

Broadband Secondary Optical Splitter Capacity Expansion



Overview

How to expand the capacity of a broadband secondary optical splitter. PVProjekt Digital Infrastructure designs and manufactures fiber optic cables, 400G.

Key Takeaways

Expanding broadband capacity using secondary optical splitters allows a single fiber to serve more endpoints efficiently, balancing cost, signal quality, and scalability. Role of Secondary Optical Splitters

Secondary optical splitters are deployed downstream of primary splitters in a distributed splitter architecture, enabling the network to serve additional endpoints without laying new fiber from the central office. By cascading splitters (e.g., a 1:4 primary splitter feeding multiple 1:8 secondary splitters), operators can achieve higher overall split ratios such as 1:32 or 1:64 while maintaining manageable optical loss and fiber usage .

Split Ratios and Network Impact

- Common split ratios: 1:2, 1:4, 1:8, 1:16, 1:32, 1:64; odd ratios like 1:3 or 1:5 are also used in some networks .
- Signal attenuation: Each split introduces optical loss, so careful planning is required to ensure ONTs receive sufficient power. Distributed splitting reduces long-distance loss compared to a single high-ratio centralized splitter .

- Bandwidth sharing: In PON networks, bandwidth is shared among endpoints. Expanding capacity with secondary splitters increases the number of users per OLT port, which may require monitoring to maintain service quality .

Deployment Strategies

- Centralized Splitter Architecture: A single high-ratio splitter (e.g., 1:32 or 1:64) is placed near the central office. While simpler to manage, it requires more fiber and can result in higher optical loss over long distances .
- Distributed Splitter Architecture: Secondary splitters are placed closer to end-users, reducing fiber usage and optical loss. This approach is more flexible for incremental capacity expansion but requires careful management of multiple splitter locations .

Advanced Techniques

- Uneven optical splitting: Allocates more optical power to high-demand areas while retaining sufficient power for local users, optimizing network efficiency .
- Pre-connection and cascading: Pre-connected splitters and fiber access terminals (FATs) simplify installation and reduce operational faults, supporting scalable expansion .
- Passive operation: Optical splitters do not require power, reducing operational costs and simplifying deployment in edge locations .

Benefits of Secondary Splitter Expansion

- Cost-effective: Reduces the need for additional fiber runs and active components like switches or media converters .
- Scalable: New endpoints can be added by connecting additional ONTs to existing secondary splitter outputs.
- Compact and low-maintenance: Passive splitters save space and require minimal upkeep, making them ideal for dense urban or edge deployments .

Practical Considerations

- Ensure optical budget is sufficient for cascaded splitters to maintain signal quality.
- Plan splitter placement to balance fiber usage, maintenance accessibility, and future expansion.
- Monitor bandwidth allocation per OLT port to prevent congestion as more endpoints are added.
- Consider pre-connection and uneven splitting for high-density or high-demand areas to optimize performance and reduce installation complexity . By strategically deploying secondary optical splitters, broadband providers can expand network capacity efficiently, minimize infrastructure costs, and maintain high-quality service for an increasing number of subscribers.

Article Content

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PVProjekt Digital Infrastructure designs and manufactures fiber optic cables, 400G optical transceivers, data center interconnect

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Optical Splitters

Optical Splitters An optical splitter takes light from one fiber and splits it into two or more light streams. They are used in FTTH

What Is an Optical Splitter?

What's an optical splitter? How does the fiber optic splitter work? How many fiber splitter types? How to choose the right fiber

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Primary and secondary optical splitters in FTTH networks

Like coaxial cable transmission system, optical network system also needs to couple, branch and distribute optical

Optimizing Your FTTH Design: Strategies for Designing Split Levels

The distinctions between these two optical splitter types dictate which one is more suitable for FTTH networks. Here

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