MERCURY

Fibre to the Home Design Course

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Introduction

The Fibre to the Home Design Course provides a foundation in modern fiber-optic network design principles used in residential and urban environments. It equips participants with a deep understanding of FTTH planning, architecture selection, and deployment methodologies. The course explains the essential concepts of passive optical networks and the industry standards that govern efficient fiber distribution systems. Learners explore the design workflow from feasibility studies to detailed engineering documentation. It also examines performance metrics, cost considerations, and quality benchmarks that influence project outcomes. By the end, participants will understand how to design scalable, reliable, and high-performance FTTH networks aligned with operational and commercial demands.

Targeted Groups

This Fibre to the Home Design Course targets professionals seeking specialized knowledge and skills:

- Network engineers working on fiber rollout projects.
- Telecom technicians are involved in fiber installation.
- Planners designing broadband infrastructure.
- Project managers overseeing optical network deployments.
- GIS engineers supporting spatial data for FTTH design.
- Quality engineers evaluating FTTH network performance.
- Professionals transitioning to fiber-optic design roles.
- Technical staff from ISPs and telecom operators.

Course Objectives

Participants will achieve the following objectives by completing the Fibre to the Home Design course:

- Understand core FTTH design principles.
- Analyze network requirements for various deployment environments.
- Evaluate optical distribution network architectures.
- Develop efficient fiber routing and layout plans.
- Apply industry standards for FTTH engineering.
- Interpret civil design requirements for fiber pathways.
- Prepare a detailed bill of quantities for FTTH projects.
- Assess optical power budgets and link performance.
- Review documentation for network quality assurance.
- Identify risks in FTTH design and propose mitigation strategies.
- Optimize infrastructure for future-proof fiber expansion.
- Design solutions aligned with high-speed broadband delivery.

Targeted Competencies

Participants will gain the following competencies during the program:

- Ability to plan FTTH networks using structured methodologies.

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- Skill in selecting suitable optical network architectures.
- Competence in designing feeder, distribution, and drop networks.
- Capability to interpret fiber design standards.
- Proficiency in identifying optical link losses.
- Skill in developing cost-effective FTTH layouts.
- Ability to prepare design documentation and reports.
- Competence in reviewing quality and performance criteria.
- Ability to support FTTH engineering decisions in real projects.

Studying Scenarios

In this training, participants will develop their skills through the analysis of the following scenarios:

- Designing FTTH networks for new residential developments.
- Planning network upgrades in congested urban areas.
- Evaluating fiber routes in diverse terrain conditions.
- Assessing optical losses in multi-level distribution setups.
- Preparing design plans for mixed-use buildings.
- Reviewing risks in existing fiber infrastructure.

Course Content

Unit 1 - Fundamentals of FTTH Network Design

- Introduction to the fibre to the home concept and its role in broadband expansion.
- Overview of fiber optic network design principles.
- Explanation of FTTH network components and physical layers.
- Classification of optical distribution architectures in residential applications.
- Differences between point-to-point and PON-based FTTH design.
- Factors influencing FTTH deployment in various environments.
- Overview of fiber cables, connectors, splitters, and passive elements.
- Key terminology used in fiber-to-the-home engineering.

Unit 2 - FTTH Planning, Feasibility, and Network Architecture

- Steps in conducting FTTH feasibility studies.
- Evaluating demographic and service demand for fiber rollout.
- Understanding ODN requirements and design constraints.
- Mapping feeder, distribution, and drop network segments.
- Identifying central office and optical line terminal placement.
- Determining splitter ratios based on capacity and performance needs.
- Planning fiber routes using GIS support for accurate mapping.
- Aligning FTTH design with local regulatory and civil requirements.

Unit 3 - Optical Performance, Power Budget, and Quality Standards

- Introduction to optical signal behavior and attenuation.
- Calculating link budgets for reliable FTTH performance.
- Identifying losses associated with splicing, connectors, and splitters.
- Understanding reflectance, dispersion, and key optical parameters.
- Industry standards governing FTTH network performance.
- Ensuring compliance with ITU-T and broadband quality benchmarks.

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- Methods to evaluate optical distribution network performance.
- Detecting performance risks that affect service quality.

Unit 4 - FTTH Civil Design, Documentation, and Engineering Outputs

- Understanding duct systems, micro-ducts, and cable pathways.
- Civil design considerations for underground and aerial deployment.
- Preparing as-built drawings for FTTH infrastructure.
- Producing route maps and fiber allocation plans.
- Creating a bill of materials for FTTH projects.
- Documenting fiber capacity, splicing plans, and termination points.
- Coordinating engineering inputs with construction teams.
- Ensuring safety standards in fiber deployment environments.

Unit 5 - FTTH Project Integration, Optimization, and Future-Proofing

- Steps to integrate FTTH design with existing network infrastructure.
- Strategies for optimizing fiber usage in dense areas.
- Techniques for ensuring future scalability and load capacity.
- Identifying challenges in multi-dwelling unit fiber deployment.
- Reviewing risks associated with fiber cuts and service disruption.
- Approaches to enhance network resilience and redundancy.
- Preparing final design reports for stakeholder approval.
- Ensuring long-term sustainability in fiber network planning.

Final Insights & Key Takeaways

The course empowers participants to design FTTH networks that meet high-speed service demands and industry quality standards. It also strengthens their ability to develop scalable, future-ready fiber-optic solutions.