



SHODAN for Penetration Testers

Michael “theprez98” Schearer



SHODAN for Penetration Testers

- What is SHODAN?
- Basic Operations
- Penetration Testing
- Case Study 1: Cisco Devices
- Case Study 2: Default Passwords
- Case Study 3: Infrastructure Exploitation
- Other Examples
- The Future
- Conclusions



By pen testing, I mean...

- Black/gray/white box testing
- Ethical hacking
- Security auditing
- Vulnerability assessment
- Standards compliance
- Training
- All of the above



SHODAN for Penetration Testers

WHAT IS SHODAN?

What is SHODAN? (1)

- SHODAN (<http://www.shodanhq.com/>) is a computer search engine designed by web developer John Matherly (<http://twitter.com/achilleian>)
- While SHODAN is a search engine, it is much different than content search engines like Google, Yahoo or Bing



What is SHODAN? (2)

- Typical search engines crawl for data on web pages and then index it for searching
- SHODAN interrogates ports and grabs the resulting banners, then indexes the banners (rather than the web content) for searching



What is SHODAN? (3)

- Rather than to locate specific content on a particular search term, SHODAN is designed to help the user find specific nodes (desktops, servers, routers, switches, etc.) with specific content in their banners
- Optimizing search results requires some basic knowledge of banners



SHODAN for Penetration Testers

BASIC OPERATIONS

Welcome to SHODAN, the first computer search engine

- » Search the internet for servers, routers and more
- » Find computers running certain software (HTTP, FTP, etc.)
- » Filter hosts based on geographic location

[» Learn more](#)

» Popular Searches

cisco-ios last-modified

Finds Cisco-IOS results that do not require any authentication ;-)

default password

Finds results with "default password" in the banner; the named defaults might work!

FTP anon successful

this search does not provide as many results as the other ftp search, but it looks like all the results that come back are successful anonymous logins

IIS 4.0 web servers

Almost all false positives removed by excluding other versions and http error codes

Contact



FOLLOW ME
ON TWITTER

For direct inquiries:

imath@surtri.com

Presentations



Shodan Computer Search Engine

Shodan Information

SHODAN
Computer Search Engine

Query

Country

All Countries

Service

All Services

Hostname (full or partial)

Search

SHODAN
Helper
Firefox Add-
on

SHODAN - Computer Search Engine

SHODAN

SHODAN Search Provider
Firefox Add-on

- » Search the internet for servers, routers and more
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» Learn more

» Popular Searches

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IIS 4.0 web servers

Contact

Present:

Basic Operations: Search

- Search terms are entered into a text box (seen below)
- Quotation marks can narrow a search
- Boolean operators + and – can be used to include and exclude query terms (+ is implicit default)

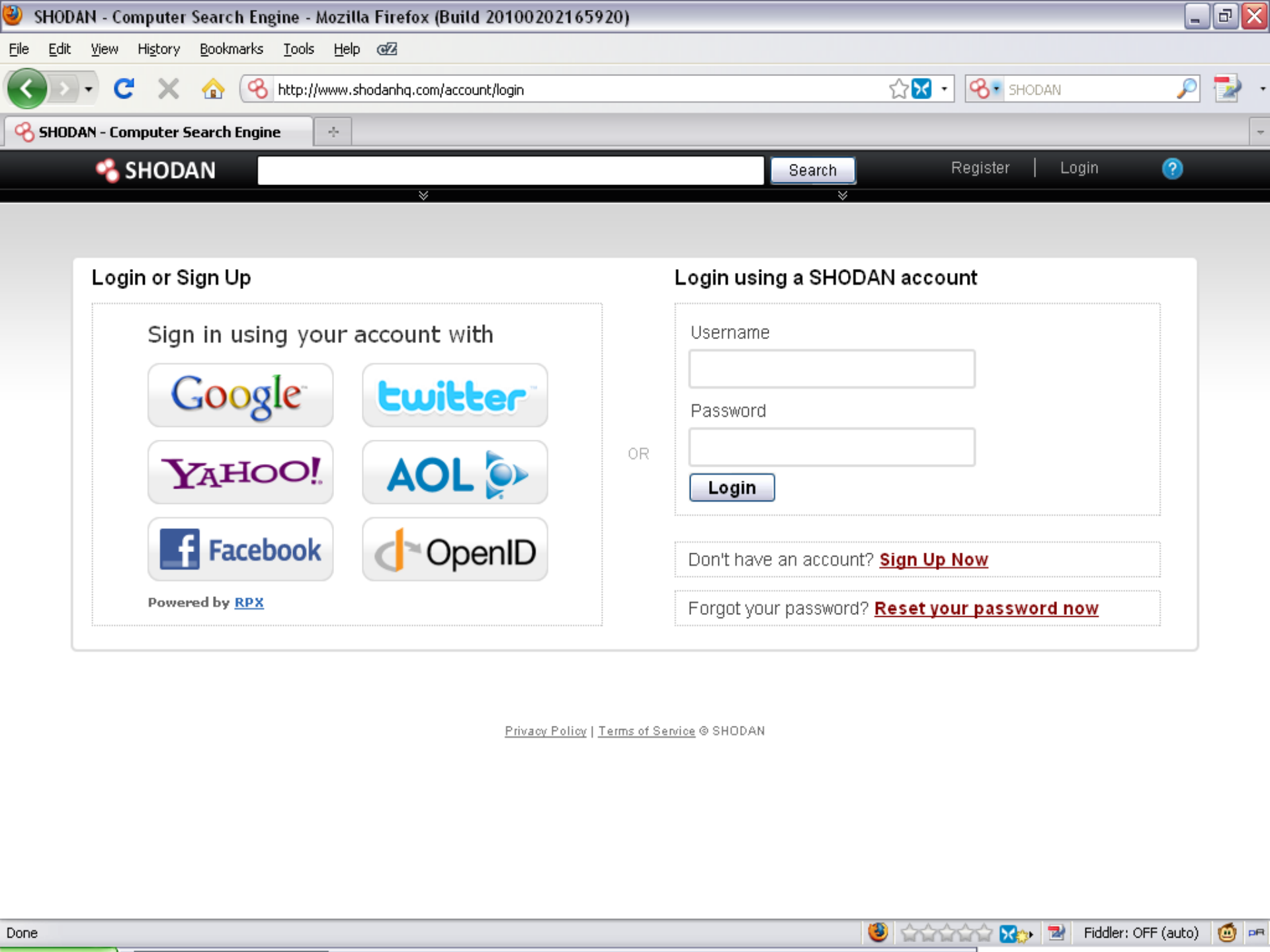
A screenshot of the Shodan search interface. It features a dark horizontal bar with the Shodan logo (three red dots) and the word "SHODAN" in white on the left. To the right of the logo is a large, empty white rectangular text input box. Further to the right is a blue button with the word "Search" in white text.

SHODAN Search



Basic Operations: Login

- Create and login using a SHODAN account;
or
- Login using one of several other options
(Google, Twitter, Yahoo, AOL, Facebook,
OpenID)
- Login is *not* required, but *country* and *net*
filters are not available unless you login
- Export requires you to be logged in



Login or Sign Up

Sign in using your account with

Google

twitter

YAHOO!

AOL

f Facebook

OpenID

Powered by [RPX](#)

Login using a SHODAN account

Username

Password

OR

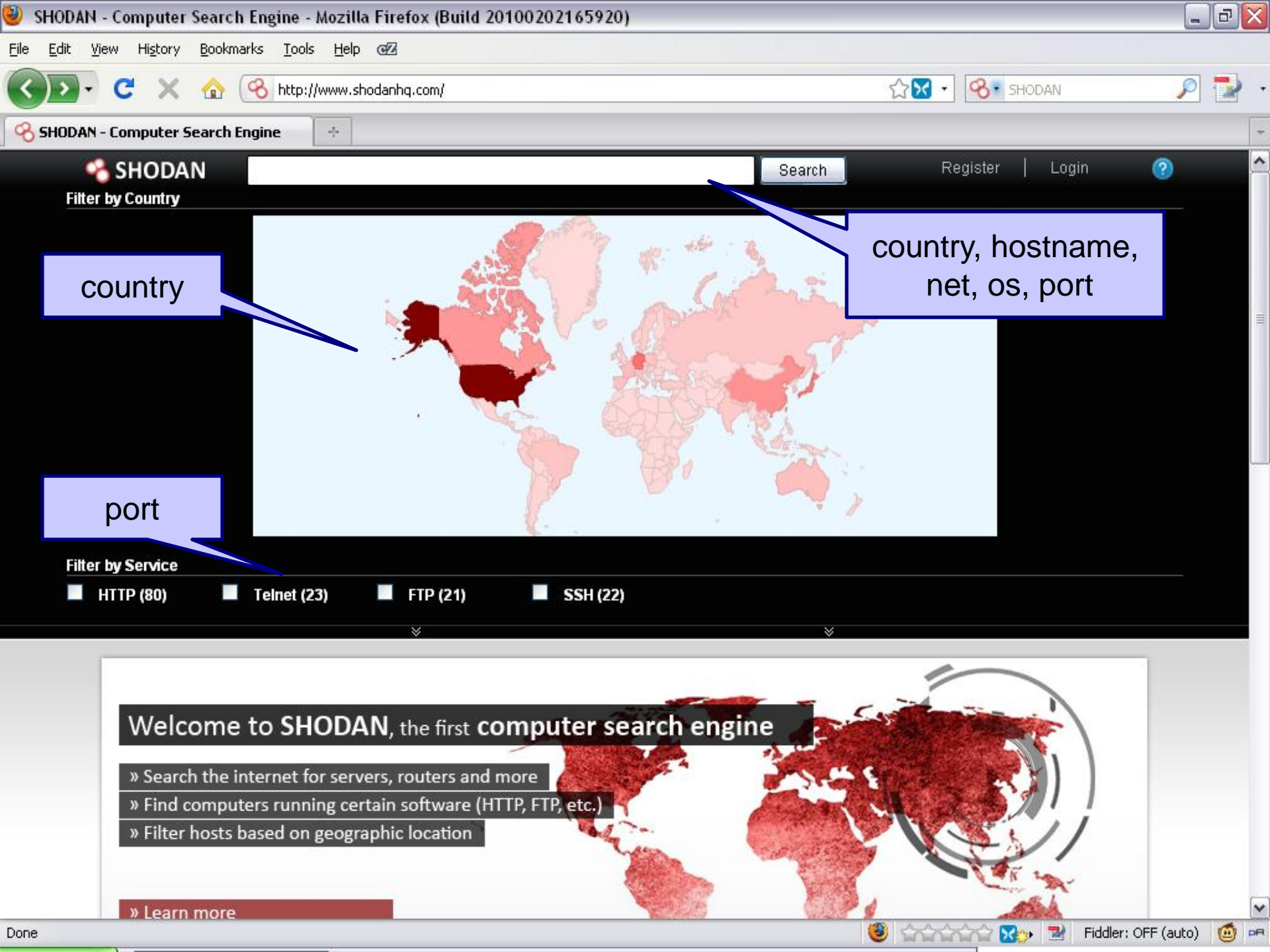
Login

Don't have an account? [Sign Up Now](#)Forgot your password? [Reset your password now](#)



Basic Operations: Filters

- **country:** filters results by two letter country code
- **hostname:** filters results by specified text in the hostname or domain
- **net:** filter results by a specific IP range or subnet
- **os:** search for specific operating systems
- **port:** narrow the search for specific services



country

country, hostname,
net, os, port

port

Filter by Service

☐ HTTP (80) ☐ Telnet (23) ☐ FTP (21) ☐ SSH (22)

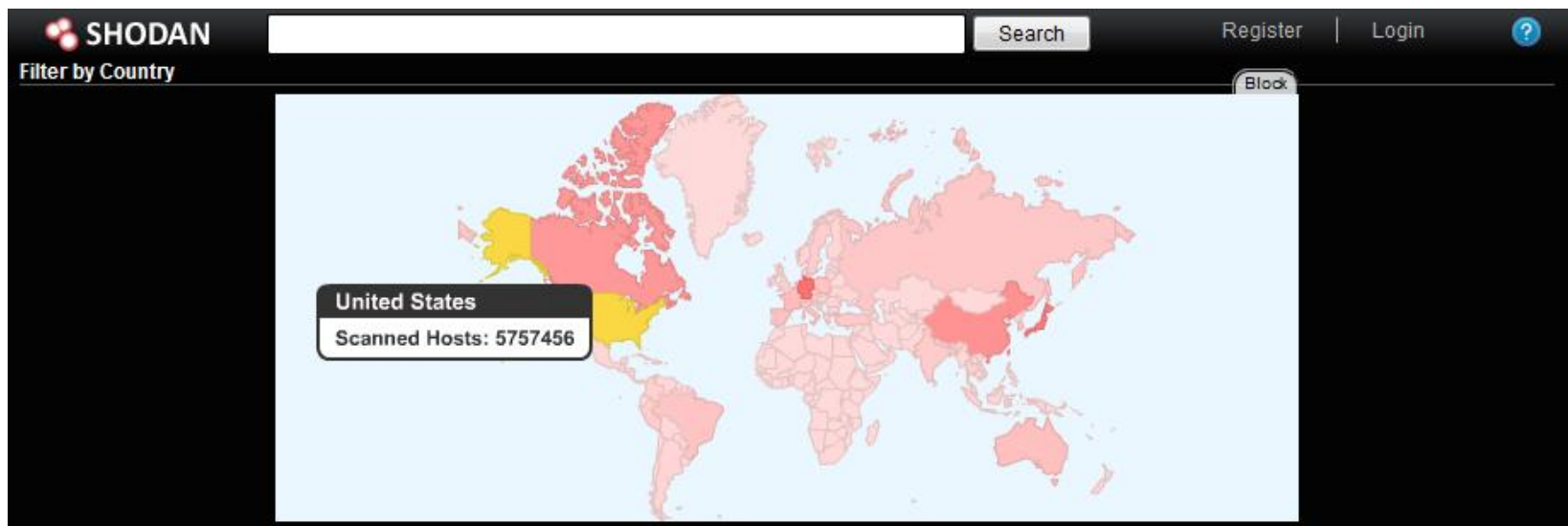
Welcome to SHODAN, the first computer search engine

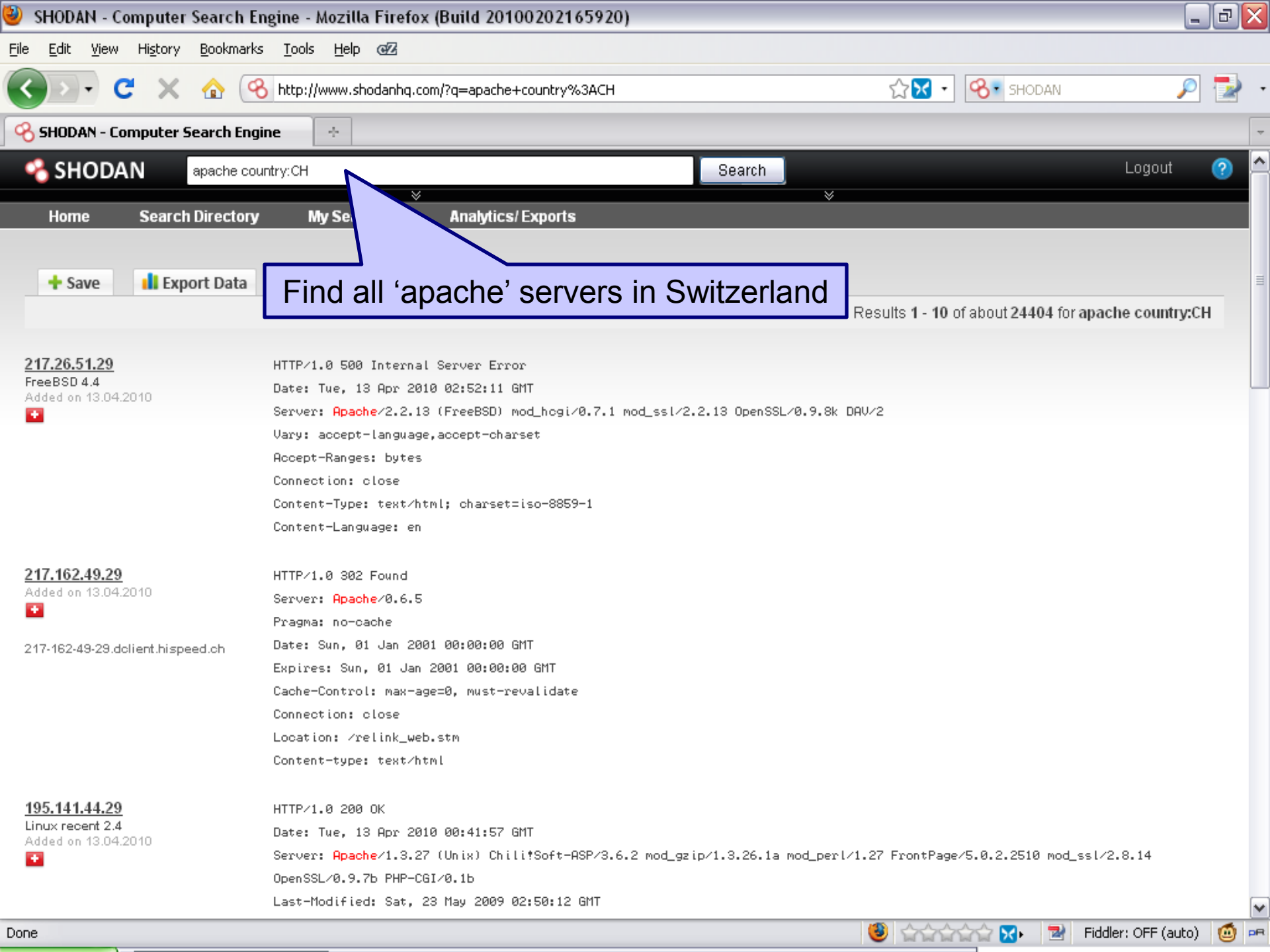
- » Search the internet for servers, routers and more
- » Find computers running certain software (HTTP, FTP, etc.)
- » Filter hosts based on geographic location

» Learn more

Basic Operations: Country Filter

- Filtering by country can be accomplished by clicking on the country map (available from the drop down menu)
- Mouse over a country for the number of scanned hosts for a particular country





Find all 'apache' servers in Switzerland

Results 1 - 10 of about 24404 for apache country:CH

217.26.51.29

FreeBSD 4.4
Added on 13.04.2010



HTTP/1.0 500 Internal Server Error
Date: Tue, 13 Apr 2010 02:52:11 GMT
Server: **Apache**/2.2.13 (FreeBSD) mod_hcgi/0.7.1 mod_ssl/2.2.13 OpenSSL/0.9.8k DAV/2
Vary: accept-language, accept-charset
Accept-Ranges: bytes
Connection: close
Content-Type: text/html; charset=iso-8859-1
Content-Language: en

217.162.49.29

Added on 13.04.2010



217-162-49-29.dclient.hispeed.ch

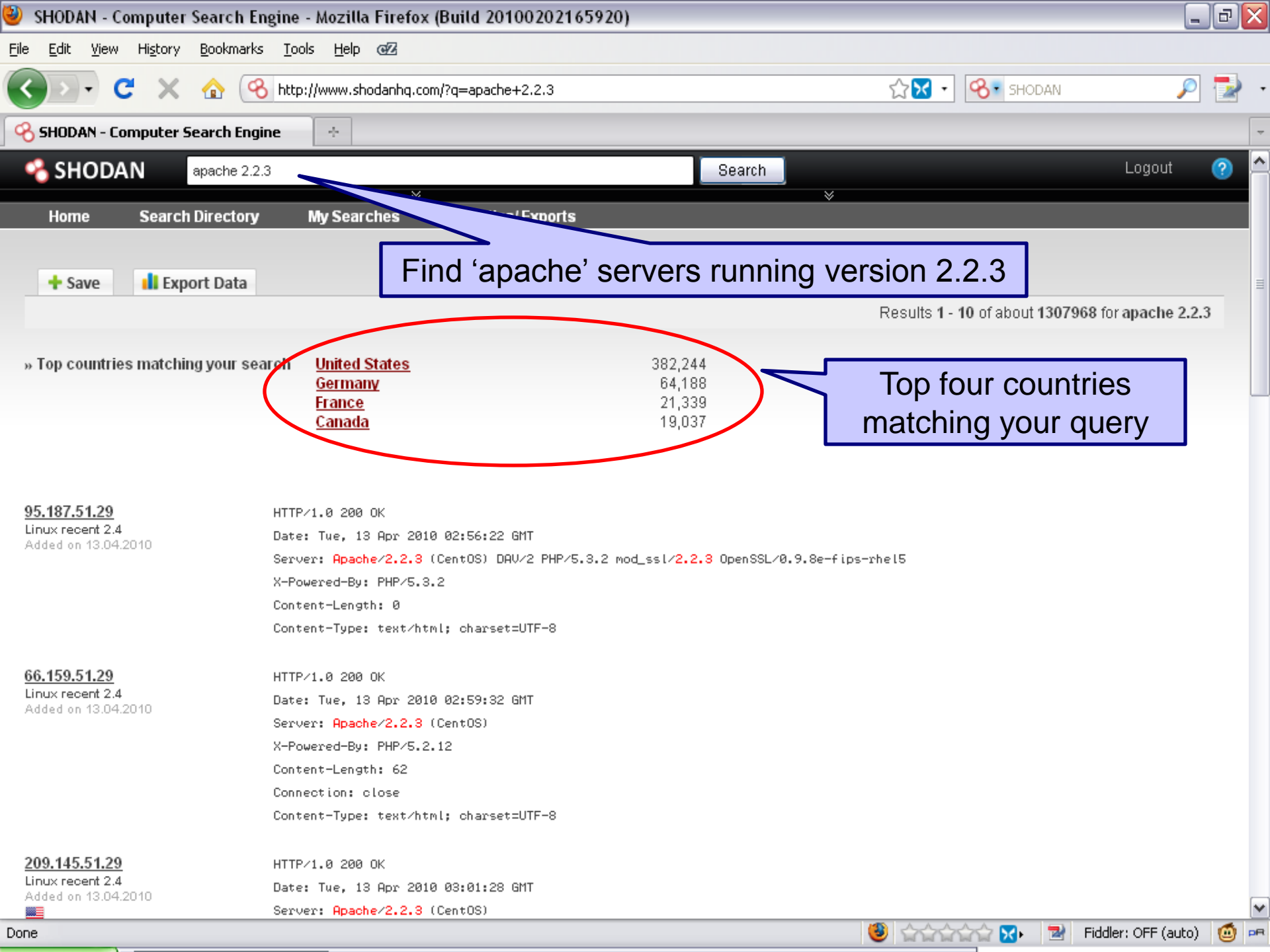
HTTP/1.0 302 Found
Server: **Apache**/0.6.5
Pragma: no-cache
Date: Sun, 01 Jan 2001 00:00:00 GMT
Expires: Sun, 01 Jan 2001 00:00:00 GMT
Cache-Control: max-age=0, must-revalidate
Connection: close
Location: /relink_web.stm
Content-type: text/html

195.141.44.29

Linux recent 2.4
Added on 13.04.2010



HTTP/1.0 200 OK
Date: Tue, 13 Apr 2010 00:41:57 GMT
Server: **Apache**/1.3.27 (Unix) Chili!Soft-ASP/3.6.2 mod_gzip/1.3.26.1a mod_perl/1.27 FrontPage/5.0.2.2510 mod_ssl/2.8.14
OpenSSL/0.9.7b PHP-CGI/0.1b
Last-Modified: Sat, 23 May 2009 02:50:12 GMT



Find 'apache' servers running version 2.2.3

Results 1 - 10 of about 1307968 for apache 2.2.3

» Top countries matching your search

United States	382,244
Germany	64,188
France	21,339
Canada	19,037

Top four countries
matching your query

[95.187.51.29](#)

Linux recent 2.4
Added on 13.04.2010

HTTP/1.0 200 OK
Date: Tue, 13 Apr 2010 02:56:22 GMT
Server: **Apache/2.2.3** (CentOS) DAV/2 PHP/5.3.2 mod_ssl/2.2.3 OpenSSL/0.9.8e-fips-rhel5
X-Powered-By: PHP/5.3.2
Content-Length: 0
Content-Type: text/html; charset=UTF-8

[66.159.51.29](#)

Linux recent 2.4
Added on 13.04.2010

HTTP/1.0 200 OK
Date: Tue, 13 Apr 2010 02:59:32 GMT
Server: **Apache/2.2.3** (CentOS)
X-Powered-By: PHP/5.2.12
Content-Length: 62
Connection: close
Content-Type: text/html; charset=UTF-8

[209.145.51.29](#)

Linux recent 2.4
Added on 13.04.2010

HTTP/1.0 200 OK
Date: Tue, 13 Apr 2010 03:01:28 GMT
Server: **Apache/2.2.3** (CentOS)

Basic Operations: Hostname Filter

Search results can be filtered using any portion of a hostname or domain name



Find 'apache' servers in the .nist.gov domain



Find 'iis-5.0' servers in the .edu domain



Basic Operations: Net / OS Filters

- The net filter allows you to refine your searches by IP/CIDR notation
- The OS filter allows you to refine searches by operating system



Basic Operations: Port Filter

- SHODAN can filter your search results by port
- Current collection is limited to ports 21 (FTP), 22 (SSH), 23 (Telnet), and 80 (HTTP), while the overwhelming majority of collection is HTTP
- More ports/services coming (send requests to the developer via Twitter)



Basic Operations: Searches

- Popular searches are available on the main page
- Logged in users can save searches and share them with other users

Basic Operations: Export

- SHODAN lets you export up to 1,000 results per credit in XML format
- Credits can be purchased online
- Sample data export file is available

```
<shodan>
  <summary date="2010-03-16 23:23:19.921034" query="apache" total="6287987"/>
  <host country="US"
    hostnames="1stadvantagebailbond.com"
    ip="198.171.76.21"
    port="80"
    updated="16.03.2010">
    HTTP/1.0 200 OK
    Date: Tue, 16 Mar 2010 07:43:07 GMT
    Server: Apache/1.3.41 (Unix) FrontPage/5.0.2.2635 mod_ssl/2.8.31 OpenSSL/0.9.7m
    Last-Modified: Tue, 17 Nov 2009 17:40:25 GMT
    ETag: "19258d5-591-4b02e009"
    Accept-Ranges: bytes
    Content-Length: 1425
    Content-Type: text/html
  </host>
  ...
</shodan>
```



SHODAN for Penetration Testers

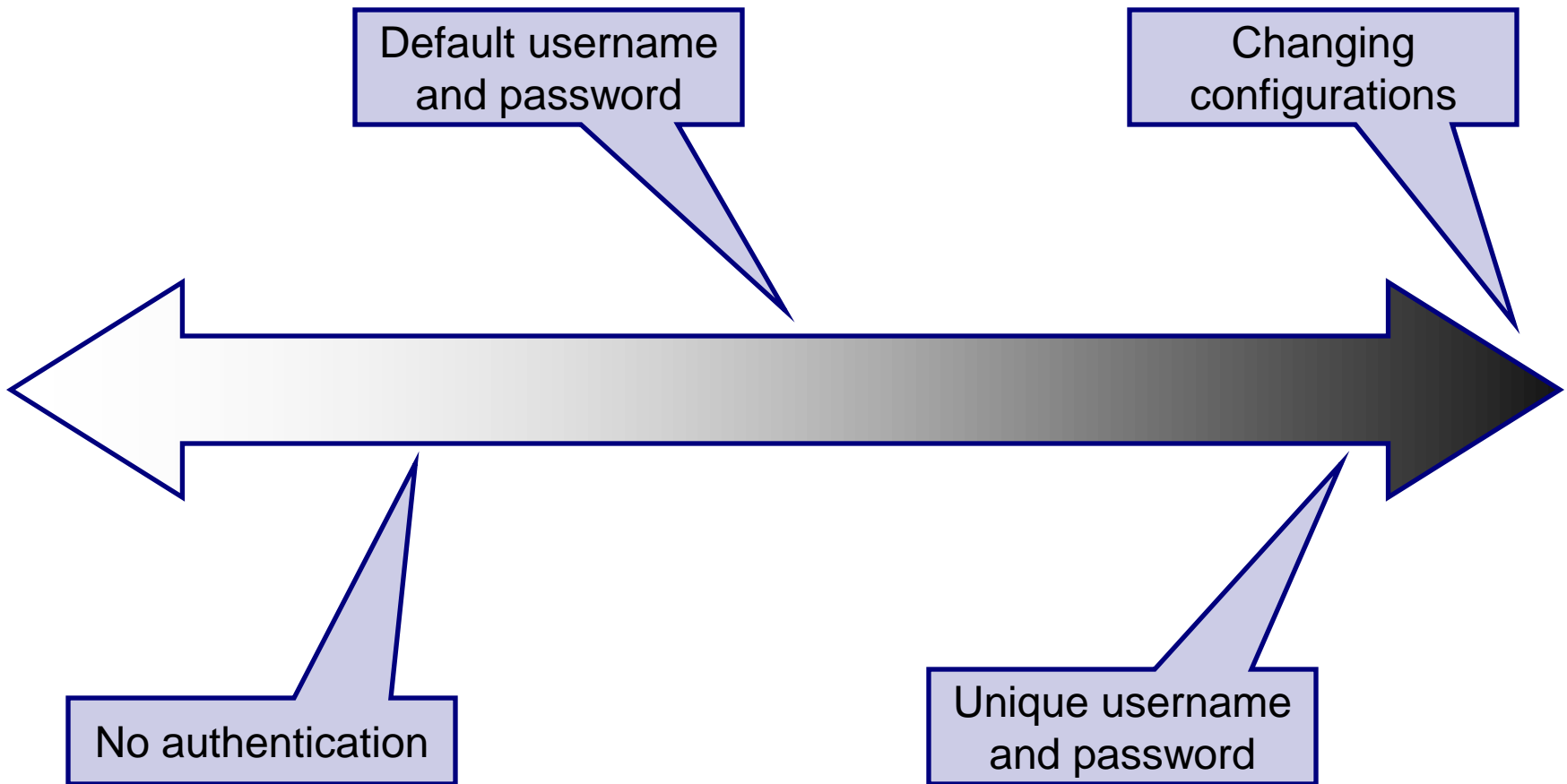
PENETRATION TESTING



Pen Testing: Ethics (1)

- Is it acceptable under any circumstances to view the configuration of a device that requires no authentication to view?
- What about viewing the configuration of a device using a default username and password?
- What about viewing the configuration of a device using a unique username and password?
- Changing the configuration of any device?

Pen Testing: Ethics (2)






Pen Testing Applications

- Using SHODAN for penetration testing requires some basic knowledge of banners including HTTP status codes
- Banners advertise service and version
- Banners can be spoofed (unlikely?)



Pen Testing: HTTP Status Codes

Status Code	Description
200 OK	Request succeeded
401 Unauthorized	Request requires authentication
403 Forbidden	Request is denied regardless of authentication



Pen Testing: Assumptions

- “200 OK” banner results will load without any authentication (at least not initially)
- “401 Unauthorized” banners with *Www-authenticate* indicate a username and password pop-up box (authentication is possible but not yet accomplished, as distinguished from “403 Forbidden”)
- Some banners advertise defaults



SHODAN for Penetration Testers

CASE STUDY: CISCO DEVICES

Case Study: Cisco Devices

Here is a typical “401 Unauthorized” banner when using the simple search term “cisco”:

```
HTTP/1.0 401 Unauthorized
```

```
Date: Tue, 01 Dec 2009 16:09:46 GMT
```

```
Www-authenticate: Basic realm="level_15 or view_access"
```

```
Connection: close
```

```
Accept-ranges: none
```

```
Server: cisco-IOS
```

Take note of the *Www-authenticate* line which indicates the requirement for a username and password

Case Study: Cisco Devices

Now consider an example of a “200 OK” banner which does not include the *Www-authenticate* line:

```
HTTP/1.0 200 OK
```

```
Transfer-encoding: chunked
```

```
Accept-ranges: none
```

```
Expires: Tue, 08 Jun 1993 06:55:45 GMT
```

```
Server: cisco-IOS
```

```
Last-modified: Tue, 08 Jun 1993 06:55:45 GMT
```

```
Connection: close
```

```
Cache-control: no-store, no-cache, must-revalidate
```

```
Date: Tue, 08 Jun 1993 06:55:45 GMT
```

```
Content-type: text/html
```


Case Study: Cisco Devices

A comparison of the two banners finds the second banner to include the *Last-modified* line which does not appear when *Www-authenticate* appears:

```
HTTP/1.0 401 Unauthorized
Date: Tue, 01 Dec 2009 16:09:46 GMT
Www-authenticate: Basic realm="level_15 or view_access"
Connection: close
Accept-ranges: none
Server: cisco-IOS
```

```
HTTP/1.0 200 OK
Transfer-encoding: chunked
Accept-ranges: none
Expires: Tue, 08 Jun 1993 06:55:45 GMT
Server: cisco-IOS
Last-modified: Tue, 08 Jun 1993 06:55:45 GMT
Connection: close
Cache-control: no-store, no-cache, must-revalidate
Date: Tue, 08 Jun 1993 06:55:45 GMT
Content-type: text/html
```

In fact, among “cisco” results these two lines are more than 99% mutually exclusive



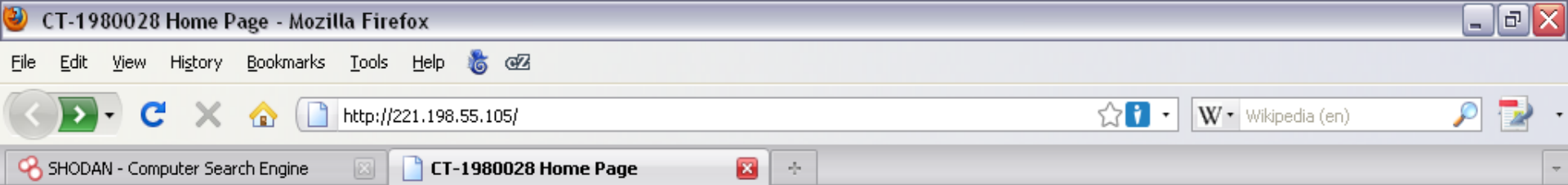
Case Study: Cisco Results

Search	Results
cisco	251,742
cisco-ios	226,184
cisco www-authenticate	225,402
cisco last-modified	4,265
cisco last-modified www-authenticate	56



Case Study: Cisco Results

- This suggests that Cisco “200 OK” banners that include the *Last-modified* line do not require any authentication (at least not initially)
- The results on the previous slide suggest there are potentially **4,200+** Cisco devices that do not require authentication



Cisco Systems

Accessing Cisco 1812W "CT-1980028"

[Show diagnostic log](#) - display the diagnostic log.

[Monitor the router](#) - HTML access to the command line interface at level [0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15](#)

[Show tech-support](#) - display information commonly needed by tech support.

[Extended Ping](#) - Send extended ping commands.

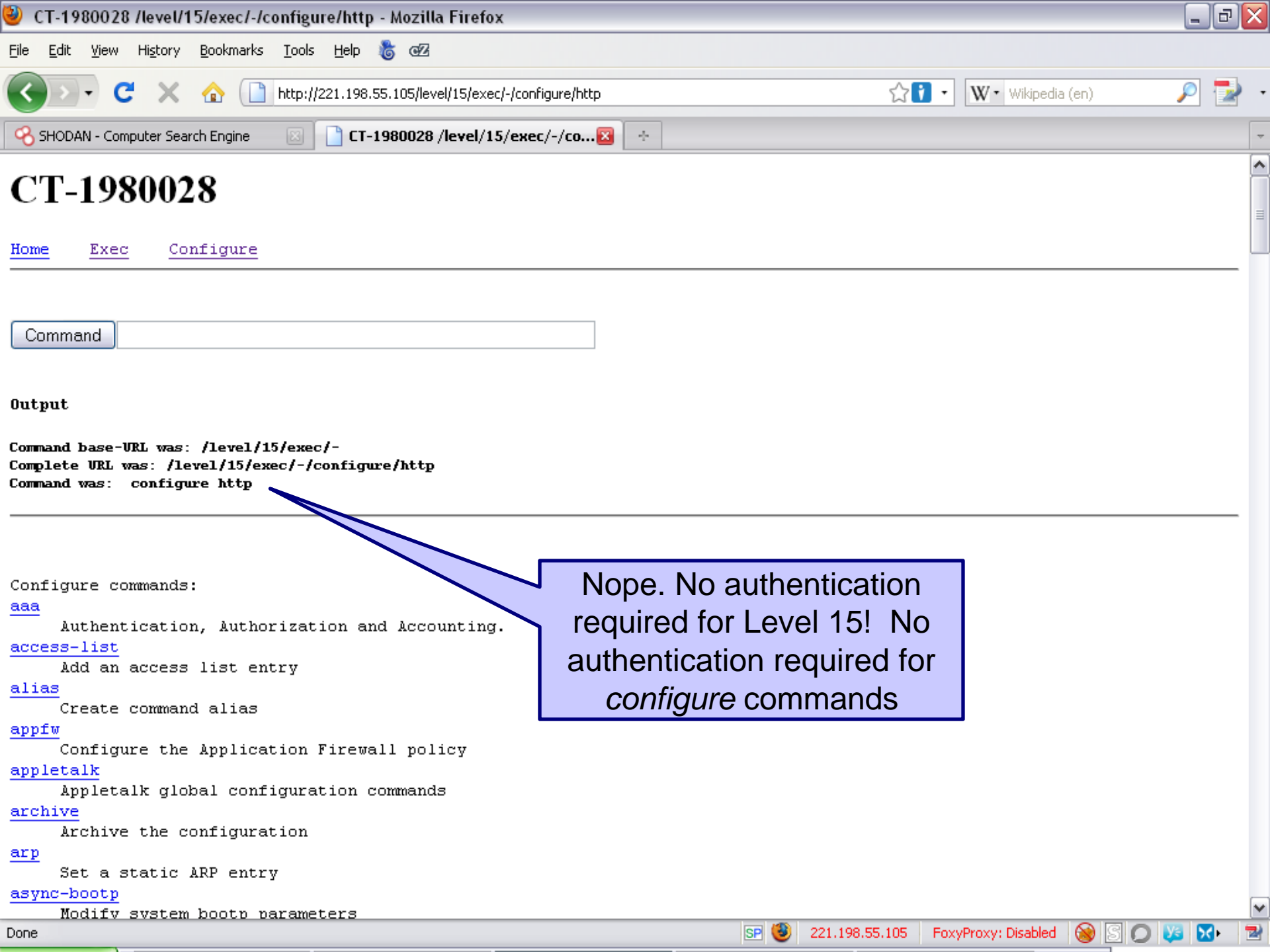
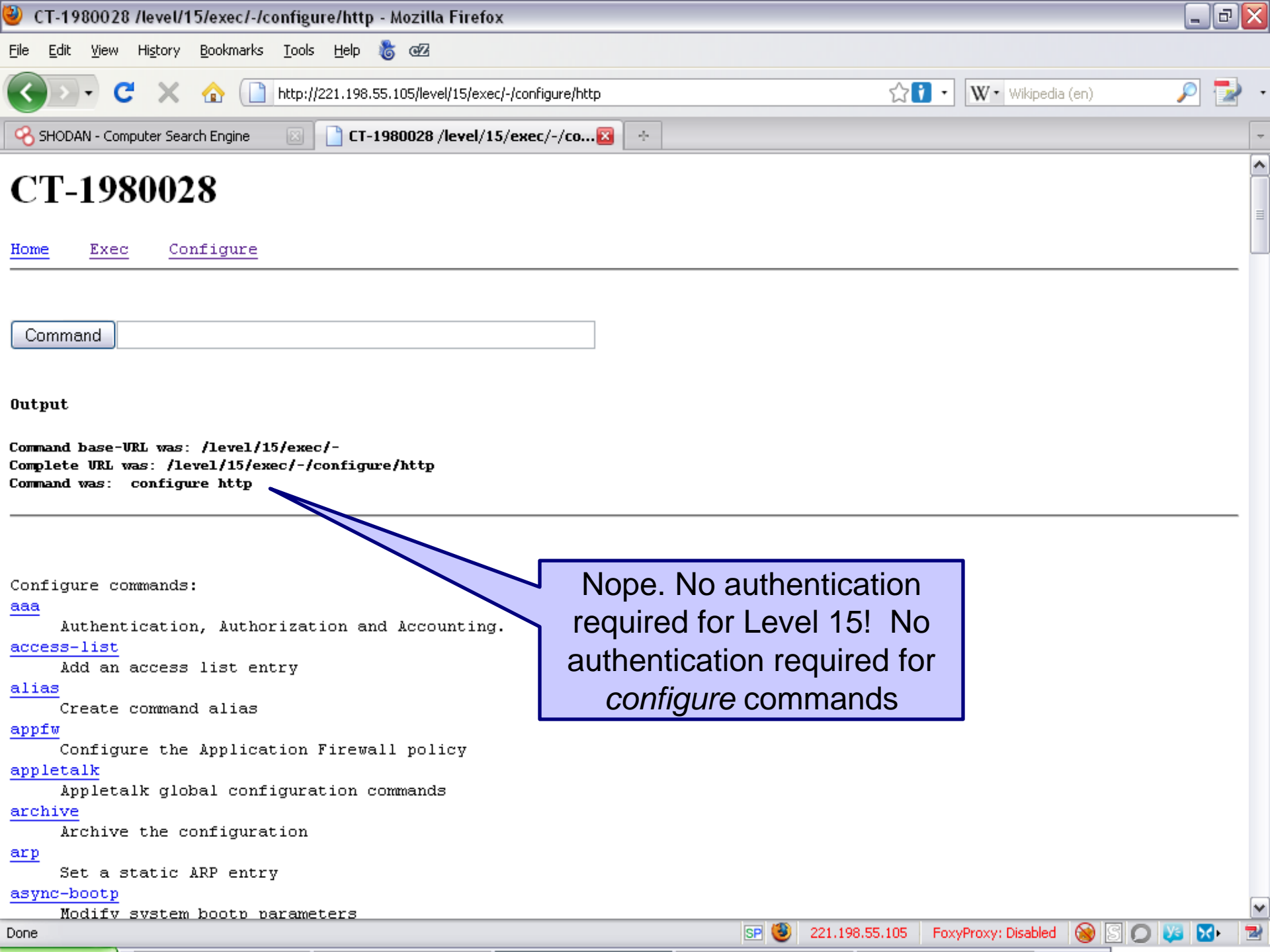
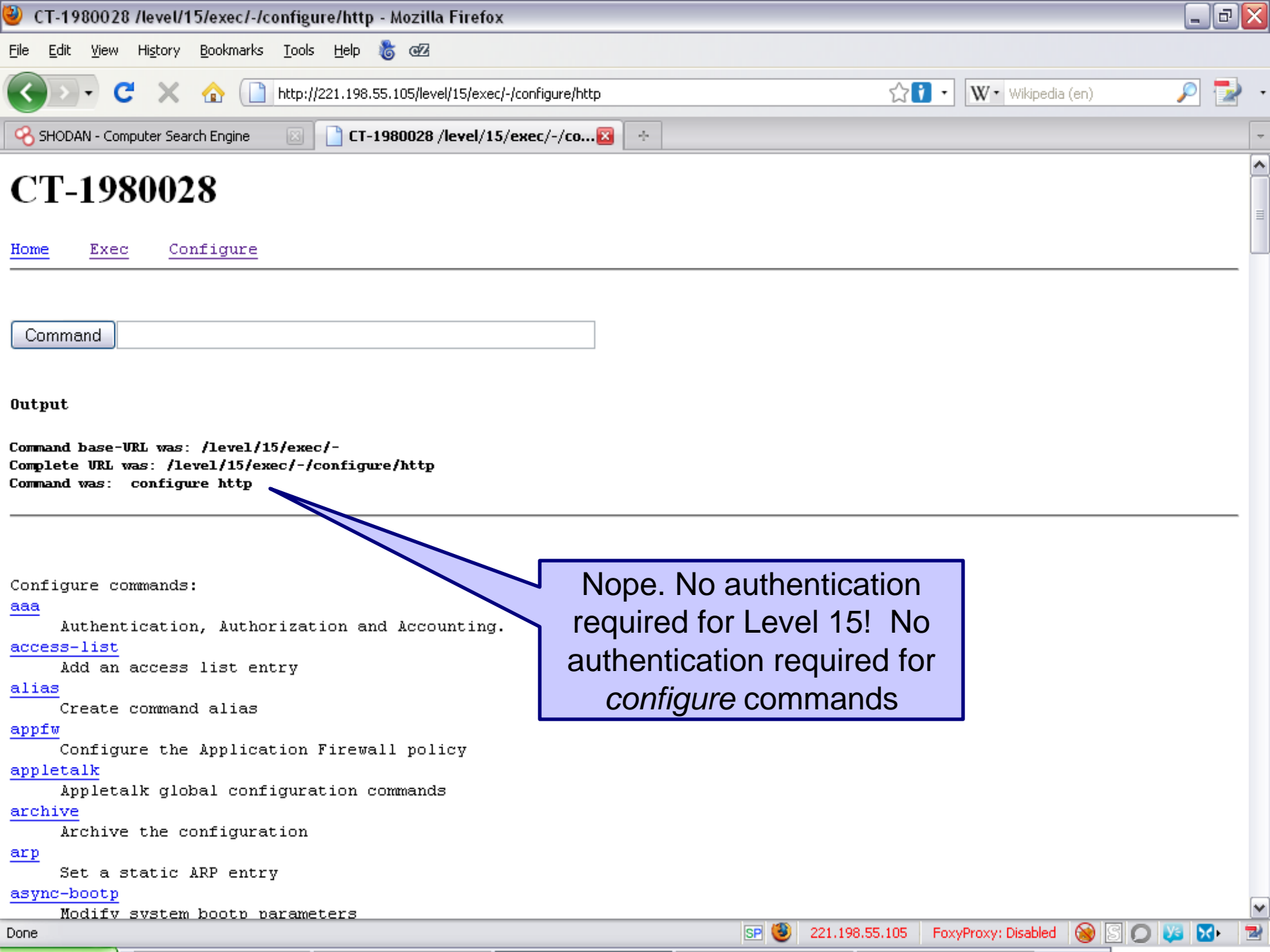
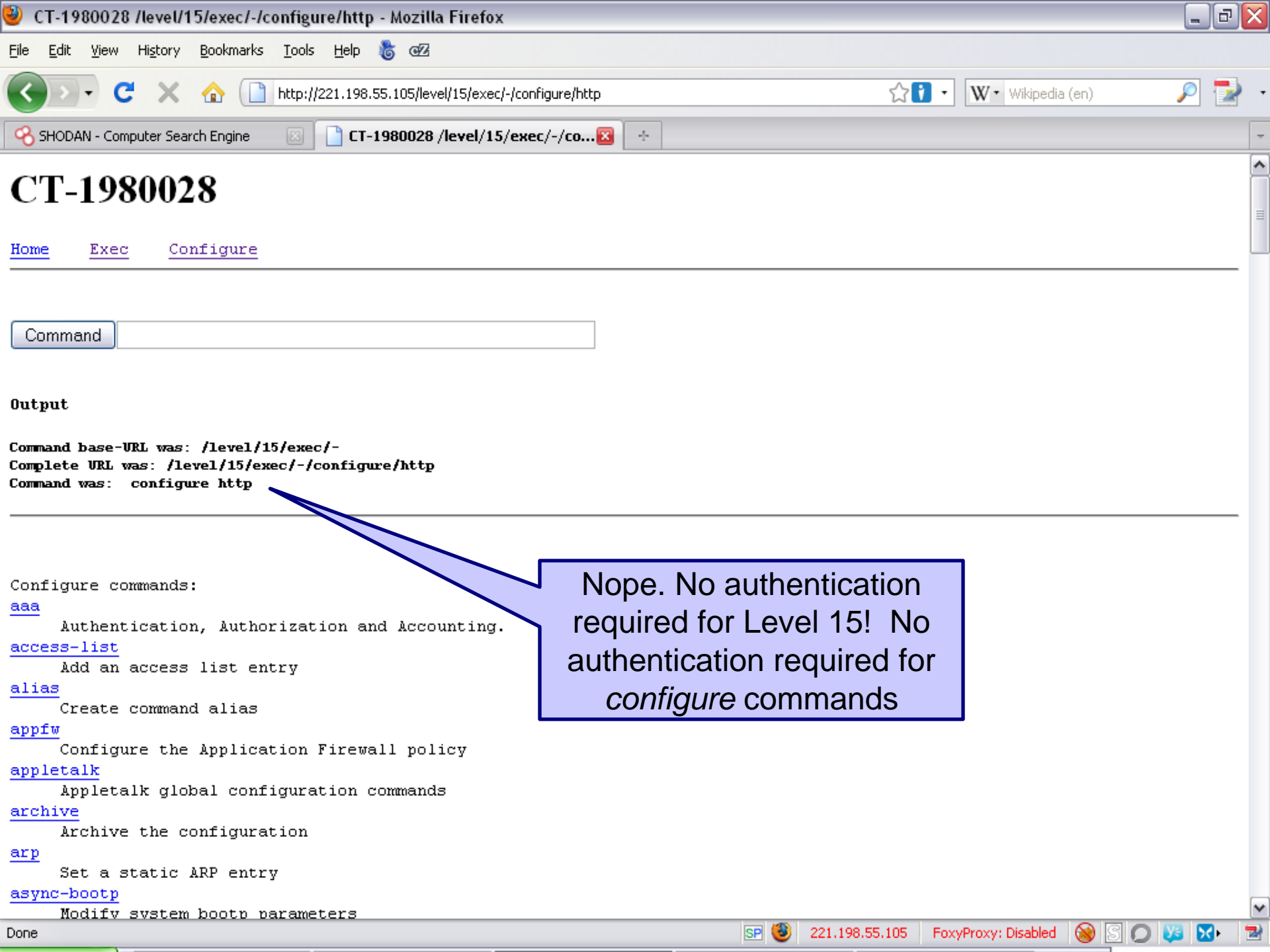
[QoS Device Manager](#) - Configure and monitor QoS through the web interface.

[VPN Device Manager \(VDM\)](#) - Configure and monitor Virtual Private Networks (VPNs) through the

Surely these HTML links will require some additional authentication...

Help resources

1. [CCO at www.cisco.com](#) - Cisco Connection Online, including the Technical Assistance Center (TAC).
2. [tac@cisco.com](#) - e-mail the TAC.
3. **1-800-553-2447 or +1-408-526-7209** - phone the TAC.
4. [cs-html@cisco.com](#) - e-mail the HTML interface development group.



CT-1980028

[Home](#) [Exec](#) [Configure](#)

Output

Command base-URL was: /level/15/exec/-
Complete URL was: /level/15/exec/-

Exec commands:

[access-enable](#)

Create a temporary Access-List entry

[access-profile](#)

Apply user-profile to interface

[access-template](#)

Create a temporary Access-List entry

[archive](#)

manage archive files

[auto](#)

Exec level Automation

[bfe](#)

For manual emergency modes setting

[calendar](#)

Manage the hardware calendar

[cd](#)

Change current directory

[clear](#)

Reset functions

No authentication required
for Level 15 exec commands

CT-1980028

[Home](#) [Exec](#) [Configure](#)

Command

show running-config

Output

Command base-URL was: /level/15/exec/-
Complete URL was: /level/15/exec/-/show/running-config/CR
Command was: show running-config

Building configuration...

Current configuration : 8995 bytes

```
!  
version 12.3  
service timestamps debug datetime msec  
service timestamps log datetime msec  
service password-encryption  
!  
hostname CT-1980028  
!  
boot-start-marker  
boot-end-marker  
!  
logging buffered 51200 warnings  
!  
no aaa new-model  
!
```

CT-1980028

[Home](#) [Exec](#) [Configure](#)

Command

show cdp neighbors

Output

Command base-URL was: /level/15/exec/-
Complete URL was: /level/15/exec/-/show/cdp/neighbors/CR
Command was: show cdp neighbors

```
this[0] = "CN-CNC-VPNHUB-1";  
this[1] = "10.97.248.1";  
this[2] = "Cisco 3745";  
this[3] = "Tunnel0";  
this[4] = "Tunnel0";  
this[5] = "R S I ";  
this[6] = "CN-CNC-VPNHUB-2";  
this[7] = "10.65.8.1";  
this[8] = "Cisco 3745";  
this[9] = "Tunnel1";  
this[10] = "Tunnel1";  
this[11] = "R S I ";
```

command completed.



Cisco Aironet 350 Series Access Point

**HOME**

EXPRESS SET-UP

EXPRESS SECURITY

NETWORK MAP

ASSOCIATION

NETWORK

INTERFACES

SECURITY

SERVICES

WIRELESS SERVICES

SYSTEM SOFTWARE

EVENT LOG

Hostname **ap-romeulandi-open**

21:57:35 Mon Dec 7 2009

Home: Summary Status

Association

[Clients: 0](#)[Repeaters: 0](#)

Network Identity

IP Address

200.160.10.8

MAC Address

0040.9644.b738

Network Interfaces

Interface

MAC Address

Transmission Rate

[FastEthernet](#)

0040.9644.b738

100Mb/s

[Radio0-802.11B](#)

0040.9645.ed11

11.0Mb/s

Event Log

Time

Severity

Description

Dec 7 20:33:53.718

◆ Warning

Packet to client 0021.c510.b576 reached max retries, removing the client

Dec 7 20:33:49.495

◆ Information

Interface Dot11Radio0, Deauthenticating Station 0023.6c83.3f41
Reason: Sending station has left the BSS

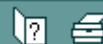
Dec 7 20:33:40.830

◆ Information

Interface Dot11Radio0, Station 0021.c510.b576 Associated
KEY_MGMT[NONE]



Cisco Aironet 350 Series Access Point



HOME

EXPRESS SET-UP

EXPRESS SECURITY

NETWORK MAP

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SYSTEM SOFTWARE

EVENT LOG

Hostname ap-romeulandi-open

21:58:30 Mon Dec 7 2009

Express Set-Up

Host Name: ap-romeulandi-open

MAC Address: 0040.9644.b738

Configuration Server Protocol: ☐ DHCP ☒ Static IP

IP Address: 200.160.10.8

IP Subnet Mask: 255.255.255.0

Default Gateway: 200.160.10.1

SNMP Community: registro

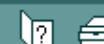
☒ Read-Only ☐ Read-Write

Radio0-802.11B

Role in Radio Network: ☒ Access Point ☐ RepeaterOptimize Radio Network for: ☒ Throughput ☐ Range ☐ CustomAironet Extensions: ☒ Enable ☐ Disable



Cisco Aironet 350 Series Access Point



- HOME
- EXPRESS SET-UP
- EXPRESS SECURITY**
- NETWORK MAP
- ASSOCIATION
- NETWORK INTERFACES
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- SERVICES
- WIRELESS SERVICES
- SYSTEM SOFTWARE
- EVENT LOG

Hostname ap-romeulandi-open

21:59:00 Mon Dec 7 2009

Express Security Set-Up

SSID Configuration

1. SSID

☐ [Broadcast SSID in Beacon](#)

2. VLAN

☒ No VLAN☐ Enable VLAN ID: (1-4094) ☐ Native VLAN

3. Security

☒ [No Security](#)☐ [Static WEP Key](#)Key 1 128 bit ☐ [EAP Authentication](#)RADIUS Server: (Hostname or IP Address)RADIUS Server Secret: ☐ [WPA](#)RADIUS Server: (Hostname or IP Address)



Cisco Aironet 350 Series Access Point

Hostname **ap-romeulandi-open**

22:01:40 Mon Dec 7 2009

Network Interfaces: Summary

System Settings

IP Address (Static)	200.160.10.8	
IP Subnet Mask	255.255.255.0	
Default Gateway	200.160.10.1	
MAC Address	0040.9644.b738	

Interface Status

[FastEthernet](#)[Radio0-802.11B](#)

Software Status	Enabled	Enabled
Hardware Status	Up	Up
Interface Resets	0	1

Receive

Input Rate Timespan	5 minute	5 minute
Input Rate (bits/sec)	2000	1000
Input Rate (packets/sec)	4	2
Time Since Last Input	00:00:00	04:27:34
Total Packets Input	54958045	56487586



Cisco Aironet 350 Series Access Point

Hostname **ap-romeulandi-open**

22:02:06 Mon Dec 7 2009

Security Summary

Administrators

Username	Read-Only	Read-Write
admin		✓

Service Set Identifiers (SSIDs)

SSID	VLAN	Radio	BSSID/Guest Mode✓	Open	Shared	Network EAP
CGIBR		Radio0-802.11B	0040.9645.ed11 ✓	no addition		

Radio0-802.11B Encryption Settings

Encryption Mode	WEP		Cipher					Key Rotation
	MIC	PPK	TKIP	WEP40bit	WEP128bit	CKIP	CMIC	
None								

Server-Based Security

Server Name/IP Address	Type	EAP	MAC	Admin	Accounting



Cisco Aironet 350 Series Access Point

Hostname **ap-romeulandi-open**

22:02:37 Mon Dec 7 2009

Services Summary

Telnet/SSH : Enabled/Enabled	Hot Standby : Disabled
CDP : Disabled	DNS : Enabled
Filters : Filter Defined	HTTP : Enabled
QoS : Disabled	STREAM : Disabled
SNMP : Enabled	SNTP : Enabled
VLAN : Disabled	ARP Caching : Disabled

HOME

EXPRESS SET-UP

EXPRESS SECURITY

NETWORK MAP

ASSOCIATION

NETWORK INTERFACES

SECURITY

SERVICES

Telnet/SSH

Hot Standby

CDP

DNS

Filters

HTTP

QoS

STREAM

SNMP

SNTP

VLAN

ARP Caching

WIRELESS SERVICES

SYSTEM SOFTWARE

EVENT LOG

Catalyst 2960 Series Device Manager - STCM-sw1.cb3.bck

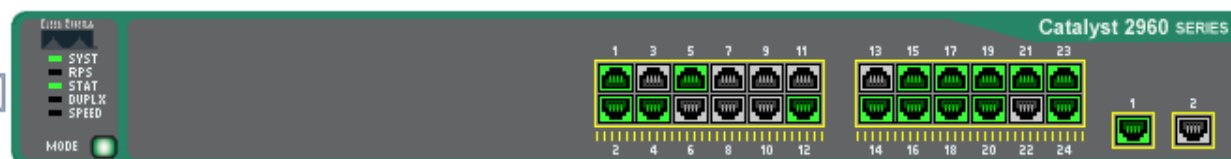
Language: English

[Refresh](#) [Print](#) [Smartports](#) [Software Upgrade](#) [Legend](#) [Help](#)

Uptime: 1 year, 32 weeks, 2 days, 19 hours, 28 minutes

Next refresh in 55 seconds

View: Status



Move the pointer over the ports for more information.

Contents

- Dashboard
- Configure
- Monitor
- Maintenance
- Network Assistant

Dashboard

Switch Information

Host Name: STCM-sw1.cb3.bck
Product ID: WS-C2960-24TT-L
IP Address: 217.75.0.230
MAC Address: 00:1E:BD:B8:18:80
Version ID: V03
Serial Number: FOC1149W02J
Software: 12.2(35)SE5
Contact:
Location:

Switch Health

[View Trends](#)

Bandwidth Used



0%

Packet Error



0%

Fan



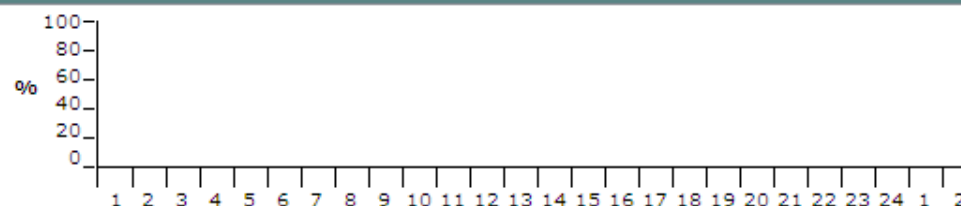
OK

Temp



OK

Port Utilization

[View Trends](#) | [View Port Statistics](#)

Catalyst 2960 Series Device Manager - STCM-sw1.cb3.bck

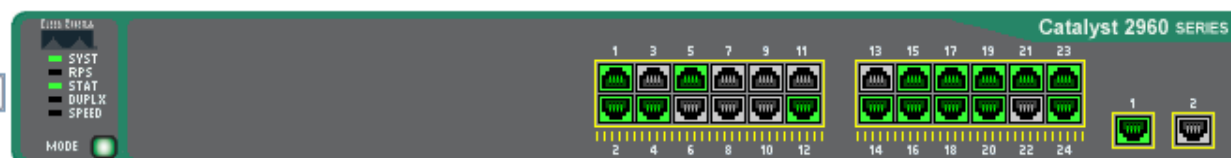
Language: English

[Refresh](#)
[Print](#)
[Smartports](#)
[Software Upgrade](#)
[Legend](#)
[Help](#)


Uptime: 1 year, 32 weeks, 2 days, 19 hours, 28 minutes

Next refresh in 27 seconds

View: Status



Move the pointer over the ports for more information.

Contents

- Dashboard
- ▼ Configure
 - Smartports
 - Port Settings
 - Express Setup
 - Restart / Reset
- Monitor
- Maintenance
- Network Assistant

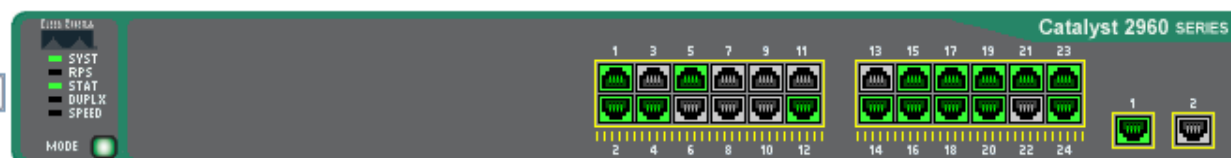
Port Settings

Port ^	Description	Enable	Speed	Duplex
Fa0/18	SWS Spam firewall	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/19	IomegaNAS	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/20	Fix-IT DRAC port	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/21	Fix-IT Webfarm	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/22	Lynxtec Hosted ser	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/23	ESP Server	<input checked="" type="checkbox"/>	Auto	Auto
Fa0/24	SWS Spam firewall	<input checked="" type="checkbox"/>	Auto	Auto
Gi0/1	Uplink to SW12	<input checked="" type="checkbox"/>	Auto	Auto

Submit

Cancel

View: Status



Move the pointer over the ports for more information.

Contents

- Dashboard
- Configure
 - Smartports
 - Port Settings
 - Express Setup
 - Restart / Reset
- Monitor
- Maintenance
- Network Assistant

Network Settings

Management Interface (VLAN ID):

IP Address:

217 . 75 . 0 . 230

Subnet Mask:

128.0.0.0

Default Gateway:

77 . 107 . 225 . 1

Switch Password:

Confirm Switch Password:

Optional Settings

Host Name:

STCM-sw1.cb3.bck

Telnet Access:

☐ Enable ☒ Disable

Telnet Password:

Confirm Telnet Password:

Submit

Cancel

Catalyst 2960 Series Device Manager - STCM-sw1.cb3.bck

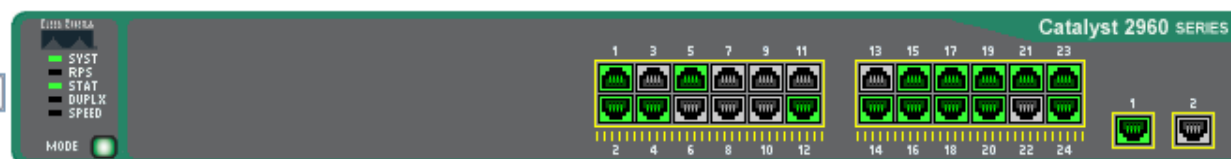
Language: English

[Refresh](#)
[Print](#)
[Smartports](#)
[Software Upgrade](#)
[Legend](#)
[Help](#)


Uptime: 1 year, 32 weeks, 2 days, 19 hours, 29 minutes

Next refresh in 37 seconds

View: Status



Move the pointer over the ports for more information.

Contents

- Dashboard
- ▼ Configure
 - Smartports
 - Port Settings
 - Express Setup
 - Restart / Reset
- ▼ Monitor
 - Trends
 - Port Status
 - Port Statistics
- Maintenance
- Network Assistant

Port Status

Port ▲	Description	Status	VLAN	Speed	Duplex
Fa0/1	APC Managed PDU	●	55	100	full
Fa0/2	Brillo Connection	●	1	100	full
Fa0/3	Sanquay Temp Firew	○	55		
Fa0/4		●	171	100	full
Fa0/5	Kirby - WF	●	104	10	full
Fa0/6		○	1		
Fa0/7		○	1		
Fa0/8		○	1		
Fa0/9		○	1		
Fa0/10		○	1		
Fa0/11	Sqnquay-CMR	○	801		
Fa0/12	AcomGUY Hosted ser	●	55	100	full
Fa0/13		○	1		
Fa0/14	Jacc.IT - PWCC WF	●	40	100	full
Fa0/15	...	●	40	100	full

Cisco SDM Express



Tasks

- Overview
- Basic Configuration
- LAN
- Internet (WAN)
- Firewall
- DHCP
- NAT
- Routing
- Security
- Reset to Factory Default

Tools

- Ping
- Telnet
- Cisco SDM
- Software Update

Overview

LAN



Total Supported LAN:	2
Configured LAN Interface:	2

Internet (WAN)



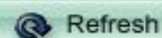
Total Supported WAN:	0
Total WAN Connections:	0

Firewall



Firewall:	Not Supported
------------------	---------------

Model Type: Cisco 1841
IOS Version: 12.4(18b)



Cisco SDM Express



Tasks

- Overview
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Basic Configuration

The username and password are used to log into the router.

[Edit...](#)[Delete](#)

Username	Login Password	Password is Encrypted

Secret Password

The enable secret password provides access to the routers command line.

Current Password: <none>

Enter New Password:

Re-Enter New Password:

Hostname:

Domain Name:

Model Type: Cisco 1841
IOS Version: 12.4(18b)

Refresh

Apply Changes

Discard Changes

Cisco SDM Express



Tasks

- Overview
- Basic Configuration
- LAN**
- Internet (WAN)
- Firewall
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- Routing
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LAN

LAN Interface Configuration

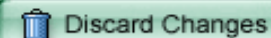
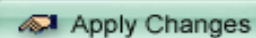
You can edit the LAN address shown below. Use the new IP address to reconnect to your router from the browser.

Interface: FastEthernet0/1

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0 or Subnet Bits: 24

Model Type: Cisco 1841
IOS Version: 12.4(18b)





Cisco SDM Express

Tasks

- Overview
- Basic Configuration
- LAN
- Internet (WAN)
- Firewall
- DHCP
- NAT
- Routing
- Security
- Reset to Factory Default

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- Cisco SDM
- Software Update

Internet (WAN)

Cisco SDM Express lets you configure one WAN connection. To configure a WAN connection, choose an interface, click Add Connection, and enter the connection parameters.

Interface List

[Add Connection](#)[Edit](#)[Delete](#)[Disable](#)

Interface	IP	Type	Status
FastEthernet0/0	220.231.101.130/30	10/100Ethernet	Up

Model Type: Cisco 1841
IOS Version: 12.4(18b)

[Refresh](#)



Cisco SDM Express

Tasks

- Overview
- Basic Configuration
- LAN
- Internet (WAN)
- Firewall
- DHCP
- NAT
- Routing**
- Security
- Reset to Factory Default

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- Cisco SDM
- Software Update

Routing

When a router has not learned a route to a destination network, it can use a configured default route. The default route specifies the next stop for traffic to unknown networks, called the next hop. You can specify a router interface, or an IP address as the next hop.

☒ Enable default route

Select a router interface or the IP address of a remote host as the next hop.

☐ Interface

FastEthernet0/0

☒ IP Address

220.231.101.129

Model Type: Cisco 1841
IOS Version: 12.4(18b)

Refresh

Apply Changes

Discard Changes

Cisco SDM Express



Tasks

- Overview
- Basic Configuration
- LAN
- Internet (WAN)
- Firewall
- DHCP
- NAT
- Routing
- Security**
- Reset to Factory Default

Tools

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- Cisco SDM
- Software Update

Security

Security Settings

[Select All \(Recommended by Cisco\)](#)

☐ **Disable services that involve security risks**

This disables active services such as Finger, PAD, CDP etc. which may make your router vulnerable to security attacks.

☐ **Enable services for enhanced security on the router/network**

This enables Logging and other services, which will enhance the security on the router.

☐ **Encrypt passwords**

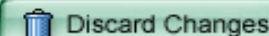
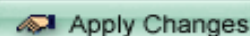
This encrypts all passwords on your router by enabling password encryption services.

Router Clock Settings

You can synchronize your routers date/time settings with the local PC clock. The router clock is used during negotiation of some of the security options.

[Synchronize with my local PC clock](#)

Model Type: Cisco 1841
IOS Version: 12.4(18b)





SHODAN for Penetration Testers

CASE STUDY: DEFAULT PASSWORDS



Case Study: Default Passwords (1)

- The 'default password' search locates servers that have those words in the banner
- This doesn't suggest that these results will be using the defaults, but since they're advertising the defaults they would potentially be the lowest hanging fruit

Case Study: Default Passwords (2)

An example of a 'default password' result:

```
HTTP/1.0 401
Date: Sat, 21 Dec 1996 12:00:00 GMT
Www-authenticate: Basic realm="Default password:1234"
Server: PrintSir WEBPORT 1.1
```

The server line indicates this is likely to be a print server; also note the “401” and *Www-authenticate* which indicates the likelihood of a username and password pop-up box



Case Study: Default Passwords (3)

- This does not suggest that this device is using the default password, but it does mean that it is a possibility
- While no username is listed, a null username or “admin” is always a good guess
- And did it work?

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://220.130.40.86/

SHODAN - Computer Search Engine Loading...

Authentication Required

? A username and password are being requested by http://220.130.40.86. The site says: "Default password:1234"

User Name:

Password:

OK Cancel



Device Setup



Setup Wizard



System Tools

General

TCP / IP

TCP / IP

SMB

SNMP

NetWare

AppleTalk

Printer Settings

Printer Settings			
Printer Name :	PSCC789E	Raw Printing :	Enable
Printer Model :	EPSON680	IPP Printing :	Enable
Resolution :	PS1206P	LPR Printing :	Enable
Firmware Version :	2.6.21	AppleTalk Printing :	Enable
MAC Address :	00:00:B4:CC:78:9E	NetWare Printing :	Enable
USB Port Number :	No	SMB :	Enable
LPT Port Number :	1	SNMP :	Enable
NetBEUI :	No	NetBEUI :	Disable



SHODAN for Penetration Testers

~~CASE STUDY: INFRASTRUCTURE~~ **~~EXPLOITATION~~**

How to PWN an ISP

Cisco Systems

Accessing Cisco WS-C3750G-12S

[Telnet](#) - to the router.

[Show interfaces](#) - display the status of the interfaces.

[Show diagnostic log](#) - display the diagnostic log.

[Monitor the router](#) - HTML access to the command line interface at level [0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15](#)

[Connectivity test](#) - ping the nameserver.

[Show tech-support](#) - display information commonly needed by tech support.

[Extended Ping](#) - Send extended ping commands.

[Web Console](#) - **Manage the Switch through the web interface.**

Help resources

1. [CCO at www.cisco.com](#) - Cisco Connection Online, including the Technical Assistance Center (TAC).
2. [tac@cisco.com](#) - e-mail the TAC.
3. **1-800-553-2447 or +1-408-526-7209** - phone the TAC.
4. [cs-html@cisco.com](#) - e-mail the HTML interface development group.

Command

Output

Command base-URL was: /level/15/exec/-
Complete URL was: /level/15/exec/-/show/ip/route/CR
Command was: show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route

Gateway of last resort is to network 0.0.0.0

is variably subnetted, 10 subnets, 3 masks

D EX	[170/28416] via	2w5d, Vlan401
	[170/28416] via	2w5d, Vlan400
D	[90/3072] via	2w5d, Vlan401
	[90/3072] via	2w5d, Vlan400
D EX	[170/4226816] via	3w5d, Vlan401
	[170/4226816] via	3w5d, Vlan400
D EX	[170/3115776] via	3w5d, Vlan401
	[170/3115776] via	3w5d, Vlan400
D EX	[170/2178816] via	02:01:41, Vlan401
	[170/2178816] via	02:01:41, Vlan400
D EX	[170/3072] via	2w5d, Vlan401
	[170/3072] via	2w5d, Vlan401

[Home](#) [Exec](#) [Configure](#)

Command

Output

Command base-URL was: /level/15/exec/-
Complete URL was: /level/15/exec/-/show/running-config/CR
Command was: show running-config

Building configuration...

```
Current configuration : 10374 bytes
!
! Last configuration change at 06:40:37 EST Tue Apr 6 2010 by
! NVRAM config last updated at 06:40:48 EST Tue Apr 6 2010 by
!
version 12.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname
!
boot-start-marker
boot-end-marker
!
!
username          privilege 15 secret 5
username          privilege 2 secret 5
aaa new-model
!
!
```

Command

Output

Command base-URL was: /level/15/exec/-

Complete URL was: /level/15/exec/-/show/cdp/neighbors/CR

Command was: show cdp neighbors

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
	Gig 1/0/11	173	R S I	CISCO7606	Gig 1/6
	Gig 1/0/12	143	R S I	WS-C3750G	Gig 1/0/12
	Gig 1/0/2	155	S I	WS-C3750-	Gig 1/0/1
	Gig 1/0/10	167	S I	WS-C3560E	Gig 0/25
	Gig 1/0/9	131	R S I	WS-C3750-	Gig 1/0/1

command completed.

Case Study: *How to PWN an ISP*

- Two Cisco 3750 infrastructure switches with direct access to Cisco 7606 Router
- VLAN IDs for internal ISP network, hotels, condos, apartments, convention center, public backbone...
- SNMP server IP address and community strings



SHODAN for Penetration Testers

OTHER EXAMPLES

Some general observations...

 SHODAN	<input 5.0\""="" iis="" type="text" value="\"/>	<input type="button" value="Search"/>	Results 1 - 10 of about 362695 for "iis/5.0"
 SHODAN	<input 4.0\""="" iis="" type="text" value="\"/>	<input type="button" value="Search"/>	Results 1 - 10 of about 9977 for "iis/4.0"
 SHODAN	<input 3.0\""="" iis="" type="text" value="\"/>	<input type="button" value="Search"/>	Results 1 - 10 of about 381 for "iis/3.0"
 SHODAN	<input 2.0\""="" iis="" type="text" value="\"/>	<input type="button" value="Search"/>	Results 1 - 10 of about 42 for "iis/2.0"
 SHODAN	<input 1.0\""="" iis="" type="text" value="\"/>	<input type="button" value="Search"/>	Results 1 - 10 of about 159 for "iis/1.0"

Logitech

Logitech Wireless Network Camera



設定項目

-- 1つを選択 --

水平移動間隔 0

上下移動間隔 0

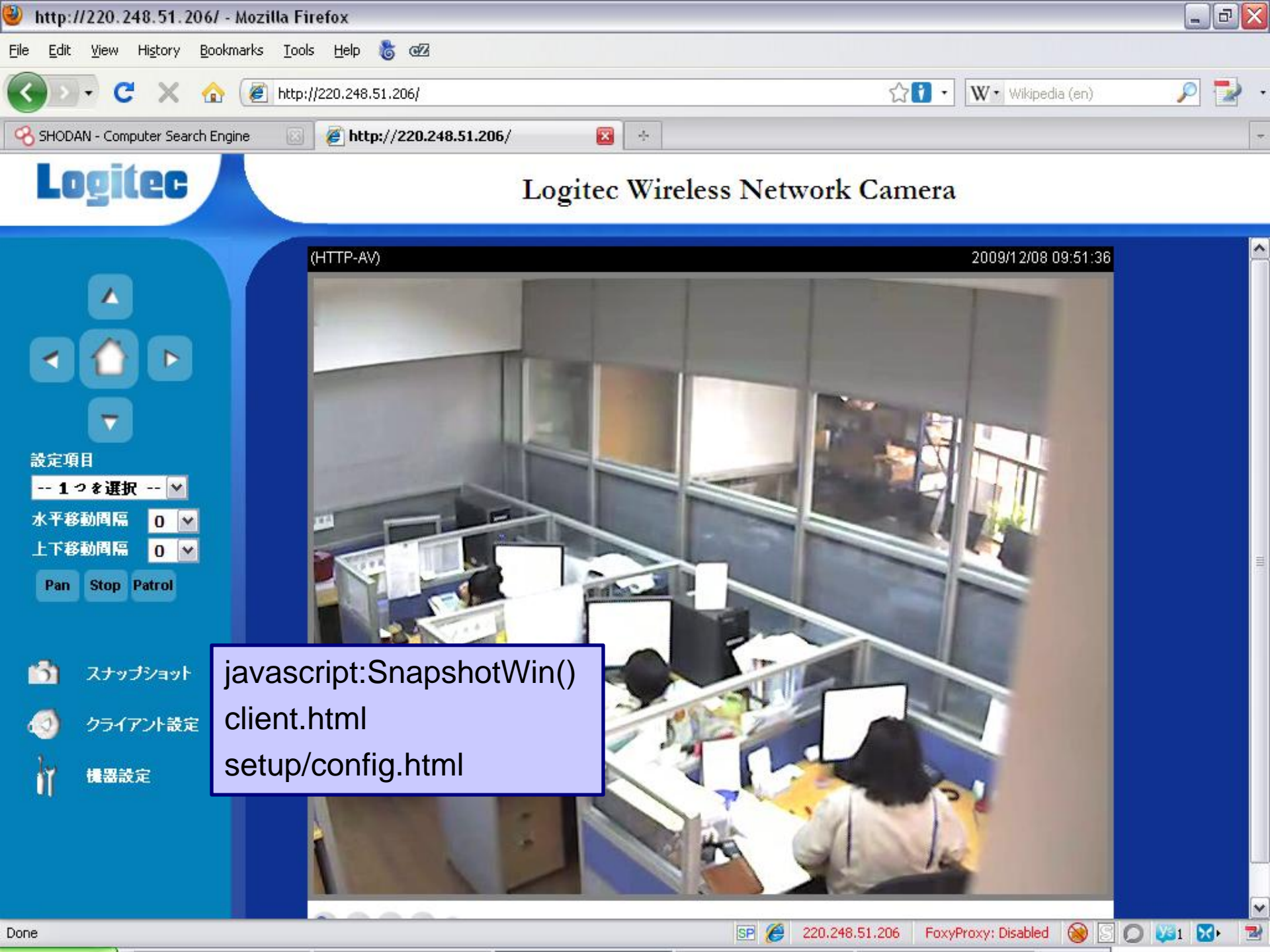
Pan Stop Patrol

スナップショット

クライアント設定

javascript:SnapshotWin()
client.html



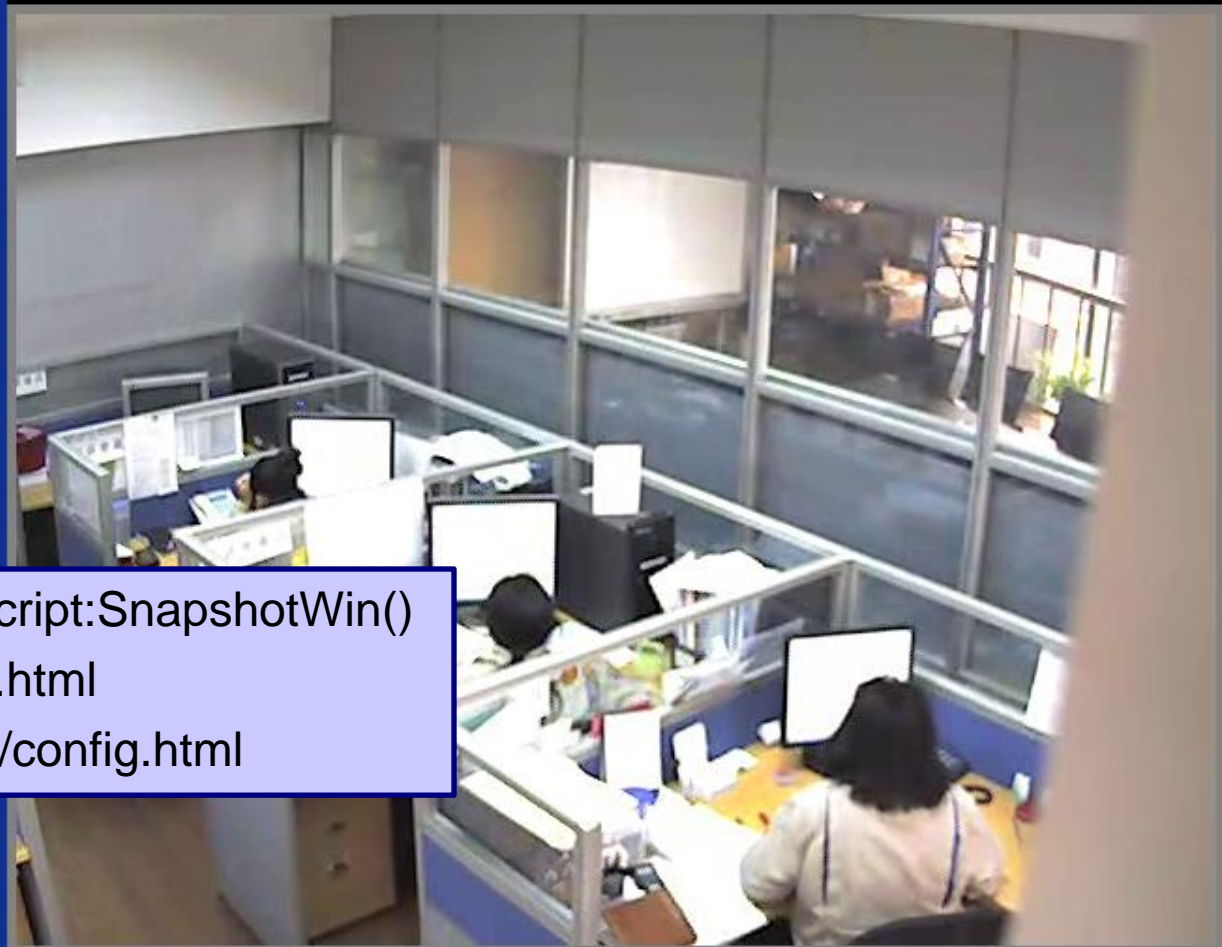


Logitec

Logitec Wireless Network Camera

(HTTP-AV)

2009/12/08 09:51:36



javascript:SnapshotWin()
client.html
setup/config.html

設定項目

-- 1つを選択 --

水平移動間隔 0

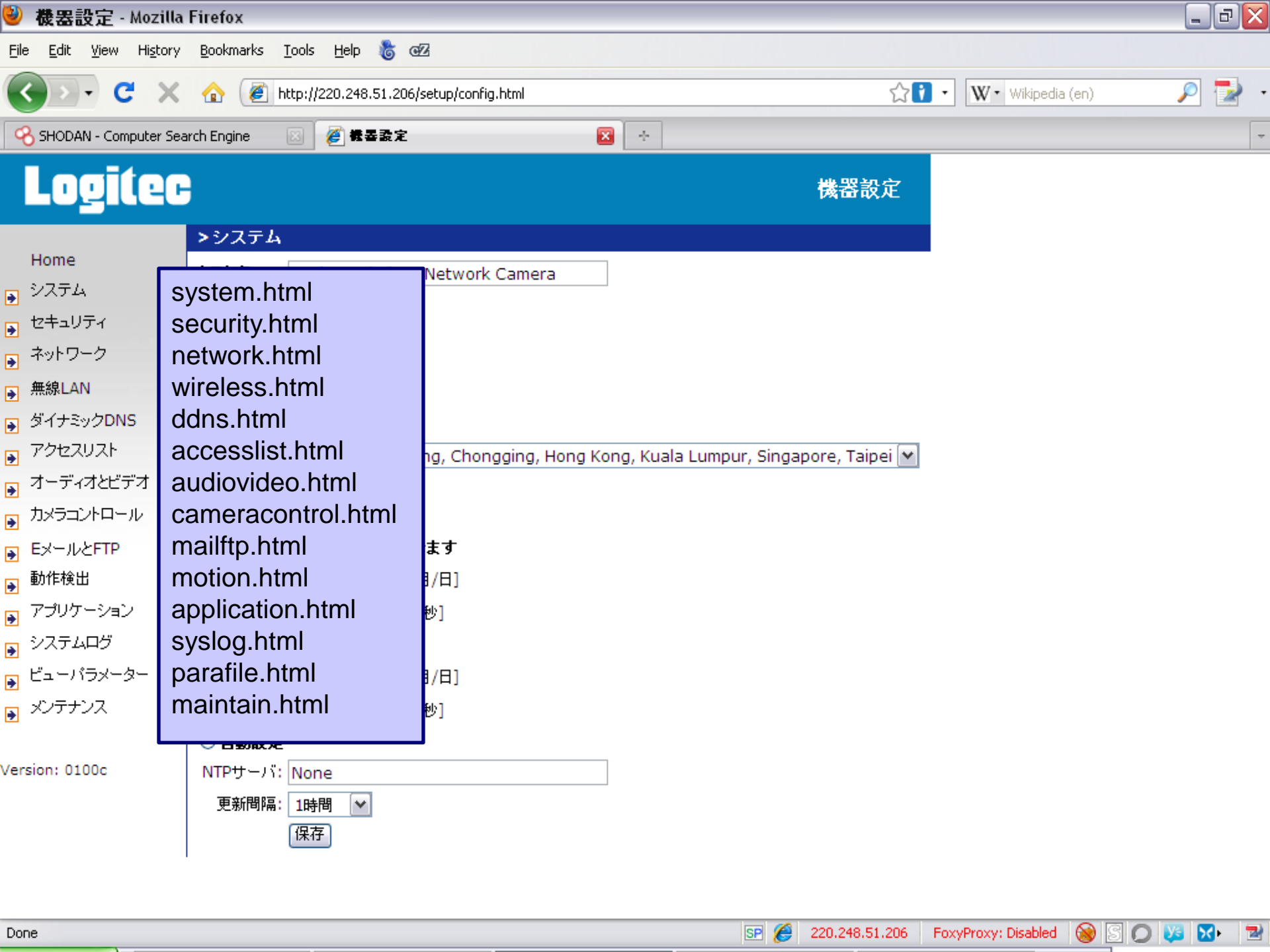
上下移動間隔 0

Pan Stop Patrol

スナップショット

クライアント設定

機器設定



- system.html
- security.html
- network.html
- wireless.html
- ddns.html
- accesslist.html
- audiovideo.html
- cameracontrol.html
- mailftp.html
- motion.html
- application.html
- syslog.html
- parafire.html
- maintain.html



SHODAN for Penetration Testers

THE FUTURE



The Future

- API in the works for program integration
- Summary report for export option
- Software fingerprints
- Collection of HTTPS



SHODAN for Penetration Testers

CONCLUSIONS

Conclusions

- SHODAN aggregates a significant amount of information that isn't already widely available in an easy to understand format
- Allows for passive vulnerability analysis

Bottom line: SHODAN is a potential game-changer for pen testers that will help shape the path for future vulnerability assessments



Authors and add-ons

- John Matherly (<http://twitter.com/achillea>)
- Gianni Amato (SHODAN Helper)
- sagar38 (SHODAN Search Provider)



SHODAN for Penetration Testers

QUESTIONS



SHODAN for Penetration Testers

Michael “theprez98” Schearer