

# Martin W. Koyabe

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## Objective

Offer a unique combination of in depth knowledge and understanding of both communication engineering and IT, based on a broad network research background and industrial experience.

## Career Profile

Highly successful in designing, implementing and testing innovative data communication software for wired and wireless communication networks. I have hands on experience in designing, coding and testing of different software applications (data/multimedia), over complex topologies (LANs/WANs/Wireless). Proven ability to deliver high-quality solutions, which fully support corporate or organizational growth objectives. Worked directly or indirectly, on a number of projects, with different organizations viz. academic/research institutions, non-governmental organizations, banks, hospitals and commercial enterprises. Fostered professional growth, through management training and development of different skills. Demonstrates a great ability to communicate effectively to clients and fellow colleagues. Background includes extensive international travel and exposure to different cultures. Multilingual with fluency in English, Swahili and working knowledge in French language.

## Work and Professional Experience

### *Electronics Research Group (ERG), Aberdeen University, UK - (02/1998 - To date)*

**Job title:** *Research Fellow*

- Concluding an EC funded *multiCAST via GEOstationary* (GEOCAST) project. The project objective was to design and implement an infrastructure for supporting IP multicast services via wireless and next-generation DVB satellite systems to edge networks. My main tasks involved: conducting a comprehensive survey on the suitability of deploying existing reliable IP multicast protocols over high-bandwidth capacity asymmetric links; performing large-scale simulations (using OPNET/ns) to investigate the scalability of a set of surveyed protocols; the designing, implementation and evaluation, over a fastEthernet LAN and GEOCAST testbed, of a robust reliable multicast protocol (i.e. SAT-RMTP) developed in this work; publishing and contributing my findings to other research organisations and standardising bodies (i.e. IETF and ETSI); and liaising with other project partners to explore commercial trials using SAT-RMTP protocol. Currently SAT-RMTP has been deployed, on trial basis, over a commercial Content Delivery Network (CDN) under an EC funded project called CODIS.
- Integrated a security module with the multicast protocol to provide data encryption and authentication at the edge network.
- Worked for the European Space Agency (ESA), on a network performance project. The aim of the project was to analyse the performance of different multimedia streaming and data applications (running on Solaris/Linux/MAC OS and Windows) over IP multicast enabled, terrestrial and satellite networks.
- Conducted baseline research work for the Joint information Systems Committee (JISC) on a Video Medical Project. The aim of the project was to study the use of digital MPEG-2 video clips for teaching, and its suitability for use with interactive multimedia CAL applications. My main task focused on analysing the degree of video degradation, QoS/CoS issues, and the performance of TimeLine reliable multicast protocol over a wide range of high data rates (> 5 Mbps) network topologies experiencing varying packet loss rates.
- Involved in supervising, lecturing and tutoring undergraduate courses (mathematics and data communication) in the departments and within the university. Acting as the maths course co-ordinator for the Key-Learning department in the university.

**Telos Bioinformatic Ltd, London, UK - (09/1996 - 12/1997)**

Job title: *Internet consultant and programmer (Internship)*

- Worked as part of the multimedia development team, in designing *intelligent* Internet web based multimedia information gathering systems (using JAVA/HTML/CGI) for a number of major pharmaceutical companies. Key project involved designing and implementing a web-based livestock disease monitoring tool for Food and Agriculture Organization (FAO) based in Rome, Italy.

**Partnership in Advanced Computing Technology (PACT), Bristol, UK - (05/1997 - 09/1997):**

Job title: *Researcher*

- Worked as a researcher with the application development team, involved in designing, implementing and multimedia applications (JAVA/HTML) and IEEE protocols (C/C++).
- Designed and implemented a compiler (based on BISON and YACC) for visualizing the behaviour of *IEEE 1355 PROTOCOL Standard*, using JAVA programming language, as part of my M.Sc. project work.

**Africa Regional Centre for Computing (ARCC), Nairobi, Kenya - (01/1995 - 08/1996):**

Job title: *Principal Communication Engineer*

- Part of the team that pioneered the provision of full Internet services (IS) to a number of organizations and research institutions in Kenya. This was in conjunction with the National Science Foundation (NSF), based in the US, who provided the technical expertise. Key tasks included: running and maintaining the main ISP network infrastructure consisting of servers (running BSD Unix, Solaris and Linux), configuring modem (internal/external) and CISCO routers (running CGMP).
- Trained new recruits in the company on network operations (installation, trouble-shooting and configuring customer work stations and modems), customer service skills and use of application software.
- Worked on consultancy projects, for a number of non-governmental organizations, research institutions, banks, embassies and commercial enterprises, on behalf of ARCC.

**Kenya Rural Enterprise Programme (KREP) Bank, Nairobi, Kenya - (06/1993 - 12/1994):**

Job title: *Systems Administrator/Analyst*

- Managed and maintained the LAN infrastructure, based on LANtastic and Banyan Vines.
- Offered technical advise to senior managers and heads of departments on emerging technologies and relevant financial systems suited for the organization.
- Conducted several in-house staff training sessions and seminars, on newly acquired computer systems and common software applications.

**Egerton University, Computer Department, Njoro, Kenya - (10/1990 - 05/1993):**

Job title: *Teaching Assistant*

- Teaching computer science courses to undergraduates
- Worked as a consultant for the computing service department.

## Technical Expertise

- *Applications:* All Microsoft Office products, Adobe Photoshop, Illustrator, VISIO, Paint Brush, and a number of Unix-, PC- and MAC OS- software tools (Scripts, Perforce & Codewarrior) .
- *Languages:* C, C++, Visual C++, ANSI C, Perl, CGI, Java, Java++, XML, HTML, Network Simulator-ns, Clipper, Bison, YACC and Assembly languages, MATLAB.
- *Network:* Network configuration and design, installation, and maintenance. Configuring LAN Switches, Hubs and routers (experience in CISCO products).
- *Operating Systems:* Microsoft Windows NT 4.0 Workstation, Microsoft Windows NT Server 4.0, Sun Solaris 2.x, Unix BSD, Free BSD, Linux, MAC OS 8.x, 9.x, X, Win 95/98/2000/XP, Novell, Windows for Workgroups 3.11, LANtastic 4.0, Banyan vines.
- *Protocols/Multimedia Tools:* IP, TCP/IP, UDP, UDP-lite, TCP, ATM, Reliable Multicast Protocols (SAT-RMTP, MFTP, SRM, PGM, Timeline), Real Time Protocols (RTSP, RTTP), Multicast Streaming Applications/Tools (mtrace, ping, mhealth, mrinfo, RAT, VAT, VIC).

## Education

PhD	<i>Communication Engineering</i>	Aberdeen University, United Kingdom	2003
MSc	<i>Advanced Computing</i>	Bristol University, United Kingdom	1997
PGDipSC	<i>Computer Science</i>	Nairobi University, Kenya	1993
BSc	<i>Statistics and Computing</i>	Egerton University, Kenya	1990

## Publications

### Papers/Posters

- **M.W. Koyabe, G. Fairhurst,** *Satellite Reliable Multicast Transport Protocol (SAT-RMTP): A Network Tool for Multimedia File Distribution over High-Bandwidth Asymmetric Links* (Yet to be published).
- **M.W. Koyabe, G. Fairhurst, A. Matthews, H. Cruickshank, S. Iyengar, M.P. Howarth,** *Satellite Reliable Multicast Transport Protocol (SAT-RMTP): A Network Tool for Multimedia File Distribution*, Poster and Protocol Demonstration, Alcatel Space Industries (ASPI), 29<sup>th</sup> April 2003, Toulouse, France.
- **M.W. Koyabe, G. Fairhurst,** *Performance of Reliable Multicast Protocols via Satellite at EHF with Persistent Fades*, presented in the 7<sup>th</sup> Ka-Band Utilization Conference, 26-28<sup>th</sup> September 2001, Santa Margherita Ligure, Genoa, Italy.
- **M.W. Koyabe, N. M. Hamilton, G. Fairhurst, S. Pavett, S. Klein, D. Alexander, N. Samaraweera, K. Duguid, A. Keen,** *Video-based computer-assisted learning*, Journal of Audiovisual Media in Medicine, Vol: 24 (1), 21-26, 2001.
- **M.W. Koyabe, G. Fairhurst,** *RELIABLE MULTICAST VIA SATELLITE: A Comparison Survey and Taxonomy*, International Journal of Satellite Communications (IJSC), Vol: 19 (3-28), 2001.
- **M.W. Koyabe, G. Fairhurst,** *Wide Area Multicast Internet Access via Satellite*, presented at the 5<sup>th</sup> European Conference on Satellite Communications, Toulouse, France, 3 - 5<sup>th</sup> November 1999.
- **M.W. Koyabe, Y. Baldeh,** *Considerations in Application of Advanced IT in Medicine and HealthCare: An African Perspective*. African Telematics Conference, Mid-Rand, South Africa, May 1996. (Earlier version presented at KENIT Conference, KICC, Nairobi, Kenya, 1995).

### Reports

- **M.W. Koyabe, G. Fairhurst, A. Matthews, H. Cruickshank, S. Iyengar, M.P. Howarth**, *A Network Tool for Multimedia File Distribution*, Technical Report, GEOC-UOA-2400-3, Department of Engineering, Aberdeen University, UK, April 2002.
- **M.W. Koyabe, G. Fairhurst, A. Matthews**, *Satellite Reliable Multicast Transport Protocol (SAT-RMTP): Specification and Functionality*, Technical Report GEOC-UOA-2400-2, Department of Engineering, Aberdeen University, UK, November 2001.
- **M.W. Koyabe, G. Fairhurst, A. Matthews**, *Reliable Multicast Transport Techniques Appropriate for Satellite Networks*, Technical Report GEOC-UOA-2400-1, Department of Engineering, Aberdeen University, UK, June 2001.
- **M.W. Koyabe, G. Fairhurst, A. Matthews**, *Survey of Multicast Applications and Protocols*, Technical Report GEOC-UOA-1300-1, Department of Engineering, Aberdeen University, UK, August 2000.
- **M.W. Koyabe**, *Reliable Multicast via Satellite or Wireless Links: A Comparison Survey and Taxonomy*. Technical Report, Department of Engineering, Aberdeen University, UK, May 1999.
- **M.W. Koyabe, G. Fairhurst**, *StarBurst MFTP Evaluation and Performance over FastEthernet and the CODE VSAT System*. Technical Workshop Internet Protocols over Satellite, ESTEC, Noordwijk, Netherlands, January 1999.
- **M.W. Koyabe**, *TimeLine System Performance & Experience: MPEG-2 File Delivery to Forester Hill Medical School Library*. Technical Report, Department of Engineering, Aberdeen University, UK, August 1998.

### Thesis

- **M.W. Koyabe**, *Appropriate and Robust Reliable Multicast Transport Techniques for Satellite Networks experiencing persistent link fades*. PhD. Thesis, Electronics Research Group, Department of Engineering, Aberdeen University, UK.
- **M.W. Koyabe**, *Compiler Implementation for Visualizing Protocol Behaviour: With Application to IEEE 1355 PROTOCOL Standard*. MSc. Thesis, Department of Computer Science, Faculty of Engineering, Bristol University, UK, October 1997.
- **M.W. Koyabe**, *Information Systems in Egerton University: Case study on the Bookshop and Egerton Material Centre (EMC)*, PG Diploma Thesis, Institute of Computer Science, Nairobi University, Kenya, December 1992.

### Research Interest

Data communication protocols and applications over IP in wired (LANs) or wireless (i.e. Mobile or Satellite) networks. Specific areas of interest include: -

- Reliability techniques adopted over wired or wireless network links experiencing severe outages or fades.
- Scalability of reliable multicast protocols and applications to large heterogeneous receiver groups experiencing varied data loss rates, congestion and data rates.
- Bandwidth-on-Demand (BoD), Quality of Service (QoS) and Class of Service (CoS) deployment issues over wired and wireless networks.
- Internet Protocol (IP) routing mechanisms and deployment over Any Source Multicast (ASM) and Source Specific Multicast (SSM).
- Real-time MPEG video streaming
- Internet security issues (authenticity and integrity) at the edge of network.
- Wide-band CDMA, CDMA2000, UMTS, 2.5G/3G and Wi-Fi Technologies

### **Merits/Awards/Grants**

- European Space Agency (ESA) study grant (1998).
- TELOS Bio-informatics study grant (1996).
- Banyan Vines Network certificate (1994).
- Best student in Computer Science (undergraduate) (1990).
- Best Student of the Year; Most Creative and Innovative Science Club Member; Best A' Level results; Best Physics talk –awarded in my A' levels (1986).

### **Professional Affiliations**

- European Research Association (EU-RA)
- Institute of Electrical and Electronics Engineers (IEEE).
- Institute of Electrical Engineers (IEE).
- Association of Computing Machinery (ACM).
- Internet Society (ISOC).
- 3<sup>rd</sup> Generation Partnership Project (3GPP)