Hands-On

IP Multicasting

for Multimedia Distribution Networks

Course Description

This Hands-On course provides an in-depth look how IP multicasting works, its advantages and limitations and how it can be deployed to provide effective services over a Next Generation converged network. It will demonstrate examples of multimedia service configurations in the class-room and identify practical problems and their solution. It will provide a detailed understanding for implementers, designers, managers and infrastructure engineers that need to plan, implement and use the new generation of networks and services.

The next generation of telecommunications networks will deliver broadband data and multimedia services to users. Integration with TV, music and radio distribution will become a reality provided mechanisms to provide multicast delivery are implemented. This technology allows a broadcasting station to send a single stream of packets into the network and have these delivered to the subscribing users. It provides therefore a scalable solution to the problem of transmitting IP Television and other services over next generation IP infrastructures

In order to make multicasting function effectively it is necessary to deploy routers and switches capable of supporting the appropriate protocols and to design and configure the network correctly. Core infrastructure, distribution nodes, access devices and client devices all must play their part in a working service.

Students Will Learn

- **Describe The Basic Function Of Multicast IP**
- **Select The Appropriate Sparse Mode Or Dense Mode Options For Deployment**
- **Compare The Efficiency Of Routed And MPLS Switched Options For Qos Networks**
- **Implement Appropriate Addressing Mechanisms For Streams**
- **Provide Reliability By Deploying The Re-Routing With Protocol Independent Multicast**
- **Select Programme Streams Using Internet Group Management Protocol**
- **Engineer Traffic Loading**
- **Carry Real Time Multicast Services Over Real Time Transport Protocol And Real Time Streaming Protocol**
- **And Much More**

Prerequisites

A solid understanding of IP and WAN technologies is required.

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Course Outline

Module I: Multicasting over IP: An Introduction

Application user over Internet Access

Increasing Demand for Multimedia applications

Traffic patters for data and Multimedia Services

TV and Music Distribution

Sizing Traffic Demands for Unicast Transmission Services

Converting Services to Multicast Transmission

Module II: Addressing and Identification For Multicast Streams

Internet Protocol Addressing Mechanisms

Allocating Network and Subnetwork Identities

Historic Address Classes A, B, C and D

Classless Addressing

Addressing for Multicast IP Streams

Carrying Multicast over Link Access

Ethernet and IEEE 802 Addressing

Multicasting over 802 Networks

Module III: Routing for Multicast Delivery

Registering for Multicast Streams

Defining the Roles of the Router, Client and Server

Internet Group Management Protocol (IGMP)

Multicasting at Layer 2

Routing Alternatives Compared

- Distance Vector Multicast Routing Protocol (DVMRP)

- Multicast Open Shortest Path First (MOSPF)

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- Protocol-Independent Multicast (PIM)

PIM Dense Mode

PIM Sparse Mode

Reverse Path Forwarding

Defining a Rendezvous Point

Module IV: Practical Implementation Issues

Announcing Multicast Streams

Query of Streams Required

Bootstrap Router Considerations

IGMP Snooping

Automatic Rendezvous Point Allocation

Controlling the Scope of Multicast

Module V: Multicasting Multimedia over Datagram Services

Internet Protocol Data Transfer

TCP Operation

Recovering Errors and Lost Packets

Selective Retransmission

UDP Operation: Fire and Forget

Real-Time Transport Protocol

Sequencing and Timestamps

Encoding media Channels

Real Time Stream Protocol

MPEG encoding: Framing and clocking

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Module VI: Deploying QoS

Definition of QoS

Delay requirements for likely multicast media

Interactive vs Broadcast services

Mechanisms for Requesting QoS

Resource Reservation Protocol (RSVP)

Integrated Services (IntServ) Parameters

Diffserve and Differentiated Services Code points

Weighted Fair Queuing

QoS over MPLS

Module VII: Reliability Considerations for Multicast Services

Typical Stream Service Configurations

Potential Failure Modes and their effect

Overcoming Element Failures

Hot Standby Routing Protocol

Virtual Router Redundancy Protocol

Delivering Streamer Reliability

Duplicating Streamer Configuration

Switchover Mechanisms

Aggregation for reliable service

Evaluation and Review

Delivery Method

This course will include the following hands-on exercises and demonstrations-
Multicasting video over LANs

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Multicasting Video over Wide Area Routed Connections
Implementing Resilience to link failure using Ethernet Aggregation
Analyzing Multicast Routing Protocols using WireShark
Identify mechanisms for improving multicast real-time services

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

2 Days

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