PROSKY

PLANNING GUIDE

# FTTH Deployment Planning Guide

Architecture, optical budgets, ODN design and rollout phasing for fiber-to-the-home networks.

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# FTTH Deployment Planning Guide

A structured method for planning a fiber-to-the-home rollout: from demand mapping and architecture selection through optical budget engineering to acceptance testing. Written for network planners, ISPs and contractors; values quoted are typical planning figures for the equipment classes involved.

## 1 · Define the service area

- Map homes passed vs. homes connected targets per phase; FTTH economics are set by take-rate assumptions, so plan distribution capacity for end-state, drops for take-up.
- Classify premises: single-family, MDU (multi-dwelling), business — each changes the drop and terminal-box design.
- Survey existing infrastructure: usable ducts, pole lines, building risers, wayleaves and permits set the civil-works cost line.

## 2 · Choose the PON architecture

| Aspect | Centralized splitting | Cascaded splitting |
|---|---|---|
| Split location | One hub (e.g. 1×32 at the ODF/cabinet) | Two levels (e.g. 1×4 feeder + 1×8 at distribution boxes) |
| Fiber usage | More distribution fibers | Fewer feeder fibers |
| Testing & fault-finding | Simplest — one splitter point | More field points to test through |
| Flexibility | Easy port reallocation at the hub | Capacity follows geography closely |
| Typical fit | Dense urban with short distribution | Suburban/rural spread-out plant |

*Typical values for this product class — request the certified PROSKY datasheet for guaranteed figures.*

## 2a · Plan for technology coexistence

The passive plant outlives the electronics by decades, so the ODN should be planned for wavelength coexistence from day one:

| PON generation | Wavelengths (down / up) | ODN implication |
|---|---|---|
| GPON | 1490 / 1310 nm | Baseline design; B+ or C+ budget class |
| XGS-PON | 1577 / 1270 nm | Coexists on the same splitters via WDM1r at the OLT |
| RF overlay (CATV) | 1550 nm | Adds ~1 dB coexistence element loss if used |
| OTDR maintenance | 1625 / 1650 nm | Reserve the band; specify filtered ONT test ports where in-service testing is planned |

Practical consequence: specify full-band (1260 – 1650 nm) splitters and G.657-compatible plant everywhere — both are PROSKY class defaults — and any future overlay becomes an electronics swap, not a civil-works project.

## 3 · Engineer the optical budget

Every subscriber path from OLT to ONT must close the power budget of the PON class (e.g. GPON B+ ≈ 28 dB, C+ ≈ 32 dB between reference points). Sum the typical losses:

| Element | Typical planning loss |
|---|---|
| Fiber @ 1310 nm (worst PON wavelength) | 0.35 dB/km |
| Fusion splice | 0.05 dB each |
| Mated connector pair | 0.3 dB each (0.5 dB field-installable) |
| 1×32 PLC splitter (total, any cascade) | ≈ 17.2 dB |
| 1×64 PLC splitter (total, any cascade) | ≈ 21.0 dB |
| Design margin (ageing, repairs, temperature) | ≥ 3 dB reserved |

*Typical values for this product class — request the certified PROSKY datasheet for guaranteed figures.*

The budget decides the split ratio and reach together: a 1×64 GPON tree on C+ optics with 3 dB margin leaves roughly 8 dB for fiber and connections — about 20 km of clean plant; a 1×32 tree roughly doubles the connection allowance.

### Worked example — suburban 1×32 cascaded tree (GPON B+)

| Path element | Loss |
|---|---|
| OLT → hub feeder: 6 km fiber @ 0.35 dB/km | 2.10 dB |
| Feeder splices: 4 × 0.05 dB | 0.20 dB |
| Hub 1×4 splitter (level 1) | 7.30 dB |
| Distribution: 1.5 km + 3 splices | 0.68 dB |
| Distribution box 1×8 splitter (level 2) | 10.70 dB |
| Drop: 60 m + 1 fusion splice + 2 mated pairs | 0.67 dB |
| **Total path loss** | **21.65 dB** |
| GPON B+ budget 28 dB – path 21.65 dB | 6.35 dB margin ✓ (≥ 3 dB required) |

*Typical values for this product class — request the certified PROSKY datasheet for guaranteed figures.*

## 4 · Design the ODN layer by layer

### Feeder

Central office / OLT cabinet to distribution hubs. High-count loose-tube or armored cable, terminated on ODFs; protect with diverse routes where the business case justifies it.

### Distribution

Hub to distribution boxes (FDB/FAT). Mid-span access architecture — looping an uncut distribution cable through boxes and opening one tube per box — saves splices and speeds turn-up. Size boxes 8/16/24 ports to the premises cluster.

### Drop

Box to premises: G.657.A2 flat drop (aerial self-supporting or clipped façade), terminated on an outlet or directly on the ONT; pre-connectorised drops trade slightly higher loss for large labor savings.

### In-home

Terminal outlet, patch cord to ONT, ONT placement near power and the home-network center. Keep the in-home section ≤ 2 connectors where possible.

## 5 · Map the design to equipment classes

| Network layer | PROSKY category |
|---|---|
| OLT / active edge | Communication Equipment |
| CO / hub termination | Fiber Distribution Frames, Network Cabinets |
| Feeder & distribution cable | Fiber Optic Cables |
| Splitting | PLC Splitters |
| Street / building distribution | Fiber Distribution Boxes |
| Subscriber connection | Fiber Patch Cords, Optical Connectors, FTTH Accessories |
| Build & acceptance | Testing and Installation Tools |

## 5a · Multi-dwelling units (MDUs)

- Place a building distribution box at the entry point and floor terminal boxes on the risers; a 1-per-floor or 1-per-2-floors pattern keeps drops under 30 m.
- Use LSZH indoor riser cable and G.657.A2 in-building drops; building fire codes drive the sheath class, so confirm before ordering.
- Pre-connectorised riser assemblies dramatically reduce in-building work time where shafts allow them.
- Agree access, reinstatement and aesthetics with the building owner in writing before the first drill hole — MDU disputes stall rollouts more than civil works.

## 5b · Materials planning

A per-cluster bill-of-materials pattern (illustrative planning ratios for a 128-home cluster on 1×4 + 1×8 cascaded splitting):

| Item | Typical planning quantity |
|---|---|
| Distribution boxes, 16-port | 16 (one per ~8 homes, ports for take-up growth) |
| PLC splitters 1×8 (box level) | 16 |
| PLC splitter 1×4 (hub level) | 4 |
| Distribution cable | Route length + 15 % slack/wastage allowance |
| Drop cable | Average drop length × homes connected × 1.1 |
| Field connectors / pigtails | Connected drops × 1.05 attrition allowance |
| Closures, clamps, hooks, labels | Per route survey — order with the cable |

*Illustrative planning ratios only — final quantities come from the route design. PROSKY quotation engineering can price a complete cluster BOM from the design pack.*

## 6 · Plan the civil works

- Duct where it exists, aerial where poles allow, micro-trench or direct-buried armored cable elsewhere — mixed-media routes are normal; design the transitions.
- Reserve duct/pole capacity for the end-state fiber counts decided in step 1.
- Permits and wayleaves are usually the critical path — start them before detailed design finishes.

## 7 · Phase the rollout

- Build feeder + hubs first, then distribution per cluster, connecting drops on subscriber orders (success-based drops).
- Turn up and test each PON tree as its distribution completes — do not leave testing to a single end-of-project campaign.
- Track per-cluster: homes passed, ports available, ports sold, average drop time. These four numbers expose rollout health early.

## 8 · Acceptance and handover

- Test every splitter output port for insertion loss against the design budget; OTDR the feeder and distribution sections bidirectionally.
- Photograph and record every closure, box and hub as-built before closing.
- Hand over plant records, test archives and port maps to operations as a condition of phase completion.

## 8a · Resilience and diversity

- Feeder diversity: where the business case supports it (business parks, hospitals, backhaul-carrying trees), run feeder pairs on separated routes to dual OLT ports (Type B protection).
- Concentrate risk knowingly: one cut on an unprotected 1×64 feeder takes out 64 subscribers — decide per tree whether that exposure is acceptable.
- Standardise spares: one splitter family, a small set of cable classes and one box family keep the spares shelf small and repairs fast.
- Pre-agree repair access to private land and MDUs during construction — chasing wayleaves during an outage doubles repair time.

## 8b · Common planning pitfalls

- Designing distribution for today's take-rate — capacity should follow homes passed, not current subscribers.
- Budgeting at 1550 nm only — 1310/1270 nm upstream attenuation is the constraint in most GPON/XGS-PON trees.
- Forgetting the second connector pair at the hub patch — every mated pair is 0.3 dB the budget must carry.
- Boxes positioned for cable convenience rather than drop reach — drops over 70 m erode both budget and install speed.
- No labelling standard agreed before construction — retro-labelling a live network costs more than the labels ever did.

## 9 · Operate: KPIs that keep the network honest

| KPI | Why it matters |
|---|---|
| Homes passed / connected per cluster | Rollout progress against the business case |
| Average drop install time | Field-force productivity and drop-design quality |
| Ports available vs. sold per box | When to add boxes or re-balance splitters |
| Faults per 100 connections / month | Plant quality; spikes localise bad workmanship |
| Mean time to repair | Records quality — slow repairs usually mean bad as-builts |

## 10 · Glossary

| Term | Meaning |
|---|---|
| ODN | Optical distribution network — all passive plant between OLT and ONTs |
| OLT / ONT | Operator-side and subscriber-side PON terminals |
| FDB / FAT | Fiber distribution box / fiber access terminal (street or building) |
| Homes passed | Premises a drop could reach without new distribution build |
| Success-based drop | Drop built only when the subscriber orders service |
| Mid-span access | Opening one tube of an uncut cable at a box or closure |
| B+ / C+ optics | GPON optical budget classes (≈ 28 dB / ≈ 32 dB) |

PROSKY supports FTTH planning with class datasheets, deployment solutions on proskytele.com and quotation engineering for full bills of material — see proskytele.com/solutions and /request-a-quote.