
Preface

Since the release of the first Internet Phone in 1995, Voice over Internet Protocol (VoIP) has grown exponentially, from a lab-based application to today's established technology, with global penetration, for real-time communications for business and daily life. Many organisations are moving from the traditional PSTN networks to modern VoIP solutions and are using VoIP products such as audio/video conferencing systems for their daily business operation. We depend on different VoIP tools such as Skype, Google Talk and Microsoft Lync to keep contact with our business partners, colleagues, friends and family members, virtually any time and from anywhere. We now enjoy free or low cost VoIP audio or even high quality video calls which have made the world like a small village for real-time audio/video communications. VoIP tools have been incorporated into our mobile devices, tablets, desktop PCs and even TV sets and the use of VoIP tools is just an easy one-click task.

Behind the huge success and global penetration of VoIP, we have witnessed great advances in the technologies that underpin VoIP such as speech/video signal processing and compression (e.g., from narrowband, wideband to fullband speech/audio compression), computer networking techniques and protocols (for better and more efficient transmission of multimedia services), and mobile/wireless communications (e.g., from 2G, 3G to 4G broadband mobile communications).

This book aims to provide an understanding and a practical guide to some of the fundamental techniques (including their latest developments) which are behind the success of VoIP. These include speech compression, video compression, media transport protocols (RTP/RTCP), VoIP signalling protocols (SIP/SDP), QoS and QoE for voice/video calls, Next Generation Networks based on IP Multimedia Subsystem (IMS) and mobile VoIP, together with case studies on how to build a VoIP system based on Asterisk, how to assess and analyse VoIP quality, and how to set up a mobile VoIP system based on Open IMS and Android mobile. We have provided many practical examples including real trace data to illustrate and explain the concepts of relevant transport and signalling protocols. Exercises, illustrative worked examples in the chapters and end-of-chapter problems will also help readers to check their understanding of the topics and to stretch their knowledge. Step-by-step instructions are provided in the case studies to enable readers to build their own open-source based VoIP system and to assess voice/video call quality accordingly, or to set up their own mobile VoIP system based on Open IMS Core and IMSDroid with an Android mobile. Challenging questions are set up in the case studies to help them to think deeper and to practice more.

This book has benefitted from the authors' research activities in VoIP and related activities of over 10 years. In particular, it has benefitted from the recent international collaborative projects, including the EU FP7 ADAMANTIUM project (Grant agreement no. 214751), the EU FP7 GERYON project (Grant agreement no. 284863) and the EU COST Action IC1003 European Network on Quality of Experience in Multimedia Systems and Services (QUALINET). The book has also benefitted from the authors' teaching experience in developing and delivering modules on "Voice and Video over IP" to undergraduate and postgraduate students at Plymouth University in the past four years. Some of the contents of the book were drawn from the lecture notes and some of the case studies materials from the lab activities.

This book can be used as a textbook for final year undergraduate and first year postgraduate courses in computer science and/or electronic engineering. It can also serve as a reference book for engineers in industry and for those interested in VoIP, for example, those who wish to have a general understanding of VoIP as well as those who wish to have an in-depth and practical understanding of key VoIP technologies.

In this book, Dr. Sun has contributed to Chaps. 1 (Introduction), 2 (Speech Compression), 3 (Video Compression), 4 (Media Transport) and 6 (VoIP QoE); Dr. Mkwawa has contributed to Chaps. 1 (Introduction), 5 (SIP Signalling), 7 (IMS and Mobile VoIP), 8 (Case Study 1), 9 (Case Study 2) and 10 (Case Study 3); Dr. Jammeh has contributed to Chap. 3 (Video Compression) and Professor Ifeakor has contributed to Chap. 1 (Introduction) and the book editing. Due to the time constraints and the limitation of our knowledge, some errors or omissions may be inevitable in the book, we welcome any feedbacks and comments about the book.

Finally, we would like to thank Simon Rees, our editor at Springer-Verlag for his encouragement, patience, support and understanding in the past two years in helping us complete the book. We would also like to express our deepest gratitude to our family for their love, support and encouragement throughout the process of this book.

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For Fixed and Mobile Networks

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