

## Course Description

Next Generation networks must deliver IPTV, Voice over IP as well Internet access services. Networks may cover the complete services of a national carrier, Regional carriers or local rural carrier services. Equally corporations must design service networks to meet their current and future needs. The scale of the networks may be different but the techniques used for Engineering and Architectures are common.

Considerable experience exists in the sizing and design of circuit switched TDM voice networks. This enables the appropriate technologies to match the need. Less experience exists in the design of IP based next generation networks. However the services of Triple Play networks may well be dominated by the requirements for quality video and for integrated delivery of all services.

This course addresses the underlying skills of sizing, network analysis and network design applied to this new generation of services. It will provide a practical understanding of the necessary theory together with the application of these using spreadsheets prepared for the purpose. It will examine the infrastructure requirements, multicasting configuration needs and the sizing for delivery of services that match customer expectation.

## Students Will Learn

- **Specify In Detail The Requirements Of A Triple-Play Service**
- **Translate Specifications Into The Sizing Data Needed To Size A Service**
- **Calculate The Sizing Parameters For Specification Of Infrastructures To Deliver Quality Services**
- **Select Appropriate Qos Protocols And Implementations**
- **Configure The Multicasting Services Needed To Deliver Reliable Implementations**
- **Size The Traffic Demands And Map This To Technology Options**
- **Design The Networks And Service Provision**
- **Specify Appropriate Testing To Prove The Service Delivery**
- **Identify Mechanisms That Can Be Used To Manage The Service**
- **And More...**

## Course Outline

Module I: Elements of Network Design and Management

User requirements

Defining Service profiles  
IPTV Broadcast delivery  
Video On Demand  
Internet Access  
Voice Services  
Key design considerations  
Interconnection of devices and sites  
Information transfer  
Quality of service  
Geographical coverage  
Critical success factors  
Key skills  
Evaluation  
Estimation  
QOS Metrics  
Deliverables  
Network Management Concepts

## Module II: Quality of Service (QoS)

Service provided by IP  
Network performance requirements and implementations  
Measurement of service quality  
Delay  
Jitter  
Loss and error  
Duplication  
Miss delivery  
Impact of datagram delivery  
Impact of retransmissions

Selective retransmission

Concepts and functions

QoS Components

Congestion management

### Module III: Sizing and Performance Analysis

Capacity Considerations

Response Time

Queuing Delays

Scalability

System performance

Performance and Sizing in Practice

Measuring the performance of a real LAN under load

Measuring the Performance of a routed network

Measuring the performance typical applications

Example Sizing Calculations for Triple-Play Services

Using spread sheets to size Next Generation Services

Using spread sheets to Identifying delay and Loss

Sizing Server farms for Carrier services

### Module IV: Availability and Reliability

Fundamentals of failure analysis

Probability of failure

MTBF and MTTR

Calculating Availability

System Availability

Effective availability

Failure patterns of hardware and software

Human availability

Practical Redundancy of Network

System redundancy

Link redundancy

Improving reliability with aggregation

Module V: Design and Implementation

Approach to Network Design in Practice

Analysis of the Requirements

Searching for what is missing

Locating Servers and Services

Defining Traffic Flow Profiles

Multicast Infrastructure Design and Configuration

Key Metrics

Predicted Performance

Measurement and Validation

Provable Performance Testing

Designing infrastructure (L1 + L2)

Designing network layer (addressing + routing protocols)

Designing network security

Designing for network performance

**Module VI: Technology Options**

Access Technologies

Aggregation Technologies

Metro Area

Interfacing to the Core

Core technologies

Considering the Life of the Solution

Migration and Maintenance Planning

Considering the life of the design

Selecting suppliers

### **Case Studies**

### **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**

2 Days