

Wireless Networking in the Developing World

A practical guide to planning and building low-cost
telecommunications infrastructure

Wireless Networking in the Developing World

For more information about this project, visit us online at <http://wndw.net/>

First edition, January 2006

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About This Book

This book is part of a set of related materials about the same topic: Wireless Networking in the Developing World. While not all materials are available at the time of first printing, these will include:

- Printed books
- A DRM-free PDF version of the book
- An archived mailing list for discussion of the concepts and techniques described in the book
- Additional case studies, training course material and related information

For all of this material and more, see our website at <http://wndw.net/>

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The website will include additional case studies, currently available equipment, and more external website references. Volunteers and ideas are welcome. Please join the mailing list and send ideas.

The training course material was written for courses given by the Association for Progressive Communications and the Abdus Salam International Center for Theoretical Physics. See <http://www.apc.org/wireless/> and <http://wireless.ictp.trieste.it/> for more details on those courses and their material. Additional information was provided by the International Network for the Availability of Scientific Publications, <http://www.inasp.info/>. Some of this material has been incorporated directly into this book.

Credits

This book was started as the BookSprint project at the 2005 session of WSFII, in London, England (<http://www.wsfii.org/>). A core team of seven people built the initial outline over the course of the event, presented the results at the conference, and wrote the book over the course of a few months. Rob Flickenger served as the lead author and editor. Throughout the project, the core group has actively solicited contributions and feedback from the wireless networking community.

Core group

- **Corinna “Elektra” Aichele.** Elektra’s main interests include autonomous power systems and wireless communication (antennas, wireless long shots, mesh networking). She made a small linux distro based on slackware geared to wireless mesh networking. This information is of course redundant if one reads the book... <http://www.scii.nl/~elektra>
- **Rob Flickenger** was the lead author, editor, and illustrator of this book. Rob has been writing professionally since 2002. He has written and edited several books, including *Building Wireless Community Networks* and *Wireless Hacks*, published by O’Reilly Media. He co-founded Metrix Communication LLC (<http://metrix.net/>), a wireless hardware company dedicated to open source software, open standards, and ubiquitous wireless networking. Prior to becoming an active member of SeattleWireless (<http://seattlewireless.net/>), he was a founding father of the NoCat project (<http://nocat.net/>).

Rob’s ultimate goal is the realization of Infinite Bandwidth Everywhere for Free. He publishes some of his adventures along the path toward realizing this goal at <http://constructiveinterference.net/>

- **Carlo Fonda** is a member of the Radio Communications Unit at the Abdus Salam International Center for Theoretical Physics in Trieste, Italy.
- **Jim Forster** has spent his career in software development, mostly working on operating systems and networking in product companies. He has experience with several failed startup companies in Silicon Valley, and one successful one, Cisco Systems. After a lot of product development work there, his more recent activities involve projects and policies for improving Internet access in developing countries. He can be reached at jrforster@mac.com.
- **Ian Howard.** After flying around the world for seven years as a paratrooper in the Canadian military, Ian Howard decided to trade his gun for a computer.

After finishing a degree in environmental sciences at the University of Waterloo he wrote in a proposal, "Wireless technology has the opportunity to

bridge the digital divide. Poor nations, who do not have the infrastructure for interconnectivity as we do, will now be able to create a wireless infrastructure." As a reward, Geekcorps sent him to Mali as the Geekcorps Mali Program Manager, where he led a team equipping radio stations with wireless interconnections and designed content sharing systems.

He is now a consultant on various Geekcorps programs.

- **Tomas Krag** spends his days working with *wire.less.dk*, a registered non-profit, based in Copenhagen, which he founded with his friend and colleague Sebastian Büttrich in early 2002. *wire.less.dk* specialises in community wireless networking solutions, and has a special focus on low-cost wireless networks for the developing world.

Tomas is also an associate of the Tactical Technology Collective <http://www.tacticaltech.org/>, an Amsterdam-based non-profit "to strengthen social technology movements and networks in developing and transition countries, as well as promote civil society's effective, conscious and creative use of new technologies." Currently most of his energy goes into the Wireless Roadshow (<http://www.thewirelessroadshow.org/>), a project that supports civil society partners in the developing world in planning, building and sustaining connectivity solutions based on license-exempt spectrum, open technology and open knowledge.

- **Marco Zennaro**, aka *marcusgennaro*, is an electronic engineer working at the ICTP in Trieste, Italy. He has been using BBSes and ham radios since he was a teenager, and he is happy to have merged the two together working in the field of wireless networking. He still carries his Apple Newton.

In addition to the core group, several others have contributed their writing, feedback, editing, and other skills to make this project what it is.

Contributors

- **Sebastian Büttrich** (<http://wire.less.dk/>) is a generalist in technology with a background in scientific programming and physics. Originally from Berlin, Germany, he worked with IconMedialab in Copenhagen from 1997 until 2002. He holds a Ph.D. in quantum physics from the Technical University of Berlin. His physics background includes fields like RF and microwave spectroscopy, photovoltaic systems, and advanced maths.

He is also a performing and recording musician.

- **Kyle Johnston**, <http://www.schoolnet.na/>
- **Adam Messer**. Originally trained as an insect scientist, Adam Messer metamorphosed into a telecommunications professional after a chance conversation in 1995 led him to start one of Africa's first ISPs. Pioneering wireless data services in Tanzania, Messer worked for 11 years in eastern

and southern Africa in voice and data communications for startups and multinational cellular carriers. He now resides in Amman, Jordan.

- **Ermanno Pietrosemoli** has been involved in planning and building computer networks for the last twenty years. As president of the Latin American Networking School, Escuela Latinoamericana de Redes “EsLaRed”, www.eslared.org.ve, he has been teaching wireless data communications in several countries while keeping his base at Mérida, Venezuela.
- **Dana Spiegel** is an independent software consultant and founder of sociableDESIGN (www.sociableDESIGN.com), a consulting firm that specializes in social software and wireless technologies. He serves as the Executive Director and a member of the Board of Directors of NYCwireless (www.nycwireless.net), a New York City non-profit organization that advocates and enables the growth of free, public wireless networks. He also writes the Wireless Community blog (www.wirelesscommunity.info).

Support

- **Lisa Chan** (<http://www.cowinanorange.com/>) was the lead copy editor.
- **Richard Lotz** (<http://greenbits.net/~rlotz/>) provided technical review and suggestions. He works on SeattleWireless projects and would like to take his node (and his house) off the grid.
- **Casey Halverson** (<http://seattlewireless.net/~casey/>) provided technical review and suggestions.
- **Catherine Sharp** (<http://odessablue.com/>) provided copy edit support.
- **Matt Westervelt** (<http://seattlewireless.net/~mattw/>) provided technical review and copy edit support. Matt is the founder of SeattleWireless (<http://seattlewireless.net/>) and an evangelist for FreeNetworks worldwide. He left the corporate world to start Metrix Communication LLC (<http://metrix.net/>), a company created to supply FreeNetworkers with high quality, standards-based wireless networking products. As a child, he watched a lot of Sesame Street and has a firm (perhaps misguided) belief that cooperation can solve a lot of the world's problems.

Special thanks

The core team would like to thank the organizers of WSFI for providing the space, support, and occasional bandwidth that served as the incubator for this project. We would especially like to thank community networkers everywhere, who devote so much of their time and energy towards fulfilling the promise of the global Internet. Without you, community networks could not exist.