Customer Training Catalog
Training Programs
Mobile Backhaul

HUAWEI Learning Service
2019
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1.1 Overview

1.1.1 ATN&CX600 Mobile Backhaul Solution Training
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## 1.2 Required Training Programs

List of Training Program(s) for Mobile Backhaul Solution Training Project:

<table>
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<tr>
<th>Training Program</th>
<th>Program Level</th>
<th>MOOC (Weeks)</th>
<th>Centralized Training (Workdays)</th>
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**Level Description:**
- **I**: Basic Course
- **II**: Intermediate Course
- **III**: Advanced Course
- **IV**: Expert Course
1.3 5G Bearer Network Training

1.3.1 5G Bearer Network Key Technology and Evolution Deployment Training

Training Path

Target Audience

Technical Managers
Radio Network Engineer
Core Network Engineer
Bearer Network Planning Engineer

Prerequisites

- 3 years’ experience of mobile communication network

Objectives

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

- Describe the challenges of 5G bearer network
- Describe bearer network requirement
- Describe 5G front backhaul, Midhaul&l backhaul, backhaul network solution

Training Content

- 5G Bearer Network Requirement Analysis
  - 5G Radio Network Evolution Architecture
  - 5G Core Network Changes
  - 5G Bandwidth Requirement Analysis
  - 5G Low Latency Requirement
  - 4G/5G Evolution Relationship
  - Network Slicing Requirement Analysis
  - 5G Automation Requirement Analysis
  - 5G Clock Synchronization Requirement Analysis

- 5G Bearer Solution and Key Technology
  - 5G Front Backhaul Network Solution
  - 5G Midhaul&l Backhaul Network Solution
  - 5G Bearer Network Slicing Key Technology
  - 5G Bearer Network Operation and Maintenance
  - 5G Bearer Network Clock Solution

Training Duration

1 working day

Class Size

Min 6, Max 12
1.3.2 5G Midhaul & Backhaul Network Evolution and Key Technology

Training Path

Target Audience

5G Midhaul&Backhaul Network Planning and Maintenance Engineer

Prerequisites

- A general knowledge in LTE mobile bearer network architecture and deployment

Objectives

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

- Describe Bearer Network Evolution and Deploy Solution
- Understand 5G Bearer Network New Technology and Application
- Describe 5G Bearer Network New Technology Characteristic and Application Scenario

Training Content

- 5G Bearer Network Requirement Analysis
  - 5G Radio Network Evolution Architecture
  - 5G Core Network Changes
  - 5G Bandwidth Requirement Analysis
  - 5G Low Latency Requirement
  - 4G/5G Evolution Relationship
  - Network Slicing Requirement Analysis
  - 5G Automation Requirement Analysis
  - 5G Clock Synchronization Requirement Analysis
- 5G Bearer Network Evolution Solution
  - 5G Bearer Network Solution Introduction
  - 5G Service Bearer Solution
  - 5G Operation and Maintenance Solution
  - 5G Bearer Fragment Deployment Solution
  - 5G Clock Synchronization solution
- 5G Bearer Network Key Technology
  - 5G Segment Routing Technical Analysis
  - 5G L3VPN Technical Analysis
  - 5G EVPN Technical Analysis
  - 5G Flex-Eth Technical Analysis
  - 5G 1588V2 Technical Analysis
Unified Management and Control Platform NCE Solution

Training Duration
3 working days

Class Size
Min 6, Max 12

1.3.3 5G Midhaul & Backhaul Products Installation and Commissioning

Training Path

Target Audience
- Midhaul&Backhaul Network installation Engineer

Prerequisites
- 1 year experience of IPRAN network maintenance experiences

Objectives
Upon completion of this program, participants will be able to:
- Understand midhaul&backhaul products hardware
- Perform midhaul&backhaul products installation and commissioning

Training Content
- 5G Midhaul&backhaul network products hardware description
  - 5G new ATN&CX600 products application scenarios
  - 5G new ATN&CX600 product cabinet and system overview
  - 5G new ATN&CX600 product boards introduction
  - 5G new ATN&CX600 product indicator introduction
- 5G Midhaul&backhaul network products installation and commissioning
  - ATN series product installation guide
  - ATN series products commissioning

Centralized training Duration
1 working days

Class Size
Min 6, Max 12
5G Midhaul & Backhaul Network Operation and Maintenance Training

Training Path

Target Audience

- Midhaul&Backhaul Network Maintenance Engineer

Prerequisites

- 3 years’ experience of IPRAN network maintenance experiences

Objectives

Upon completion of this program, participants will be able to:

- Understand the working principle of 5G bearer network
- Perform 5G service configuration
- Perform 5G synchronization configuration

Training Content

- 5G Midhaul&Backhaul solution introduction
  - 5G midhaul&backhaul challenges and requirements
  - 5G midhaul&backhaul solution introduction
  - 5G midhaul&backhaul live network evolution
- 5G Midhaul&backhaul network products hardware description
  - 5G new ATN&CX600 products application scenarios
  - 5G new ATN&CX600 product cabinet and system overview
  - 5G new ATN&CX600 product boards introduction
- VRP8 new platform introduction
- VRP8 new platform introduction
- VRP8 compare with VRP5
- VRP8 typical configuration

- IGP protocol implementation
  - ISIS basic concepts
  - ISIS working principle
  - ISIS configuration

- BGP protocol implementation
  - BGP overview
  - BGP working principles
  - BGP route attributes
  - BGP extended applications

- Segment Routing technology
  - SR technology background
  - SR concepts and working principle
  - 5G bearer network application
  - SR tunnel configuration

- EVPN technology introduction and implementation
  - MPLS L2VPN working principle
  - MPLS L2VPN configuration

- MPLS L3 VPN technology introduction and implementation
  - MPLS BGP VPN overview
  - Implementation principles of MPLS BGP VPN
  - MPLS BGP VPN service protection techniques
  - MPLS L3VPN configuration

- 5G service configuration
  - 5G E2E S1 service configuration
  - 5G E2E X2 service configuration

- 5G midhaul&backhaul network clock synchronization implementation
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

- Flex-Eth technology implementation
  - Flex-eth technology background
  - Flex-eth concepts and working principle
  - 5G bearer network application

- 5G midhaul&backhaul daily maintenance
  - NCE system architecture
  - NCE basic operation
  - NCE alarm handling and monitoring
  - NCE data backup
Centralized training Duration
10 working days

Class Size
Min 6, Max 12

1.3.4 5G Midhaul&Backhaul Network Planning & Design Training

Training Path

Target Audience
- IPRAN Planning & Design Engineer

Prerequisites
- 3 years’ experience of transport network

Objectives
Upon completion of this program, participants will be able to:
- Describe the planning and design principles of the 5G bearer network
- Describe the planning and design methods of the 5G bearer network
- Plan and design 5G bearer network, parameters, complete daily planning and design tasks

Training Content
- 5G Midhaul&Backhaul Network Solution Overview
  - The challenges and requirements of 5G bearer network
  - Introduction of 5G bearer network solution
- 5G Midhaul&Backhaul Network Planning and Designing Overview
  - The basic concepts of HLD and LLD
  - How to planning 5G Bearer Network
  - 5G Bearer Network planning steps
- 5G Midhaul&Backhaul Network Planning - Requirements Analysis
  - Design Rule and Requirements Analysis
- 5G Midhaul&Backhaul Network Planning - Topology and Hardware Planning
  - Topology and Hardware Planning
- 5G Midhaul&Backhaul Network Planning - NE Parameter and IP Address Planning
  - NE parameter planning
  - IP address planning
- 5G Midhaul&Backhaul Network Planning - NM and DCN Planning
  - SNMP basic concept
  - DCN solution in IP backhaul network
  - NM planning
  - DCN planning
- 5G Midhaul&Backhaul Network Planning - Routing Protocol Planning
• IP routing protocol basic concept
• IS-IS routing protocol planning
• OSPF routing protocol planning
• 5G Midhaul&Backhaul Network Planning - Tunnel Planning
  • MPLS basic concept
  • SR basic concept
  • SR tunnel basic concept
• 5G Midhaul&Backhaul Network Planning - Service Bearer Planning
  • S1 service planning and design
  • X2 service planning and design
• 5G Midhaul&Backhaul Network Planning - High Availability Planning
  • High availability concept
  • High availability of deployment
• 5G Midhaul&Backhaul Network Planning - QoS Planning
  • QoS basic concept
  • QoS planning
• 5G Midhaul&Backhaul Network Planning - Clock Synchronization Planning
  • Clock concept (Synchronization Ethernet +1588 v2)
  • Deployment of the clock synchronization
  • Synchronization Ethernet planning
  • The IEEE1588v2 planning
• 5G Midhaul&Backhaul Network Planning - Case Analysis
  • Case Research

Centralized Training Duration
5 working days

Class Size
Min 6, Max 12
1.4 Mobile Backhaul Evolution and Trends Training

1.4.1 ATN&CX600 Mobile Backhaul Solution Training

Training Path

| IP Backhaul Solution Overview | ODN31 | Lecture | 0.5D |

Target Audience
- Operation manager
- Technical manager

Prerequisites
- Having basic knowledge of TCP/IP

Objectives
On completion of this program, the participants will be able to:
- Describe the demands and challenges of the MBB backhaul network
- Understand the mobile backhaul solution

Centralized Training Content

ODN31 IP Backhaul Solution Overview
- ATN&CX600 IP Backhaul Solution Overview
  - The challenge of MBB
  - All kinds of mobile backhaul implement
  - Service data forwarding in IP backhaul solution
  - Service protection in IP backhaul solution
  - QOS and clock synchronization in IP backhaul solution
- ATN&CX600 IP Backhaul Network Solution Overview
  - Overall development trend of MBB
  - Requirements and challenges of MBB
  - Implementation and deployment of mobile backhaul network solutions
  - Operations and management of MBB

Centralized Training Duration
- 0.5 working day

Class Size
- Min 6, Max 12
1.4.2 LTE Mobile Backhaul Solution Introduction Training

Training Path

Target Audience

Operation manager
Technical manager

Prerequisites

- Having basic knowledge of TCP/IP

Objectives

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

- Describe the wireless network evolution to LTE network
- Understand LTE mobile backhaul network solutions

Centralized Training Content

ODL02 LTE IP Backhaul Solution Overview

- LTE Mobile Backhaul Network Solution Introduction
  - Wireless network standard of the evolution to LTE
  - Requirements and challenges of LTE mobile backhaul network
  - Implementation and deployment of the LTE bearer solutions
  - Operations and management of LTE bearer network

Centralized Training Duration

0.5 working day

Class Size

Min 6, Max 12
1.4.3 LTE Small Cell Backhaul Solution Introduction Training

Training Path

Target Audience

Operation manager
Technical manager

Prerequisites

- Having basic knowledge of TCP/IP

Objectives

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

- List small cell bearing requirements
- Understand small cell backhaul solution implementation

Centralized Training Content

ODL01 LTE Small Cell Backhaul Solution Overview

- LTE Small Cell Backhaul Solution Overview
  - Small cell concepts and application scenarios
  - Small cell backhaul requirement and challenges
  - Small cell backhaul solution implementation
  - Huawei small cell backhaul products introduction

Centralized Training Duration

0.5 working day

Class Size

Min 6, Max 12
1.4.4 PTN-Based Mobile Backhaul Evolution Solution Training

Training Path

Target Audience

Technical manager

Prerequisites

- Having an overview of telecommunications

Objectives

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

- Describe Huawei PTN-Based mobile backhaul evolution solution

Centralized Training Content

ODP16 PTN-Based Mobile Backhaul Evolution Solution

- PTN-Based Mobile Backhaul Evolution Solution Overview
  - Huawei IP RAN Solution
  - Successful Applications of Huawei PTN products
  - PTN-Based Mobile Backhaul Evolution Solution

Centralized Training Duration

0.5 working day

Class Size

Min 6, Max 12
1.5 IP Network OSS

1.5.1 iManager U2000 IP Backhaul Network Deployment Training

Training Path

| iManager U2000 IP Backhaul Network Deployment | ODM11 Lecture, Hands on | 1D |

Target Audience

Mobile backhaul network operation and maintenance engineers

Prerequisites

- Having basic knowledge of Datacom

Objectives

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

- Apply network devices discovery and basic services configuration
- Describe the steps of the plug and play in the IP backhaul network
- Use U2000 to complete the plug and play tasks

Centralized Training Content

ODM11 iManager U2000 IP Backhaul Network Deployment

- iManager U2000 IP Backhaul Network Server Deployment Solution
  - U2000 server deploying mode
  - DCN type
  - How to select U2000 server
- iManager U2000 IP Backhaul Network Plug and Play Introduction
  - How to implement plug and play
  - How to plan plug and play
  - Plug and play configuration by U2000
- iManager U2000 IP Backhaul Network PnP Practice Guide
  - Plug and play process
  - Using U2000 to Practice plug and play

Centralized Training Duration

1 working day

Class Size

Min 6, Max 12
1.5.2  **iManager U2000 IP Backhaul Network Service Management Training**

**Training Path**

![Diagram of training path]

**Target Audience**

Mobile backhaul network operation and maintenance engineer

**Prerequisites**

- Familiar with the working principle of IGP routing protocol
- Familiar with the working principle of MPLS VPN including L3VPN, VPLS and PWE3

**Objectives**

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

- Describe L3VPN service implementation in the IP backhaul network
- Understand PWE3 service implementation in the IP backhaul network
- Understand VPLS service implementation in the IP backhaul network
- Apply MPLS VPN service configuration by U2000

**Centralized Training Content**

**ODM10 iManager U2000 Operation and Maintenance Solution**

- iManager U2000 Operation and Maintenance Solution
  - U2000 system structure
  - U2000 system functions
  - U2000 system common operation
- iManager U2000 System Introduction(IP Backhaul)
  - The architecture and main features of U2000
  - The directory structure of U2000
  - The main functions of U2000

**ODM13 iManager U2000 IP Backhaul Network Service Management**

- iManager U2000 IP Backhaul Network L3VPN Service Introduction and Management
  - Introducing L3VPN service basic concept
  - Using U2000 to deploy L3VPN service
- iManager U2000 IP Backhaul Network L3VPN Service Practice Guide
  - L3VPN service configuring procedure
  - Using U2000 to configure L3VPN service
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- **iManager U2000 IP Backhaul Network PWE3 Service Introduction and Management**
  - Introducing PWE3 service basic concept
  - Using U2000 to deploy PWE3 service
- **iManager U2000 IP Backhaul Network PWE3 Service Practice Guide**
  - PWE3 service configuring procedure
  - Using U2000 to configure PWE3 service
- **iManager U2000 IP Backhaul Network VPLS Service Introduction and Management**
  - Introducing VPLS service basic concept
  - Using U2000 to deploy VPLS service
- **iManager U2000 IP Backhaul Network VPLS Service Practice Guide**
  - VPLS service configuring procedure
  - Using U2000 to configure VPLS service
- **iManager U2000 IP Backhaul Network HVPN Service Introduction and Management**
  - Introducing HVPN service basic concept
  - Using U2000 to deploy HVPN service
- **iManager U2000 IP Backhaul Network HVPN Service Practice Guide**
  - HVPN service configuring procedure
  - Using U2000 to configure HVPN service
- **iManager U2000 IP Backhaul Network Mixed VPN Service Introduction and Management**
  - Introducing Mixed VPN service basic concept
  - Using U2000 to deploy Mixed VPN service
- **iManager U2000 IP Backhaul Network Mixed VPN Service Practice Guide**
  - Mixed VPN service configuring procedure
  - Using U2000 to configure Mixed VPN service

**Centralized Training Duration**

5 working days

**Class Size**

Min 6, Max 12
1.5.3 iManager U2000 IP Backhaul Network Assurance Training

Training Path

Target Audience
Mobile backhaul network operation and maintenance engineer

Prerequisites
- At least one year U2000 products operation experience
- Familiar with the working principle of MPLS VPN including L3VPN, VPLS and PWE3

Objectives
On completion of this program, the participants will be able to:
- Apply IPRAN alarm management by U2000, handle daily alarms by U2000
- Use U2000 troubleshooting in the IP backhaul network

Centralized Training Content

ODM14 iManager U2000 IP Backhaul Network Service Assurance
- iManager U2000 Operation and Maintenance Solution
  - U2000 system structure
  - U2000 system functions
  - U2000 system common operation
- iManager U2000 IP Backhaul Network Alarm Management
  - Alarm locating
  - Alarm experience
  - Alarm masking
  - Alarm correlation analysis
- iManager U2000 IP Backhaul Network Troubleshooting Guide
  - The requirement of IP backhaul network troubleshooting
  - Fault type and dealing process
  - Fault locating ways
  - The troubleshooting case on IP backhaul network
- iManager U2000 IP Backhaul Network Troubleshooting Practice Report
  - Using U2000 to do troubleshooting

Centralized Training Duration
3 working days

Class Size
Min 6, Max 12
1.6 Mobile Backhaul Planning and Design Training

1.6.1 ATN&CX600 Mobile Backhaul Network Planning and Designing Training

Training Path

Target Audience

Mobile backhaul network planning and design engineer

Prerequisites

- Having basic knowledge of TCP/IP

Objectives

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

- Describe planning and design principles of the IP backhaul network
- Describe planning and design methods of the IP backhaul network
- Plan and design IPRAN network, parameters, complete daily planning and design tasks

Centralized Training Content

ODN31 IP Backhaul Solution Overview

- ATN&CX600 IP Backhaul Solution Overview (Tech-level)
  - The challenge of MBB
  - All kinds of mobile backhaul implement
  - Service data forwarding in IP backhaul solution
  - Service protection in IP backhaul solution
  - QOS and clock synchronization in IP backhaul solution

ODN39 IP Backhaul Network Planning and Designing

- IP Backhaul Network Planning and Designing Overview
  - The basic concepts of HLD and LLD
  - How to planning IP backhaul network
  - IP backhaul network planning steps
- IP Backhaul Network Planning - Requirement Analysis
  - Design Rule and Requirements Analysis
- IP Backhaul Network Planning - Topology and Hardware Planning
  - Topology and Hardware Planning
- IP Backhaul Network Planning - NE Parameter and IP Address Planning
  - NE parameter planning
  - IP address planning
- IP Backhaul Network Planning - NM and DCN Planning
  - SNMP basic concept
  - DCN solution in IP backhaul network
  - NM planning
  - DCN planning
- IP Backhaul Network Planning - Routing Protocol Planning
  - IP routing protocol basic concept
  - IS-IS routing protocol planning
  - OSPF routing protocol planning
- IP Backhaul Network Planning - Tunnel Planning
  - MPLS basic concept
  - MPLS TE basic concept
  - Static tunnel planning
  - dynamic tunnel planning
- IP Backhaul Network Planning - Service Bearer Planning
  - VPN concept and classification
  - MPLS L3VPN basic concept
  - MPLS L2VPN basic concept
  - TDM PWE3 services planning
  - ATM PWE3 service planning
  - ETH L3VPN service planning
- IP Backhaul Network Planning - High Availability Planning
  - High availability concept
  - High availability of deployment
  - Voice service High availability planning
  - Data service High availability planning
- IP Backhaul Network Planning - QoS Planning
  - QoS basic concept
  - Qos planning
- IP Backhaul Network Planning - Clock Synchronization Planning
  - Clock concept (Synchronization Ethernet +1588 v2)
  - Deployment of the clock synchronization
  - Synchronization Ethernet planning
  - The IEEE1588v2 planning
- IP Backhaul Network Planning - Case Analysis
  - Case Research

Centralized Training Duration

5 working days
Class Size

Min 6, Max 12
1.6.2 PTN Network Planning and Design Training

Training Path

PTN Network Planning and Design

Target Audience

PTN network planning and design engineer

Prerequisites

- Completion of PTN 2nd Line Maintenance training

Objectives

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

- Describe planning and design principles of the PTN network
- Describe planning and design methods of the PTN network
- Plan and design PTN network, parameters, complete daily planning and design tasks

Centralized Training Content

ODP15 PTN Network Planning and Design

- PTN Network Planning and Design
  - PTN network planning and design overview
  - Products specifications
  - Requirements collection
  - Topology and hardware planning
  - NM and DCN planning
  - NE parameters planning
  - Service bandwidth analysis
  - Service and tunnel planning
  - QoS planning
  - Protection planning
  - OAM planning
  - Synchronization planning

- PTN Network Planning -- Case Research
  - Typical Case research and study

- PTN Network Design
  - PTN network design overview

Centralized Training Duration

3 working days
Class Size

Min 6, Max 12
1.6.3 PTN 6900 Network Planning and Design Training

Training Path

<table>
<thead>
<tr>
<th>Training Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODP31 PTN 6900 Mobile Backhaul Solution</td>
<td>0.5D</td>
</tr>
<tr>
<td>ODP42 PTN 6900 Network Planning and Design</td>
<td>4.5D</td>
</tr>
</tbody>
</table>

Target Audience

PTN 6900 network planning and design engineers

Prerequisites

- Completion of PTN 6900 3nd Line Maintenance Training

Objectives

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

- Describe Huawei PTN 6900 Mobile Backhaul Solution
- Understand PTN6900 planning and design method and principle, complete PTN6900 planning and design tasks

Centralized Training Content

ODP31 PTN 6900 Mobile Backhaul Solution
- PTN 6900 Mobile Backhaul Solution Overview
  - The development of mobile backhaul
  - Huawei PTN 6900 backhaul network solution

ODP42 PTN 6900 Network Planning and Design
- PTN&PTN 6900 Network Planning and Design Overview
  - The basic concepts of HLD and LLD
  - How to plan mobile backhaul network
  - Mobile backhaul network planning steps
- PTN&PTN 6900 Network Planning-Requirement Analysis
  - Design rule and requirements analysis
- PTN&PTN 6900 Network Planning-Topo and Hardware Planning
  - Topology and hardware planning
- PTN&PTN 6900 Network Planning-NE Parameter and IP Planning
  - NE parameter planning
  - IP address planning
- PTN&PTN 6900 Network Planning-NM and DCN Planning
  - Simple Network Management Protocol (SNMP) concept
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- DCN overview
- Network management and DCN planning
- PTN&PTN 6900 Network Planning-Routing Protocol Planning
  - Routing protocol basics
  - IS-IS basic concepts
  - IS-IS fast convergence
  - Planning the IS-IS routing protocol in mobile backhaul network
- PTN&PTN 6900 Network Planning-Tunnel Planning
  - MPLS basic concept
  - MPLS TE basic concept
  - Tunnel planning
- PTN&PTN 6900 Network Planning-Service Bearer Planning
  - VPN concept and classification
  - MPLS L3VPN basic concept
  - MPLS L2VPN basic concept
  - TDM PWE3 services planning
  - ATM PWE3 service planning
  - ETH L3VPN service planning
- PTN&PTN 6900 Network Planning-High Availability Planning
  - HA overview
  - Key technologies for network HA
  - HA planning for PTN
  - PTN 6900 network
- PTN&PTN 6900 Network Planning-QoS Planning
  - QoS Technology
  - QoS Planning
- PTN&PTN 6900 Network Planning-Clock Synch Planning
  - Clock concept (Synchronization Ethernet +1588 v2)
  - Synchronization Ethernet planning
  - The IEEE1588v2 planning
- PTN&PTN 6900 Network Planning-Case Analysis
  - Case research

Centralized Training Duration

5 working days

Class Size

Min 6, Max 12
1.7 Mobile Backhaul Operation and Maintenance Training

1.7.1 ATN&CX600 Mobile Backhaul Operation and Maintenance Training

Training Path

Target Audience

Mobile backhaul network operation and maintenance engineer

Prerequisites

- Familiar with the working principle of IGP routing protocol
- Familiar with the working principle of MPLS VPN including L3VPN and VPLS

Objectives

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

- Understand IPRAN network architecture, network protocol implementation, services working flow and principle
- Complete the L3VPN service and reliability configuration
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- Complete the TDM / ATM of PWE3 service and reliability configuration
- Complete QoS configuration in the IP backhaul network
- Complete clock synchronization technology configuration in IP backhaul network

Online Pre-learning Content

ODR00 ATN&CX600 Mobile Backhaul Operation and Maintenance MOOC
- ATN&CX600 Hardware Introduce (MOOC) (Video, about 18 minutes)
  - ATN series products hardware introduction
  - ATN series products boards
  - CX600 series products hardware introduction
  - CX600 series products boards
- TCP&IP Basics (MOOC) (Video, about 35 minutes)
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Classification of IP addresses
- Ethernet Basics (MOOC) (Video, about 13 minutes)
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
- IP Routing Basics (MOOC) (Video, about 7 minutes)
  - What is router and route
  - IP routing table structure
  - The classification of routing protocols

Online Pre-learning Duration

1 week (total 70 minutes, 70 minutes per week)

Centralized Training Content

ODN31 IP Backhaul Solution Overview
- ATN&CX600 IP Backhaul Solution Overview (Tech-level)
  - The challenge of MBB
  - All kinds of mobile backhaul implement
  - Service data forwarding in IP backhaul solution
  - Service protection in IP backhaul solution
  - QOS and clock synchronization in IP backhaul solution

ODN25 IP Backhaul Network Basics
- TCP&IP Basics
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Classification of IP addresses
- Ethernet Basics
  - Ethernet physical layer
  - Ethernet data link layer
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- VLAN technology and its applications

- IP Routing Basics
  - What is router and route
  - IP routing table structure
  - The classification of routing protocols

- IP Backhaul Networking Products Introduction
  - Hardware structure of the ATN & the CX600 & NE products
  - ATN&CX&NE products chassis and boards

- iManager U2000 Operation and Maintenance Solution
  - U2000 system structure
  - U2000 system functions
  - U2000 system common operation

- IP Backhaul Network U2000 Management Configuration
  - U2000 topology management
  - Familiar with the U2000 software used to complete the basic configuration of the data
  - Completion the experiments of the U2000 Plug and Play

- IP Backhaul Network High Availability Overview
  - What is HA
  - BFD concept
  - OAM concept
  - Service availability overview

ODN26 IP Backhaul Network Routing Protocol Introduction and Configuration

- IP Backhaul Network IS-IS Routing Protocol Basics
  - IS-IS working process
  - IS-IS multi-process introduction
  - IS-IS configuration based on U2000 system

- IP Backhaul Network U2000 IS-IS Routing Protocol Configuration
  - U2000 configuration of IS-IS routing protocol in IP backhaul network

- IP Backhaul Network OSPF Routing Protocol Basics
  - OSPF working process
  - OSPF areas introduction
  - OSPF multi-process introduction
  - OSPF configuration based on U2000 system

- IP Backhaul Network U2000 OSPF Routing Protocol Configuration
  - U2000 configuration of OSPF routing protocol in IP backhaul network

- IP Backhaul Network BGP Routing Protocol Basics
  - BGP basic concepts
  - BGP working principle
  - BGP route reflector
  - BGP path attributes

ODN27 IP Backhaul Network Services Introduction and Configuration

- IP Backhaul Network MPLS Basics
- MPLS basic concepts
- MPLS LDP basic concepts
- U2000 configure MPLS LDP

- **IP Backhaul Network MPLS TE and TE Tunnel Availability Introduction**
  - MPLS TE working principle
  - MPLS TE deployment in IP backhaul scenario
  - TE FRR protection technology introduction
  - TE Hot-standby protection technology introduction
  - U2000 configuration of TE Tunnel
  - U2000 configuration of TE Hot-standby

- **IP Backhaul Network U2000 MPLS TE and Tunnel Availability Configuration**
  - U2000 configuration of MPLS TE Tunnel in IP backhaul network
  - U2000 configuration of TE hot-standby

- **IP Backhaul Network MPLS L3VPN Service and L3VPN Availability Introduction**
  - VPN basic concept
  - BGP MPLS VPN working principle
  - BGP MPLS VPN in IP backhaul scenario
  - VPN FRR protection technology introduction
  - U2000 configuration of E2E BGP MPLS VPN
  - U2000 configuration of VPN FRR

- **IP Backhaul Network U2000 MPLS L3VPN Service and L3VPN Availability Configuration**
  - U2000 configuration of E2E L3VPN in IP backhaul network
  - U2000 configuration of VPN FRR

- **IP Backhaul Network MPLS L2VPN Service and L2VPN Availability Introduction**
  - The basic concepts of PWE3
  - How TDM service is emulated by PWE3
  - How ATM service is emulated by PWE3
  - How Ethernet service is emulated by PWE3
  - Deploying PWE3 services
  - PW Redundancy protection technology introduction
  - U2000 configuration of E2E PWE3
  - U2000 configuration of PW redundancy

- **IP Backhaul Network U2000 MPLS L2VPN Service and L2VPN Availability Configuration**
  - U2000 configuration of E2E PWE3 in IP backhaul network
  - U2000 configuration of PW redundancy

- **ODN28 IP Backhaul Network Advanced Feature Introduction and Configuration**
  - **IP Backhaul Network QoS Implementation and Configuration**
    - QoS model introduction
    - QoS basic concept
    - DiffServ mode introduction
    - Deploying QoS in backhaul scenario
  - **IP Backhaul Network U2000 QoS Configuration**
- U2000 configuration of QoS in IP backhaul network
- IP Backhaul Network Clock Synchronization Implementation and Configuration
  - The synchronization of Ethernet clock technology
  - SyncE clock technology
  - 1588 v2 clock technology
- IP Backhaul Network U2000 Clock Synchronization Configuration
  - U2000 configuration of Sync Eth in IP backhaul network
  - U2000 configuration of 1588v2 in IP backhaul network

Centralized Training Duration

10 working days

Class Size

Min 6, Max 12
1.7.2 ATN&CX600 Mobile Backhaul Operation and Maintenance Advanced Training

Training Path

- ATN&CX600 Mobile Backhaul Operation and Maintenance MOOC
  - ODN00 MOOC 1 Week

  - IP Backhaul Solution Overview
    - ODN31 Lecture 0.5D

  - IP Backhaul Network HVPN/Mixed VPN Solution Design and Implementation
    - ODN33 Lecture, Lab Practice 1.5D

  - IP Backhaul Network Expansion and Optimization
    - ODN36 Lecture, Case Study, Scenario-Based Practice 1.5D

  - IP Backhaul Network Protocol Troubleshooting
    - ODN37 Lecture, Scenario-Based Practice 1.5D

Target Audience

Mobile backhaul network operation and maintenance engineer

Prerequisites

- Familiar with the working principle of IGP routing protocol
- Familiar with the working principle of MPLS VPN including L3VPN and VPLS

Objectives

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

- Understand IPRAN mobile backhaul solution, understand IPRAN services implementation
- Understand IPRAN network expansion and optimization methods, apply network adjustment tasks.
- Troubleshooting IPRAN network problems

Online Pre-learning Content

- ODR00 ATN&CX600 Mobile Backhaul Operation and Maintenance MOOC
  - ATN&CX600 Hardware Introduce(MOOC)(Video, about 18 minutes)
- ATN series products hardware introduction
- ATN series products boards
- CX600 series products hardware introduction
- CX600 series products boards
- TCP&IP Basics(MOOC)(Video, about 35 minutes)
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Classification of IP addresses
- Ethernet Basics(MOOC)(Video, about 13 minutes)
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
- IP Routing Basics(MOOC)(Video, about 7 minutes)
  - What is router and route
  - IP routing table structure
  - The classification of routing protocols

Online Pre-learning Duration

1 week (total 70 minutes, 70 minutes per week)

Centralized training Content

ODN31 IP Backhaul Solution Overview
- ATN&CX600 IP Backhaul Solution Overview (Tech-level)
  - The challenge of MBB
  - All kinds of mobile backhaul implement
  - Service data forwarding in IP backhaul solution
  - Service protection in IP backhaul solution
  - QOS and clock synchronization in IP backhaul solution

ODN33 IP Backhaul Network HVPN Solution Design and Implementation
- IP Backhaul Network HVPN Solution Design and Implementation
  - Design and implementation of docking in HVPN solution
  - Design and implementation of IGP in HVPN solution
  - Design and implementation of MPLS Tunnel in HVPN solution
  - Design and implementation of Ethernet service in HVPN solution
  - Design and implementation of TDM/ATM service in HVPN solution
  - Design and implementation of HA in HVPN solution
  - Design and implementation of QoS in HVPN solution
  - Design and implementation of Clock Synchronization in HVPN solution
- iManager U2000 IP Backhaul Network HVPN Service Practice Guide
  - U2000 configuration HVPN solution

ODN34 IP Backhaul Network Mixed VPN Solution Design and Implementation
- IP Backhaul Network Mixed VPN Solution Design and Implementation
  - Design and implementation of docking in Mixed VPN solution
- Design and implementation of IGP in Mixed VPN solution
- Design and implementation of MPLS Tunnel in Mixed VPN solution
- Design and implementation of Ethernet service in Mixed VPN solution
- Design and implementation of TDM/ATM service in Mixed VPN solution
- Design and implementation of HA in Mixed VPN solution
- Design and implementation of QoS in Mixed VPN solution
- Design and implementation of Clock Synchronization in Mixed VPN solution

- iManager U2000 IP Backhaul Network Mixed VPN Service Practice Guide
  - U2000 configuration Mixed VPN solution

ODN36 IP Backhaul Network Expansion and Optimization
- iManager U2000 IP Backhaul Network Expansion and Optimization Overview (HVPN)
  - How to add new service on IP backhaul network
  - How to add a CSG
  - How to delete a CSG
  - How to change chain to ring
- iManager U2000 IP Backhaul Network Expansion and Optimization Practice Guide (HVPN)
  - Add new service on CSG on access ring
  - Add a CSG to an access ring
  - Delete a CSG from an access ring
  - Change chain to ring

ODN37 IP Backhaul Network Expansion and Optimization case study
- IP backhaul Network Expansion and Optimization case study
  - IP backhaul network adjustment fail case study

ODN37 IP Backhaul Network Protocol Troubleshooting
- iManager U2000 IP Backhaul Network Protocol Troubleshooting Overview (HVPN)
  - IP backhaul network troubleshooting ideas and processes
  - IP backhaul network fault location method
  - IP backhaul network troubleshooting cases
- iManager U2000 IP Backhaul Network Protocol Troubleshooting Scenario-Based Practice (HVPN)
  - Troubleshooting routing protocol problem on IP backhaul network
  - Troubleshooting MPLS tunnel problem on IP backhaul network
  - Troubleshooting VPN service problem on IP backhaul network

Centralized training Duration
5 working days

Class Size
Min 6, Max 12
1.7.3 ATN Products Field Maintenance Training

Training Path

ATN Series Products Introduction
ODL03 Lecture 0.5D

ATN Series Products Routine Maintenance
ODL04 Lecture 0.5D

Target Audience
ATN Series Product FO engineer

Prerequisites
- Having basic knowledge of TCP/IP

Objectives
On completion of this program, the participants will be able to:
- Describe ATN products chassis and boards, understand ATN network application
- Apply ATN products daily maintenance

Centralized Training Content

ODL03 ATN Series Products Introduction
- ATN Series Products Introduction
  - Mobile services trends and challenges
  - ATN products chassis and boards
  - ATN network application
- ATN905 Series Products Introduction
  - Small cell concepts and application scenarios
  - ATN905 products chassis and boards

ODL04 ATN Series Products Routine Maintenance
- ATN Series Products Routine Maintenance
  - Overview of routine maintenance
  - Routine maintenance item
  - Operations involving risks
  - Commonly used commands introduction
- ATN905 Series Products Routine Maintenance
  - ATN905 daily maintenance process
  - ATN905 daily maintenance implementation
Centralized Training Duration

1 working day

Class Size

Min 6, Max 12
1.7.4 ATN Products Installation and Commissioning Training

Training Path

ATN Series Products Introduction
ODL03 Lecture 0.5D

ATN Series Products Installation
ODL05 Lecture 0.5D

ATN Series Products Remote Commissioning
ODL06 Lecture, Lab Practice 1D

Target Audience

ATN Series Product installation and commissioning engineers

Prerequisites

- Having basic knowledge of TCP/IP

Objectives

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

- Install ATN series products cabinet, frame and board properly
- Perform ATN series products cable routing and termination properly
- Identify the cautions and facts which may affect ATN series products system running due to improperly installation

Centralized Training Content

ODL03 ATN Series Products Introduction

- ATN Series Products Introduction
  - Mobile services trends and challenges
  - ATN products chassis and boards
  - ATN network application
- ATN905 Series Products Introduction
  - Small cell concepts and application scenarios
  - ATN905 products chassis and boards

ODL05 ATN Series Products Installation

- ATN Series Products Installation and Commission
  - Safety precautions
  - Installation preparation
Installing the ATN series products
Installing and routing cables
Checking cable connectivity

• ATN905 Series Products Installation and Commission
  • Safety precautions
  • Installation preparation
  • Installing the ATN905 series products
  • Installing and routing cables
  • Commissioning the ATN905 series products

ODL06 ATN Series Products Remote Commissioning
• ATN Series Products Remote Commissioning Principle
  • IP backhaul site deployment scenario
  • Basic configuration planning
  • Remote commissioning through the DCN
  • Remote commissioning using DHCP
• ATN Series Products Remote Commissioning Practice Guide
  • Remote commissioning introduction
  • ATN products remote commissioning through U2000

Centralized Training Duration

2 working days

Class Size

Min 6, Max 12
1.7.5 LTE Mobile Backhaul Security Feature Training

Training Path

Target Audience
Mobile backhaul network operation and maintenance engineer

Prerequisites
- Familiar with the working solution of IP backhaul network
- Completion of "IP Backhaul Network Operation and Maintenance training"

Objectives
On completion of this program, the participants will be able to:
- Describe security Plug-and-Play PKI-based site deployment step
- Complete LTE backhaul IPsec feature deployment

Centralized Training Content

ODL07 LTE Security Feature Principle and Configuration
- **LTE IPSec Feature Principle**
  - VPN Introduction
  - Principles of IPSec
  - IKE Overview
  - IPSec Configuration
- **LTE IPSec Feature Practice Guide**
  - Basic concepts and operation commands introduction
  - Configure the IPSec VPN in IKE negotiation mode

ODL08 LTE Backhaul Security Solution Deployment
- **LTE End-to-End Network Security Solution Overview**
  - LTE security challenges
  - Huawei security solution
  - Transport Security Solution
  - EPC Security Solution
  - SGi Security Solution
  - Wireless Security Solution
  - eNodeB Security Solution
OM Plane Security Solution

LTE Backhaul Network Security Solution Introduction
- LTE backhaul security challenges
- LTE security scenarios and solutions

LTE Backhaul Network Security Solution Deployment Practice Guide
- Security Plug-and-Play PKI-based site deployment process
- IPSec solution for LTE networks configuration guide

Centralized Training Duration

3 working days

Class Size

Min 6, Max 12
1.7.6 LTE Mobile Backhaul Clock Synchronization(1588v2) Feature Training

Training Path

Target Audience

Mobile backhaul network operation and maintenance engineer

Prerequisites

- Having basic experience of telecommunications network

Objectives

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

- Understand basic concepts of synchronization network
- Outline the planning principles of 1588V2 network scenarios
- Perform the 1588V2 deployment

Centralized Training Content

ODL09 LTE Mobile Backhaul 1588v2 Feature

- IEEE 1588V2 Principle Introduction
  - IEEE 1588v2 Standard Introduction
  - IEEE 1588v2 Overview
  - IEEE 1588v2 Device Model
  - IEEE 1588v2 Messages
  - BMC Algorithm
  - IEEE 1588v2 Typical Application Scenarios
  - IEEE 1588v2 Deployment
- IEEE 1588V2 Planning and Design
  - IEEE 1588v2 Overview
  - IEEE 1588v2 Deployment Planning
  - Synchronize Ethernet Design
  - IEEE 1588v2 Network capability and performance Analysis
  - IEEE 1588v2 Reliability Design
  - IEEE 1588v2 Network Management Ability Analysis
- IEEE 1588V2 Deployment
  - Deployment Preparation
  - IEEE 1588v2 Network Planning
  - IEEE 1588v2 Configuration Process
  - IEEE 1588v2 Asymmetry Compensation Analysis
- IEEE 1588V2 Maintenance and Troubleshooting
Maintenance and Troubleshooting Methods
IEEE 1588v2 Maintenance Process
IEEE 1588v2 Troubleshooting Process

Centralized Training Duration
2 working days

Class Size
Min 6, Max 24
1.7.7 IPRAN Seamless MPLS Solution Operation Training

Training Path

```
IPRAN Seamless MPLS Solution
Introduction

ODL10 Lecture 1D

IPRAN Seamless MPLS Solution Design
and Configuration

ODL11 Lecture, Hands on 4D
```

Target Audience

Mobile backhaul network operation and maintenance engineer

Prerequisites

- Familiar with the working principle of routing protocol
- Familiar with the working principle of MPLS L3 VPN

Objectives

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

- Describe Service Implementation of IDEAL Solution
- Configure Services of IDEAL Solution

Centralized Training Content

ODL10 IPRAN Seamless MPLS Solution Introduction

- IPRAN Seamless MPLS Solution Introduction
  - IPRAN Seamless MPLS Solution Overview
  - Logical Network Design and Implementation
  - Service Design and Implementation
  - Reliability Design and Implementation
  - QoS Design and Implementation
  - Clock Solution Design and Implementation
  - Security Design and Implementation
  - OAM Design and Implementation

ODL11 IPRAN Seamless MPLS Solution Design and Configuration

- IPRAN Seamless MPLS Solution Network Implementation and Basic Configuration
  - Physical Network Implementation
  - Interconnection Implementation
  - Basic Configuration Example
- IPRAN Seamless MPLS Solution IGP Implementation and Configuration
  - IGP(ISIS/OSPF) Implementation
  - IGP Configuration Example
• IPRAN Seamless MPLS Solution BGP Implementation and Configuration
  ■ BGP Implementation
  ■ Route Priority and Routing Policy Implementation
  ■ BGP Configuration Example
• IPRAN Seamless MPLS Solution MPLS Tunnel Implementation and Configuration
  ■ MPLS Tunnel(RSVP-TE/LDP) Implementation
  ■ MPLS Tunnel Configuration Example
• IPRAN Seamless MPLS Solution MPLS (BGP LSP) Implementation and Configuration
  ■ MPLS(BGP LSP) Implementation
  ■ BGP LSP Configuration Example
• IPRAN Seamless MPLS Solution ETH (LTE S1/3G) Services Implementation and Configuration
  ■ ETH (LTE S1/3G) Services Implementation
  ■ ETH (LTE S1/3G) Services Configuration Example
• IPRAN Seamless MPLS Solution LTE X2 Services Implementation and Configuration
  ■ LTE X2 Services Implementation
  ■ LTE X2 Services Configuration Example
• IPRAN Seamless MPLS Solution Enterprise Services Implementation and Configuration
  ■ Enterprise Services Implementation
  ■ Enterprise Services Configuration Example
• IPRAN Seamless MPLS Solution QoS Implementation and Configuration
  ■ QoS Implementation
  ■ QoS Configuration Example
• IPRAN Seamless MPLS Solution Clock Synchronization Implementation and Configuration
  ■ Clock Synchronization Implementation
  ■ Clock Synchronization Configuration Example
• IPRAN Seamless MPLS Solution Network Management Implementation and Configuration
  ■ Network Management Implementation
  ■ Network Management Configuration Example
• IPRAN Seamless MPLS Solution Practice Guide
  ■ IPRAN Seamless MPLS Network and Service Practice Guide

Centralized Training Duration

  5 working days

Class Size

  Min 6, Max 12
1.7.8 ATN Series Products Fixed Network Solution Training

Training Path

Target Audience

ATN Series Product Operation and maintenance engineers
FO engineer

Prerequisites

- Familiar with basic knowledge of data communications

Objectives

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

- Understand ATN Ethernet feature, be able to configure Ethernet features on ATN products.
- Describe the concept and architecture of MPLS L2VPN, MPLS OAM, apply MPLS L2VPN implementation.

Centralized Training Content

ODL14 ATN Series Products Layer2 Feature Design and Deployment
- ATN Series Products Eth-Trunk Feature Design and Deployment(Fixed Network)
  - Eth-Trunk overview
  - LACP protocol overview
  - Eth-Trunk practice
- ATN Series Products QinQ Feature Design and Deployment(Fixed Network)
  - QinQ overview
  - Selective QinQ overview
QinQ Practice

ODL15 ATN Series Products IGP Feature Design and Deployment
- ATN Series Products OSPF Protocol Design and Deployment (Fixed Network)
  - OSPF overview
  - Basic OSPF concepts
  - OSPF route calculation
  - OSPF fast convergence
  - OSPF Practice
- ATN Series Products ISIS Protocol Design and Deployment (Fixed Network)
  - IS-IS overview
  - IS-IS basic concepts
  - IS-IS route calculation
  - IS-IS fast convergence
  - IS-IS Practice

ODL16 ATN Series Products Fixed Network Service Design and Deployment
- ATN Series Products E-Line Service Design and Deployment (Fixed Network)
  - MPLS L2VPN overview
  - Ethernet service emulation
  - E-Line service configuration practice

ODL17 ATN Series Products OAM Feature Design and Deployment
- ATN Series Products EDD Design and Deployment (Fixed Network)
  - Huawei ATN EDD solution
  - The concept and principle of RFC2544
  - The concept and principle of basic Y.1731 functions
  - The concept and principle of HQoS
  - EDD configuration
- ATN Series Products OAM Feature Design and Deployment (Fixed Network)
  - Ethernet OAM overview
  - MPL-TP OAM overview
  - OAM configuration practice

Centralized Training Duration

5 working days

Class Size

Min 6, Max 12
1.7.9 ATN&CX600 Mobile Backhaul Operation and Maintenance Advanced Training

Training Path

ATN&CX600 Mobile Backhaul Operation and Maintenance Advanced Training  
ODL18  Lecture, Case Study, Scenario-Based Practice  5D

Target Audience

Mobile backhaul network senior operation and maintenance engineer

Prerequisites

- Familiar with the working principle of IGP routing protocol
- Familiar with the working principle of MPLS VPN including L3VPN and VPLS

Objectives

On completion of this program, the participants will be able to:
- Understand IPRAN common problems handling process and methods
- Complete IP backhaul network problem analysis and troubleshooting

Centralized Training Content

ODL18 ATN&CX600 Mobile Backhaul Network Advanced Troubleshooting
- IP Backhaul Network Troubleshooting Overview
  - IP backhaul network standard solution introduction
  - IP backhaul network problem classification
  - IP backhaul network problem troubleshooting process
- ATN&CX600 Mobile Backhaul Network common Problem Analysis and Troubleshooting case study
  - IP backhaul network routing problem case study
  - IP backhaul network MPLS TE problem case study
  - IP backhaul network HVPN solution problem case study
  - IP backhaul network Mixed VPN solution problem case study
- ATN&CX600 Mobile Backhaul Network common Problem Analysis and Troubleshooting Scenario-Based Practice
  - IP backhaul network routing problem Scenario-Based Practice
  - IP backhaul network MPLS TE problem Scenario-Based Practice
  - IP backhaul network HVPN solution problem Scenario-Based Practice
  - IP backhaul network Mixed VPN solution problem Scenario-Based Practice

Centralized Training

5 working days
Class Size

Min 6, Max 12
1.7.10 PTN Products Installation and Commissioning Training

Training Path

PTN Products Hardware Description
ODP03 Lecture 1D

PTN Products Installation and Commissioning
ODP05 Lecture 1D

Target Audience
PTN series installation and commissioning engineer

Prerequisites
- Having an overview of PTN products applications
- Having an overview of telecommunications

Objectives
On completion of this program, the participants will be able to:
- Describe PTN Frame-Shaped Series hardware structure
- Describe PTN Case-Shaped Series hardware structure
- Master PTN installation and commissioning skill

Centralized Training Content

ODP03 PTN Products Hardware Description
- PTN Frame-Shaped Series Hardware Description
  ■ Networking applications of the PTN Frame-Shaped series products
  ■ System structure of the PTN Frame-Shaped series products
  ■ Main functions of the boards used on the PTN Frame-Shaped series products
  ■ System protection schemes of the PTN Frame-Shaped series products
- PTN Case-Shaped Series Hardware Description
  ■ PTN Case-Shaped series products application
  ■ PTN Case-Shaped series products chassis
  ■ PTN Case-Shaped series products boards

ODP05 PTN Products Installation and Commissioning
- PTN 7900&3900&1900 Installation Guide
  ■ Cabinet installation
  ■ PTN 3900 sub-rack installation
  ■ PTN 1900 sub-rack installation
- PTN 950&910 Installation Guide
  ■ Precautions of installation
- PTN 950 installation
- PTN 910 installation
- Checking process after installation

Centralized Training Duration

   2 working days

Class Size

   Min 6, Max 12
### 1.7.11 PTN Products Field Maintenance Training

**Training Path**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<td>ODP03</td>
<td>PTN Products Hardware Description</td>
<td>1D</td>
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<td>ODP06</td>
<td>PTN Products Field Maintenance</td>
<td>0.5D</td>
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<td>ODP07</td>
<td>PTN Products Routine Maintenance in NOC</td>
<td>0.5D</td>
</tr>
</tbody>
</table>

**Target Audience**

PTN series 1st line/field maintenance engineer

**Prerequisites**

- Having an overview of PTN products applications
- Having an overview of telecommunications

**Objectives**

- On completion of this program, the participants will be able to:
  - Describe PTN Frame-Shaped Series hardware structure
  - Describe PTN Case-Shaped Series hardware structure
  - Complete PTN daily field maintenance tasks

**Centralized Training Content**

**ODP03 PTN Products Hardware Description**

- PTN Frame-Shaped Series Hardware Description
  - Networking applications of the PTN Frame-Shaped series products
  - System structure of the PTN Frame-Shaped series products
  - Main functions of the boards used on the PTN Frame-Shaped series products
  - System protection schemes of the PTN Frame-Shaped series products

- PTN Case-Shaped Series Hardware Description
  - PTN Case-Shaped series products application
  - PTN Case-Shaped series products chassis
  - PTN Case-Shaped series products boards

**ODP06 PTN Products Field Maintenance**

- PTN 3900&1900 On-Site Maintenance
- Routine maintenance in NMS Center
- On-site routine maintenance
- Routine maintenance of spare parts
  - PTN 950&910&912 On-site Maintenance
  - Understand the meanings of PTN 950&910&912 indicators

ODP07 PTN Products Routine Maintenance in NOC
- PTN Products Routine Maintenance
  - Tools and method of routine maintenance in NOC.

Centralized Training Duration

2 working days

Class Size

Min 6, Max 12
1.7.12 PTN Products 2nd Line Maintenance Training

Training Path

- **PTN Products Operation and Maintenance MOOC**
  - ODP00: MOOC, 1 week

- **PTN Products Public Principle**
  - ODP08: Lecture, 2 days

- **PTN Products Hardware Description**
  - ODP03: Lecture, 1 day

- **PTN Products Features Description**
  - ODP04: Lecture, 1 day

- **PTN Products Public Features**
  - ODP09: Lecture, 2 days

- **PTN Products Basic Configuration**
  - ODP10: Hands on, 1 day

- **PTN Products Service Configuration**
  - ODP11: Hands on, 1 day

- **PTN Products Routine Maintenance in NOC**
  - ODP07: Lecture, Hands on, 0.5 day

- **PTN Products Basic Troubleshooting**
  - ODP13: Lecture, Hands on, 0.5 day
Target Audience

PTN series 2nd Line maintenance engineer

Prerequisites

- Having an overview of PTN products applications
- Having an overview of telecommunications

Objectives

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

- Describe PTN Frame-Shaped Series hardware structure
- Describe PTN Case-Shaped Series hardware structure
- Understand PTN 2G, 3G, LTE services carrying solution, understand PTN PWE3, MPLS L3VPN working principle
- Complete PTN 2G, 3G, LTE service configuration, manage PTN network trouble and alarms

Online Pre-learning Content

ODR00 PTN Products Operation and Maintenance MOOC

- PTN Products Hardware Introduce (MOOC) (Video, about 18 minutes)
  - PTN series products hardware introduction
  - PTN series products boards
- TCP&IP Basics (MOOC) (Video, about 35 minutes)
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Classification of IP addresses
- Ethernet Basics (MOOC) (Video, about 13 minutes)
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
- IP Routing Basics (MOOC) (Video, about 7 minutes)
  - What is router and route
  - IP routing table structure
  - The classification of routing protocols

Online Pre-learning Duration

1 week (total 70 minutes, 70 minutes per week)

Centralized training Content

ODP08 PTN Products Public Principle

- TCP-IP Fundamental
- TCP/IP and OSI Reference Model
- Function of layers of TCP/IP
- Describe classification of IP addresses
- Basic principle of IP routing

- Ethernet Technology
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
  - MSTP technology and its applications

- IP Routing Basic
  - What are router and route
  - Classification of routing protocols
  - How IS-IS routing protocol works

- MPLS Basic
  - MPLS concepts
  - How LSP is setup and how MPLS forward packets
  - Common ways of MPLS troubleshooting
  - MPLS OAM concepts and applications

ODP03 PTN Products Hardware Description
- PTN Frame-Shaped Series Hardware Description
  - Networking applications of the PTN Frame-Shaped series products
  - System structure of the PTN Frame-Shaped series products
  - Main functions of the boards used on the PTN Frame-Shaped series products
  - System protection schemes of the PTN Frame-Shaped series products

- PTN Case-Shaped Series Hardware Description
  - PTN Case-Shaped series products application
  - PTN Case-Shaped series products chassis
  - PTN Case-Shaped series products boards

ODP04 PTN Products Features Description
- PTN Frame-Shaped Series Feature Description
  - PTN Frame-Shaped series products applications
  - PTN Frame-Shaped series products protection features
  - PTN Frame-Shaped series products QoS features
  - PTN Frame-Shaped series products OAM features
  - PTN Frame-Shaped series products synchronization features
  - PTN Frame-Shaped series products In-band DCN features

- PTN Case-Shaped Series Feature Description
  - Service type of PTN Case-Shaped series products
  - Microwave feature of PTN Case-Shaped series products
  - PTN Case-Shaped series products protection, QoS, OAM, Synchronization, xDSL features etc.

ODP09 PTN Products Public Features
PTN PWE3 Technology
- Basic concepts of PWE3
- How TDM service is emulated by PWE3
- How ATM service is emulated by PWE3
- How Ethernet service is emulated by PWE3
- Typical applications of different service type

PTN Control Plane Introduction
- Four elements of MPLS TE
- How IS-IS TE distribute the TE information
- How the TE path is calculated
- How RSVP-TE works
- Basic principle of LDP

PTN QoS Technology
- QoS model
- QoS basic concept
- ATM QoS
- Concepts of the HQoS
- QoS typical application in PTN network

PTN Protection Technology
- MPLS APS and MPLS FRR protection
- LMSP protection
- Ethernet LAG protection
- E1-link protection

PTN Packet Clock Technology
- Necessity of synchronization on IP network
- Principle of ACR/TOP
- Principle of synchronization Ethernet
- IEEE 1588v2 principle

ODP10 PTN Products Basic Configuration
- PTN Products Basic Configuration
  - Starting U2000
  - Creating network using U2000
- PTN Products Interface Configuration
  - Configuration flow of SDH interface
  - SDH interface configuration using T2000
  - Parameters of SDH interface
- PTN Control Plane Configuration
  - Basic configuration of Control plane
  - IS-IS configuration process
  - LDP configuration process
  - RSVP configuration process
  - Static route configuration process
PTN Tunnel Configuration
- Dynamic MPLS Tunnel Configuration
- Static MPLS Tunnel Configuration

PTN Basic Configuration Practice
- U2000 basic operation through practice
- Interface configuration
- Tunnel configuration

PTN PWE3 Service Configuration
- Using trail function to configure CES service
- CES service configuration process based on per-NE basis
- E-Line service configuration
- E-Line service related parameters
- Using trail function to configure ATM service
- ATM service configuration process based on per-NE basis

PTN E-LAN Service Configuration
- E-LAN service configuration
- E-LAN service related parameters

PTN Products Routine Maintenance in NOC
- Tools and method of routine maintenance in NOC.

PTN Products Troubleshooting Basic
- Fault handling flow
- Familiar with methods of analyzing and locating faults
- Regular operations for troubleshooting
- Software package loading & diffusion

PTN Ring Protection Feature
- PTN Ring Protection Introduction
  - PTN Ring Protection Basic Concepts
  - PTN Ring Protection Switchover
  - PTN Ring Protection Application
- PTN Ring Protection Practice Guide
  - PTN Ring Protection Practice

Centralized Training Duration
10 working days

Class Size
Min 6, Max 12
1.7.13 PTN Products 3rd Line Maintenance Training

Training Path

PTN Products Advanced Configuration  
ODP12 Hands on 2D

PTN Products Basic Troubleshooting  
ODP13 Lecture 0.5D

PTN Products Advanced Troubleshooting  
ODP14 Lecture, Hands on 2.5D

Target Audience

PTN series products operation and maintenance engineer

Prerequisites

- Completion of PTN 2nd Line Maintenance Training

Objectives

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

- Describe PTN products basic troubleshooting process
- Describe PTN products alarm and performance analysis
- Locate and eliminate PTN products faults

Centralized training Content

ODP12 PTN Products Advanced Configuration

- PTN Products Protection Configuration
  - MPLS APS protection configuring process
  - MPLS FRR protection configuring process
  - Ethernet LAG configuring process

- PTN Products QoS Configuration
  - Creating a DiffServ Domain
  - Creating the Service WRED Policy
  - Creating the WFQ Scheduling Policy
  - Creating the Port Policy
  - Creating the V-UNI Ingress Policy
  - Creating the V-UNI Egress Policy
  - Creating the PW Policy
Creating the QinQ Policy
Configuring the ATM CoS Mapping
Creating the ATM Policy

PTN Products Integrated Service Deployment
- End-to-end CES service configuration
- End-to-end ATM service configuration
- End-to-end E-Line service configuration
- End-to-end E-LAN service configuration
- End-to-end E-Agg service configuration

ODP13 PTN Products Basic Troubleshooting
- Fault handing flow
- Familiar with methods of analyzing and locating faults
- Regular operations for troubleshooting
- Software package loading & diffusion

ODP14 PTN Products Advanced Troubleshooting
- PTN Products Alarm and Performance Analysis
- PTN Products Alarm and Performance Analysis
- DCN Communication Faults
- Operation Fails
- Interconnection Faults
- Service Faults

- PTN Products Troubleshooting Practice Guide
  - Network Topology and Parameter Settings
  - Troubleshooting of Faults of the NMS and DCN
  - Troubleshooting of Control Plane Faults
  - Tunnel Fault Troubleshooting
  - CES Service Troubleshooting
  - Ethernet Service Troubleshooting
  - ATM Service Troubleshooting

Centralized training Duration
5 working days

Class Size
Min 6, Max 12
1.7.14 PTN 6900 Products Installation and Commissioning Training

Training Path

Target Audience

PTN 6900 series installation and commissioning engineers

Prerequisites

- Having an overview of PTN 6900 products applications
- Having an overview of telecommunications

Objectives

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

- Describe PTN 6900 series hardware structure
- Describe PTN 6900 series boards
- Describe PTN 6900 products installation and the precautions

Centralized training Content

ODP32 PTN 6900 Products Hardware Description

- PTN 6900-3/8/16 Hardware Description
  - PTN 6900-3/8/16 products application scenarios
  - Cabinet and system overview
  - PTN 6900 boards introduction

ODP34 PTN 6900 Products Installation and Commissioning

- PTN 6900 Installation Guide
  - Installation preparation
  - PTN 6900 installation guide
  - Checking process after installation

- PTN 6900 Commissioning Guide
  - Safety operation guide
  - Preparations for commissioning
  - On-Site commissioning

Centralized training Duration

1 working day
Class Size

Min 6, Max 12
1.7.15 PTN 6900 Products Field Maintenance Training

Training Path

Target Audience

PTN 6900 series 1st line /field maintenance engineers

Prerequisites

● Having an overview of PTN 6900 products applications
● Having an overview of telecommunications

Objectives

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

● Describe PTN 6900 series hardware structure
● Perform PTN 6900 products daily routine maintenance

Centralized training Content

ODP32 PTN 6900 Products Hardware Description

● PTN 6900-3/8/16 Hardware Description
  ■ PTN 6900-3/8/16 products application scenarios
  ■ Cabinet and system overview
  ■ PTN 6900 boards introduction

ODP35 PTN 6900 Products Routine Maintenance in NOC

● PTN 6900 Product Routine Maintenance Introduction
  ■ Maintenance items and operations
  ■ Dustproof maintenance of the device
  ■ Operations involving risks

Centralized training Duration

1 working day
Class Size

Min 6, Max 12
1.7.16 PTN 6900 Products 2nd Line Maintenance Training

Training Path

PTN Products Operation and Maintenance MOOC
ODP00 MOOC 1Week

PTN 6900 Products Hardware Description
ODP32 Lecture 0.5D

PTN 6900 Products Features Description
ODP33 Lecture 0.5D

PTN 6900 Products Public Principle
ODP36 Lecture 1D

PTN 6900 Products Public Features
ODP37 Lecture 4D

PTN 6900 Products Service Configuration
ODP38 Lab Practice 2.5D

PTN 6900 Products Basic Troubleshooting
ODP40 Lecture 0.5D

PTN Ring Protection Feature
ODP17 Lecture 1D

Target Audience

PTN 6900 products operation and maintenance engineers

Prerequisites

- Having an overview of PTN 6900 products applications
● Having an overview of telecommunications

Objectives

On completion of this program, the participants will be able to:
● Describe PTN 6900 series hardware structure
● Describe PTN 6900 series boards
● Understand PTN service implementation, traffic flow, protocol implementation
● Perform daily maintenance tasks.

Online Pre-learning Content

ODR00 PTN Products Operation and Maintenance MOOC
● PTN Products Hardware Introduce(MOOC)(Video, about 18 minutes)
  ■ PTN series products hardware introduction
  ■ PTN series products boards
● TCP&IP Basics(MOOC)(Video, about 35 minutes)
  ■ TCP/IP and OSI Reference Model
  ■ Function of layers of TCP/IP
  ■ Classification of IP addresses
● Ethernet Basics(MOOC)(Video, about 13 minutes)
  ■ Ethernet physical layer
  ■ Ethernet data link layer
  ■ VLAN technology and its applications
● IP Routing Basics(MOOC)(Video, about 7 minutes)
  ■ What is router and route
  ■ IP routing table structure
  ■ The classification of routing protocols

Online Pre-learning Duration

1 week (total 70 minutes, 70 minutes per week)

Centralized training Content

ODP32 PTN 6900 Products Hardware Description
● PTN 6900-3/8/16 Hardware Description
  ■ PTN 6900-3/8/16 products application scenarios
  ■ Cabinet and system overview
  ■ PTN 6900 boards introduction

ODP33 PTN 6900 Products Features Description
● PTN 6900 Feature Description
  ■ PTN 6900 service features
  ■ PTN 6900 routing features
  ■ PTN 6900 protection features
  ■ PTN 6900 OAM features
  ■ PTN 6900 QoS features
PTN 6900 synchronization features

ODP36 PTN 6900 Products Public Principle

- TCP-IP Fundamental(PTN 6900)
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Describe classification of IP addresses
  - Basic principle of IP routing
- Ethernet Technology(PTN 6900)
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
  - MSTP technology and its applications
- IP Routing Basics(PTN 6900)
  - What is router and route
  - Classification of routing protocols
  - How IS-IS routing protocol works

ODP37 PTN 6900 Products Public Features

- PTN&PTN 6900 ISIS Routing Protocol Basics
  - IS-IS overview
  - IS-IS basic concepts
  - IS-IS route calculation
  - IS-IS fast convergence
  - PTN 6900 network ISIS planning
- PTN&PTN 6900 BGP Routing Protocol Basics
  - BGP overview
  - BGP working principles
  - BGP route attributes
  - BGP extended applications
- PTN&PTN 6900 High Availability Overview
  - Reliability technology overview
  - Fast detection technology
  - Reliability technologies
- PTN&PTN 6900 MPLS Basics
  - MPLS basics
  - Static MPLS tunnels
  - Dynamic MPLS LDP tunnels
- PTN&PTN 6900 MPLS TE Introduction
  - MPLS TE overview
  - Working Principles of MPLS TE
  - MPLS Tunnel APS Protection
  - MPLS Tunnel configuration
- PTN&PTN 6900 MPLS L2VPN Service Introduction
- MPLS L2VPN overview
- TDM service emulation
- ATM service emulation
- Ethernet service emulation
- L2VPN service protection techniques
- Service and reliability configuration

- PTN&PTN 6900 MPLS L3VPN Service Introduction
  - MPLS BGP VPN overview
  - Implementation principles of MPLS BGP VPN
  - MPLS BGP VPN service protection techniques

- PTN&PTN 6900 QoS Technology
  - QoS measurement counters
  - QoS models
  - IP&MPLS QoS technology
  - ATM QoS technology
  - Analysis of QoS requirements for wireless services

- PTN&PTN 6900 Clock Synchronization Implementation
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

ODP38 PTN 6900 Products Service Configuration

- PTN&PTN 6900 Basics Configuration
  - Starting U2000
  - Creating network and discovering devices using U2000
  - Interface configuration by using U2000

- PTN&PTN 6900 IS-IS Routing Protocol Configuration
  - IS-IS configuration for legacy PTN
  - IS-IS configuration for PTN 6900

- PTN&PTN 6900 MPLS TE Tunnel and Tunnel Availability Configuration
  - Control plane parameters configuration
  - E2E MPLS Tunnels configuration
  - MPLS tunnel APS 1:1 protection configuration

- PTN&PTN 6900 TDM Service Configuration
  - E-APS configuration
  - E2E TDM PW APS 1:1 protection

- PTN&PTN 6900 ATM Service Configuration
  - AC-Side E-APS 1:1 protection
  - E2E ATM PW APS 1:1 protection

- PTN&PTN 6900 ETH Service (L2) Configuration
  - E2E ETH PW APS 1:1 protection

- PTN&PTN 6900 ETH Service (L3) Configuration
  - MP-BGP configuration for PTN 6900
- MP-BGP configuration for legacy PTN
- E2E ETH L3 VPN protection

**ODP40 PTN 6900 Products Basic Troubleshooting**
- PTN&PTN 6900 Troubleshooting Basic
  - Fault processing flow
  - Familiar with methods of analyzing and locating faults
  - Regular operations for troubleshooting

**ODP17 PTN Ring Protection Feature**
- PTN Ring Protection Introduction
  - PTN Ring Protection Basic Concepts
  - PTN Ring Protection Switchover
  - PTN Ring Protection Application
- PTN Ring Protection Practice Guide
  - PTN Ring Protection Practice

Centralized training Duration

10 working days

Class Size

Min 6, Max 12
1.7.17 PTN 6900 Products 3rd Line Maintenance Training

Training Path

PTN 6900 Products Public Features
ODP37 Lecture 2D

PTN 6900 Products Advanced Configuration
ODP39 Hands on 2D

PTN 6900 Products Advanced Troubleshooting
ODP41 Lecture, Hands on 1D

Target Audience

PTN 6900 products operation and maintenance engineers

Prerequisites

- Completion of PTN 6900 2nd Line Maintenance Training

Objectives

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

- Configure clock synchronization in mobile backhaul network
- Locate and eliminate PTN products faults

Centralized training Content

ODP37 PTN 6900 Products Public Features

- PTN&PTN 6900 ISIS Routing Protocol Basics
  - IS-IS overview
  - IS-IS basic concepts
  - IS-IS route calculation
  - IS-IS fast convergence
  - PTN 6900 network ISIS planning

- PTN&PTN 6900 BGP Routing Protocol Basics
  - BGP overview
  - BGP working principles
  - BGP route attributes
  - BGP extended applications

- PTN&PTN 6900 High Availability Overview
  - Reliability technology overview
- Fast detection technology
- Reliability technologies

• PTN&PTN 6900 MPLS Basics
  - MPLS basics
  - Static MPLS tunnels
  - Dynamic MPLS LDP tunnels

• PTN&PTN 6900 MPLS TE Introduction
  - MPLS TE overview
  - Working Principles of MPLS TE
  - MPLS Tunnel APS Protection
  - MPLS Tunnel configuration

• PTN&PTN 6900 MPLS L2VPN Service Introduction
  - MPLS L2VPN overview
  - TDM service emulation
  - ATM service emulation
  - Ethernet service emulation
  - L2VPN service protection techniques
  - Service and reliability configuration

• PTN&PTN 6900 MPLS L3VPN Service Introduction
  - MPLS BGP VPN overview
  - Implementation principles of MPLS BGP VPN
  - MPLS BGP VPN service protection techniques

• PTN&PTN 6900 QoS Technology
  - QoS measurement counters
  - QoS models
  - IP/MPLS QoS technology
  - ATM QoS technology
  - Analysis of QoS requirements for wireless services

• PTN&PTN 6900 Clock Synchronization Implementation
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

ODP39 PTN 6900 Products Advanced Configuration

• PTN&PTN 6900 QoS Configuration
  - QoS configuration in mobile backhaul network

• PTN&PTN 6900 Clock Syn Configuration
  - Clock Syn configuration in mobile backhaul network

ODP41 PTN 6900 Products Advanced Troubleshooting

• PTN&PTN 6900 Performance Monitoring and Analysis
  - Performance monitoring and analysis

• PTN&PTN 6900 Troubleshooting Case Study
  - Troubleshooting case study
PTN&PTN 6900 Troubleshooting Practice Guide

Centralized training Duration

5 working days

Class Size

Min 6, Max 12
1.7.18  PTN 7900 Products Installation and Commissioning Training

Training Path

PTN 7900 Products Hardware Description
ODP43 Lecture 0.5D

PTN 7900 Products Installation and Commissioning
ODP45 Lecture 0.5D

Target Audience

PTN 7900 series installation and commissioning engineers

Prerequisites

- Having an overview of PTN 7900 products applications
- Having an overview of telecommunications

Objectives

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

- Describe PTN 7900 series hardware structure
- Describe PTN 7900 series boards

Centralized training Content

ODP43 PTN 7900 Products Hardware Description

- PTN 7900 Hardware Description
  - PTN 7900 products application scenarios
  - Cabinet and system overview
  - PTN 7900 boards introduction

ODP45 PTN 7900 Products Installation and Commissioning

- PTN 7900 Installation Guide
  - Installation preparation
  - PTN 7900 installation guide
  - Checking process after installation

- PTN 7900 Commissioning Guide
  - Safety operation guide
  - Preparations for commissioning
  - On-Site commissioning

Centralized training Duration

1 working day
Class Size

Min 6, Max 12
1.7.19 PTN 7900 Products Field Maintenance Training

Training Path

<table>
<thead>
<tr>
<th>Training Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTN 7900 Products Hardware Description</td>
<td>0.5D</td>
</tr>
<tr>
<td>PTN 7900 Products Routine Maintenance in NOC</td>
<td>0.5D</td>
</tr>
</tbody>
</table>

Target Audience

PTN 7900 series 1st line /field maintenance engineers

Prerequisites

- Having an overview of PTN 7900 products applications
- Having an overview of telecommunications

Objectives

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

- Describe PTN 7900 series hardware structure
- Describe PTN 7900 series boards

Centralized training Content

ODP43 PTN 7900 Products Hardware Description

- PTN 7900 Hardware Description
  - PTN 7900 products application scenarios
  - Cabinet and system overview
  - PTN 7900 boards introduction

ODP46 PTN 7900 Products Routine Maintenance in NOC

- PTN 7900 Product Routine Maintenance Introduction
  - Maintenance items and operations
  - Dustproof maintenance of the device
  - Operations involving risks
- PTN7900 Product Parts Replacement Introduction
  - Overview of parts replacement
  - Replacing boards
  - Replacing other parts

Centralized training Duration

1 working day
Class Size

Min 6, Max 12
1.7.20  PTN 7900 Products 2nd Line Maintenance Training

Training Path

PTN Products Operation and Maintenance MOOC
ODP00  MOOC  1Week

PTN 7900 Products Hardware Description
ODP43  Lecture  0.5D

PTN 7900 Products Features Description
ODP44  Lecture  0.5D

PTN 7900 Products Public Principle
ODP47  Lecture  1D

PTN 7900 Products Public Features
ODP48  Lecture  3D

PTN 7900 Products Service Configuration
ODP49  Hands on  3.5D

PTN 7900 Products Basic Troubleshooting
ODP51  Lecture  0.5D

PTN Ring Protection Feature
ODP17  Lecture  1D

Target Audience

PTN7900 products operation and maintenance engineers

Prerequisites

- Having an overview of PTN 7900 products applications
Having an overview of telecommunications

Objectives

On completion of this program, the participants will be able to:
- Describe PTN 7900 series hardware structure
- Describe PTN 7900 series boards
- Perform PTN 7900 service configuration

Online Pre-learning Content

ODR00 PTN Products Operation and Maintenance MOOC
- PTN Products Hardware Introduce(MOOC)(Video, about 18 minutes)
  - PTN series products hardware introduction
  - PTN series products boards
- TCP&IP Basics(MOOC)(Video, about 35 minutes)
  - TCP/IP and OSI Reference Model
  - Function of layers of TCP/IP
  - Classification of IP addresses
- Ethernet Basics(MOOC)(Video, about 13 minutes)
  - Ethernet physical layer
  - Ethernet data link layer
  - VLAN technology and its applications
- IP Routing Basics(MOOC)(Video, about 7 minutes)
  - What is router and route
  - IP routing table structure
  - The classification of routing protocols

Online Pre-learning Duration

1 week (total 70 minutes, 70 minutes per week)

Centralized training Content

ODP43 PTN 7900 Products Hardware Description
- PTN 7900 Hardware Description
  - PTN 7900 products application scenarios
  - Cabinet and system overview
  - PTN 7900 boards introduction

ODP44 PTN 7900 Products Features Description
- PTN 7900 Feature Description
  - PTN 7900 service features
  - PTN 7900 protection features
  - PTN 7900 OAM features
  - PTN 7900 QoS features
  - PTN 7900 synchronization features

ODP47 PTN 7900 Products Public Principle
TCP-IP Fundamental (PTN 7900)
- TCP/IP and OSI Reference Model
- Function of layers of TCP/IP
- Describe classification of IP addresses
- Basic principle of IP routing

Ethernet Technology (PTN 7900)
- Ethernet physical layer
- Ethernet data link layer
- VLAN technology and its applications
- MSTP technology and its applications

IP Routing Basics (PTN 7900)
- What is router and route
- Classification of routing protocols
- How IS-IS routing protocol works

ODP48 PTN 7900 Products Public Features

PTN&PTN 7900 ISIS Routing Protocol Basics
- IS-IS overview
- IS-IS basic concepts
- IS-IS route calculation
- IS-IS fast convergence
- PTN 6900 network ISIS planning

PTN&PTN 7900 BGP Routing Protocol Basics
- BGP overview
- BGP working principles
- BGP route attributes
- BGP extended applications

PTN&PTN 7900 High Availability Overview
- Reliability technology overview
- Fast detection technology
- Reliability technologies

PTN&PTN 7900 MPLS Basics
- MPLS basics
- Static MPLS tunnels
- Dynamic MPLS LDP tunnels

PTN&PTN 7900 MPLS TE Introduction
- E2E MPLS Tunnels configuration
- MPLS tunnel protection configuration

PTN&PTN 7900 MPLS L2VPN Service Introduction
- MPLS L2VPN overview
- TDM service emulation
- ATM service emulation
- Ethernet service emulation
L2VPN service protection techniques
Service and reliability configuration

- PTN&PTN 7900 MPLS L3VPN Service Introduction
  - MPLS BGP VPN overview
  - Implementation principles of MPLS BGP VPN
  - MPLS BGP VPN service protection techniques

- PTN&PTN 7900 QoS Technology
  - QoS measurement counters
  - QoS models
  - IP&MPLS QoS technology
  - ATM QoS technology
  - Analysis of QoS requirements for wireless services

- PTN&PTN 7900 Clock Synchronization Implementation
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

ODP49 PTN 7900 Products Service Configuration
- PTN&PTN 7900 Basics Configuration
  - Starting U2000
  - Creating network and discovering devices using U2000
  - Interface configuration by using U2000

- PTN&PTN 7900 IS-IS Routing Protocol Configuration
  - IS-IS configuration for legacy PTN
  - IS-IS configuration for PTN 7900

- PTN&PTN 7900 MPLS TE Tunnel and Tunnel Availability Configuration
  - Control plane parameters configuration
  - E2E MPLS Tunnels configuration
  - MPLS tunnel APS 1:1 protection configuration

- PTN&PTN 7900 TDM Service Configuration
  - E-APS configuration
  - E2E TDM PW APS 1:1 protection

- PTN&PTN 7900 ATM Service Configuration
  - AC-Side E-APS 1:1 protection
  - E2E ATM PW APS 1:1 protection

- PTN&PTN 7900 ETH Service(L2) Configuration
  - E2E ETH PW APS 1:1 protection

- PTN&PTN 7900 ETH Service (L3)Configuration
  - MP-BGP configuration for PTN 7900
  - E2E ETH L3 VPN protection

ODP51 PTN 7900 Products Basic Troubleshooting
- PTN&PTN 7900 Troubleshooting Basic
  - Fault processing flow
- Familiar with methods of analyzing and locating faults
- Regular operations for troubleshooting

**ODP17 PTN Ring Protection Feature**

- PTN Ring Protection Introduction
  - PTN Ring Protection Basic Concepts
  - PTN Ring Protection Switchover
  - PTN Ring Protection Application

- PTN Ring Protection Practice Guide
  - PTN Ring Protection Practice

**Centralized training Duration**

10 working days

**Class Size**

Min 6, Max 12
1.7.21 PTN 7900 Products 3rd Line Maintenance Training

Training Path

PTN 7900 Products Public Features
ODP48 Lecture 2D

PTN 7900 Products Advanced Configuration
ODP50 Hands on 2D

PTN 7900 Products Advanced Troubleshooting
ODP52 Lecture, Hands on 1D

Target Audience

PTN 7900 products operation and maintenance engineers

Prerequisites

- Completion of PTN 7900 2nd Line Maintenance Training

Objectives

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

- Describe PTN services implementation technology
- Configure QoS in mobile backhaul network
- Configure clock synchronization in mobile backhaul network
- Perform clock synchronization troubleshooting

Centralized training Content

ODP48 PTN 7900 Products Public Features
- PTN&PTN 7900 ISIS Routing Protocol Basics
  - IS-IS overview
  - IS-IS basic concepts
  - IS-IS route calculation
  - IS-IS fast convergence
  - PTN 6900 network ISIS planning
- PTN&PTN 7900 BGP Routing Protocol Basics
  - BGP overview
- BGP working principles
- BGP route attributes
- BGP extended applications

- **PTN&PTN 7900 High Availability Overview**
  - Reliability technology overview
  - Fast detection technology
  - Reliability technologies

- **PTN&PTN 7900 MPLS Basics**
  - MPLS basics
  - Static MPLS tunnels
  - Dynamic MPLS LDP tunnels

- **PTN&PTN 7900 MPLS TE Introduction**
  - E2E MPLS Tunnels configuration
  - MPLS tunnel protection configuration

- **PTN&PTN 7900 MPLS L2VPN Service Introduction**
  - MPLS L2VPN overview
  - TDM service emulation
  - ATM service emulation
  - Ethernet service emulation
  - L2VPN service protection techniques
  - Service and reliability configuration

- **PTN&PTN 7900 MPLS L3VPN Service Introduction**
  - MPLS BGP VPN overview
  - Implementation principles of MPLS BGP VPN
  - MPLS BGP VPN service protection techniques

- **PTN&PTN 7900 QoS Technology**
  - QoS measurement counters
  - QoS models
  - IP&MPLS QoS technology
  - ATM QoS technology
  - Analysis of QoS requirements for wireless services

- **PTN&PTN 7900 Clock Synchronization Implementation**
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

**ODP50 PTN 7900 Products Advanced Configuration**

- **PTN&PTN 7900 QoS Configuration**
  - QoS measurement counters
  - QoS models
  - IP&MPLS QoS technology
  - ATM QoS technology
Mobile Backhaul Product Technical Training Proposal

- Analysis of QoS requirements for wireless services
- PTN&PTN 7900 Clock Syn Configuration
  - Mobile network synchronization requirements
  - Mobile network synchronization system
  - Implementation of time synchronization on mobile networks

ODP52 PTN 7900 Products Advanced Troubleshooting
- PTN&PTN 7900 Performance Monitoring and Analysis
  - Performance monitoring and analysis
- PTN&PTN 7900 Troubleshooting Case Study
  - Troubleshooting case study
- PTN&PTN 7900 Troubleshooting Practice Guide
  - Troubleshooting practice

Centralized training Duration

5 working days

Class Size

Min 6, Max 12

1.7.22 ETN Products Installation and Commissioning Training

Training Path

ETN Series Products Introduction
ODL03 Lecture 0.5D

ETN Series Products Installation
ODL05 Lecture 0.5D

ETN Series Products Remote Commissioning
ODL06 Lecture, Hands on 1D

Target Audience

ETN Series Product FO engineer
Prerequisites

- Having basic knowledge of TCP/IP

Objectives

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

- Describe ETN products chassis and boards
- Describe ETN network application
- Install ETN series products cabinet, frame and board
- Perform ETN series products cable routing

Training Content

ODL03 ETN Series Products Introduction

- ETN Series Products Introduction
  - ETN500 products chassis and boards

ODL05 ETN Series Products Installation

- ETN Series Products Installation and Commission
  - Safety precautions
  - Installation preparation
  - Installing the ETN series products
  - Installing and routing cables
  - Checking cable connectivity

- ETN Series Products Installation and Commission
  - Safety precautions
  - Installation preparation
  - Installing the ETN905 series products
  - Installing and routing cables
  - Commissioning the ETN905 series products

ODL06 ETN Series Products Remote Commissioning

- ETN Series Products Remote Commissioning Principle
  - IP backhaul site deployment scenario
  - Basic configuration planning
  - Remote commissioning through the DCN
  - Remote commissioning using DHCP

- ETN Series Products Remote Commissioning Practice Guide
  - Remote commissioning introduction
  - ETN products remote commissioning through U2000

Duration

2 working days
Class Size

Min 6, Max 12

1.7.23 ETN Products Operation and Maintenance Training

Training Path

ETN Series Products Layer2 Feature Design and Deployment
ODL14 Lecture, Hands on 1D

ETN Series Products IGP Feature Design and Deployment
ODL15 Lecture, Hands on 1D

ETN Series Products Fixed Network Service Design and Deployment
ODL16 Lecture, Hands on 1D

ETN Series Products OAM Feature Design and Deployment
ODL17 Lecture, Hands on 1.5D

ETN Products Routine Maintenance
ODP07 Lecture, Hands on 0.5D

Target Audience

ETN Products Operation and maintenance engineers

Prerequisites

- Familiar with basic knowledge of data communications

Objectives

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

- Describe ETN Products hardware and boards
- Perform ETN service configuration
- Perform ETN Products routine maintenance
Training Content

ODL14 ETN Series Products Layer2 Feature Design and Deployment
- ETN Series Products Eth-Trunk Feature Design and Deployment
  - Eth-Trunk overview
  - LACP protocol overview
  - Eth-Trunk practice
- ETN Series Products QinQ Feature Design and Deployment
  - QinQ overview
  - Selective QinQ overview
  - QinQ Practice

ODL15 ETN Series Products IGP Feature Design and Deployment
- ETN Series Products OSPF Protocol Design and Deployment
  - OSPF overview
  - Basic OSPF concepts
  - OSPF route calculation
  - OSPF fast convergence
  - OSPF Practice
- ETN Series Products ISIS Protocol Design and Deployment
  - IS-IS overview
  - IS-IS basic concepts
  - IS-IS route calculation
  - IS-IS fast convergence
  - IS-IS Practice

ODL16 ETN Series Products Fixed Network Service Design and Deployment
- ETN Series Products E-Line Service Design and Deployment
  - MPLS L2VPN overview
  - Ethernet service emulation
  - E-Line service configuration practice

ODL17 ETN Series Products OAM Feature Design and Deployment
- ETN Series Products EDD Design and Deployment
  - Huawei ETN EDD solution
  - The concept and principle of RFC2544
  - The concept and principle of basic Y.1731 functions
  - The concept and principle of HQoS
  - EDD configuration
- ETN Series Products OAM Feature Design and Deployment(Fixed Network)
  - Ethernet OAM overview
  - MPL-TP OAM overview
  - OAM configuration practice

ODP35 ETN Products Routine Maintenance
ETN Product Routine Maintenance Introduction

- Maintenance items and operations
- Dustproof maintenance of the Service
- Operations involving risks

Duration

5 working days

Class Size

Min 6, Max 12