

# GSM Signaling Protocols

15 - 19 February 2016  
Gaborone, Botswana



COMMONWEALTH  
TELECOMMUNICATIONS  
ORGANISATION



## Overview

Understanding of fundamental technological concepts, regulatory framework and commercial requirements are essential for the deployment and maintenance of a successful GSM network. The course will cover a wide range of technological choices to provide comprehensive understanding of the key issues in GSM technology

For more information  
about this course, or to  
register, contact us on:  
**Tel:** +44 (0) 208 600 3800  
**Fax:** +44 (0) 208 600 3819  
**Email:** [h.muchando@cto.int](mailto:h.muchando@cto.int)

## OBJECTIVES

### On completion of this course the participants will:

- Understand GSM network architecture and its components.
- Have a comprehensive knowledge of GSM base station subsystem signalling.
- Identify GSM radio resource management and GSM mobility management concepts.
- Recognise migration to GPRS, EDGE and Nokia 3G Technologies

## TARGET AUDIENCE

This course is ideal primarily for engineers and technicians who work for GSM-based mobile telecommunications network providers or GSM network equipment manufacturers, who require a basic understanding of the GSM signalling protocol. Regulatory agency technical staff involved in signalling issues or Quality of Service (QoS) relating to mobile communication will also benefit from attending this course.

## COURSE OUTLINE

### Review of radio communications

- Transmitter, propagation channel, receiver
- Radio propagation review
- Duplex and multiple access
- Link budgets
- Multipath propagation
- Frequency selectivity
- Mobile channels: Doppler and time selectivity

### Digital Communications Review

- Review Shannon's information theory
- Capacity, bandwidth, SNR trade-offs
- Signal (speech) compression
- Error control coding
- Digital modulation
- Spectrum efficiency

### Cellular Radio Concepts

- Frequency e-use
- Co-channel interference
- Propagation environments – rural, semi-rural, urban
- Propagation slope and radio planning
- Macro/micro/pico indoor cells
  - Cell splitting

### Introduction to Radio Resource Management (RRM)

- RRM algorithms
- Adaptive time advance
- Frequency hopping
- Discontinuous transmission/reception
- Power control
- Handover
- Admission control
- Load control (congestion control)
- Interference margin
- Diversity

### GSM network

- GSM history
- Standardisation
- GSM network architecture
- Network elements
  - Mobile station
  - Base station subsystem
  - Network switching subsystem
- MS – BTS : Air interface
- BTS – BSC : A-bis interface
- Core network and signalling protocols
- Transmission network
- GSM base station subsystem signalling

### Radio network planning and link budget

- Propagation channels and fading
- Basics of network planning
- Dimensioning
- Configuration planning
- Capacity planning
- Coverage planning
- Frequency planning
- Link budget
- Radio environment characterization

### Network optimisation

- Differences between GSM and WCDMA network optimisation
- Key performance indicators
- Practical challenges in optimisation 2G networks
  - Optimisation tools
  - Parameter optimisation

### Network evolution

- Drivers behind evolution
- Migration strategies
- Challenges for migration

### GPRS, EDGE and 3G

- Review – Wireless data applications
- Circuit versus packet switched data on GSM
- Evolution of GSM data services
- Circuit switched data services
- High speed circuit switched data
  - GPRS
  - EDGE



### GPRS Network Elements

- Evolution to EDGE
- Differences between GSM and UMTS
- 3G Networks
  - UMTS (WCDMA), CDMA2000
  - UTRAN
  - 3G services
  - 3G evolution
  - HSDPA
  - LTE

### Regulatory Principals

- Spectrum information
- Global harmonisation
- Regulatory requirements

## COURSE TRAINER

### Dr Abhaya Sumanasena

Dr Abhaya holds a Master's degree from King's College London and a PhD in 3G Mobile Systems from the University of Surrey, UK where he has also been involved in teaching and supervising research students. His in-depth understanding of current issues and technologies together with commercial awareness in diverse environments is grounded in 16 years of experience working in R&D, vendor, operator, managed service, regulatory and consultancy environments. Currently, Dr Abhaya is working as a managing consultant, where he is responsible for delivering various strategic and policy development projects for the National regulator, Ofcom and for various world leading organisations. Prior to this, Dr Abhaya worked on capacity strategy for a leading mobile operator in the UK. Dr Abhaya has been also engaged at ITU, the European level and at standardisation groups to influence various policy developments at international level. Prior to Ofcom, he worked as a technology specialist in Ericsson and Hutchison 3UK, the first mobile operator dedicated to 3G services in the UK.

## UPCOMING COURSES

INTERNATIONAL COURSES	DATE	LOCATION	DURATION
GSM Signaling Protocols	October 5 - 9, 2015	Gaborone, Botswana	5 days
Regulatory Impact Assessment	October 5 - 9, 2015	Liberia	5 days
Costing in Telecommunications and Tariff Planning and Structuring	October 12 - 16, 2015	Port Louis, Mauritius	5 days
Telecommunications Business Process Re-Engineering	October 19 - 23, 2015	Johannesburg, South Africa	5 days
Mobile IP	October 19 - 23, 2015	Gaborone, Botswana	5 days
Public Key Infrastructure (PKI) - In Depth	October 26 - 30, 2015	Port of Spain, Trinidad & Tobago	5 days
ICT Regulation Understanding the Big Picture of ICTs for Development	October 26 - 30, 2015	London, UK	5 days
Telecommunications Finance for Non Finance	November 2 - 6, 2015	Johannesburg, South Africa	5 days
Building Consumer Advocacy in the Telecommunications	November 2 - 6, 2015	Port of Spain, Trinidad & Tobago	5 days
Licensing in a Converged Environment	November 2 - 6, 2015	Johannesburg, South Africa	5 days
Broadband Technologies and Multimedia Services	November 16 - 20, 2015	Gaborone, Botswana	5 days
Analogue to Digital Broadcasting Switchover	November 23 - 27, 2015	Johannesburg, South Africa	5 days
Introduction to IPTV	January 18 - 22, 2015	Johannesburg, South Africa	5 days



## Registration Form

### Personal Details

Event ID: 8007

Mr/Mrs/Ms/Other \_\_\_\_\_ First Name \_\_\_\_\_ Last Name \_\_\_\_\_

Job Title \_\_\_\_\_

Organisation \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Postcode \_\_\_\_\_ Country \_\_\_\_\_

Tel. \_\_\_\_\_ Mobile \_\_\_\_\_ Fax \_\_\_\_\_

E-mail \_\_\_\_\_

Authorising Line Manager's Name \_\_\_\_\_

Authorising Line Manager's E-mail \_\_\_\_\_

### REGISTRATION DEADLINE

### 3 SIMPLE WAYS TO REGISTER!

Fill in and fax this form back at  
**+44 20 8600 3819**

Call the programme team at  
**+44 20 8600 3800**

E-mail the programme team at  
**programmes@cto.int**, quoting the course  
"Event ID" above.

### NEED HELP?

Call us now on +44 20 8600 3800  
or e-mail the Programmes team at  
**programmes@cto.int**

### Payment Options

1. Select Delegate Rate (please refer to the list of CTO members/PDT Partners provided overleaf)

	Standard Rate	Early Registration by: 21 August 2015
CTO Members	<input type="checkbox"/> £750	<input type="checkbox"/> £700
Others	<input type="checkbox"/> £1,150	<input type="checkbox"/> £1,100

2. Payment Mode (choose from either Invoice, Bank Transfer, Cheque, or Credit Card)

- Invoice  
Invoice me at the above address  
(Discounts do not apply, payment must be received by us prior to the above event's start date)
- Bank Transfer  
To: Coultts & Co., 440 Strand, London WC2R 0QS, UK  
A/c Name: CTO; A/c Number: 83675071  
Reference: GB72COUT18000208367507  
Sort Code: 18-00-02; Swift Code: COUTGB22
- Cheque  
Cheque enclosed,  
payable to "CTO HQ"

Credit Card: Visa / Mastercard (circle as appropriate)

Card Holder's Name \_\_\_\_\_

Card Holder's Billing Address (if different from above) \_\_\_\_\_

Card Number

Valid From  /  /  Expiry Date  /  /  3-digit security code on back of card

### Signature

Date \_\_\_\_\_ Name \_\_\_\_\_ Signature \_\_\_\_\_

### Additional Information

To help us improve our services to you and your organisation, please tell us more about you and your organisation.

#### Your role in the organisation

- Strategic/executive  
 Planning  
 Control  
 Operational

#### Your area of work in the organisation

- Business development  
 Corporate affairs  
 Customer service and care  
 Engineering and technical management  
 Financial, purchasing and investor relations  
 IT/IP management
- Marketing and sales  
 Public relations and corporate communications  
 Regulatory and legal affairs  
 Telecoms network management  
 Human resources  
 Other

#### Your organisation type

- Government  
 Regulator  
 Operator  
 Manufacturer  
 Other

#### Your organisation's service areas

- Fixed network/services  
 Mobile/wireless network/services  
 Satellite network/services  
 Internet
- Broadcasting  
 Value-added services  
 Support  
 Other services

### Summary Terms and Conditions

The CTO will endeavour, as can be reasonably expected, to ensure that the course is delivered to meet delegates' expectations. Registration is subject to availability and payment received by the deadline where specified, or else before the course start date, whichever applies. Dates may be subject to changes. Travel, accommodation, daily transportation to venue, subsistence and other costs are the sole responsibility of the delegate and are not included in the above fees. Applicants are responsible for their visa arrangements and other formalities wherever required. Course bookings may be cancelled at the discretion of the CTO or its partners. Applicants paying by bank transfer are responsible for bank charges and any other such costs and should ensure the exact amount in GBP Sterling is credited in the CTO bank account. Applicants requiring additional information prior to their booking should ensure they provide sufficient time before the booking deadline. Cancellation rules apply, as summarised below. For a full version of our Ethical Framework or our Terms and Conditions, please visit our website at [www.cto.int](http://www.cto.int)

### Cancellations / Refunds

For delegate cancellations/withdrawals, the following refund rules apply:

- 31 days or more prior to event: the full amount less a handling charge of 10% or a minimum of £55, whichever applies
- 30 days or less prior to event: no refund

For CTO cancellations/withdrawals, delegates are entitled to a 100% refund within 60 days of the withdrawal/cancellation. Refunds will be made by bank transfer only.

### Data Protection / Privacy

The CTO does not sell, rent or lease its customer information to third parties. We may, from time to time, contact you on behalf of a third party/partner about a particular offering that may be of interest to you. In those cases, your unique personally identifiable information (e-mail, name, address, telephone number) is not transferred to the third party/partner. In addition, we may share your information with trusted partners to help us perform statistical analyses, send you by e-mail or postal mail, provide customer support, or arrange for deliveries or other such services. All such third parties are prohibited from using your personal information except to provide these services to the CTO and they are required to maintain the confidentiality of your information. For more information about our privacy policy, visit our website at [www.cto.int](http://www.cto.int).

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