Anti-Electrical Tracking Solution for Optical Core Routers



Overview

Ensuring the fire safety of high voltage (HV) outdoor insulators is key to maintain the reliable operation of the electrical grid. This requires the careful selection of suitable polymeric...

Key Takeaways

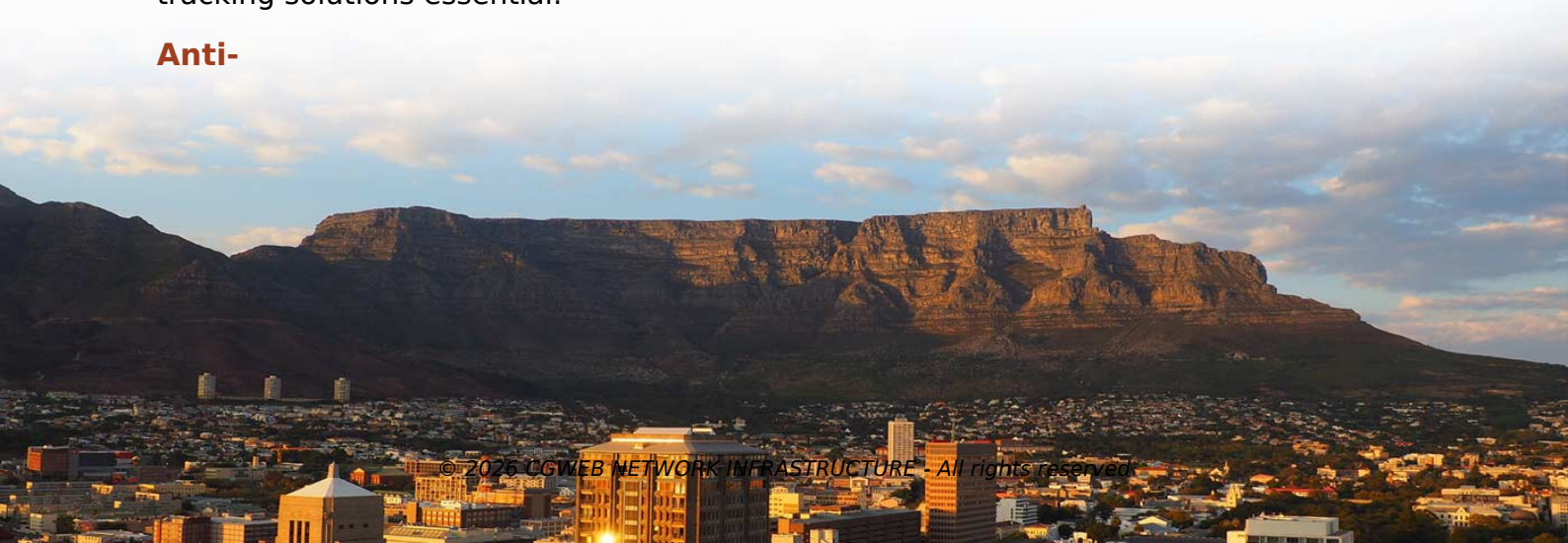
Using ADSS optical cables with anti-tracking polyethylene jackets and specialized additives prevents electrical tracking and dry band arcing in high-voltage environments.

Understanding Electrical Tracking in ADS

S CablesADSS (All-Dielectric Self-Supporting) optical cables are commonly installed on high-voltage transmission lines. In these environments, strong electric fields can induce surface potential differences on the cable, especially when the cable surface is wet or contaminated. This can lead to dry band arcing, which burns through the cable sheath, damages the aramid yarn, and eventually causes cable failure ( ).

Standard polyethylene jackets are insufficient for voltages above 12kV, making anti-tracking solutions essential.

Anti-



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Tracking Sheath Materials

To mitigate electrical tracking, ADSS cables use tracking-resistant polyethylene sheath materials. Key strategies include: Additives for surface stability: Incorporating trimethyl trifluoropropyl siloxane polymer elastomers enhances the thermostability and toughness of the polyethylene, improving resistance to electrical tracking ( ). Flame-retardant fillers: Adding hibbsite (ATH) helps absorb heat generated by leakage currents, releasing water vapor to reduce surface temperature and prevent carbonization or dendritic corrosion ( ).

Optimized polymer base: High-density polyethylene (HDPE) or ethylene-vinyl acetate (EVA) are preferred, while polar polymers like PVC are avoided to maintain insulating properties ( ). Reduced carbon black content: Limiting carbon black to below 2. 6% prevents conductivity that could exacerbate tracking, while UV-resistant additives maintain long-term durability ( ).

Deployment Considerations

Voltage rating: Anti-tracking jackets are recommended for 110kV and 220kV lines, while standard PE jackets suffice for voltages below 12kV ( ). Environmental factors: Ensure the cable surface remains clean and dry where possible, as contamination and moisture increase the risk of tracking. Monitoring and testing: Optical Time Domain Reflectometry (OTDR) can be used to monitor insertion loss and detect early signs of sheath degradation in routed optical networks ( ).

Complementary Technologies

While the focus is on cable sheath materials, additional solutions like Smart Detect™ electronic markers can enhance asset management and monitoring of optical cables, though they primarily track location rather than prevent electrical tracking ( ).

Summary

For optical core routers deployed over high-voltage lines, ADSS cables with anti-tracking polyethylene jackets and specialized additives such as trimethyl trifluoropropyl siloxane and hibbsite provide the most effective protection against electrical tracking. Proper material selection, voltage-appropriate jackets, and environmental management are critical to ensure long-term reliability and safety of optical networking infrastructure ( ).

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The ABPTEL AT Jacket ADSS (Anti-Tracking Optical Cable) is purpose-built to mitigate this risk. It uses a specially formulated AT polymer outer sheath

TECHNICAL DATA SHEET

· Protection of electrical connections and terminations against electrical arcing. · Reduction of the risk of electrical discharge in industrial and outdoor environments.

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This paper analyzes optical routers in Optical Networks-on-Chip (ONoC), focusing on MRRs, MZIs, and hybrid designs. It offers valuable insights

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