



# Global Information Assurance Certification Paper

Copyright SANS Institute  
Author Retains Full Rights

This paper is taken from the GIAC directory of certified professionals. Reposting is not permitted without express written permission.

## Interested in learning more?

Check out the list of upcoming events offering  
"Security Essentials Bootcamp Style (Security 401)"  
at <http://www.giac.org/registration/gsec>

# An Explanation of "TCP Wrappers" for the Security Manager

Rick Branicki

November 21, 2000

## Introduction:

Security Managers are often challenged with making decisions based upon presentations filled with technical terms and buzzwords. In today's small to large networked environments, it is common to have multiple platforms linked together within the organization. This has become a necessity as different business processes are automated outside of the organization, and these automated processes are only available on the platform of the vendor's choice. It is not always possible for any single Security Manager to have a working knowledge of the specific platform and its terminology. This paper attempts to assist the Security Manager in understanding the concept of TCP Wrappers, a tool often recommended for securing the Unix platform.

## Simplification of terminology:

Anything that relates to a programmed set of instructions will be referred to as a *process*. Programs, scripts, and daemons are examples of processes. Anything that refers to a contained set of data or referenced information will be referred to as a *file*. The word *host* will be restricted to the single system that contains the business processes and related files that help comprise the value of your entity. The combination of these processes and files form your *system*, whether its purpose is billing, law enforcement records management, financial accounting and reporting, or product research and development.

## A word on the importance of securing the host:

The field of Information Systems Security is often described in terms of military defense tactics. This helps in understanding how your network is secured. As an example, think of your network as the walled cities of earlier Mid-Eastern times. The walls were constructed around the perimeter of the city to keep the invaders out. Within these walls, dwellings were further fortified for individual protection. When the walls, or perimeter defenses, failed, families protected themselves by securing themselves inside their dwellings and fought off the invaders from their rooftops. This is a layered defense. Here, if constructed adequately, defenders could save the lives of their families. If your organization is protected from the Internet by perimeter devices such as routers and firewalls, you can think of your host as a dwelling inside the walled city. If your host is adequately configured for security, you could save the lives of your system family should your perimeter defense fail.

## TCP Wrappers

TCP Wrappers is a process that was created by Wietse Venema in the early 1990's(1).

Venema also co-authored the well-known SATAN vulnerability assessment process based upon a concept written in 1993(2). TCP Wrappers was created to help combat an intrusion by a destructive Dutch hacker at the university where Venema worked. They realized that someone from the outside was coming in, and their Unix systems did not have a way to record any information about who was coming in to their systems. TCP Wrappers was developed as an intermediate process to help record that information.

### **Access to Unix services from the Internet:**

To understand how access to your Unix host from the Internet is accomplished, consider the example of a corporate receptionist. The receptionist's job is to answer the phones, find out what service the caller is requesting, and forward the call to the appropriate servicing department. When an Internet customer wants access to your Unix host, there is a receptionist process waiting, or listening, for the call, or request, for Unix services. The receptionist's Unix name is *inetd*. The *inetd* process manages the Internet requests on your Unix host, and is referred to as the Internet Super Server (3). The *inetd* process listens for a Unix service request and forwards it the requested Unix service. Note that in our description of the receptionist's job, there is no mention of writing down or recording any information about the caller or service being requested. This is what Venema encountered when investigating the Dutch intruder. There was no information recorded about the requestor or services requested.

### **What TCP Wrappers does:**

It was mentioned that TCP Wrappers is an intermediate process. Using our receptionist example, consider that we hire a second receptionist that the first receptionist forwards the calls to. This second receptionist, or intermediate receptionist, writes down who the caller is and what servicing department the caller wants. The second receptionist then forwards the call to the requested servicing department. The second receptionist can also be assigned the responsibility of looking up the caller to see if the caller is a legitimate customer of the requested servicing department, and even verify the caller is who she says she is by calling her back at her number. TCP Wrappers, with a Unix name of *tcpd*, performs these functions. The *tcpd* process is inserted between the *inetd* process and the requested Unix services. Here the *tcpd* process can record the remote host and Unix service requested. It can also be configured optionally to look up the remote host in "allow" or "deny" files and do a reverse lookup to verify the identity of the remote host(4). The information is then recorded in your Unix host logs.

### **How this helps you:**

By being able to record information on who is using your Unix host, you have an audit trail to follow should there be a need to investigate a possible intrusion into your system. With the optional TCP Wrappers functions configured, you can verify that the party that wants to get in to your system from the Internet has legitimate access to your system. There is a slight cost in overhead in terms of transaction processing and disk space, as

well as the cost of labor to configure and verify TCP Wrappers. If your Unix System Administrator or vendor is not reviewing and managing your system logs, this will be an additional cost as well.

### **A word of caution:**

TCP Wrappers can be downloaded at no cost from the Internet. In January of 1999, an advisory was published that stated that someone had modified and inserted a Trojan Horse into copies of the TCP Wrappers code found in various sites on the Internet (5). If the only way for you to obtain TCP Wrappers is from the Internet, ensure that your administrator or vendor verifies the authenticity of the code. This can be accomplished with encrypted numerical "hashes" compiled on the code itself and with public key identifiers. A verifiable copy of TCP Wrappers can be obtained at <ftp://ftp.porcupine.org/pub/security/>.

### **The future of TCP Wrappers:**

Wietse Venema stated in his paper that he did not have access to the inetd source code. This is why the intermediate TCP Wrappers process was necessitated. In June of 2000, a replacement process for inetd, *xinetd*, was made available(6). This has promise to incorporate the same functionality as TCP Wrappers (and more) in to the Unix Internet management process that inetd now performs. The xinetd process is new and currently is being tested for bugs and vulnerabilities.

### **Conclusion:**

This paper has been written with the intention of giving the Security Manager an explanation of TCP Wrappers that the manager can understand. It is with hope that the paper has accomplished its purpose.

### **References:**

- (1) Venema, Wietse. "TCP Wrapper". 15 July 1992  
URL: [http://tpwww.gsfc.nasa.gov/tpcf/about/unix/Depotdoc/tcp\\_wrappers/index.html](http://tpwww.gsfc.nasa.gov/tpcf/about/unix/Depotdoc/tcp_wrappers/index.html). (21 Nov. 2000).
- (2) Kemer, Edwin. "What SATAN is". 24 April 1995.  
URL: <http://www.cs.ruu.nl/cert-uu/satan.html>. (21 Nov. 2000).
- (3) delorie software (based upon documentation by Lotter, Mark). "INETD". 5 July 2000.  
URL: <http://theoryx5.uwinnipeg.ca/gnu/inetutils/inetd.8.html> (21 Nov. 2000).
- (4) Quinn, Stephen. "Unix Host and Network Security Tools". 16 May 1996.  
URL: <http://cs-www.ncsl.nist.gov/tools/tools.htm#access> (20 Nov. 2000).
- (5) Carnegie Mellon University. "Cert® Advisory CA-99-01-Trojan-TCP-Wrappers". 22

Jan. 1999. [URL:http://www.cert.org/advisories/ca-1999-01.html](http://www.cert.org/advisories/ca-1999-01.html) (21 Nov. 2000)

(6)Braun, B. "xinetd". (undated). [URL:http://www.synack.net/xinetd](http://www.synack.net/xinetd). (20 Nov. 2000).

© SANS Institute 2000 - 2005, Author retains full rights.

# Upcoming Training

Click Here to  
**{Get CERTIFIED!}**



SANS New York City Winter 2018	New York, NY	Feb 26, 2018 - Mar 03, 2018	Live Event
Mentor Session - AW SEC401	Melbourne, FL	Mar 01, 2018 - May 10, 2018	Mentor
SANS London March 2018	London, United Kingdom	Mar 05, 2018 - Mar 10, 2018	Live Event
Mentor Session - SEC401	Vancouver, BC	Mar 06, 2018 - May 15, 2018	Mentor
Mentor Session - SEC401	Grand Rapids, MI	Mar 09, 2018 - Apr 13, 2018	Mentor
SANS San Francisco Spring 2018	San Francisco, CA	Mar 12, 2018 - Mar 17, 2018	Live Event
SANS Paris March 2018	Paris, France	Mar 12, 2018 - Mar 17, 2018	Live Event
SANS Secure Singapore 2018	Singapore, Singapore	Mar 12, 2018 - Mar 24, 2018	Live Event
SANS Secure Osaka 2018	Osaka, Japan	Mar 12, 2018 - Mar 17, 2018	Live Event
SANS Northern VA Spring - Tysons 2018	McLean, VA	Mar 17, 2018 - Mar 24, 2018	Live Event
SANS Munich March 2018	Munich, Germany	Mar 19, 2018 - Mar 24, 2018	Live Event
SANS Pen Test Austin 2018	Austin, TX	Mar 19, 2018 - Mar 24, 2018	Live Event
Mentor Session - SEC401	Studio City, CA	Mar 20, 2018 - May 01, 2018	Mentor
Mentor Session - AW SEC401	Mayfield Village, OH	Mar 21, 2018 - May 23, 2018	Mentor
SANS Boston Spring 2018	Boston, MA	Mar 25, 2018 - Mar 30, 2018	Live Event
SANS 2018	Orlando, FL	Apr 03, 2018 - Apr 10, 2018	Live Event
SANS 2018 - SEC401: Security Essentials Bootcamp Style	Orlando, FL	Apr 03, 2018 - Apr 08, 2018	vLive
SANS vLive - SEC401: Security Essentials Bootcamp Style	SEC401 - 201804,	Apr 09, 2018 - May 16, 2018	vLive
Community SANS Charleston SEC401	Charleston, SC	Apr 09, 2018 - Apr 14, 2018	Community SANS
Community SANS St. Louis SEC401	St Louis, MO	Apr 16, 2018 - Apr 21, 2018	Community SANS
SANS London April 2018	London, United Kingdom	Apr 16, 2018 - Apr 21, 2018	Live Event
SANS Zurich 2018	Zurich, Switzerland	Apr 16, 2018 - Apr 21, 2018	Live Event
Mentor Session - AW SEC401	Memphis, TN	Apr 17, 2018 - May 17, 2018	Mentor
SANS Baltimore Spring 2018	Baltimore, MD	Apr 21, 2018 - Apr 28, 2018	Live Event
Baltimore Spring 2018 - SEC401: Security Essentials Bootcamp Style	Baltimore, MD	Apr 23, 2018 - Apr 28, 2018	vLive
SANS Seattle Spring 2018	Seattle, WA	Apr 23, 2018 - Apr 28, 2018	Live Event
SANS Riyadh April 2018	Riyadh, Saudi Arabia	Apr 28, 2018 - May 03, 2018	Live Event
Automotive Cybersecurity Summit & Training 2018	Chicago, IL	May 01, 2018 - May 08, 2018	Live Event
Community SANS Houston SEC401	Houston, TX	May 07, 2018 - May 12, 2018	Community SANS
SANS Security West 2018	San Diego, CA	May 11, 2018 - May 18, 2018	Live Event
SANS Northern VA Reston Spring 2018	Reston, VA	May 20, 2018 - May 25, 2018	Live Event