

Hands-On

# **IPTV over Fiber Optics for CPE Installers**

Customer Premise Equipment Installation and Troubleshooting



## **Course Description**

This Hands-On course provides an indepth look at IPTV Services deliver over Fiber Optics installation for installation technicians and technical support staff. IPTV generally includes the delivery of services over Passive and Active Optical Networks. Services generally include both live streamed TV and Video on demand services. VoD may be provided using RTSP applications, WebTV applications or both.

This course will provide an understanding of how these services are delivered over routed and switched IP networks through Ethernet interfaces.

Attendees will gain a Hands-On understanding of the function and operation of the equipment installed on customer site, installation testing of Passive and Active Optical Network equipment, ONT, OLT, Access devices, IPTV Set top boxes as well as their connection to modern TVs and Flat screen monitors as well as older CRT based equipment.

This course is designed for installers who need a fast introduction to the technology, equipment and network architectures as well as identifying symptoms of problems or failures.

The course will be run using an emulated customer environment in the classroom and attendees will use emulated headend streams to understand how set top boxes work. They will then install set top boxes and connect these to a selection of TV equipment and customer services. Fault conditions will then be introduced into the environment and the attendees will learn how to detect and identify these, locate the elements causing the fault, correct the fault and verify the completed working service.

As part of the labs, attendees will be provided with examples of each type of Customer Equipment that will be installed and will practice installations of each type. They will then use Protocol analyzers, Test Meters, and software based protocol analyzers together with, wireless analyzers and IPTV transport stream analyzer software to test the installed services to verify correct operation and to locate faults.

During the final day of the course the attendees will practice the skills that they have learned by undertaking an exercise testing and isolating faults in a number of configurations into which simulated customer faults have been inserted. They will isolate the faults and correct them as part of the Hands-On experience.

## **Students Will Learn**

- **Understand the equipment and applications used to deliver IPTV over Fiber Optics**
- **Understand the equipment and software used to deliver IPTV and VoD services**
- **Describe the architecture of these modern TV services**
- **Identify the installation and Local Loop issues with IPTV and VoIP services**
- **Install ONTs, OLTs, Set top boxes and home TV equipment**
- **Appreciate how the services can be delivered throughout homes, institutions and hotels**

- Use Testing Laptop Computers as protocol analyzers, transport stream analyzers and wireless test equipment to isolate faults and troubleshooting services
- Recognize typical fault conditions and where to fix them
- And more...

## Target Audience

Anyone interested and or involved with the support and installation of IPTV services. Installation technicians and technical support staff and the primary focus for this course.

## Prerequisites

Basic understanding of Fiber Optics and telephony. and, or working knowledge of both.

## Course Outline

### 1. Modern Access

- Typical customer Access
- Passive/Active Optical Networks: OLT, ONT
- Checking and Qualifying cables
- ONTs and routers
- Wireless connection
- Home Networking
- Using Wireless LAN Access
- CAT5 5/6 home network wiring
- Switches, Routers, Hubs, Access Points
- Basic IP for Internet Access
- Testing IP Reachability

Hands-on Exercise Installing/Testing Customer Residential Gateways and Internet Access

In this exercise attendees will learn how to install ONT and access points used in the service. They will learn which elements they must configure and how to configure them.

Hands-on Testing Internet Access and validating IP Services

In this exercise attendees will learn how to verify IP service reachability, IP addressing using DHCP and local customer IP service conditions.

### Hands-on Surveying Home Wireless Services

In this exercise attendees will learn how to use testing software to survey wireless conditions within the customer premises environment for correct customer gateway connection.

## 2. IPTV Services

- IPTV Services
- Multicast Live TV
- How Set top boxes request streams and change channels
- Analyzing protocols

### Hands-on Exercise Playing IPTV streams

In this exercise attendees will learn how to stream and play IPTV streams on a Laptop computer for testing purposes.

### Hands-on Exercise using protocol analyzer to analyze IPTV streams

In this exercise attendees will learn how to install WireShark and test access links and STB interfaces. They will learn how to recognize different key protocols, locate channel changes and measure response times. (other Test equipment can be incorporated)

## 3. Video On Demand

- TV over the Internet over the top TV
- Video on Demand with guaranteed quality
- Broadcast and multicast TV
- Technical requirements for good quality IPTV
- IPTV subscriber view of the service
- IPTV Installation
- Set-top box setup
- Connecting to TV Interfaces
- Composite Video, S-Video, VGA and HDMI connection
- TV set-up
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### Hands-on IP Television Installation

In this exercise attendees will learn how to install different kinds of TV on to each type of STB and access.

### Hands-on Exercise exploring Symptoms of key IPTV failures and fixes

In this exercise attendees will play IPTV streams and experiment with different failure conditions to be able to recognize faults

## Hands-on Testing Wireless Access

In this exercise attendees will learn how to install and test wireless access.

### 4. Access Faults, Tests and Fixes

- Fundamentals of troubleshooting: How to fault-find
- Locating faults in telephone line services
- Understanding the characteristics of Fiber Optics, twisted Pairs
- Frequency and distance trade-off
- Impact of distance and noise on Fiber Optics service
- Types of noise and crosstalk
- Impact of noise on IPTV performance
- Finding the causes of wiring problems and their fixes
- IPTV Troubleshooting Techniques
- Network System Checks
- Locating the fault and its isolation
- Measuring Signal quality
- Finding the cause of Freeze Frames
- Troubleshooting Drop Zones and Disconnects

## Hands-on Exercise Troubleshooting Access issues on IPTV Services

In this exercise attendees will learn the different kinds of fault conditions that are possible, how to recognize faults, how to isolate faults and which of them can be fixed. Where faults can be fixed they will learn how to fix them.

### 5. Customer Service Validation

- Dealing with the customer
- Questions to ask and listening to the answers
- Information to get from the customer about service under test
- Information to leave the customer

## Hands-on Exercise: Mystery Setups for fault finding

In this exercise attendees will be presented with customer configurations that include faults which they must isolate and correct.

### 6. Support Roadmap

- Equipment safety and maintenance
- Test Equipment toolkit
- Information to leave the customer

Evaluation and Review

### **Delivery Method**

Instructor-Led with numerous Hands-On labs and exercises.

### **Equipment Requirements**

**(This apply's to our hands-on courses only)**

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

### **Course Length**

3 Days