed Microwave 6-42 GHz, E-Band 70/80 GHz

Long-distance, engineered transport between sites. Predictable, SLA-grade performance. The load-bearing spine of the network -- built to stay up in every condition.

4 Backup / Wide-Area Layer

Cellular LTE / 5G, CBRS, Satellite

Resiliency and extended coverage for mobile assets and remote locations. The secondary path when primary infrastructure is unavailable or insufficient.

Each layer is designed for a specific role. Systems combine layers where it makes sense.

Layers are engineered to work together. Design starts with system requirements and the network environment—sometimes a single layer is sufficient

What Good Wireless Design Looks Like



Designed for worst-case conditions

Not peak performance -- sustained, predictable performance when weather, interference, load, and range are all at their hardest. Best-case design fails in the field.

Validated in the field

Survey first, design second. Satellite imagery is a starting point, not ground truth. Every path must be walked and measured before it is trusted.

Aligned to the environment

Terrain, movement patterns, interference, rain fade, and multipath all shape the design. The environment is not a variable -- it is a design constraint.

Layered and redundant

No single point of failure. Every critical path has a backup. When one layer degrades, the system continues. Redundancy is not optional -- it is the design.

Clear roles for each technology — and the ability to adapt or develop new technologies when needed.

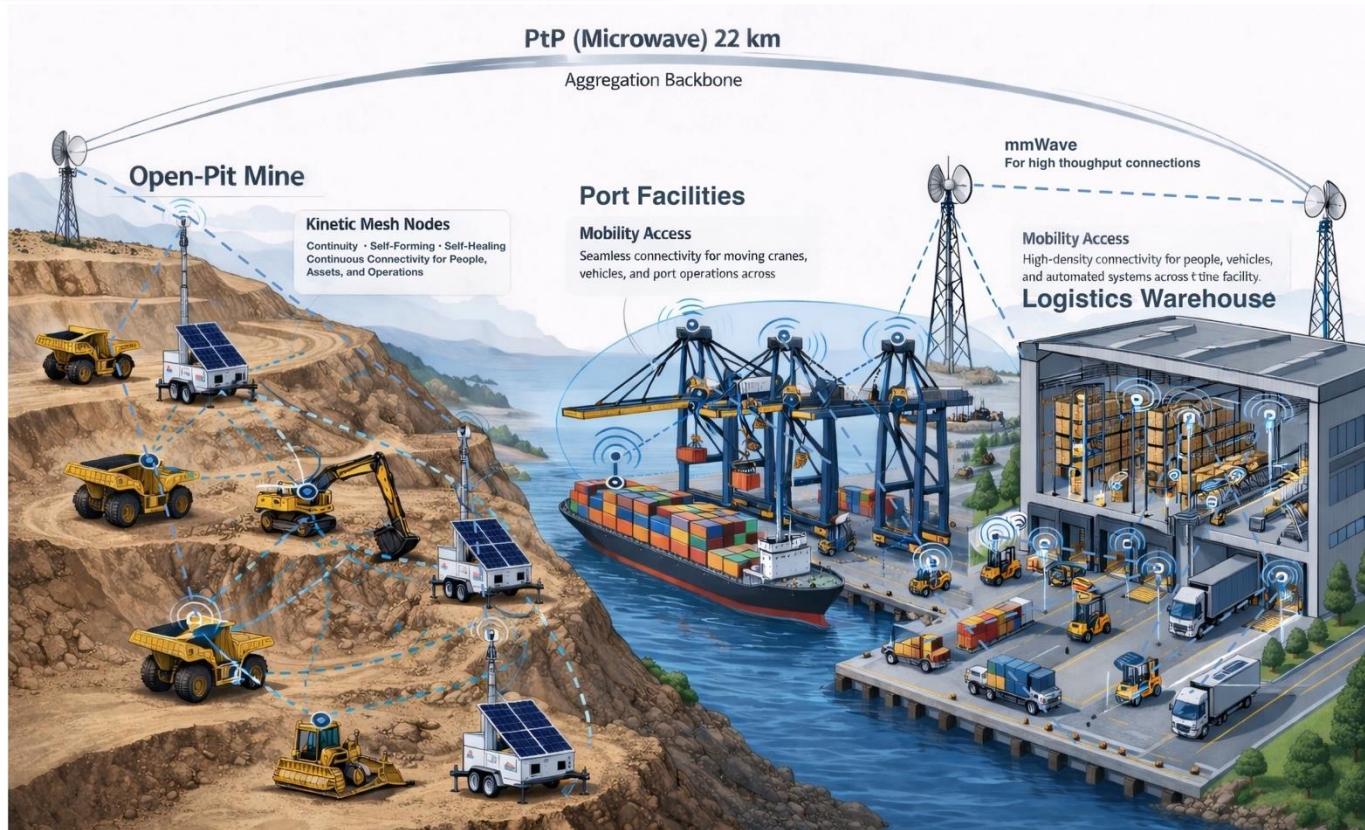
No overlap, no confusion, no wasted capacity. Every technology has a defined role. If you cannot clearly explain why each technology is in the system, the design is not complete.

If a required system or device does not exist, we can rapidly prototype it—devices, brackets, or full systems. Our devices are frequently purchased by manufacturers and integrators worldwide.

The goal is not a working link -- the goal is a system that stays working. • Performance is defined at the worst moment, not the best one.

► *Good wireless design is invisible. When it works, nothing fails. When something does fail, the system keeps running.*

Integrated Communications • Layered Network View



- ▶ Layered design: backbone / access / mobility
- ▶ PtP microwave for aggregation backbone
- ▶ Rajant mesh for dynamic coverage
- ▶ PtMP millimeter wave for edge capacity
- ▶ Supports vehicles, cranes, field assets
- ▶ Maintains continuity during movement



Wireless fails when treated as a product. It succeeds when engineered as a system.

- ▶ Know your frequency — it governs everything
- ▶ Design for the worst case — not the best
- ▶ Survey the path — engineering starts on the ground
- ▶ Layer technologies — no single solution covers everything

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