ConnectPlanner

Automated connectivity planning assign each source site to the best target by engineering preference

A user guide explaining what ConnectPlanner does, how priority works, and how it complements the Trace Tool with a complete worked example.

Input	Output	Engine
Two CSV files — sources and targets (with priority P1 to P10)	Assignment report (CSV) + color-coded KML map	Globally optimal assignment respecting priority and capacity

1. What is ConnectPlanner?

ConnectPlanner solves a very common transmission planning problem: given a set of new (source) sites that need connectivity, and a set of existing (target) sites that can host them, which source should connect to which target?

Doing this by hand for hundreds of sites takes hours of trial and error. ConnectPlanner does it in seconds and produces a globally optimal plan that respects your engineering rules.

It is NOT just picking the nearest target. The engine takes into account three things at once:

1. Your priority preferences (P1 first, then P2, P3, ...)
2. Maximum distance allowed per priority
3. Maximum capacity (Max Connected) per target

Then it finds the assignment that minimizes total distance while honouring all of those rules.

2. The Most Important Concept: Priority

Priority is the heart of ConnectPlanner. It tells the engine which target sites you prefer the new source sites to connect to the engineer decide the priority for target sites.

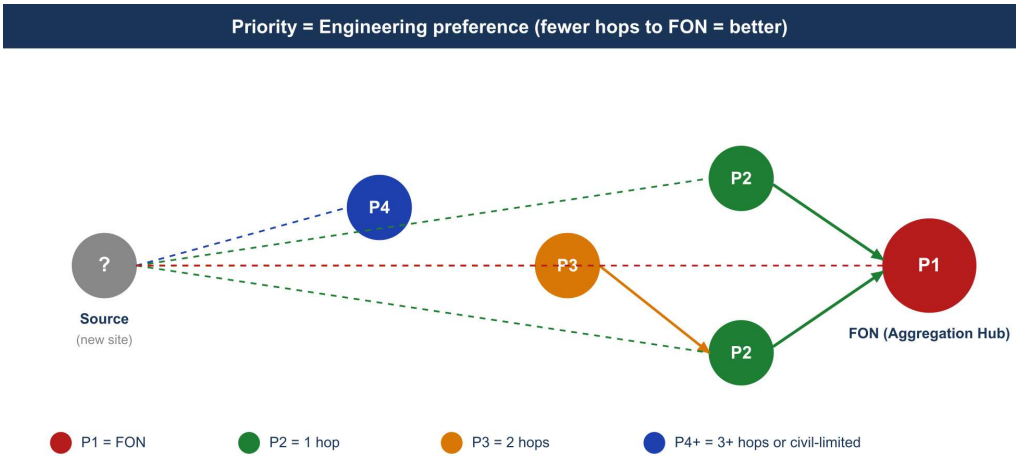
Engineering rule of thumb

Fewer hops to the FON = higher priority. Sites closer to the FON / Aggregation Hub get P1, target sites with one hop to FON / Aggregation get P2 and target sites with two hops to FON get P3, …, etc

Why? Two practical reasons every transmission engineer knows:

- **Lower upgrade cost.** When you connect to a site close to the FON, you avoid having to upgrade many intermediate links.
- **Lower latency and higher reliability.** Each extra hop adds delay, more potential points of failure, and less availability and reliability.

Note: Ideally, connect directly to the FON when there is no civil or Freq. Limitation. Otherwise, choose the next fewest hops target available like P2, P3,..,etc.



Priority reflects engineering preference. P1 is the FON itself; P2 = 1-hop targets; P3 = 2-hop targets; P4+ for farther or civil-limited sites.

Max Connected sites per target site

Every target site has a maximum number of MW links it can host. This is set by you in the parameters (Max Connected per target). It usually reflects a physical/civil reality of the site:

- **How many dishes the tower can carry** (structural limit).
- **How much rooftop / mast space is available** (civil limit).
- **Operational policy** — e.g. you don't want any single site responsible for more than 4 links.

The optimizer never exceeds this cap, no matter how many sources would prefer that target.

Competition — what happens when many sources want the same target

This is where ConnectPlanner really earns its place. In real planning data, multiple new sources often want the same nearby target site — but the target only has a few number of rehoming sites.

Imagine target T1 has capacity = 2, but four sources (S1, S2, S3, S4) all qualify for it under P2. The optimizer cannot connect all four. So it has to choose: which two sources get T1, and which two are pushed to their next-best option

> **How the engine decides:** It minimizes the total distance across all assignments at once — globally, not one source at a time. The two sources closest to T1 get it; the other two are sent to T1's co-target (other P2 targets nearby), or downgraded to P3, and so on. The result is the assignment that produces the lowest total link length while still honouring every priority and capacity rule.

This is fundamentally different from a simple 'nearest target' approach, which would let early sources grab the best slots and leave later sources stranded.

When to lower a target's priority

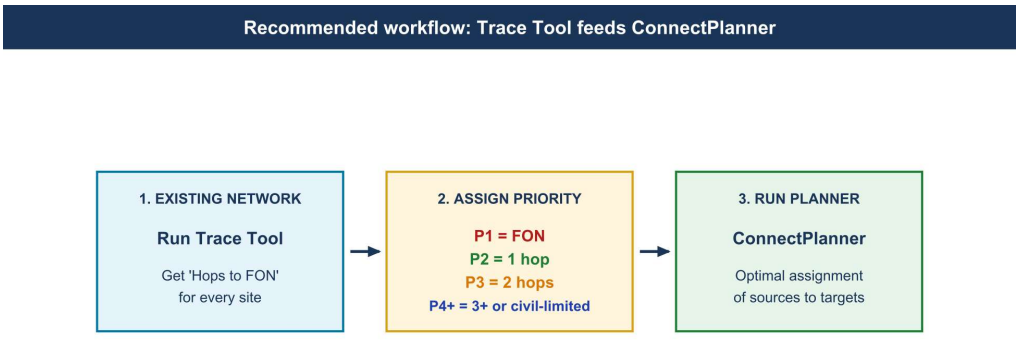
Sometimes a site is geographically close to the FON (only 1 or 2 hops away), but you still don't want it to be the first choice — you want the optimizer to use it only when no better option exists. Common reasons to push a target down in priority (for example, from P2 down to P3 or P4):

- **Civil limitations** — limited rooftop space, restricted antenna mounting positions, or the tower can't support more dishes.
- **Access restrictions** — site is hard to reach, requires special permits, or has security constraints.
- **Existing congestion** — the site is already serving heavy traffic and you want to avoid adding more.
- **Future plans** — the site is scheduled for decommissioning or modification.

3. Recommended Workflow — Trace Tool Feeds ConnectPlanner

How do you know how many hops each existing site is from a FON? **Use the Trace Tool first.**

This is the simplest, most reliable way to assign priorities — based on real network data, not estimates.



Two tools, one workflow — Trace shows you the topology, ConnectPlanner uses it to plan new connectivity

The two tools work as a pair: Trace shows you the existing topology, ConnectPlanner plans new connectivity on top of it.

Step-by-step workflow

1. **Run Trace Tool** on your existing network. The Excel output's `'Hops to FON'` column tells you exactly how far each site is from a hub.

2. **Assign priorities in your Target CSV:**

- Hops to FON = 0 (the FON itself) → P1
- Hops to FON = 1 → P2 Civil Restriction Downgrade to P3/P4
- Hops to FON = 2 → P3 Civil Restriction Downgrade to P4/P5
- Hops to FON = 3 → P4 Civil Restriction Downgrade to P5/P6
- Hops to FON = 4→ P5 Civil Restriction Downgrade to P6/P7 and so on

3. **Run ConnectPlanner** with this Target CSV. The optimizer will prefer P1 (FON) first, then P2, then P3, and only use P4+ when nothing better is available.

> **Note:** This is a planning baseline. Many things will change during implementation — site surveys may reveal additional civil limits, LOS issues, or access problems. Use the output as your starting point, then iterate.

4. CSV Formats — Two Files

ConnectPlanner needs two separate CSV files: one for the source sites (new sites that need connectivity), and one for the target sites (potential hosts).

4.1 — Source CSV (3 columns)

Column	Type	Example	Required	Notes
Site ID	Text	NE_001	Yes	Source (new) site identifier
Lat	Number	24.7136	Yes	Latitude (decimal degrees)
Longitude	Number	46.6753	Yes	Longitude (decimal degrees)

4.2 — Target CSV (4 columns — includes Priority)

Column	Type	Example	Required	Notes
Site ID	Text	FE_001	Yes	Target site identifier
Lat	Number	24.7510	Yes	Latitude (decimal degrees)
Longitude	Number	46.7010	Yes	Longitude (decimal degrees)
Priority	Text	P1	Yes	P1 to P10. P1 = highest engineering preference.

5. Parameters You Set at Run Time

On the tool page, set the rules that the optimizer must respect:

Parameter	Example	What it does
Global Max Distance	`30km`	Hard upper limit on MW link distance — applies to all priorities. No assignment will be made longer than this.
Max Distance per Priority	`P1: 5km, P2: 8km, p3: 12km, ...`	Finer control per priority. P1 can have a tight 5km limit; P2 can allow up to 8km; P3 allow up to 12Km, …., etc
Max Connected per target (capacity)	`P1: 4, P2: 2, P3: 1`	How many MW links each target site can host. Usually limited by civil/space constraints. The optimizer never exceeds this cap.

Tip: Start with conservative numbers (short max distances, low capacity). Then run again with relaxed numbers and compare — you'll quickly see which sources are truly difficult to connect and which targets are the bottlenecks.

6. Worked Example

Imagine you have 2 new source sites needing connectivity, and 3 candidate target sites:

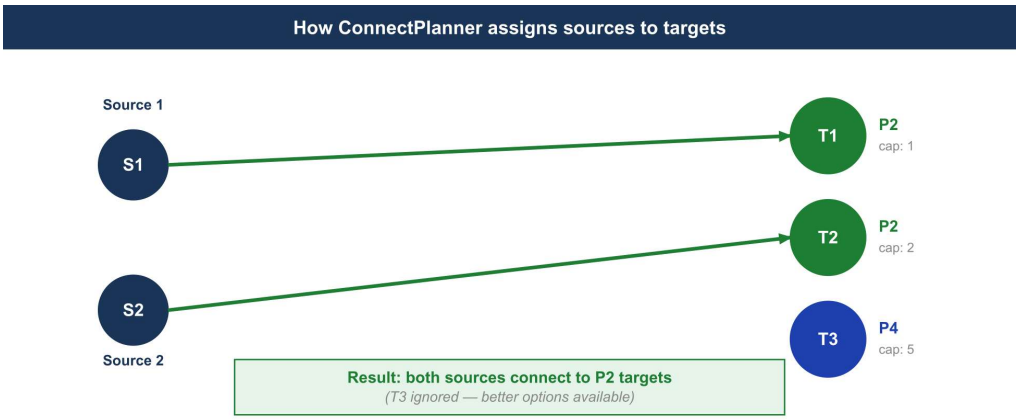
Source CSV

Site ID	Lat	Longitude
S1	24.7100	46.6700
S2	24.7200	46.6800

Target CSV

Site ID	Lat	Longitude	Priority
T1	24.7150	46.6750	P2
T2	24.7250	46.6850	P2
T3	24.7300	46.6900	P4

Settings: P2 max distance = 10 km, P2 capacity = 2 links each, P4 max distance = 15 km, P4 capacity = 5.



The optimizer assigns:

S1 → **T1** (P2, **connected**)

S2 → **T2** (P2, **connected**)

T3 is not used — both sources found acceptable P2 targets within range. T3 (P4, civil-limited) would only be used if T1 and T2 ran out of capacity, or if a source was too far from both.

7. What You Get Back

Two files download automatically:

7.1 — Connectivity CSV

One row per source site. Columns include:

- **Source ID** — from your Source CSV
- **Target ID** — the assigned target, or blank if no valid target found
- **Priority matched** — which priority level the target was (P1 / P2 / ...)
- **Distance (km)** — link distance from source to target
- **Status** — **Connected** or **Unconnected** with reason (no target in range, all targets at capacity, etc.)
- **Duplicate Flag** — marks any duplicate sites found in the source or target CSV (same name, different coordinates)

7.2 — Color-coded KML map

Opens in Google Earth. Easy-to-read color scheme:

- ■ **Green line** — successful connection from source to target
- ● **Blue pin** — connected source site
- ● **Red pin** — unconnected source site (needs your attention)
- ● **Yellow pin** — target site
- ● **Orange / Purple pins** — duplicate sites detected (orange = source, purple = target)

8. How to Run the Tool

1. (Optional but recommended) Run Trace Tool first

Use traceroute.telecomblueprint.com on your existing network to know how many hops each site is from a FON. This is your basis for assigning priorities.

2. Open ConnectPlanner

Go to connectplanner.telecomblueprint.com — no login needed.

3. Upload Source CSV and Target CSV

Two separate files. The Target CSV must include the Priority column (P1 to P10).

4. Set the criteria

Global Max Distance, max distance per priority, and max capacity per target. Leave any priority blank to skip it entirely.

5. Click 'Run Connectivity Study'

The optimizer assigns every source to its best valid target in seconds. CSV report and KML map download automatically.

9. Important Caveats

What ConnectPlanner does NOT consider: Terrain or line-of-sight, antenna heights, frequency bands, weather effects. It only looks at distance, priority, and capacity. For LOS-aware planning, use **SmartConnect** (smartconnectplanner.telecomblueprint.com).

This is a planning baseline. Use the results as a starting point. Site surveys, LOS checks, civil-works confirmation, and final coordination with operations are still required before any link is implemented.

Summary

ConnectPlanner answers the most common question in transmission planning: which source site should connect to which target?

Use the Trace Tool first to find 'Hops to FON' for every existing site, then assign priorities: P1 = FON itself, P2 = 1 hop, P3 = 2 hops, and so on. ConnectPlanner combines those priorities with distance and capacity to find the globally optimal plan — instantly.

It is a planning baseline; site surveys and field validation are still required before implementation.

Try it now: connectplanner.telecomblueprint.com
Trace Tool (for hops): traceroute.telecomblueprint.com
Other free tools: telecomblueprint.com
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