Cost-Conscious Impairment-Aware Routing

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A routing method for transparent optical networks that allows constraint dependencies and objectives minimizing regeneration cost. It uses transponder resources efficiently and is guaranteed to identify impairment-feasible paths when they exist.

Network Design Paradigms

- **Islands of Transparency** (isolated opaque nodes)
- **Focused Design** (some OEO at every node)
- **Uniform Design** (some OEO at every node)

Technique: Solve a shortest path problem on an expanded graph whose nodes correspond to “impairment states”

Example of impairment graph expansion:

**Routing Algorithm**

- Uses OEO locations as stepping stones to cross the network
- Constraints force diversion to OEO locations when needed
- A wide range of physical constraints can be programmed into algorithm
- Impairment-feasible path, if one exists
- To include regenerator costs in routing objective, assign positive costs to red links

Not a polynomial-time algorithm, but practical on large networks

Constraints define impair ment feasibility

A wide range of physical constraints can be programmed into algorithm

Cost-conscious impairment-aware routing uses existing transponders more efficiently