Hands-On

# Troubleshooting LTE with WireShark

## Course Description

This extensive Hands-On course is aimed at Field Service technicians, Systems Engineers, Systems Specialists, Integrators, Developers, Designers, Customer Support and Systems Delivery Project Engineers who need to troubleshoot LTE service network Interfaces.

In particular the course will focus on the air interface, S1 interface carrying signals between MME, and eNodeB backhaul and the X1 Interface used to interconnect eNodeB devices.

It will teach the fundamentals of the supported protocols, how to filter traffic by protocol type, address and conversation and how to identify potential faults, failures and much more...

## Students Will Learn

- **Use key functions of WireShark to capture and display protocol traffic**
- **Measure delay, bandwidth, jitter and packet loss**
- **Filter traffic by protocol type, address and service function**
- **Identify potential protocol issues and problems**
- **Monitor and extract calls and service exchanges**
- **Analyze signaling exchanges**
- **And more...**
- **Hands-On Labs will include**
- **Capture traffic over a network**
- **Analyze Signaling protocols used**
- **Troubleshoot call reachability**
- **Record and playback exchanges to monitor multimedia service quality**
- **Troubleshoot voice quality issues**
- **Analyze call connections**
- **And more...**

## Target Audience

Field Service technicians, Systems Engineers, Systems Specialists, Integrators, Developers, Designers, Customer Support and Systems Delivery Project Engineers.

## Course Outline

**1. Capturing LTE Backhaul Traffic**

Capturing Traffic and calls

Locating the capture point

Capturing at router ports and interfaces

Using port mirroring and SPAN

Configuring WireShark to capture LTE traffic

Hands-on Exercise Capturing LTE Traffic

Identifying packet sources

Timing

Building Simple Filters

Hands-on Exercise filtering traffic

**2. Analyzing Protocol Headers**

LTE Interfaces and their functions

Components of calls

Signaling

Media Streams

Recognizing port numbers

LTE Protocol Dissectors

- MAC-LTE
- PDCP-LTE
- RLC-LTE

Hands-on Exercise Discovering signaling protocols

**3. Analyzing Signaling**

Signaling for service setup

Recognizing multimedia streams

Filtering key protocols like SCTP

Hands-on Analyzing Signaling

Analyzing the Signaling Protocol Layers

Layer 2

Layer 3

Transport Layer

SCTP

Identifying addresses

Locating service exchanges

Hands-on Analyzing signaling

**4. X2AP Signaling Issues**

Recognizing key signaling messages

Tracing a signaling exchange for one UE id

Recognizing User plane and control plane messages

Hands-on exercise analyzing X2 Messages

Hands-on Exercise analyzing S1 Messages

**5. Throughput Issues**

Recognizing user traffic throughput

Filtering selected throughput

Graphing throughput

Hands-on Exercise Graphing User throughput

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)**

Attendees should supply their own laptop computer running Windows XP or Windows 7and have Administrator privileges to install the software. A working knowledge Windows will be assumed.

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

2 Days