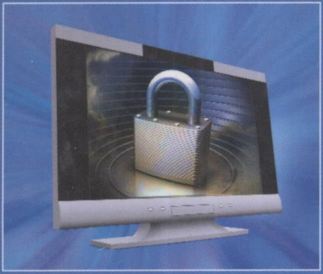

IPTV Security

Protecting High-Value Digital Contents

David Ramirez, *Alcatel-Lucent, UK*

Television was one of the inventions that shaped the way society and culture evolved over the second half of the twentieth century. It had the powerful effect of shrinking the world which created a unified view of how things were. There continues to be an evolution of television and a migration towards a fully interactive and ubiquitous IPTV.

IPTV Security describes the science and history behind TV as well as detailed descriptions of all the architectural components that comprise an IPTV environment. It covers subjects logically from the Head End passing through the aggregation network and concluding with the Home End environment. The countermeasures required to ensure the safe operation of the IPTV environment are also examined, including Digital Rights Management technologies, network level security and application level security. *IPTV Security* defines the security model for an IPTV environment, ensuring that all critical elements are covered and a layered approach to security is implemented.

This book is ideal for anyone responsible for IPTV security such as security officers and auditors working with internet services and telecommunications providers, phone and cable companies, content owners and security consultants and architects. It will also be of interest to networking and security engineers, software developers, network operators and university lectures and students involved in media, IT and security.

- One of the only books available on *IPTV Security*
- Provides a comprehensive view of IPTV components along with the associated threats and required countermeasures
- Detailed descriptions allow readers to understand the technology even if new to the field
- A complete reference guide to the security aspects of IPTV.

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IPTV Security

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Preface

Paraphrasing the famous quote from Karl Marx, I would say that television is the opium of the masses. If we have any doubts, we just need to look at the number of people glued to the TV every day. I fully understand this inclination. When I was young I spent most of my time looking at the world through the TV. Many images and sounds that now as an adult I try to revisit in person. For many of us, black-and-white TV is still a memory (not just a scary story or an urban myth!). We lived with just a few TV channels that started in the morning and by late afternoon were finished. Only in recent years have we had access to cable packages with hundreds of channels and basically any topic we may want to see.

For many years, TV has been a central mechanism for sharing culture. Although books, music and radio are helpful in bringing an insight into other worlds, audiovisual messages are more powerful and gain more attention from the audience. TV is also cheaper than live performances, and the audience is constantly growing as the number of TV sets per family increases. In many countries, TV channels are closely controlled by the political power, which ensures that only acceptable contents are presented to the public. New technologies may change this environment, allowing subscribers to choose what they see and select from different sources worldwide.

Being a TV fan, it was very interesting to get involved in the topic of IPTV. It was almost by accident that I was requested to write a chapter for an IPTV book in 2005. I had to jump head first into the subject and learn as much as I could about IPTV. One of the conclusions from my initial research on the topic was that information was limited, mostly linked with specific products, and some information lacked structure. This is a common situation with new technologies – there are very clever people developing the technology and they have little time to share all the details with the world.

I expanded the topic of IPTV in my MSc dissertation and, as a result of this additional research, concluded that writing a book on the specific aspects of security could be a positive contribution for those interested in the subject. The writing process became a very interesting journey as I was faced with the challenge of structuring in a coherent way a number of separate areas that span different knowledge domains. I tried to replicate my learning process in the book, bringing together all the diverse subjects that form IPTV in a single document that would allow the reader quickly to gain insight into the components and interactions within IPTV environments.

In general, most of the information available on the subject was either related to particular products or was work in progress expected to become a standard in the future. The book intends to provide detailed information about the different elements that comprise the IPTV environment, filling in some of the gaps left by available information.

The most exciting part of exploring IPTV is realizing how subscribers will have the power to control most aspects of their viewing experience. It may not start with the death of television as we know it, but in years to come subscribers will be able to choose exactly when and what type of content they want to access. Today we have a few IPTV deployments worldwide, and these are slowly gathering momentum. This technology will definitely become an alternative to satellite and cable.

Moreover, as we have seen with many other technologies, the first versions do have security vulnerabilities. More specifically, IPTV is a highly complex environment that brings together technologies from many different vendors, and this increases the potential for security problems. The journey of exploring the security of the IPTV environment clearly shows that there are hundreds of potential points of failure. Many components can become the weakest link and allow intruders to have access to digital assets or components within the IPTV environment.

Hopefully, this book will help security professionals gain a broader picture of the challenges and tools available to secure the environment and ensure that security incidents are reduced and controlled.

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David Ramirez has been involved with information security for the past 13 years. He began his career as a networking specialist and then joined a consulting company managing information risk management practice where he was involved in risk assessments for more than 80 companies. His next move was to a risk management company in the UK, as part of their new information security division. In that role, Ramirez was responsible for developing the methodologies for the practice, including penetration testing, ISO 17799 compliance and disaster recovery. He was involved in security projects for banks and other financial institutions around the world. The projects focused on security awareness, disaster recovery and business continuity, security policies, security architecture, managed security services and compliance with international standards.

Ramirez is a member of Alcatel-Lucent's security consulting practice. His responsibilities include innovation and technology, thought leadership and knowledge sharing.

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Introduction to IPTV

1.1 Introduction

Television is one of the inventions that has shaped the way society and culture has evolved in the past 60 years. Back in 1940, the first commercial television broadcast started a revolution, showing people of all ages how others lived outside their towns and cities. Television had a powerful effect, shrinking the world and creating a unified view of how things were.

In 1969, ARPANET was created, and a new stage in communications started. Then, in 1983, the core protocol of ARPANET went from NCP (Network Control Protocol) to TCP/IP (Transfer Control Protocol/Internet Protocol) and the Internet was born.

Both the TV and the Internet have revolutionized the way we live. We now have TV channels providing information 24 hours a day, and the Internet facilitating both communication and commerce. Several common areas between the two have finally drawn the technologies into merging, creating IPTV (Internet Protocol Television).

There are some differences between IPTV and IP video. Although the two terms are very similar, there is a clear distinction in the way the market is using the two. IPTV can be used to refer to commercial offerings by service providers with very close access to the subscriber and offers a number of TV channels with a similar look and feel to standard television. IP video is more common within websites and portals, offering downloadable contents and, in some cases, even TV shows and movies downloaded on demand. If it has a number of channels and acceptable quality, it would be called IPTV.

IPTV is a new technology that enables much more flexibility to manage contents and facilitates direct interaction with the sources of content, improving the feedback and future planning. The customer experience is greatly improved by allowing more control over the type of contents immediately available, as well as two-way communication with content providers.

A few years ago, another new technology shocked the entertainment industry – the infamous Napster enabled people to share music and movies in an unprecedented way. With

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this technology it was not just the case of a neighbor lending a VHS tape with an old movie. With Napster, people shared prerelease albums and videos, creating significant losses for the music industry and movie studios.

Napster was eventually shut down in 2001, but several peer-to-peer (P2P) networks appeared and the phenomenon grew dramatically, reaching millions of users worldwide. Checking e-mule would confirm an average user base of 600–900 million users worldwide.

At the same time, several providers have started to offer legal downloads to the general public. Anyone can buy music and video files. The entertainment industry has added digital rights management (DRM) capabilities to the files and applications used to reproduce the contents, which enables a sustainable model for sales of digital content. Recently, some online stores have even removed DRM to calm the complaints from their subscribers related to fair use of the contents. Users feel that, once they have paid for content, they should be able to enjoy it on any device, and DRM is blocking that fair use possibility.

The recently born IPTV industry will need to address the same issues that once affected the digital media distributors. Customers tend to share information, and over the years there have been a number of very clever pieces of software that enable people to share information and content. A recent example of the phenomenon is Freenet, a reportedly headless network of nodes, storing encrypted sections of content and sending it to anyone who requests a particular piece of data. With Freenet it is very difficult to find who is sharing illegal material, and hence the enforcement of intellectual property rights and copyright restrictions becomes more difficult.

One of the main risks faced by the industry is the rise of thousands of 'home-made stations' willing to broadcast DRM-protected contents. One example of the technology that will come in the future is VideoLAN. This software enables multimedia streaming of MPEG-2, MPEG-4, DVDs, satellite and terrestrial TV on a high-bandwidth network broadcast or unicast. If Freenet and VideoLAN meet, then there will be thousands of encrypted stations broadcasting content outside any control of regulators.

However, the IPTV industry not only has DRM and content protection issues, customers are used to an always-on service with consistent quality. IPTV would have to maintain high levels of availability to convince subscribers that this is a viable option.

With a worldwide trend in privacy protection laws, all the information sent and received from the customer must be protected from third parties trying to capture information. The wireless LAN/WAN markets are a prime example that bad publicity happens to good people. IT managers are not purchasing the technology because of fear, uncertainty and doubt around the potential risks of deploying wireless networks.

Many problems that have affected the cable and satellite industry in the past will gradually migrate to the IPTV service providers, with the increased impact of IPTV providing a two-way communication that includes logical paths connecting TVs to the Internet, and with that environment come computer worms and viruses. IPTV service providers must ensure that subscribers are not able to attack the servers providing contents, and also protect subscribers from the Internet and other subscribers. Most importantly, the shared infrastructure with other services has to be protected.

All those risks and threats must be addressed to achieve a profitable business model. The following chapters of this book will cover some of the basic measures required to implement IPTV security.

Chapter 1 will cover an initial reference to threats to IPTV infrastructures, including known attacks and effects on the IPTV solution.

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