



Quick answers to common problems

Elastix Unified Communications Server Cookbook

More than 140 real-life, hands-on recipes and tips to install, deploy, administer, and maintain any VoIP/Unified Communications solution based on Elastix

Gerardo Barajas Puente

[PACKT] open source*
PUBLISHING community experience distilled

Elastix Unified Communications Server Cookbook

More than 140 real-life, hands-on recipes and tips to install, deploy, administer, and maintain any VoIP/Unified Communications solution based on Elastix

Gerardo Barajas Puente



BIRMINGHAM - MUMBAI

Elastix Unified Communications Server Cookbook

Copyright © 2015 Packt Publishing

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior written permission of the publisher, except in the case of brief quotations embedded in critical articles or reviews.

Every effort has been made in the preparation of this book to ensure the accuracy of the information presented. However, the information contained in this book is sold without warranty, either express or implied. Neither the author, nor Packt Publishing, and its dealers and distributors will be held liable for any damages caused or alleged to be caused directly or indirectly by this book.

Packt Publishing has endeavored to provide trademark information about all of the companies and products mentioned in this book by the appropriate use of capitals. However, Packt Publishing cannot guarantee the accuracy of this information.

First published: March 2015

Production reference: 1260315

Published by Packt Publishing Ltd.
Livery Place
35 Livery Street
Birmingham B3 2PB, UK.

ISBN 978-1-84951-934-2

www.packtpub.com

Credits

Author

Gerardo Barajas Puente

Project Coordinator

Akash Poojary

Reviewers

Elvin E. Casem

Muhammad Zeeshan Munir

Bernard L. Samontanes

Proofreaders

Simran Bhogal

Safis Editing

Commissioning Editor

Joanna Finchen

Indexer

Priya Subramani

Acquisition Editor

James Jones

Graphics

Sheetal Aute

Content Development Editor

Anand Singh

Production Coordinator

Shantanu Zagade

Technical Editor

Ryan Kochery

Cover Work

Shantanu Zagade

Copy Editors

Tani Kothari

Vikrant Phadke

Sameen Siddiqui

About the Author

Gerardo Barajas Puente is an electrical and electronics engineer with more than 10 years of experience in the VoIP/ToIP field. He is currently employed as a CTO for Neocenter S.A. de C.V., a well-known value-added VoIP distributor in Mexico, Central and South America, and the United States. He has a strong background in signal processing, information security, and VoIP telephony. He has progressed in his career by supporting, testing, designing, and managing VoIP applications and platforms for a wide range of scenarios, such as call centers, corporate offices, multiple-site systems, and so on. He has also done some development (programming) of VoIP solutions with Asterisk, Elastix, and FreePBX with the help of the PHP, Perl, and XML languages. He is one of the first Elastix certified engineers and has spoken twice at Elastix World.

About the Reviewers

Elvin E. Casem has provided creative, innovative, and state-of-the-art web solutions and IT services. He works as an IT consultant and university instructor at Don Mariano Marcos Memorial State University. He is the CEO of Evenly Ten Web Solutions, with extensive experience in computer applications and programming management, IT systems and infrastructure, cloud computing, web development, resource management, and customer relationship management. Elvin has worked with various information and communication technology companies, such as the IT Group, Inc. and Click Dolphin LLP. He also implements Google Apps for Education for universities and campuses in Region I, the Philippines. Elvin's clients over the last 8 years include The Asset Quest LLP, Eton Properties, Pilipinas Shell, MeadJohnson Philippines, ABS-CBN Investor Relations, and Stores Specialist, among others. He has made many presentations for students and professionals.

I would like to thank God for giving me the strength and knowledge to complete this book review, my family for always supporting me, Christianne Lynnette for being an inspiration and always believing in me, and Packt Publishing for trusting me to be in this reviewing team. Thank you so much!

Muhammad Zeeshan Munir is a freelance ICT consultant and solution architect. Currently, he is working as an infrastructure consultant at Qatar Computing and Research Institute (QCRI), Qatar Foundation, in Qatar. There, he is responsible for the technology and architecture of public and private clouds and management of the research infrastructure (based on thousands of CPU cores, GPUs, co-processors, and Peta bytes of storage). Zeeshan began his career as a system administrator in 2004, and since then, he has acquired and executed many successful projects in multi-million-dollar ICT industries. With more than 10 years of experience, he provides ICT consultancy services for different clients in Europe. He regularly contributes to different wikis and produces various video tutorials, mostly about technologies such as VMWare products, Zimbra E-mail Services, OpenStack, and Red Hat Linux. These can be found at <http://zee.linxsol.com/system-administration>. In his free time, he likes to travel, and he speaks English, Urdu, Punjabi, and Italian.

Bernard L. Samontanes has 18 years of experience in the ICT industry and has taken up multiple roles from Manila to Riyadh. He possesses a mixed skill set that spans technical support, software engineering, and systems and network administration, security, and infrastructure management. He started programming using Turbo Pascal and then used Turbo C/C++. He has been interested in database application development using FoxPro, Visual Dbase, and Visual Basic. At present, Bernard enjoys coding using C#, MySQL, and PHP for his software development projects, which are mainly in POS, unified messaging solutions (e-mail, IVR, SMS, MMS, and GPRS), and Asterisk integrations.

Bernard is currently employed as the infrastructure manager (POS) for Int'ltec SkyBand, where he oversees network and software development for POS projects. He has also implemented Elastix for POS call center operations and is planning to roll out a full Asterisk-based automated attendant and IVR for the entire company.

I would like to thank my wife, Amelia, who provides support and never-ending understanding during my hectic schedule reviewing this book. To my daughter, Anna, and son, Aizek, who keep me enlighten whenever they need my attention for their school activities.

www.PacktPub.com

Support files, eBooks, discount offers, and more

For support files and downloads related to your book, please visit www.PacktPub.com.

Did you know that Packt offers eBook versions of every book published, with PDF and ePub files available? You can upgrade to the eBook version at www.PacktPub.com and as a print book customer, you are entitled to a discount on the eBook copy. Get in touch with us at service@packtpub.com for more details.

At www.PacktPub.com, you can also read a collection of free technical articles, sign up for a range of free newsletters and receive exclusive discounts and offers on Packt books and eBooks.



<https://www2.packtpub.com/books/subscription/packtlib>

Do you need instant solutions to your IT questions? PacktLib is Packt's online digital book library. Here, you can search, access, and read Packt's entire library of books.

Why Subscribe?

- ▶ Fully searchable across every book published by Packt
- ▶ Copy and paste, print, and bookmark content
- ▶ On demand and accessible via a web browser

Free Access for Packt account holders

If you have an account with Packt at www.PacktPub.com, you can use this to access PacktLib today and view 9 entirely free books. Simply use your login credentials for immediate access.

Table of Contents

Preface	vii
Chapter 1: Installing Elastix	1
Introduction to Elastix Unified Communications System	1
Installing Elastix Unified Communications Server software	7
Inserting the CD and booting	8
Choosing the system's language	12
Choosing the keyboard type	13
Partitioning the hard disk	14
Configuring the network interfaces	16
Selecting a proper time zone	20
Entering the password for the user root	21
Logging into the system for the first time	25
Chapter 2: Basic PBX Configuration	31
Introduction	32
Setting up Elastix's dashboard	32
Setting up the network parameters	36
Managing users	37
Configuring telephony cards	39
Adding VoIP trunks	43
Adding SIP extensions	45
Creating IAX extensions	48
Creating analog extensions	49
Creating custom extensions	51
Provisioning extensions in a simple way	52
Outbound calls	55
Inbound calls	57
Creating an auto-attendant	59

Controlling outbound calls using different prefixes	61
Controlling outbound calls by using a trunk sequence	62
Controlling outbound calls by using patterns	64
Controlling outbound calls using PIN Sets	65
Managing endpoints – Batch of extensions	66
Managing extensions – Batch of endpoints	68
Using the Endpoint Configurator	69
Chapter 3: Understanding Inbound Call Control	71
Introduction	71
Displaying voice announcements	72
Blocking unwanted callers	74
Routing calls based on caller ID	75
Using MySQL to search for the caller's name	76
Using HTTP to search for a user	78
Setting up day/night controls	78
Forwarding incoming calls to another extension or number	80
Setting up a ring group	83
Setting up a queue for ACD	85
Chapter 4: Knowing Internal PBX Options and Configurations	93
Introduction	94
Creating conference rooms	94
The Web Conference module	96
Changing the language of a call flow	98
Adding miscellaneous applications	99
Adding miscellaneous destinations	100
Music on hold	101
Using Internet audio streams	102
Using the SSH protocol	103
Using PuTTY as an SSH client	104
Accessing the FreePBX admin module	106
Installing the Custom-Context module	108
Using the Custom-Context module to restrict outbound calls	109
Creating paging groups	112
Creating intercom groups	113
Parking calls	114
Configuring extensions' voicemail	115
The VmX Locator feature	116
Configuring the Voicemail Blasting module	117
Setting the Callback feature	118
Configuring DISA	119

Chapter 5: Setting up the E-mail Service	121
Elastix's e-mail internals	121
Sending an e-mail message from the command line	123
Configuring the remote SMTP – setting up a Gmail relay account	123
Setting the domain and configuring the relay option	126
Adding e-mail accounts	127
Controlling ad using the e-mail service with the webmail interface	128
Filtering unwanted messages	129
Creating e-mail lists	130
Setting vacation messages	133
Chapter 6: Elastix Fax System	135
Introduction	135
Setting up the Elastix fax system	136
Sending a fax from Elastix's WebGUI	138
Viewing the sent and received faxes	140
Installing a fax client	141
Sending a fax using the HylaFAX client	146
Receiving a fax	146
Modifying the e-mail template	148
Chapter 7: Using the Call Center Module	149
Introduction	150
Installing the Call Center module	150
Configuring the Call Center module	152
Creating a group of agents	156
Creating and adding agents to a group	157
Configuring a queue for standard agent login	158
Queue for agent callback login	160
Configuring queues for incoming calls	161
Setting up the clients	162
Configuring inbound campaigns	163
Creating a script for outgoing campaigns	165
Configuring agent break time	167
Configuring an outgoing campaign	168
Creating the call file specification	169
Invoking a URL through the campaign	170
Adding a number to the Do not call list	172
Adding a list of numbers to the Do not call list	173
Adding dynamic agents to the agent console	174
Adding static agents/callback extensions	174
Logging agents to the console dynamically	175

The callback login	176
Description of the agent console	177
Call center reports	180
Chapter 8: Going Deeper into Unified Communications	183
Installing the Openfire instant messaging service	184
Integrating Openfire with Asterisk IP-PBX	189
Integrating VTiger CRM with Elastix	192
Setting up video calls	196
Dialing through MS Outlook	197
Using Directories	201
Configuring a speed dial list	203
Enabling BLFs and hints	205
Chapter 9: Networking with Elastix	209
Setting up remote extensions	209
SIP trunking between Elastix systems	213
Creating a VPN tunnel in our Elastix Unified Communications Server with OpenVPN	219
Configuring channel banks	224
Enabling multisites with Elastix	226
Chapter 10: Knowing the State of Your Elastix System and Troubleshooting	233
Using the Flash Operator Panel	234
Looking at the Call Detailed Report	236
Extension's summary	238
Creating billing rates	239
Destination Distribution	241
SIP/IAX debugging	242
Using Wireshark for debugging	244
Using TCPDUMP for debugging	248
Helpful Linux commands for debugging	249
Debugging Asterisk	251
Chapter 11: Securing your Elastix System	253
Knowing the best practices when installing Elastix – Physical security	254
Knowing the best practices when installing Elastix – Logical security	255
Installing Fail2ban	258
Using Elastix's embedded firewall	262
Using the Security Advanced Settings menu to enable security features	267
Recording and monitoring calls	267
Recording MeetMe rooms	270

Recording queues' calls	271
Monitoring recordings	271
Encrypting voice calls	272
Generating system backups	276
Restoring a backup from one server to another	277
Chapter 12: Implementing Advanced Dialplan Functions	279
Creating an advanced IVR using Asterisk AGI and Asterisk's Dialplan	280
Enabling a multiconference toggle button	283
Creating your own Dialplan features	285
Creating a phone poll using Elastix	285
Enabling Remote Call Forward	290
Installing the Custom-Context module	291
Using the Custom-Context module	293
Integrating Elastix with other PBXs	296
Integrating GSM Gateways with Elastix	297
Integrating TDM Gateways with Elastix	298
Appendix A: Description and Use of the Most Well-known FreePBX Modules	301
Third-party modules	302
Appendix B: Addon Market Module	303
Appendix C: Asterisk Essential Commands	305
Appendix D: Asterisk Gateway Interface Programming	309
Appendix E: Helpful Linux Commands	313
Index	315

Preface

The main objective of this book is to give you all the necessary tools to configure and support an Elastix Unified Communications Server. We will look at these tools through Cookbook recipes, just follow the steps to get an Elastix System up and running.

Although a good Linux and Asterisk background is required, this book is structured to help you grow from a beginner to an advanced user.

We would like to consider this book as introductory documentation for the journey to becoming a guru in the field of unified communications.

Introduction to the Elastix Unified Communications Server

There is a revolution going on in the field of telecommunication these days. The world is getting smaller, the bandwidth is growing, and the protocols are becoming increasingly standardized, open, and stable.

In 1999, Mark Spencer began a very important project, Asterisk PBX. The advantages of open source licensing allowed this project to grow and develop features that were unachievable with traditional telephony devices at very competitive prices.

Nowadays, enterprises are not just looking for telephone solutions (PBX) anymore. They are looking for integral, complete, and "out-of-the box" solutions that allow them to be as productive as possible. They want to keep their coworkers connected, reachable, and available at all times. If a CTO calls any coworker and the call cannot be answered because the person is at the lobby receiving a customer, it will be routed to that coworker's cell phone, which happens to have a SIP client registered to the PBX using the wireless LAN of the building.

The cost of such a call is almost 0 USD, and even if that coworker does not answer their cell phone, the call can be sent to a voicemail. The voicemail system can send the voice message as an e-mail, and when this person arrives in the office, the message waiting indicator LED on their phone tells them that they have a voice message.

What this book covers

Chapter 1, Installing Elastix, covers basic recipes for installing Elastix.

Chapter 2, Basic PBX Configuration, demonstrates the processes for creating extensions, configuring telephony cards, setting an IVR, and controlling incoming and outgoing calls in a simple way.

Chapter 3, Understanding Inbound Call Control, explains how to get deeper into the IP-PBX features to give the installed solution.

Chapter 4, Knowing Internal PBX Options and Configurations, contains recipes used to configure the language of the recordings (or phrases) the Elastix Unified Communications Server displays, create conference bridges, restrict calls, add miscellaneous destinations and applications, and so on.

Chapter 5, Setting up the E-mail Service, assists you to set up the Elastix Unified Communications Server as an e-mail server.

Chapter 6, Elastix Fax System, explains that although the use of faxes is decreasing, there are situations (especially in communication with banks or government offices) in which it is necessary to send and receive faxes. This chapter is dedicated to this feature.

Chapter 7, Using the Call Center Module, shows one of Palo Santo's best contributions to the world of open source telephony, which is an open source call center module. In this chapter, you will be guided through the process of installing and configuring this feature.

Chapter 8, Going Deeper into Unified Communications, tells you how you can learn more about Unified Communications. This chapter includes recipes for configuring instant messaging, integration with a CRM and Outlook, video calls, and so on.

Chapter 9, Networking with Elastix, proves that one of Elastix's strengths is connecting remote sites and extensions by integrating the dialplan.

Chapter 10, Knowing the State of Your Elastix System and Troubleshooting, tells us when debugging and troubleshooting any situation in our system is necessary. The topics of billing and reporting are also discussed.

Chapter 11, Securing Your Elastix System, shows us that any IP device the Elastix Unified Communications Server can be targeted to be attacked in many ways, from denial-of-service attacks to telephone frauds, and when creating a backup of our solution, this chapter is helpful.

Chapter 12, Implementing Advanced Dialplan Functions, shows advanced features that are not included by default in our Elastix system and are very attractive to some enterprise levels, such as an IVR that retrieves information from a database.

Finally, we will discuss some important topics in the appendices, as follows:

Appendix A, Description and Use of the Most Well-known Free-PBX Modules, tells us about the contributions of third-party modules to the FreePBX community.

Appendix B, Addon Market Module, covers more of the programs certified by Palo Santo Solutions.

Appendix C, Asterisk Essential Commands, shows the most used commands available in Asterisk's command-line interface.

Appendix D, Asterisk Gateway Interface Programming, gives more in-depth information on the commands and information passed between Asterisk and any AGI.

Appendix E, Helpful Linux Commands, lists the most used Linux Commands for managing an Elastix Unified Communications system.

What you need for this book

To take full advantage of Elastix's features, it is desirable to have some knowledge of Linux, networking, and Asterisk. It is also important to know certain concepts of telephony, and be able to edit configuration files.

Who this book is for

This book is intended for those who would like to start learning the configuration steps to have a fully operational Elastix Unified Communication system. If you are a beginner in the VoIP industry, this book is ideal for you. If you are an intermediate or advanced Elastix user, this book is intended to motivate you to explore new boundaries in the world of VoIP.

Sections

In this book, you will find several headings that appear frequently (Getting ready, How to do it, How it works, There's more, and See also).

To give clear instructions on how to complete a recipe, we use these sections:

Getting ready

This section tells you what to expect in the recipe, and describes how to set up any software or any preliminary settings required for the recipe.

How to do it...

This section contains the steps required to follow the recipe.

How it works...

This section usually consists of a detailed explanation of what happened in the previous section.

There's more...

This section consists of additional information about the recipe in order to make you more knowledgeable about the recipe.

See also

This section provides helpful links to other useful information for the recipe.

Conventions

In this book, you will find a number of text styles that distinguish between different kinds of information. Here are some examples of these styles and an explanation of their meaning.

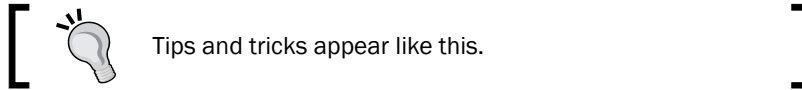
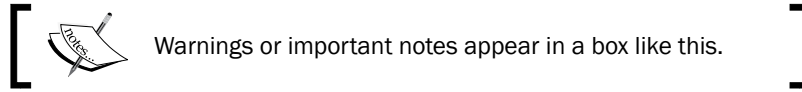
Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows:

"We can include other contexts through the use of the `include` directive."

A block of code is set as follows:

```
nat=yes
externip=<your fixed external IP> or
externhost=<mydomain.com>
localnet=192.168.1.0/255.255.255.0
externrefresh=10
```

New terms and **important words** are shown in bold. Words that you see on the screen, for example, in menus or dialog boxes, appear in the text like this: "Click on the **Set to configure the device** button."



Reader feedback

Feedback from our readers is always welcome. Let us know what you think about this book—what you liked or disliked. Reader feedback is important for us as it helps us develop titles that you will really get the most out of.

To send us general feedback, simply e-mail feedback@packtpub.com, and mention the book's title in the subject of your message.

If there is a topic that you have expertise in and you are interested in either writing or contributing to a book, see our author guide at www.packtpub.com/authors.

Customer support

Now that you are the proud owner of a Packt book, we have a number of things to help you to get the most from your purchase.

Errata

Although we have taken every care to ensure the accuracy of our content, mistakes do happen. If you find a mistake in one of our books—maybe a mistake in the text or the code—we would be grateful if you could report this to us. By doing so, you can save other readers from frustration and help us improve subsequent versions of this book. If you find any errata, please report them by visiting <http://www.packtpub.com/submit-errata>, selecting your book, clicking on the **Errata Submission Form** link, and entering the details of your errata. Once your errata are verified, your submission will be accepted and the errata will be uploaded to our website or added to any list of existing errata under the Errata section of that title.

To view the previously submitted errata, go to <https://www.packtpub.com/books/content/support> and enter the name of the book in the search field. The required information will appear under the **Errata** section.

Piracy

Piracy of copyrighted material on the Internet is an ongoing problem across all media. At Packt, we take the protection of our copyright and licenses very seriously. If you come across any illegal copies of our works in any form on the Internet, please provide us with the location address or website name immediately so that we can pursue a remedy.

Please contact us at copyright@packtpub.com with a link to the suspected pirated material.

We appreciate your help in protecting our authors and our ability to bring you valuable content.

Questions

If you have a problem with any aspect of this book, you can contact us at questions@packtpub.com, and we will do our best to address the problem.

1

Installing Elastix

The topics covered in this chapter are:

- ▶ Installing Elastix Unified Communications Server software
- ▶ Inserting the CD-ROM in the desired server or host
- ▶ Choosing the system language
- ▶ Choosing the keyboard type
- ▶ Partitioning the hard disk
- ▶ Configuring the network interfaces
- ▶ Selecting a proper time zone
- ▶ Entering the password for the user root
- ▶ Logging into the system for the first time

Introduction to Elastix Unified Communications System

There is a revolution going on in the telecommunications field these days. The world is getting smaller, bandwidth is growing, and protocols are getting increasingly standardised, open, and stable.

It was in 1999 when Mark Spencer began a very important project: **Asterisk PBX**. The advantages of open source licensing allowed this project to develop features unachievable using traditional telephony devices, at very competitive prices.

Nowadays, enterprises are not merely looking for telephonic solutions (PBX) anymore; they are looking for integrated, complete, and *out-of-the box* solutions that allow them be as productive as possible. They want to keep their co-workers connected, reachable, and available at all times. If a CTO calls any coworker and the call is not answered, because the person was at the lobby receiving a customer, it will be routed to this coworker's cellular phone, which happens to have a **Session Initiation Protocol (SIP)** client registered to the PBX using the wireless LAN of the building.

The cost of this call is almost \$0. However, if this coworker does not answer his cell phone, this call can be forwarded to a voicemail. The **Voicemail System** can send the voice message to an e-mail and when this person arrives at the office, he will have the "message waiting" indicator LED on his phone notifying him that he has a voice message.

Elastix's brief history

We all know that Asterisk runs on Linux and has gained so much attention that it has made system administrators, integrators, developers, and tech-savvy individuals see a big opportunity in business, but sometimes their knowledge of Linux is limited. This has led to projects such as **FreePBX**, **Trixbox**, **AsteriskNOW**, **Elastix**, and **PBX in a Flash** that fulfill the need to configure and administer Asterisk PBX without being a Linux expert.

However, Edgar and José Landívar of Palosanto Solutions went far beyond this. In March 2006, they released the first version of **Elastix**. This first version was only a visual reporting tool, and by December 2006, Elastix was officially released as a Unified Communications suite using Linux CentOS as the operating system.

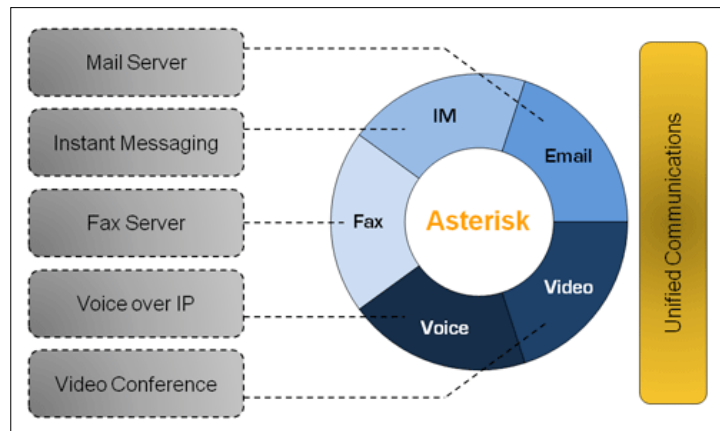
The project began to gain attention because all the communications software was completely integrated and available with the PBX engine. There was no need to recompile the fax system, for example. You just had to configure it. There was no need to recompile the drivers for a **public switched telephone network (PSTN)** card. You only had to install it physically on your server (or PC), Web-GUI would detect the card, and you would be able to configure it as well.

In many Latin American countries, digital E1 telephony lines use a very old and limited protocol called **Multi-Frequency Compelled R2** (MFC/R2 or just R2). In order to make this kind of telephony lines and cards support MFC/R2 for Asterisk, there is a module from an abstraction layer called **Unicall** (by Steve Underwood) that must be downloaded and compiled; after this patch, Asterisk has to be recompiled. This situation was very stressful for many aficionados. However, thanks to Palosanto Solution's view, since the first release of Elastix, this library has been compiled and installed. Users just needed to configure all the parameters to have their R2 E1 lines work with Asterisk.

Later, with the help of Moisés Silva (the creator of the Openr2:MFC/R2 signaling library), the support for MFC/R2 protocol was much easier. Providing support for the Spanish language gave Elastix a big advantage over other open source telephony distributions. This innovative "vision" has made this project very important these days in the open source telephony solutions community. Today, Palosanto Solutions have achieved a long list of awards and more than one million downloads.

What is Elastix?

Elastix is an **open source unified communications platform** that uses Community Enterprise Operating System Linux(**CentOS**) as the operating system. The best way to describe Elastix is with the following diagram:



As you can see, the elements involved in Elastix's architecture allow any user or enterprise to use the PBX as a gateway to the PSTN, and incorporate many other tools, programs, and elements to communicate in a more efficient way.

For example, users can receive a fax in their e-mail account, or they can have remote extensions in order to integrate all office branches and use them as a single entity to reduce call costs.

Users can also start video calls and video conferences by using their own devices such as cell phones and tablets.

Features list

Elastix's main features can be grouped in general as IP-PBX, fax, e-mail, collaboration, and messaging features. The following sections list these features, among others.

General features

The following table lists Elastix's general features:

General Features	
Online embedded help	Centralized updates management
Voicemail	Web interface configuration
System resources monitor	Backup/restore support via web
Network configuration tool	Support for Skinny/ Media Gateway Control Protocol (MGCP) protocols
Server shutdown from the web GUI	Configurable server date, time, and time zone
Access control to the interface based on Access control lists (ACL)	Port knocking
Backs up on an FTP server	Elastix's marketplace
Heartbeat module	New dashboard
Elastix modules and RPMs	Elastix news applet
DHCP client list module	Hardware detector enhanced
Automatic backup restore	Telephony hardware information
Backup restore validation	Communication activity applet
DHCP assigned by MAC	Process status applet

IP-PBX main features

The following table lists Elastix's telephony features:

Telephony Features	
Call recording	Conference center with virtual rooms
Voicemail	SIP and Inter-Asterisk eXchange (IAX) codecs support, among others
Voicemail-to-e-mail functionality	Supported codecs: Adaptive differential pulse-code modulation (ADPCM) , G.711 (A-Law & μ -Law), G.722, G.723.1 (pass through), G.726, G.728, G.729, GSM, and iLBC (optional) among others.

Telephony Features	
Flexible and configurable Interactive voice response (IVR)	Support for analog interfaces as Foreign eXchange Subscriber (FXS) / Foreign eXchange Office (FXO) , (PSTN/POTS)
Voice synthesis support	Support for digital interfaces (E1/T1/J1) through PRI/BRI/R2 protocols
IP terminal batch configuration tool	Caller ID
Integrated echo canceler by software	Multiple trunk support
Endpoint configurator	Incoming and outgoing routes with support for dial pattern matching
Support for videophones	Support for follow-me
Hardware detection interface	Support for ring groups
DHCP server for dynamic IP	Support for paging and intercom
Web-based operator panel	Support for time conditions
Call parking	Support for PIN sets
Call detail record (CDR) report	Direct Inward System Access (DISA)
Billing and consumption report	Callback support
Channel usage reports	Support for Bluetooth interfaces through cellphones (chan_mobile)
Support for call queues	Elastix Operator Panel (EOP)
Distributed dialplan with Dundi	VoIP provider configuration
Support for softphones	Virtual conference rooms
PBX interconnection	Least cost routing

Fax features

The following table lists all the features related to fax:

Fax server based on HylaFAX	Fax-to-e-mail customization
Fax visor with downloaded PDFs	Access control for fax clients
Fax-to-e-mail application	Can be integrated with Winprint HylaFAX
SendFax module - fax sent through web interface	

Collaboration features

The following table lists the collaboration-related features:

PBX-integrated calendar with support for voice notifications	Web conference
Phonebook with click-to-dial capabilities	Calendar module
Integrated Customer relationship management (CRM) to VTiger CRM	Billing support with A2Billing
Extension roaming	

Instant messaging

The following table lists all the features related to instant messaging:

Openfire instant messaging server	User session reports
IM client-initiated calls	Jabber support
Web-based management for IM server	Plugin support
IM group support	Lightweight Directory Access Protocol (LDAP) support
Support for other IM gateways like MSN, Yahoo Messenger, GTalk, and ICQ	Server-to-server support

E-mail

The following points list all the e-mail related features:

- ▶ Mail server with multi-domain support
- ▶ Web-based management
- ▶ Support for mail relay
- ▶ Web-based email client
- ▶ Support for quotas
- ▶ Anti-spam support
- ▶ Based in Postfix for high email volume

Installing Elastix Unified Communications Server software

Elastix Unified Communications Server's operating system is CentOS Linux. To install it, we need a PC or server and a bootable CD-ROM with Elastix Unified Communications System. The most common installation process is via CD-ROM. However, it is possible to install Elastix by using a USB device or virtualization software. For the purposes of this book, we will be working with Elastix Stable Release 2.5.0, which can be downloaded from www.elastix.org.

Depending on the hardware specifications, we have to choose between a 32-bit and a 64-bit distribution. Considering that 32-bit operating systems cannot work with more than 4 GB RAM computers, it is always desirable to work with 64-bit operating systems in order to have a more stable and reliable system.

The minimum system requirements for a small office with 12 analog lines (or trunks) and perhaps 12 extensions are as follows:

- ▶ CPU Speed: 1 GHz
- ▶ RAM: 1 GB RAM
- ▶ Hard Disk: At least 80 GB

It is very important to create a very good design for any Unified Communications System from the beginning. It does not matter how many features your system may have (which involves the PBX part) or how amazing it is, if the voice quality is poor, the chances of replacing your system with another solution are very high.

The main elements to cover when designing a VoIP solution are as follows:

- ▶ Resources of the hardware on which the Elastix Unified Communications System will be installed
- ▶ Quality of service in the LAN/VLAN
- ▶ Number of simultaneous (or concurrent) calls expected
- ▶ Number and type of external lines and internal endpoints
- ▶ Transcoding, recording calls, conferencing, and queues, as they demand more resources than a regular two-way call
- ▶ Additional services such as an e-mail service and a DHCP service

Before installing Elastix Unified Communications Server, it is necessary to check whether the PC or the server has CD-ROM booting capabilities. If this booting option is not available, please try using a USB device or an external CD-ROM device.

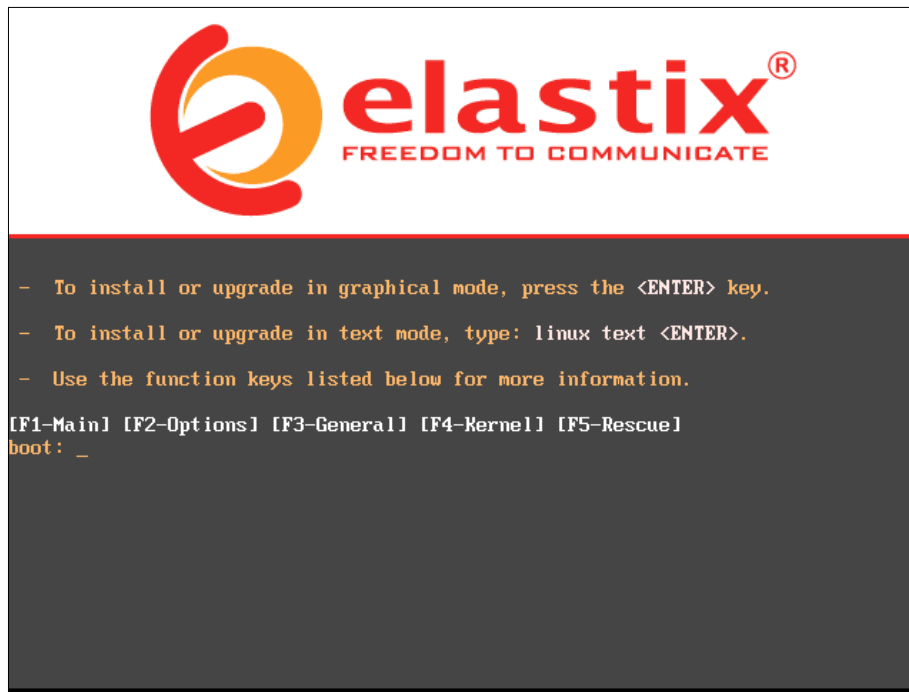
In order to check the booting capabilities of a PC/server, we must access its **BIOS** (which stands for **Basic Input Output System (BIOS)**) and follow its menu either to check it or enable it. This is usually done by pressing the *Delete*, *F1*, *F2*, or *Esc* key.

Inserting the CD and booting

After downloading the Elastix Unified Communications Server software, the file will be saved as an ISO image. It is mandatory to "burn" this image to a CD by using burning software and selecting the **BURN ISO IMAGE** or **BURN ISO** or **BURN IMAGE** option.

How to do it...

1. Turn on the destination device (PC or Server).
2. Place the CD into the CD tray immediately after turning on the PC/server. If all goes well, we will see the following screen:



3. Press the *Enter* key at the boot prompt to start the installation process.

There is more...

We can wait for 15 seconds or simply press the *Enter* key, and the installation process will start automatically. However, we will describe the options accessible with the *F1*, *F4*, *F3*, *F4*, and *F5* keys. The first option **F1-Main** will allow us to return to the **Main Booting Menu**. The **F2-Options** are the **Installer Boot Options**.

```

                          Installer Boot Options

- To disable hardware probing, type: linux noprobe <ENTER>.
- To test the install media you are using, type: linux mediacheck <ENTER>.
- To enable rescue mode, type: linux rescue <ENTER>.
  Press <F5> for more information about rescue mode.
- If you have a driver disk, type: linux dd <ENTER>.
- To prompt for the use of other install methods such as network
  install when booting from a CD, type linux askmethod <ENTER>.
- If you have an installer update disk, type: linux updates <ENTER>.
- To test the memory in your system type: memtest86 <ENTER>.
  (This option is only available when booting from CD.)

[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _
```

In this option, it is possible to select booting options such as to disable hardware probing (**linux noprobe**), enable rescue mode (**linux rescue**) and so on. To enable any of these booting options, we just type the desired option after the boot prompt and press *Enter*. Sometimes, when the **Advanced Programmable Interrupt Controller (APIC)** is present on newer motherboards and causes some problems during installation, it has been known to cause problems on older hardware. In order to avoid such issues, it is better to disable it. This can be done by typing `linux noapic` or `linux acpi=off`. This is useful on some older systems and is a requirement for using **advanced power management (APM)**. This will disable the hyper-threading support of our processor. The **F3-General** option will display the **General Boot Help**.

```
General Boot Help

You are now ready to begin the installation process.  In most cases,
the best way to get started is to simply press the <ENTER> key.

If you are having problems with the graphical installer, you can use the
'resolution=<width>x<height>' option to try and force a
particular resolution.  For example, boot with
'linux resolution=1024x768'.

Certain hardware configurations may have trouble with the automatic hardware
detection done during the installation.  If you experience problems during the
installation, restart the installation adding the 'noprobe' option.  The
'skipddc' option will also skip monitor probing which hangs some systems.

There are a number of parameters that can be passed to the Linux kernel
at boot time.  Press <F4> for more information.

[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]

boot: _
```

The **F4-Kernel** provides **Kernel Parameter Help**. To pass an option to the kernel, we use the format: `linux <options>`.

```
Kernel Parameter Help

Some kernel parameters can be specified on the command line and will be
passed to the kernel.

To pass an option to the kernel, use the following format:

    linux <options>

If a different installation mode is desired, enter it after the option(s).

For example, to install on a system with 256MB of RAM using noprobe mode,
type the following:

    linux mem=256M noprobe

[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _
```

The **F5-Rescue** option is used for rescuing an already-installed system.

```
Rescue Mode Help

The installer includes a rescue mode which can be used when a system
does not boot properly. The rescue mode includes many useful
utilities (editor, hard drive and RAID tools, etc.) which will allow
one to restore a system to a working state.

To enter the rescue mode, boot your system from the installation
CDROM or floppy and type linux rescue <ENTER>.

[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _
```

Choosing the system's language

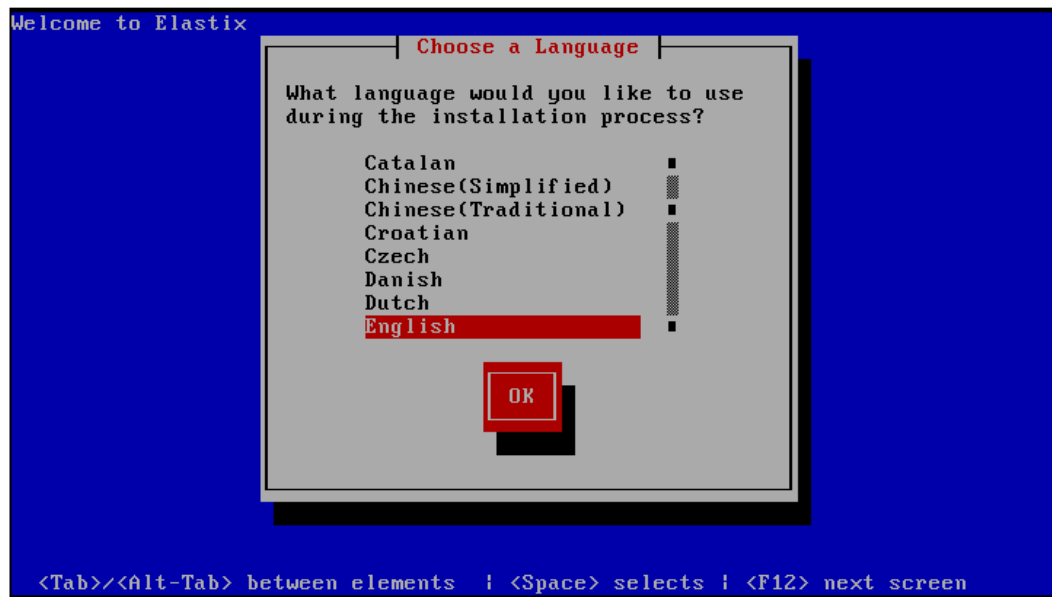
The next screen is the **Choose a Language** screen. On this screen, we choose the language that we will use during the installation process. As shown at the bottom of the screen, the *Tab* key allows us to jump between options. The *Spacebar* key will let us select any option with ***** and may work as the *Enter* key. The *F12* key will select the highlighted option and go to the following screen.

How to do it...

Here are the steps to select the system's installation language:

1. Select the language you would like to use by using the arrow keys from the keyboard.
2. Press *Tab* to move to the **OK** button.
3. Once the **OK** button is highlighted, press the *Spacebar* key or *Enter*.

These steps are shown in the following screen-shot:



Choosing the keyboard type

The next screen is the **Keyboard Type** screen where we will select the type of keyboard we are using in this process.

How to do it...

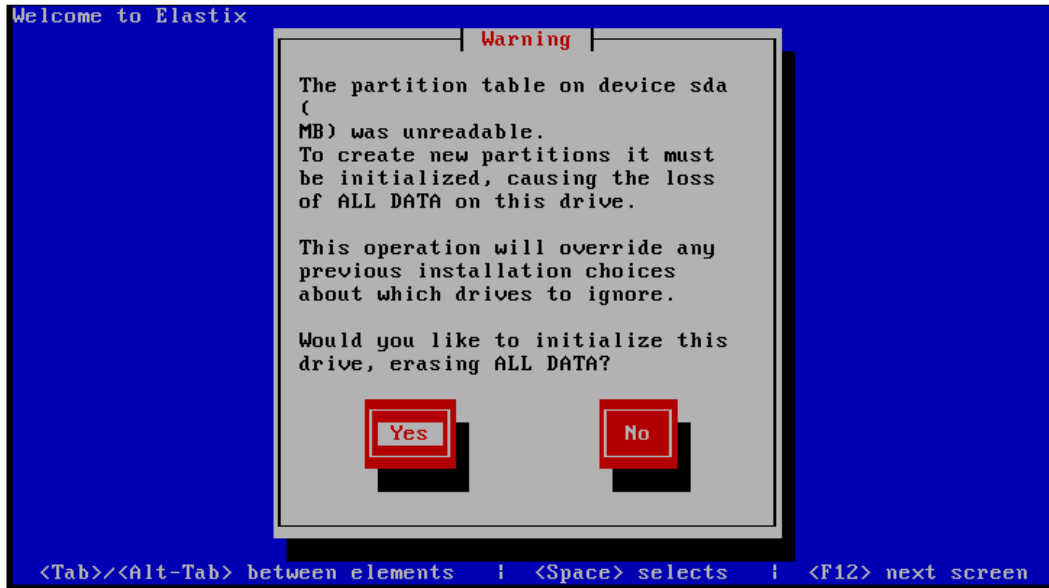
Here are the steps to choose the keyboard type:

1. Use the arrow keys and then press *Tab* highlighting the **OK** button.
2. Press the *Spacebar* key or *Enter*, as shown in the following image:



Partitioning the hard disk

After the previous step, the following screen may or may not appear; it depends on the hard disk status of the PC/server. If the hard disk has not been partitioned or does not have a valid partition table, it will indicate the need to initialize the disk. The **YES** option is already highlighted. Press *Enter* to proceed.



The next screen is the **Partitioning Type** screen. It displays the hard disk or disks detected by the installation script. If the PC/server has a RAID array of disks, the installation program will also display it on this screen as a single hard disk. The installation program was created to automatically partition the selected disk. To deploy an efficient Elastix Unified Communications Server installation, it is highly recommended to dedicate the entire hard disk space.

How to do it...

Here are the steps to partition a disk:

1. Use the arrow keys from the keyboard to move the selection up to **Remove all partitions on selected drives and create default layout.** as shown in the next screenshot. If we have multiple drives in our system, we need to make sure that it has chosen the correct drive.
2. Use *Tab* to move to the **OK** button.