

# GSM Technologies

19 - 23 October 2009  
Johannesburg, South Africa



COMMONWEALTH  
TELECOMMUNICATIONS  
ORGANISATION

[www.cto.int](http://www.cto.int)

Register by  
5th September 2009  
for a 10% discount!!



## Overview

The course will introduce some of the most important aspects of mobile communication networks, radio transmission technologies and system capabilities, tracing evolution from 2G GSM to 2.5G; basic voice and data services through enhanced data and messaging services to GPRS and EDGE.

With its focus on network capabilities, the course will also explore technologies available for maximising network capacity through:

- Radio transmission planning
- Cell allocation
- Coverage optimisation techniques such as frequency hopping

Spectral efficiency optimisation - discontinuous transmission, and half or multi-rate operation for voice traffic

The course will be useful to those working on the design and deployment of new mobile networks as well as those working to enhance the capabilities of existing networks.

For more programmes and courses run by the PDT contact us at:  
**Tel:** +44 (0) 208 600 3800 **Fax:** +44 (0) 870 0345 626 **Email:** [programmes@cto.int](mailto:programmes@cto.int)

Course programme may change due to unforeseen circumstances

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## Learning outcomes

The course is structured to give an overview of the radio access technologies involved whilst pinpointing implementation options whose effect is to provide improved quality of service at low cost and maximum spectral efficiency.

On course completion participants will have gained:

- Broad grasp of the evolution of GSM radio access technologies from 2G to 3G
- Appreciation of additional capabilities provided by this evolution
- Network optimisation for improved quality of service and spectral efficiency
- Mobile services provisioning to increase average income per subscriber
- Broad grasp of future evolution

## Key objectives

- Survey the evolution of GSM as a global mobile communication system
- Review elements of the GSM radio network
- Review sub-systems and core network elements of GSM system.
- Review how the GSM transmission system supports its numerous services
- Explore parameters and elements that influence the efficient delivery of these services
- Explore elements of GSM radio and core network planning and optimisation
- Highlight the evolution to GPRS and EDGE

## Who should attend

- Telecommunications engineers involved in the planning, optimisation or operation management of GSM networks
- Senior sales and marketing personnel with a broad grasp of GSM technologies can also attend
- Anyone keen to learn more about GSM technologies

## Learning environment

The course will be delivered through interactive lectures accompanied by handouts. Class and group work will also be carried out to complement the lectures.

## Pre-requisites

Some knowledge of digital radio communications, mobile communications and GSM technologies.

## Course content

### 1 Mobile radio concepts

- Elements of radio propagation
- Modulation Techniques
- Duplexing and multiple access
- Receiver aspects: synchronisation, equalisation, demodulation
- Audio-visual Coding
- Voice activity detection - DTX
- Error control coding
- Cellular concepts - frequency re-use, spectral efficiency, power control, frequency hopping.
- Micro/macro-cells
- Mobility management

### 2 GSM service provision

- Voice Telephony
- Messaging
- Roaming
- Data transmission: Circuit versus packet switching
- Call setup
- Signalling
- Intelligent networks

### 3 GSM network architecture

- **Network Sub-systems**
  - Mobile Station
  - GSM air interface
  - Base Station Subsystem
  - GSM A-bis interface
  - Network and Switching System
- **Access network elements**
  - Radio planning
  - Cell site location
  - Cell repeat patterns
  - Co-channel Interference
  - Power control
  - Adding capacity - cell splitting, sectorisation
  - Frequency hopping
- **Core network elements**
  - Mobile switching centre
  - Home location register
  - Visitor Location Register
- **Security/Privacy Elements**



## Course content

### 4 GSM network optimisation

- **Network Requirements**
  - o Coverage
  - o Capacity
- **Coverage planning**
  - o Parameter setting
  - o Network cost
- **Capacity planning**
  - o Frequency planning
  - o Frequency hopping
  - o Channels per cell
  - o Half-rate
  - o Capacity as traffic
- **Cell location planning**
  - o Cell sites
  - o Antenna tilt and height
  - o Micro - pico cells
  - o Frequency plan and re-use
  - o Handover algorithms

### 4 GSM technology evolution

- **Data Services**
  - o Circuit and packet switched
  - o Mobile internet
- **GPRS**
  - o Physical and logical channels
  - o GPRS Network Architecture
  - o GPRS Signalling Protocols and procedures
  - o GPRS Resource Allocation
- **EDGE/EGPRS**
  - o HSPA, HSPA+ LTE
  - o Air Interface
  - o Downlink dual carrier
  - o Higher order modulation
  - o Receiver aspects

## Course leader



**Dr. Sam Atungsiri**

Dr. Sam Atungsiri is a communications system architect for major consumer electronics multinational. In this and previous roles he has vast experience of designing receivers for many digital communication systems including GSM, GlobalStar, CDMA, UMTS and OFDM. Sam has represented major telecom and technology companies at various international forums. His experience in the specification and

design of air interfaces of communication systems for mobile and broadcast has been accumulated over more than 17 years. In his academic life, Sam has taught postgraduate communications courses at University of Surrey, UK and final year digital communication courses at The Open University Faculty of Technology. He has also taught on many Continuous Professional Development (CPD) courses in the areas of digital communications, signal processing and audio-visual coding.

Among his many other achievements, Sam also holds more than 15 international patents with many of his inventions implemented in market leading communication and consumer electronics products.

Hosted by:

**Telkom South Africa**

In partnership with:

**Telecommunications Regulatory Board  
of Cameroon**

## About the CTO

The Commonwealth Telecommunications Organisation (CTO) is an international development partnership between Commonwealth and non-Commonwealth governments, business and civil society organisations.

It provides the international community with effective means to help bridge the digital divide and achieve social and economic development through the use of Information and Communication Technologies (ICT) in the specific areas of Telecommunications, IT, Broadcasting and the Internet.

## About the programme for development and training (PDT)

Managed by the CTO, the PDT is a unique low-cost membership programme providing needs-based professional training and capacity building courses on telecommunications policy, regulation, technologies and telecoms business management.

The PDT has delivered over 3600 bilateral training and consultancy projects, covering every aspect of the telecommunications industry, training over 35,000 professionals in 33 countries of the Commonwealth.

For more programmes  
and courses run by  
the PDT contact us at:

**Tel:** +44 (0) 208 600 3800  
**Fax:** +44 (0) 870 034 5626  
**Email:** [programmes@cto.int](mailto:programmes@cto.int)

See more information  
on our website

[www.cto.int](http://www.cto.int)

# Registration form

**GSM Technologies**  
19 - 23 October 2009, Johannesburg, South Africa

ID: 6621

Please fill in this application form and fax it back to +44 208 600 3819 or return it to the CTO at the address below. Please use CAPITAL LETTERS.

## Personal details

Mr/Mrs/Ms/Other ..... First name ..... Last name .....

Job title .....

Organisation .....

Address .....

City ..... Postcode ..... Country .....

Tel ..... Mobile ..... Fax .....

Email .....

Authorising line manager's name .....

Authorising line manager's email .....

## Payment options

### 1) Select delegate rate

	Standard rate	Early registration/Group discounts*
CTO members	<input type="checkbox"/> £701	<input type="checkbox"/> 10%
PDT partners	<input type="checkbox"/> £701	<input type="checkbox"/> 10%
Others	<input type="checkbox"/> £1,132	<input type="checkbox"/> 10%

\* two or more delegates from same organisation

### 2) Payment mode (choose one option only)

**Invoice**  
Invoice me at the above address (Discounts do not apply, payment must be received by us prior to event).

**Bank transfer**  
Make payments to: Couitts & Co.  
440 Strand, London, WC2R 0QS, UK  
A/C Name: CTO; A/C Number 08367507  
Bank Sort Code :18-00-02  
SWIFT Code: COUT GB22  
IBAN Reference: GB72COUT18000208367507

Credit Card: Visa / Mastercard (delete 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

## Signature

Date ..... Name ..... Signature .....

## Additional information

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

## 3 SIMPLE WAYS TO REGISTER

 Fill in and fax this form back to  
**+44 208 600 3819**

 Call the programme team at  
**+44 208 600 3800**

 Email this completed form back to  
**register@cto.int**

## EARLY REGISTRATION DISCOUNT

**Register by 5th September 2009  
for a 10% discount!**

## NEED HELP?

**Call us now on +44 208 600 3800  
or e-mail the programme team at  
programmes@cto.int**

## 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 for each course. 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 above. For a full version of our Terms and Conditions, please visit our website at [www.cto.int](http://www.cto.int).

## Withdrawals / 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 £55
- 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 cancellation/withdrawal. 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 (email, 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)