

# Training Proposal for FBB Project



**HUAWEI**  
**HUAWEI Learning Service**  
2015

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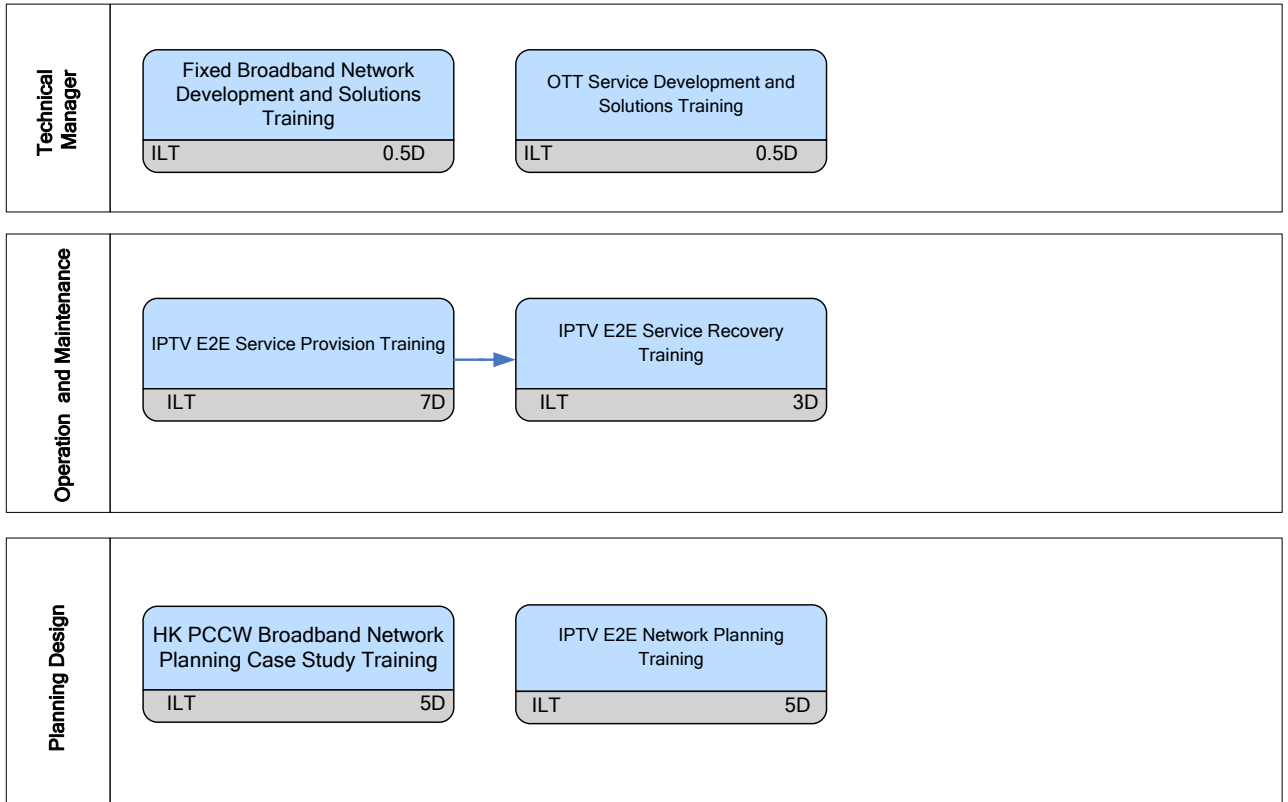
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# 1 Training Solution

## 1.1 Background Introduction

## 1.2 Overview

## 1.3 FBB Training Path



## 1.4 Required Training Programs

FBB For this project, the whole training solution is designed into the following programs. List of Training Program(s) for FBB Project:

Training Program	Program Level	Duration (workdays)	Training Location	Class Size
<b>FBB</b>				
Fixed Broadband Network Development and Solutions Training	II	0.5		6 ~ 12
OTT Service Development and Solutions Training	II	0.5		6 ~ 12

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HK PCCW Broadband Network Planning Case Study Training	III	5		6 ~ 12
IPTV E2E Network Planning Training	IV	5		6 ~ 12
IPTV E2E Service Provision Training	II	7		6 ~ 12
IPTV E2E Service Recovery Training	III	3		6 ~ 12

Level Description: I : Basic Course II : Intermediate Course III: Advanced Course IV: Expert Course

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## 1.5 FBB

### 1.5.1 Fixed Broadband Network Development and Solutions Training

#### Training Path

FBB Broadband Network Development and Solutions		
OBB01	Lecture	0.5d

#### Target Audience

FBB Technical Managers  
FBB Business Managers  
FBB Maintenance Engineers  
FBB Planning Engineers

#### Prerequisites

- Familiar with basic knowledge about telecommunications and data communications

#### Objectives

On completion of this program, the participants will be able to:

- Describe FBB concepts
- Describe trend and driving forces of FBB
- Describe FBB digital home service development
- Describe FBB OTT service development
- Describe FBB service development
- Describe FBB Network
- Outline FBB solution

#### Training Content

##### OBB01 FBB Broadband Network Development and Solutions

- FBB Broadband Network Development and Solutions
  - FBB concept introduction
  - Trend and driving forces of FBB
  - FBB digital home service development introduction
  - FBB OTT service development introduction
  - FBB service development introduction
  - FBB network introduction
  - FBB solution introduction

#### Duration

0.5 working day

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Class Size

Min 6, Max 12

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## 1.5.2 OTT Service Development and Solutions Training

### Training Path

OTT Service Development and Solutions		
OBB02	Lecture	0.5d

### Target Audience

FBB Technical Managers  
FBB Business Managers  
FBB Maintenance Engineers  
FBB Planning Engineers

### Prerequisites

- Familiar with basic knowledge about telecommunications and data communications

### Objectives

On completion of this program, the participants will be able to:

- Describe the trend and driving forces of OTT
- Describe the challenges what OTT bring
- Describe the OTT solution

### Training Content

#### OBB02 OTT Service Development and Solutions

- OTT Service Development and Solutions
  - OTT service introduction
  - OTT brings new challenges
  - OTT solution overview
  - OTT cases sharing

### Duration

0.5 working day

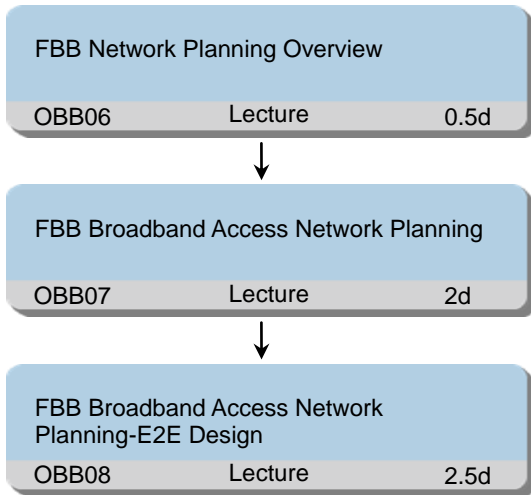
### Class Size

Min 6, Max 12

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### 1.5.3 HK PCCW Broadband Network Planning Case Study Training

#### Training Path



#### Target Audience

FBB Planning Engineers and Experts  
FBB Technical Support Engineers and Experts  
FBB Technical Managers

#### Prerequisites

- At least two years of experience in the operation and maintenance of Access network equipments
- Attended "FTTx GPON 2nd Line Maintenance Training" or having equivalent knowledge

#### Objectives

On completion of this program, the participants will be able to:

- Describe current mainstream of FBB business
- Describe FBB development trend of future business
- Describe current network structure of Fixed network operators
- Describe considering factors in FBB network planning
- Describe various typical technologies of FBB broadband access network
- Design FBB xPON broadband access network
- Design FBB xDSL broadband access network
- Design FBB Home network broadband access network
- Calculate HSI/IPTV/VoIP service total bandwidth
- Complete FBB network end-to-end QoS design
- Complete FBB network end-to-end reliability design
- Complete FBB network end-to-end security design

#### Training Content

OBB06 FBB Network Planning Overview



- 
- FBB Service Challenge Overview
    - Current mainstream FBB business presentation
    - FBB future business development trend
    - New business, New challenges
  - FBB Service Network Planning Requirements
    - current network structure of Fixed network operators
    - FBB network planning considering factors

#### OBB07 FBB Broadband Access Network Planning

- FBB Broadband Access Network Planning-Choices of AN Technologies
  - New business, New requirements to FBB network planning
  - FBB broadband access network typical technology introduction-DSL/PON/LAN
  - Choice between PON and DSL
  - FBB broadband access network planning successful case study and discussion
- FBB Broadband Access Network Planning-xPON Network Planning
  - xPON overview
  - ODN typical topology type and design
  - Choice of splitter
  - Attenuation estimation methods of optical link
  - ODN planning
  - How to choose OLT and OLT planning
  - GPON compare with EPON
  - xPON technology development trend
  - xPON network planning successful cases study and practice
- FBB Broadband Access Network Planning-xDSL Network Planning
  - xDSL overview
  - xDSL covering survey
  - xDSL site choice
  - xDSL business disaster emergency recovery
  - How to solve xDSL copper line interference
  - xDSL network planning successful cases study and practice
- FBB Broadband Access Network Planning-Home Network Planning
  - Home network technology introduction
  - Mainstream product introduction of CPE
  - CPE product design and development
  - Operators provide CPE device or the user purchase CPE
  - CPE daily maintenance FAQ
  - FBB home network planning successful cases study and practice

#### OBB08 FBB Broadband Access Network Planning-E2E Design

- FBB Broadband Access Network Planning-E2E Bandwidth Design
  - What is Bandwidth Dimensioning ?
  - Why is Bandwidth Dimensioning required ?
  - Should VAS bandwidth be included in or excluded from HSI bandwidth ?

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- Bandwidth Dimensioning for HSI, IPTV and VoIP Services
  - FBB Broadband Access Network Planning-E2E Reliability Design
    - What is High Availability ?
    - Components of High Availability
    - How should the level of High Availability be defined ?
    - Benefits of High Availability to End User and FBB Network Operator
    - NE-level High Availability: Software Features:
      - In Service Software Upgrade (ISSU)
      - Non-Stop Forwarding (NSF) and Stateful Switchover (SSO)
      - OS Software Modularity
      - BGP Non-stop Routing
      - Virtual Router Redundancy Protocol (VRRP)
      - Stateful IP Services
      - Warm Reload
      - Warm Upgrade
      - Line Card Redundancy with Y-cables
  - FBB Broadband Access Network Planning-E2E QoS Design
    - What is QoS ?
    - Why is QoS required ?
    - Can QoS be omitted for a bandwidth over-dimensioned FBB network ?
    - Benefits of QoS to (a) End User and (b) FBB Network Operator
    - QoS Design Principles
    - E2E QoS Design
    - QoS Marking
    - QoS Marker Transparency
    - QoS Queuing
    - Traffic Policing, Traffic Shaping and Call Admission Control (CAC)
    - WiFi QoS
    - QoS Features of Network Equipment
    - Multi-vendor QoS Design
    - QoS Monitoring
    - Case Study
  - FBB Broadband Access Network Planning-E2E Network Security Design
    - Security vs Availability
    - P Operator Security Design Principle
    - P Operator Service Level Security Measures
    - Line based Authentication
    - NCA for IPTV
    - Anti-Piracy Security Measure
    - Customer Profile Protection
    - Anti-DOS Attack on BRAS
    - IGMP message flooding by ONU LAN Cable Loopback

- 
- OSPF and BGP with MD5 Protection
  - Use of Firewall
  - Server Hardening
  - Physical Security Measures
  - FBB Broadband Access Network Planning-Cases Study
    - FBB broadband access network planning successful cases sharing and study
    - FBB broadband access network planning simulation exercises

Duration

5 working days

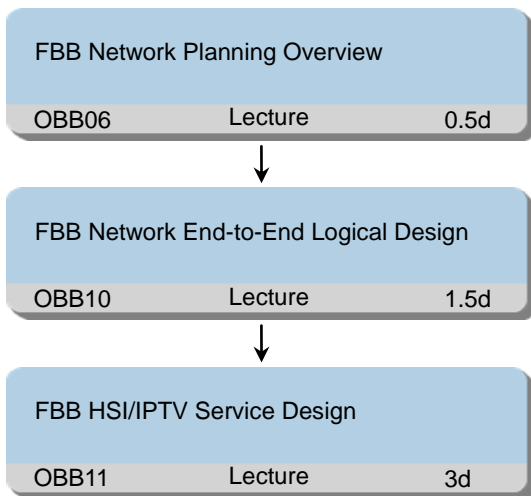
Class Size

Min 6, Max 12

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## 1.5.4 IPTV E2E Network Planning Training

### Training Path



### Target Audience

FBB Planning Engineers and Experts  
FBB Technical Support Engineers and Experts  
FBB Technical Managers

### Prerequisites

- At least two years of experience in the operation and maintenance of Access network or Datacom network equipments
- Familiar with TCP/IP protocols and FTTx technologies
- Attended "NE Series Routers 2nd Line Maintenance Training" or having equivalent knowledge
- Attended "FTTx GPON 2nd Line Maintenance Training" or having equivalent knowledge

### Objectives

On completion of this program, the participants will be able to:

- Describe current mainstream of FBB business
- Describe FBB development trend of future business
- Describe current network structure of Fixed network operators
- Describe considering factors in FBB network planning
- Calculate HSI/IPTV/VoIP service total bandwidth
- Complete FBB network end-to-end VLAN design
- Complete FBB network end-to-end IP address design
- Complete FBB network end-to-end QoS design
- Complete FBB network end-to-end reliability design
- Complete FBB network end-to-end security design
- Complete FBB network IGP routing design
- Complete FBB network BGP routing design

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- Complete FBB MPLS network design
  - Complete FBB network channel design(Home network/Access network/IP network)
  - Describe IPTV central network architecture
  - Complete FBB HSI service network planning
  - Complete FBB IPTV service network planning

#### Training Content

##### OBB06 FBB Network Planning Overview

- FBB Service Challenge Overview
  - current mainstream FBB business presentation
  - FBB future business development trend
  - New business, New challenges
- FBB Service Network Planning Requirements
  - current network structure of Fixed network operators
  - FBB network planning considering factors

##### OBB10 FBB Network End-to-End Logical Design

- FBB Network End-to-End Logical Design-Bandwidth Design
  - Bandwidth Design overview
  - Basic bandwidth calculation as (HSI/IPTV/VoIP) business needs
  - FBB end-to-end bandwidth planning and design example
- FBB Network End-to-End Logical Design-VLAN Design
  - VLAN design overview
  - Single VLAN or double VLAN
  - Home network VLAN design
  - SME access network VLAN design
  - VPN VLAN design
  - FBB end-to-end VLAN planning and design example
- FBB Network End-to-End Logical Design-IP Address Design
  - IP address design overview
  - IP address design basic principles
  - Business IP address design
  - Equipment IP address design
  - Management IP address design
  - IPv6 address planning overview
  - FBB end-to-end IP address planning and design example
- FBB Network End-to-End Logical Design-Multicast Design
  - Multicast design overview
  - L3 multicast technology introduction
  - Multicast routing design
  - L2 multicast technology introduction
  - IGMP snooping and IGMP proxy principles
  - Multicast VLAN design

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- How to choose multicast control point according to the needs of the business?
    - Multicast reliability design
    - Multicast security design
  - FBB Network End-to-End Logical Design-QoS Design
    - QoS design overview
    - 802.1 p, IP DSCP, MPLS EXP QoS design
    - CAR flow control design
    - PQ, WFQ, WRR, LLQ QoS design
    - FBB end-to-end QoS design examples
  - FBB Network End-to-End Logical Design-OAM Design
    - OAM design overview
    - CMCI, Ethernet OAM, MPLS OAM technology introduction
    - FBB End-to-end OAM design examples
  - FBB Network Logical Layered Design-FBB Channel Design
    - FBB channel design overview
    - Home network architecture introduction
    - Home network VLAN/IP/RGW/multicast design
    - Access network architecture introduction
    - Access network GPON access/GEM port/VLAN/multicast/reliability design
    - Aggregation network architecture introduction
    - Aggregation network VLAN planning/business gathering/reliability/security design
    - Service-POP network architecture introduction
    - Service-POP business bearing/VLAN planning/routing design/reliability design
    - Backbone network structure introduction
    - Backbone routing design
    - IGW design
  - FBB Network Logical Layered Design-Server Farm and IPTV Central Network Design
    - Server Farm design overview
    - Server Farm network architecture introduction
    - Server Farm deployment/VLAN planning/IP address planning/routing planning/VPN/reliability/security design
    - IPTV platform architecture introduction
    - IPTV central network design
- OBB11 FBB HSI/IPTV Service Design
- FBB Service Design-HSI Service
    - HSI Service Overview
    - HSI Service Authentication
    - HSI Service User Management
    - HSI Service Address Assignment
    - HSI Service Domain Name Resolution
    - HSI Service Accounting
    - HSI Service VAS

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- HSI Service design example
  - FBB Service Design-IPTV Service
    - IPTV Service Overview
    - IPTV Service Authentication
    - IPTV Service Multicast Solution
    - IPTV Headend Interconnection Solution (Using IPv4 as an Example)
    - IPTV Service Security
    - IPTV Service QoS principle
    - IPTV iVSE Solution
    - IPTV Service design example
  - FBB Service System Design-Server Farm (AAA/DHCP/IMS/NMS) Design
    - Server Farm design overview
    - AAA servers design example
    - DHCP servers design example
    - NGN network architecture introduction and system design overview
    - IMS network architecture introduction and system design overview
    - NMS network architecture introduction and system design overview
  - FBB Service System Design-IPTV System Design
    - IPTV Service System Overview
    - IPTV Major Services Introduction
    - Access Planning for the IPTV Data Center
    - IPTV Service IP Address Planning
    - IPTV Service System Access Design Overview
    - Access Solution 1: Firewall Gateway Mode (VRRP + Static Route)
    - Access Solution 2: Firewall Gateway Mode (VRRP + Dynamic Route)
    - Access Solution 3: Layer 2 and Layer 3 Hybrid Mode
    - IPTV Access Solution Comparison

Duration

5 working days

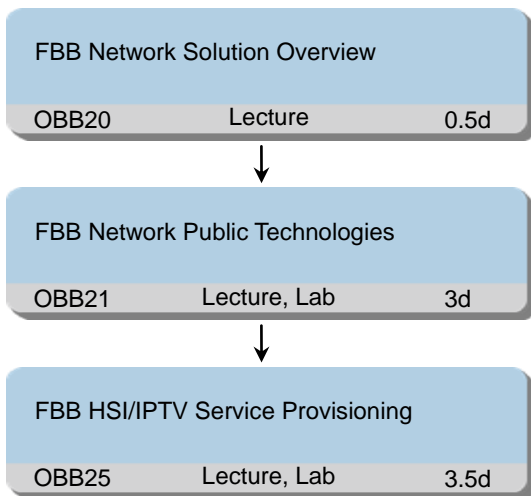
Class Size

Min 6, Max 12

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## 1.5.5 IPTV E2E Service Provision Training

### Training Path



### Target Audience

FBB Technical Support Engineers and Experts  
FBB Operation and Maintenance Engineers and Experts  
FBB Planning Engineers and Experts

### Prerequisites

- At least two years of experience in the operation and maintenance of Access network or Datacom network equipments
- Familiar with TCP/IP protocols and FTTx technologies
- Attended "NE Series Routers 2nd Line Maintenance Training" or having equivalent knowledge
- Attended "FTTx GPON 2nd Line Maintenance Training" or having equivalent knowledge

### Objectives

On completion of this program, the participants will be able to:

- Describe FBB Network Solutions
- Describe FBB Services
- Describe FBB Network Products
- Complete FBB bearer network service deployment and maintenance
- Complete FBB aggregation network service deployment and maintenance
- Complete FBB access network service deployment and maintenance
- Describe FBB HSI/IPTV service provisioning process
- Complete FBB HSI/IPTV end-to-end deployment and maintenance
- Complete FBB HSI/IPTV end-to-end operations and maintenance

### Training Content

- OBB20 FBB Network Solution Overview
- FBB Networking Solution Overview



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- FBB Solutions Overview
  - FBB Network Solution for IP MAN
  - FBB Network Solution for Aggregation network
  - FBB Services Overview
  - FBB Products Description

#### OBB21 FBB Network Public Technologies

- FBB IP MAN Operation and Maintenance
  - FBB IP MAN IGP/BGP Routing technologies
  - FBB IP MAN BGP MPLS L3VPN technologies
  - FBB MAN side of the multicast technology
  - FBB MAN side of the QoS technology
  - FBB MAN side of the HA technology
- FBB IP MAN Services Overview
  - FBB IP MAN Routing of Solutions
  - FBB MAN multicast, QoS and HA
  - BRAS features and working principle
  - AAA working principle
- FBB IP MAN Practice Guide
  - Configuration of BGP, QoS, MPLS and multicast
  - Configuration of VRRP protocol
  - Configuration of BRAS Internet service(PPPOE and Leased Line)
  - Configuration of AAA

#### OBB25 FBB HSI/IPTV Service Provisioning

- FBB HSI Service Practice Guide
  - Practice: Configuration of PPPoE service
  - Practice: Configuration of SME HSI service
  - Practice: FBB HSI reliability configuration
- FBB IPTV Service Overview
  - IPTV service end-to-end architecture
  - IPTV business type(BTV/VOD/NVOD/TSTV)
  - IPTV user authentication
  - STB on-line process
  - IPTV service monitoring
  - FBB IPTV service provisioning process
- FBB IPTV Service Configuration process
  - Configuration of PPPoE user
  - Configuration of multicast(PIM) protocol
  - Configuration of IGMP protocol
  - Configuration of IPTV service reliability
- FBB IPTV Service Practice Guide
  - Practice: Configuration of PPPoE user
  - Practice: Configuration of multicast(PIM) protocol

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- Practice: Configuration of IGMP protocol
  - Practice: Configuration of IPTV service reliability

Duration

7 working days

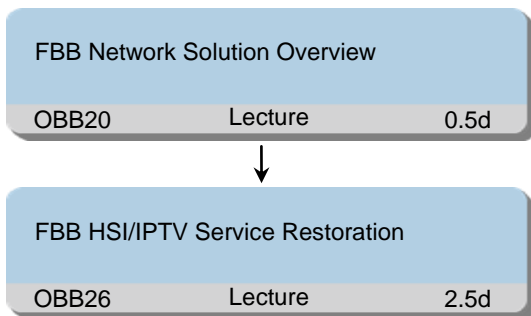
Class Size

Min 6, Max 12

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## 1.5.6 IPTV E2E Service Recovery Training

### Training Path



### Target Audience

FBB Technical Support Engineers and Experts  
FBB Operation and Maintenance Engineers and Experts  
FBB Planning Engineers and Experts

### Prerequisites

- At least two years of experience in the operation and maintenance of Access network or Datacom network equipments
- Familiar with TCP/IP protocols and FTTx technologies
- Attended "NE Series Routers 2nd Line Maintenance Training" or having equivalent knowledge
- Attended "FTTx GPON 2nd Line Maintenance Training" or having equivalent knowledge

### Objectives

On completion of this program, the participants will be able to:

- Describe FBB Network Solutions
- Describe FBB Services
- Describe FBB Network Products
- Complete FBB HSI/IPTV end-to-end operations, fault location and troubleshooting

### Training Content

#### OBB20 FBB Network Solution Overview

- FBB Networking Solution Overview
  - FBB Solutions Overview
  - FBB Network Solution for IP MAN
  - FBB Network Solution for Aggregation network
  - FBB Services Overview
  - FBB Products Description

#### OBB26 FBB HSI/IPTV Service Restoration

- FBB HSI Service Troubleshooting
  - Analysis and troubleshooting of HSI Service
  - FBB HSI Typical Troubleshooting Case Analysis

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- Case: Failure to Access the Internet
  - Case: Going Offline Frequently
  - Case: Low Internet Access Rate
  - Case: Failure to Obtain an IP Address in the DHCP Mode
  - FBB IPTV Service Overview
    - IPTV service end-to-end architecture
    - IPTV business type(BTV/VOD/NVOD/TSTV)
    - IPTV user authentication
    - STB on-line process
    - IPTV service monitoring
    - FBB IPTV service provisioning process
  - FBB IPTV Service Troubleshooting
    - Analysis and troubleshooting of IPTV Service
    - FBB IPTV Typical Troubleshooting Case Analysis
    - Case: Dark Screen After Program Ordering
    - Case: Mosaic Display in Multicast Programs
    - Case: Abnormal Program Interruption in Watching a Program

Duration

3 working days

Class Size

Min 6, Max 12