



# **CAPEX and OPEX Savings in Fiber Optic Deployments**

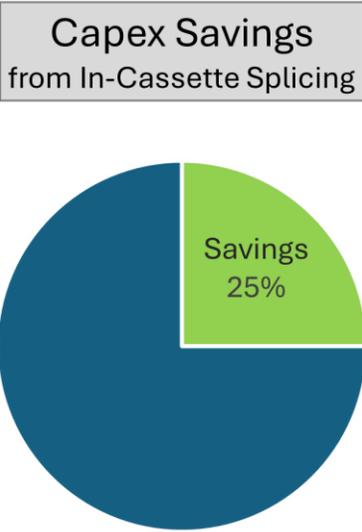
**Comparing Clearfield Patch and Splice to Traditional Splicing in Closures**

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The continuous growth in broadband demand driven by 5G, FTTH (Fiber to the Home), FTTP (Fiber to the Premises), and FTTB (Fiber to the Business) is leading network operators to deploy fiber optic networks quickly and cost-effectively. This white paper examines Capital Expenditures (CAPEX) and Operational Expenditures (OPEX) in fiber optic splicing, comparing Clearfield's innovative Patch and Splice (Clearfield's in-cassette splicing) solution to traditional splicing in closures.

Clearfield's modular, pre-terminated cassettes integrate patching and splicing, reducing field labor, enhancing scalability, and minimizing downtime. Traditional methods, while flexible for custom installations, are labor-intensive. Based on industry benchmarks and case studies the following are savings seen in the field:



CAPEX Savings: Up to 20-25% through reduced equipment needs and faster deployment (e.g., \$150–\$400 per splice point vs. \$200–\$500 traditionally).

OPEX Savings: Up to 50% via minimized maintenance, repairs, and technician interventions (e.g., \$50–\$150 annually vs. \$100–\$300).

Total Cost of Ownership (TCO): Potential 20-25% reduction over 5 years, (with faster ROI over (1-2 years) and improved network reliability.

Operational Benefits: Deployment time drops to 1-2 hours per connection (vs. 4-8 hours), and scalability supports incremental growth.

Telecommunications providers face immense pressure to accelerate fiber deployments amid rising demands for universal connectivity. Traditional splicing methods in closures, while

reliable for suggested scenarios, are becoming cost-prohibitive due to labor intensity, flexibility, and scalability challenges.

Clearfield's Patch and Splice method modernizes outside plant (OSP) connectivity with a modular, technician-friendly architecture that removes splicing, utilizing pre-terminated MPO cables from the terminals all the way back to the FDH (Fiber Distribution Hub). This paper analyzes these approaches through financial and operational lenses (CAPEX/OPEX), highlighting how innovative solutions can reduce total cost of ownership (TCO), improve liability, and support network evolution.

## Overview of Technologies

Fiber optic splicing creates continuous light paths essential for network integrity. Poor splicing leads to signal loss, attenuation, and failures.

### **Traditional Fiber Distribution Hub Splicing in Closures:**

Involves on-site fusion or mechanical splicing of fibers within sealed closures underground or in the air (e.g., dome or inline enclosures).

Requires reopening closures for new connections, repairs, or expansions increasing the risk of manmade trouble.

Accessibility is determined by weather conditions, entry times in big metropolitan areas, road traffic, entry safety protocols.

Flexible for custom installations, but prone to field errors and rework.

### **Clearfield Patch and Splice in a Fiber Distribution Hub:**

Uses pre-engineered, factory-terminated fiber cassettes that integrate splicing and patching in a compact, modular unit.

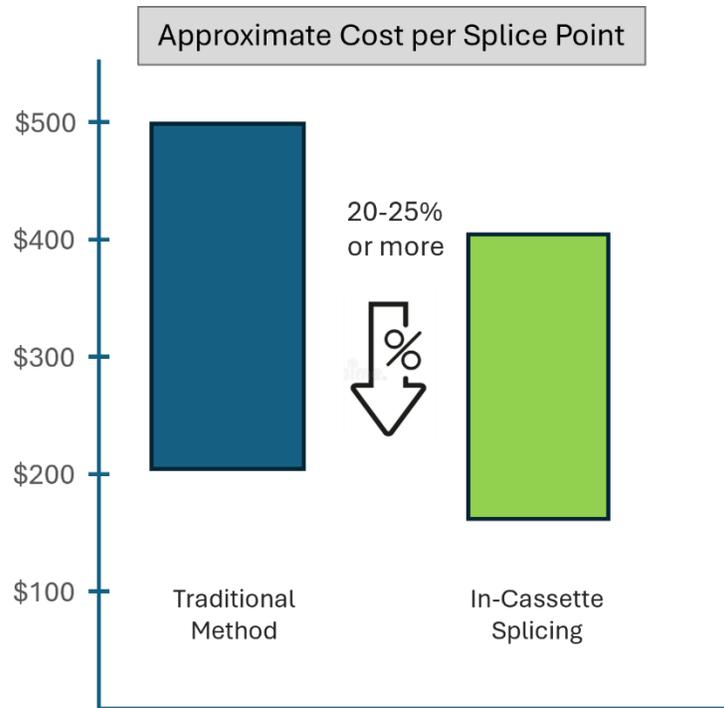
Minimizes on-site splicing; Preparing only the cable that is being spliced in the cabinet.

Scalable for central offices, data centers, OSP, FTTH, 5G backhaul, and multi-tenant networks.

Reduces fiber handling risks, downtime, and skill requirements.

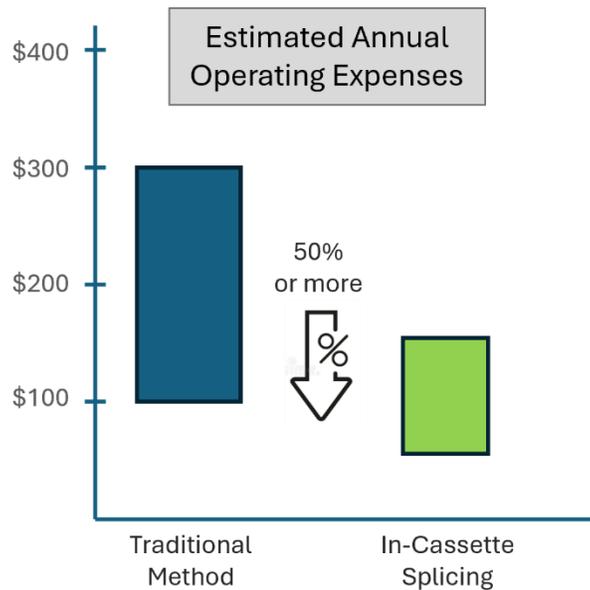
## CAPEX Analysis

Cost Element	Traditional Splicing in Closures	Clearfield Patch and Splice	Typical Savings (%)
Material Cost	Moderate (Splice closures \$50–\$300 each)	Slightly higher (pre-connectorized assemblies: \$100–\$300 per cassette)	-5 to -10% (net savings from bulk efficiency)
Installation Labor	High (4-8 hours per closure, variable with type of fiber cable and count)	Lower (1-4 hours per cabinet, variable with type of fiber cable and count)	25-30%
Equipment/Tools	High (fusion splicers, blowers, manhole guards, flaggers, other variables)	Limited (Fusion Splicers, reduced variables)	10-15%
Initial Testing & Certification	Time-intensive (setup/testing)	Simplified (factory quality, test after splicing)	20-25%
Infrastructure/Scalability	High (robust enclosures, custom upgrades)	Efficient (modular additions, no overhauls)	20-30%
<b>Total CAPEX Impact</b>	\$200–\$500 per splice point	\$150–\$400 per splice point	<b>20-25%</b>



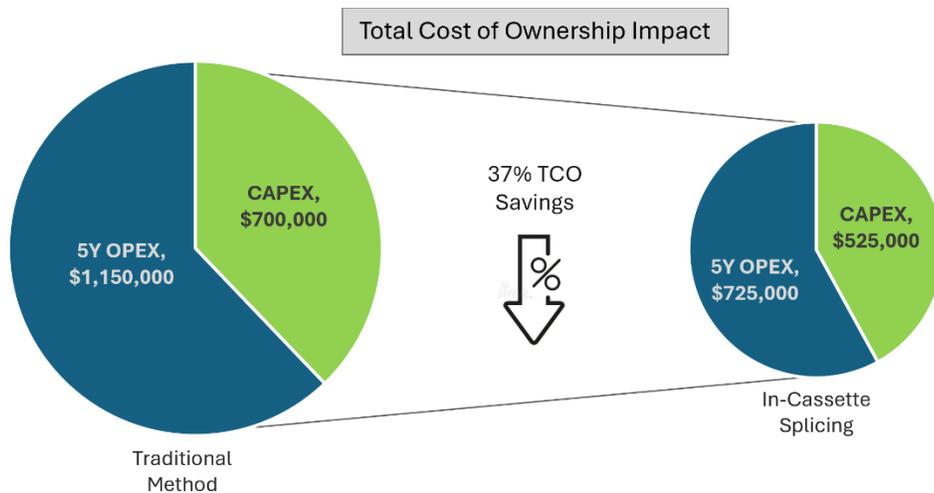
Pre-connectorized or factory cassette components may seem costlier upfront, but they slash labor and equipment investments. This accelerates time-to-homes connected enabling earlier revenue in deployments like FTTH.

### OPEX Analysis



Cost Element	Traditional Splicing	Clearfield Patch and Splice	Typical Savings (%)
Maintenance Access	High (reopening closures, frequent inspections)	Low (accessible patch interface)	40-50%
Network Expansion	High (new field splicing, rework)	Low (space to grow in cabinet, plug and play in access points)	40%
Technician Skill Requirement	High (ongoing training)	Medium-Low (simplified processes)	30%
Mean Time to Repair (MTTR)	4-6 hours (downtime: \$1,000–\$10,000/hour)	1-2 hours	50-60%
Inventory & Spares	Diverse (spare parts stocking)	Standardized (Clearfield cassettes)	30%
Labor/Repairs	High (field errors, 20-40% rework)	Low (50-70% time reduction, <0.1 dB loss)	50%
<b>Total OPEX Impact</b>	\$100–\$300 annually per splice point	\$50–\$150 annually per splice point	<b>Up to 50%</b>

**For a typical 1,000-home FTTH project:**



Based on a 1,000-home FTTH deployment.

Traditional Splicing: Initial CAPEX/OPEX \$750,000; 5-Year OPEX \$400,000; Total TCO \$1,150,000.

Clearfield Patch and Splice: Initial CAPEX/OPEX \$525,000 (30% savings); 5-Year OPEX \$200,000 (50% savings); Total TCO \$725,000 (37% savings, or \$425,000 total).  
Over 5 years per splice point: \$500–\$1,000 vs. \$300–\$600.

FTTH deployment for 1,000 homes, switching to Patch and Splice cut CAPEX from \$250,000 to \$180,000 (28% savings) and annual OPEX from \$150,000 to \$75,000 (50% savings), with faster rollout.

## Recommendations for New Builds and Best Practices

**Adopt Modular Solutions:** Prioritize Patch and Splice for new deployments to optimize CAPEX/OPEX.

**Hybrid Approaches:** Use traditional methods for custom needs, integrating modular elements.

**Training:** Technician training is crucial

**Focus on Scalability:** Invest in upscaling to a modular system to maximize efficiency and ROI.

In conclusion Clearfield's modular design supports incremental growth, avoiding overbuilding or complex retrofits. Traditional methods often require upfront, full configurations or costly expansions. Clearfield's Patch and Splice method offers an alternative to traditional splicing in closures, delivering up to 20-25% CAPEX savings and up to 50% OPEX reductions. By reducing labor, enhancing reliability, and enabling scalable growth, it addresses modern fiber deployment challenges. Network operators can achieve between 35-40% TCO savings while building robust infrastructures key to staying competitive in an era of complete connectivity.

Beyond operational cost, more benefits are:

- **Reliability:** Minimized re-entry reduces degradation and failures.
- **Speed:** Faster installations and activations.
- **Standardization:** Predictable processes improve field consistency.
- **Future-Readiness:** Supports 5G, rural broadband, and multi-tenant networks.