

OUR CORE SERVICES

1. Longhaul Network Planning & Design

- Route planning and fiber path optimization
- Network topology design (ring, mesh, linear)
- Capacity planning and traffic engineering
- Geographic redundancy and diversity routing
- Multi-year network evolution roadmaps
- Right-of-way analysis and feasibility studies

2. DWDM System Design

- Dense Wavelength Division Multiplexing architecture
- Channel planning and wavelength assignment
- Optical amplifier placement and design (EDFA, Raman)
- Chromatic and polarization mode dispersion analysis
- Optical signal-to-noise ratio (OSNR) calculations
- Coherent optical transmission design (100G, 200G, 400G, 800G+)

3. Optical Link Budget Engineering

- End-to-end power budget calculations
- Loss budget analysis including fiber, splices, connectors
- Gain and span design optimization
- Regeneration and amplification site planning
- Margin analysis for system reliability
- Temperature and aging considerations

4. Network Resilience & Protection

- Protection schemes (1+1, 1:1, 1:N)
- Optical layer restoration design
- Diverse path routing strategies
- Disaster recovery planning
- Service level agreement (SLA) optimization
- Failure impact analysis

5. Migration & Upgrade Planning

- Legacy system assessment and modernization
- Technology refresh strategies
- Capacity augmentation planning
- Minimal-disruption migration designs
- Backward compatibility considerations
- Cost-benefit analysis

OUR DESIGN APPROACH

1. Requirements Gathering

Understanding your capacity needs, latency requirements, growth projections, budget parameters, geographic coverage, redundancy expectations, and service level objectives.

2. Route Analysis

Comprehensive assessment including fiber availability studies, right-of-way analysis, existing infrastructure evaluation, geographic diversity options, and environmental considerations.

3. Network Architecture

Detailed design including topology selection, node placement optimization, equipment specifications, protection scheme design, and network management architecture.

4. Optical System Engineering

Link budget calculations, DWDM channel planning, amplifier site design, dispersion compensation, wavelength assignment, and coherent modem configuration.

5. Economic Analysis

Capital expenditure modeling, operational cost projections, ROI calculations, build-vs-lease analysis, and phased deployment options.

6. Technical Documentation

Complete design packages including network diagrams, equipment lists, fiber specifications, splice schedules, test plans, and commissioning procedures.

DESIGN DELIVERABLES

Comprehensive Planning Package:

- Executive summary and network overview
- Detailed route maps with GPS coordinates
- Network topology diagrams (logical and physical)
- Equipment placement and site plans
- Complete link budget calculations
- DWDM channel allocation tables
- Optical power budget spreadsheets
- Amplifier site specifications
- Fiber cable specifications and splice schedules
- Equipment bill of materials with vendor options
- Rack elevation drawings
- Network management system architecture
- Protection and restoration schemes
- Service level agreement analysis
- Capital and operational cost models
- Project implementation timeline
- Installation specifications and standards
- Testing and acceptance procedures
- As-built documentation templates
- Network monitoring and maintenance guidelines

KEY CONSIDERATIONS IN OPTICAL NETWORK DESIGN

Capacity & Scalability

- Current and 10-year traffic forecasts
- Modular capacity addition strategies
- Line system upgrade paths
- Wavelength addition without service disruption

Latency Optimization

- Direct routing vs. cost-optimized paths
- Geographic route selection
- Processing and equipment delay budgets
- Ultra-low latency requirements (finance, gaming)

Reliability & Availability

- Target availability (99.9%, 99.99%, 99.999%)
- Geographic diversity requirements
- Equipment and fiber protection schemes
- Mean time to repair (MTTR) considerations

Cost Efficiency

- Build vs. lease analysis
- Shared infrastructure opportunities
- Equipment cost optimization
- Operational expense reduction strategies

Environmental Factors

- Temperature range considerations
- Humidity and condensation protection
- Seismic and natural disaster resilience
- EMI/RFI interference mitigation

Core Planning Capabilities

- Long-haul fiber route feasibility and risk analysis
- Fiber characterization analysis (attenuation, CD, PMD)
- DWDM wavelength and spectrum planning
- Optical power budget and OSNR modeling
- EDFA and Raman amplifier placement and optimization
- ROADM architecture design (fixed and colorless/directionless/contentionless)
- Protection and restoration strategy design (optical and IP layer)
- Capacity scaling and future-proof wavelength planning
- Migration planning from legacy DWDM to high-capacity coherent systems
- Design documentation aligned with carrier and hyperscaler standards