Detailed Training Topics

(Customizable)

M P Birla Telecom Academy

Vindhya Telelinks Limited

Gurgaon

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DETAILED TOPICS

1. Basics of Optical Fiber Communication

- *Types of Transmission Media*
- *Definition of Optical Fiber*
- *Introduction to Optical Fiber Communication System*
- *Applications & Advantages of Optical Fiber*
- *Total Internal Reflection Phenomenon*
- *Classification of Optical Fiber*
  - *Glass Fiber*
  - *Plastic–Clad Silica (PCS) Fiber*
  - *Plastic Fiber*
  - *Single Mode Fiber*
  - *Multimode Fiber*
  - *Step Index Fiber*
  - *Graded Index Fiber*
- *Optical Fiber Spectral Bands and their Properties*
- *Optical Fiber Performance Parameters (Attenuation & Dispersion)*
  - *Model Dispersion*
  - *Chromatic Dispersion*
  - *Polarization Mode Dispersion*
- *Bending Loss in Optical Fiber*
- *ITU-T Optical Fiber Standards and Characteristics*
  - *Dispersion Shifted Fiber*
  - *Non-Zero Dispersion Shifted Fiber*

2. Fiber Optic Cable Construction & Its Types

- *Reasons of Cabling*
- *Key Evaluation Parameters of Cable*
- *Optical Fiber Cable Construction*
- *Fiber Colour Codes*
- *Cabling Process*
- *Classification of Optical Fiber Cable*
  - *Tight Buffer Cable*
  - *Loose Tube Cable*
  - *Ribbon Fiber Cable*
- *Optical Fiber Cable Drum Handling & Storage Practices*
- *Type of Fiber Optic Cables and their Applications*
  - *Armoured Cable*
  - *ADSS Cable*
  - *Distribution Cable*

- *Aerial Cable with Messenger (Fig-8 Cable)*
- *Simplex and Duplex Cable*
- *Pigtail*
- *Patch Cord*

- *Cable Selection Criterion*
- *Fiber Optic Connectors*
  - *Classification & Types of Fiber Optic Connectors*
  - *Fiber Optic Connector Hygiene*
  - *Inspection and Cleaning of Optical Connector*

3. Optical Fiber Connectorization

- *Components of Optical Fiber Connector*
- *Connectorization Process*
- *Connector Polishing*
  - *Hand Polishing*
  - *Machine Polishing*

4. Optical Fiber and Cable Manufacturing Process

- *Preform Fabrication*
- *Vapour Deposition Process*
- *Altering the Refractive Index Profile of Glass*
- *Process of Drawing Fiber from Preform*
- *Cable Manufacturing Process*
  - *Fiber Colouring and Coating*
  - *Secondary Coating Tube)*
  - *Tube Stranding (S-Z)*
  - *Armouring*
  - *Outer Sheathing*
  - *Printing and Marking*

5. Fiber Optic Link Components and Network Technologies

- *Fiber Optic Receivers and Transmitters*
  - *Lasers*
  - *LEDs*
  - *PIN and Avalanche Photo Diodes*
- *Small Form Factor Pluggable (SFP)Transceivers*
- *Fiber Optic Network Topologies*
- *Introduction to Fiber Optic Network Technologies*
  - *PDH Technology*
  - *SDH Technology*

- *DWDM Technology*
- *FTTx Technology & Architecture*
- *Gigabit Passive Optical Network (GPON) Technology & Architecture*

6. Underground OFC Laying Practices

- *Work Flow Chart of Optical Fiber Cable Laying Practices*
- *Route Planning*
- *Route Survey*
- *Right of Way(RoW) Process & Challenges*
- *Soil Types*
- *Trenching Methods & Specifications*
  - *Manual*
  - *Excavator*
  - *Moling*
  - *Horizontal Directional Drilling (HDD)*
    - *HDD Inspection Report and Graph*
    - *HDD Safety Guidelines*
- *Direct Buried Cable Installation*
- *HDPE Ducting Procedure*
  - *Duct Handling*
  - *Ducting Cautions*
  - *Use of Duct Accessories and Tools*
    - *End Cap*
    - *End Plug*
    - *Simplex Plug*
    - *Duct Decoiler*
    - *Duct Cutter*
    - *Duct Coupler*
    - *Chamfering Tool*
    - *C Spanner*
  - *Duct Storage Practices*
- *Backfilling Procedure*
  - *Good Practices for reinstatement of excavated trench*
  - *Use of Warning Tape*
- *Duct Protections*
  - *Double Walled Corrugated (DWC) Pipe*
  - *GI Pipe*
  - *Cement Concrete*
- *General Guidelines and Precautions for Bridge/River/Road/Railway/Utility Crossings*
- *Chamber Installation Practices*
  - *Types of Chambers*
  - *Chamber Installation Documentation*

- *Installation of Route Markers*
  - *RCC Route Marker*
  - *Electronic Route Marker*
- *Duct Integrity Testing*
  - *Types of DIT Tests*
  - *DIT Safety*
- *Cable Blowing Practices*
  - *Drum Test & Figure 8*
  - *Operation of Super Jet Blowing Machine*
  - *Use of Duct Rodder*
- *Fiber Splicing*
  - *Use of Joint Closure*
  - *Joint Pit Housekeeping*
- *Cable Earthing Practices*
- *Fiber Termination Practices*
  - *Installation of Fiber Distribution Management System (FDMS)*
  - *Understanding the design of FDMS*
  - *Rack Installation*
  - *Patch and Splice Panels*
  - *OFC Tagging Practices*
- *Network Construction Documents*
  - *As Built Drawing (ABD)*
  - *Single Line Diagram (SLD)*
  - *Measurement Sheet*
  - *Trenching & Ducting Report*
  - *Cable Blowing Report*
  - *Importance of Accuracy in Documentation*
- *General Safety Rules to be followed on Site*
- *Handover of Network*

7. Aerial OFC Installation Practices

- *Need of Aerial Installation*
- *Aerial vs Underground Cabling*
- *Pole to Pole Deployment*
- *Building to Building Deployment*
- *Existing Pole Deployment*
- *Temporary Aerial Cabling*
- *Permanent Aerial Cabling*
- *Aerial Cable Installation Guidelines*
- *Aerial Splicing Guidelines*
- *Types of Poles and their installation techniques*
- *Structure and Components of Aerial Assemblies*

- *GI Assembly*
- *Wedge Clamp Assembly*

- *Aerial Cable Installation Methods*
  - *Stationary Drum Method*
  - *Moving Drum Method*
- *Aerial Installation Safety Guidelines*

8. Fiber Splicing Methods and Standards

- *Need of Splicing*
- *Types of Splicing (Fusion and Mechanical)*
- *Fusion vs Mechanical Splicing*
- *Mechanical Splicing Process*
- *Fusion Splicing Process*
- *Fiber Stripping and Cleaning*
- *Fiber Cleaving*
- *Functions of Fusion Splicer*
- *Splicing Procedure on Splice Machine*
- *Splice Protection*
- *Using Splice Tray*
- *Ribbon Cable Splicing*
- *Factors Affecting Splice Loss*
- *Splicing Safety Practices*
- *Housekeeping of Splice Machine*

9. Optical Link Testing Instruments (OTDR, LSPM, VFL & Dispersion Analyzer)

- *Optical Link Budget Calculation*
- *Optical Time Domain Reflectrometer (OTDR)*
  - *Purpose of using OTDR*
  - *Functions of OTDR*
  - *OTDR Operating Wavelengths*
  - *Working Principle of OTDR*
  - *Analysis and Interpretation on OTDR Display*
  - *OTDR Parameters: Resolution, Pulse Width, Dynamic Range etc.*
  - *Dead Zone*
  - *OTDR Measurement Parameter Settings*
- *Light Source Power Meter(LSPM)*
- *Visual Fault Locator (VFL)*
- *Bi-directional Analysis (Event Table Preparation)*
- *Dispersion Analyzer (CD and PMD Tests)*
- *Housekeeping of OTDR*

10. Achieving Execution Quality

- *Definition and Importance of Quality*
- *Quality Checks in Execution*
- *Do's and Don'ts of Achieving Quality in Execution*

11. Occupational Health & Safety Practices

- *Importance of Safety*
- *Types of Incidents*
- *Types of Personal Protective Equipment (PPE)*
- *Optical Fiber Cable Risks and Safety*
- *Safety of Utilities*
- *Safety Flaw Cases*
- *Unsafe Acts on Site*
- *Material Handling Activities*
- *Traffic Management & Travel Safety*
- *Safety Signages and Barricading Practices*
- *Fire Safety & Electrical Safety*
- *Safety Communication & Training at Site*
- *Medical Facilities on Site*

12. Operations Management

- *Introduction to Operation Management*
- *Key Performance Indicators of Optical Network*
- *Cross Functional Workflow*
- *System & Process - Fiber Cut Flow*
- *Customer Handling*
- *Remote Hands Support(NOC Support)*
- *Alarm Management & Performance Monitoring*

13. Preventive Maintenance

- *Process Flow Diagram*
- *Key Activity Points*
- *Surveillance Reporting*
- *Activity Zones*
- *Liaisoning*
- *Co-ordination & Training*
- *Network Health Measurement & Correction*
- *NOC Support in Fiber Testing*

14. Restoration / Fault Management

- *Fault Rectification Process Flow Diagram*
- *Fault Escalation Procedure*
- *Fault Handling*
- *Mean Time Taken to Rectify (MTTR)*
- *Localization of Fault*
- *Observation at Fault Location*
- *Task Performed at Fault Site*
- *NOC Support in Fault Management*
- *Fault Analysis Chart*
- *Fault Management Activity List*

15. Planned Event Management

- *Planned Event Process Flow Diagram*
- *Planned Event Situations*
- *Planned Event Procedure*
- *Planned Event Clearance*
- *Cautions in Planned Event Activities*

16. Fiber To The Home (FTTH) Installation Practices

- *Introduction, Features and Benefits of FTTH*
- *Basics of Internet & Triple Play Services*
- *FTTH Network Components, Tools and Accessories*
- *In-building Survey*
- *Conduiting & Drilling Practices*
- *Optical Fiber Connectorization*
- *FTTH Aerial Cabling*
- *Health Safety & Environment in FTTH Rollout*

17. Gigabit Passive Optical Network (GPON) Technology and Components

- *Introduction to GPON Technology (Triple Play Services)*
- *Installation and Commissioning of OLT Rack, FDMS, Spare Cable Box etc.*
- *Installation and Commissioning of Charging Control Unit (CCU), ONT, Solar Panel etc.*
- *GPON Link Testing*
- *Troubleshooting of GPON links*
- *Health, Safety & Environment in GPON Rollout*

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