ASA/PIX 7.2: Block Certain Websites (URLs) Using Regular Expressions with MPF Configuration Examples

Contents

Introduction

This document describes how to configure the Cisco Security Appliances ASA/PIX 7.2 with Regular Expressions with Modular Policy Framework (MPF) in order to block certain websites (URLs).

Note: This configuration does not block all application downloads. For reliable file blocks, a dedicated appliance, such as Websense, etc., or module, such as the CSC module for the ASA, must be used.

HTTPS filtering is not supported on ASA. ASA cannot do deep packet inspection or inspection based on regular expression for HTTPS traffic because, in HTTPS, the content of packet is encrypted (ssl).

Prerequisites

Requirements

This document assumes that Cisco Security Appliance is configured and works properly.

Components Used

- Cisco 5500 Series Adaptive Security Appliance (ASA) that runs Software Version 7.2(2)
- Cisco Adaptive Security Device Manager (ASDM) Version 5.2(2) for ASA 7.2(2)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Related Products

This configuration can also be used with the Cisco 500 Series PIX that runs Software Version 7.2(2).

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Background Information

Modular Policy Framework Overview

MPF provides a consistent and flexible way to configure security appliance features. For example, you can use MPF to create a timeout configuration that is specific to a particular TCP application, as opposed to one that applies to all TCP applications.

MPF supports these features:

- TCP normalization, TCP and UDP connection limits and timeouts, and TCP sequence number randomization
- CSC
- Application inspection
- IPS
- QoS input policing
- QoS output policing
- QoS priority queue

The configuration of the MPF consists of four tasks:

1. Identify the Layer 3 and 4 traffic to which you want to apply actions. Refer to Identifying Traffic Using a Layer 3/4 Class Map for more information.
2. (Application inspection only) Define special actions for application inspection traffic. Refer to Configuring Special Actions for Application Inspections for more information.
3. Apply actions to the Layer 3 and 4 traffic. Refer to Defining Actions Using a Layer 3/4 Policy Map for more information.
4. Activate the actions on an interface. Refer to Applying a Layer 3/4 Policy to an Interface Using a Service Policy for more information.

Regular Expression

A regular expression matches text strings either literally as an exact string, or with metacharacters, so you can match multiple variants of a text string. You can use a regular expression to match the

content of certain application traffic; for example, you can match a URL string inside an HTTP packet.

Note: Use **Ctrl+V** to escape all the special characters in the CLI, such as a question mark (?) or tab. For example, type **d[Ctrl+V]g** to enter **d?g** in the configuration.

In order to create a regular expression, use the **regex** command, which can be used for various features that require text matching. For example, you can configure special actions for application inspection with Modular Policy Framework with an inspection policy map (see the policy map type inspect command). In the inspection policy map, you can identify the traffic you want to act upon if you create an inspection class map that contains one or more **match** commands, or you can use **match** commands directly in the inspection policy map. Some **match** commands let you identify text in a packet with a regular expression; for example, you can match URL strings inside HTTP packets. You can group regular expressions in a regular expression class map (see the class-map type regex command).

Table 1 lists the metacharacters that have special meanings.

Character	Description	Notes
.	Dot	Matches any single character. For example, **d.g** matches dog, dag, dtg, and any word that contains those characters, such as doggonnit.
(exp)	Subexpression	A subexpression segregates characters from surrounding characters, so that you can use other metacharacters on the subexpression. For example, **d(o|a)g** matches dog and dag, but **do|ag** matches do and ag. A subexpression can also be used with repeat quantifiers to differentiate the characters meant for repetition. For example, **ab(xy){3}z** matches abxyxyxyz.
|	Alternation	Matches either expression it separates. For example, **dog|cat** matches dog or cat.
?	Question mark	A quantifier that indicates that there are 0 or 1 of the previous expression. For example, **lo?se** matches lse or lose. **Note:** You must enter **Ctrl+V** and then the question mark or else the help function is invoked.
*	Asterisk	A quantifier that indicates that there are 0, 1 or any number of the previous expression. For example, **lo*se** matches lse, lose, loose, and so on.
{x}	Repeat quantifier	Repeat exactly x times. For example, **ab(xy){3}z** matches abxyxyxyz.

{x,}	Minimum repeat quantifier	Repeat at least x times. For example, **ab(xy){2,}z** matches abxyxyz, abxyxyxyz, and so on.
[abc]	Character class	Matches any character in the brackets. For example, **[abc]** matches a, b, or c.
[^abc]	Negated character class	Matches a single character that is not contained within the brackets. For example, **[^abc]** matches any character other than a, b, or c. **[^A-Z]** matches any single character that is not an uppercase letter.
[a-c]	Character range class	Matches any character in the range. **[a-z]** matches any lowercase letter. You can mix characters and ranges: **[abcq-z]** matches a, b, c, q, r, s, t, u, v, w, x, y, z, and so does **[a-cq-z]**. The dash (-) character is literal only if it is the last or first character within the brackets: **[abc-]** or **[-abc]**.
""	Quotation marks	Preserves trailing or leading spaces in the string. For example, **" test"** preserves the leading space when it looks for a match.
^	Caret	Specifies the beginning of a line.
\	Escape character	When used with a metacharacter, matches a literal character. For example, **\[** matches the left square bracket.
char	Character	When a character is not a metacharacter, matches the literal character.
\r	Carriage return	Matches a carriage return 0x0d.
\n	Newline	Matches a new line 0x0a.
\t	Tab	Matches a tab 0x09.
\f	Formfeed	Matches a form feed 0x0c.
\xNN	Escaped hexadecimal number	Matches an ASCII character with hexadecimal (exactly two digits).
\NNN	Escaped octal number	Matches an ASCII character as octal (exactly three digits). For example, the character 040 represents a space.

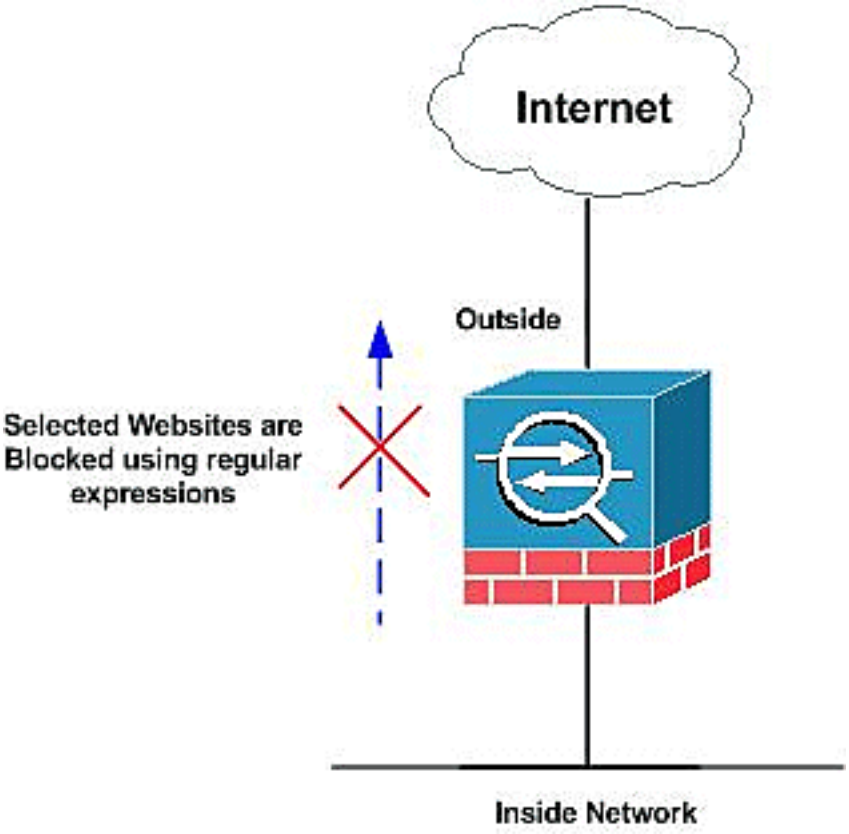
Configure

In this section, you are presented with the information to configure the features described in this document.

Note: Use the Command Lookup Tool (registered customers only) to obtain more information on the commands used in this section.

Network Diagram

This document uses this network setup:



Configurations

This document uses these configurations:

- ASA CLI Configuration
- ASA Configuration 7.2(x) with ASDM 5.2

ASA CLI Configuration

ASA CLI Configuration
ciscoasa#**show running-config** : Saved : ASA Version 7.2(2) ! hostname ciscoasa domain-name default.domain.invalid enable password 8Ry2YjIyt7RRXU24 encrypted names ! interface Ethernet0/0 nameif inside security-level 100 ip address 10.1.1.1 255.255.255.0 ! interface Ethernet0/1 nameif outside security-level 0 ip address 192.168.1.5 255.255.255.0 ! interface Ethernet0/2 nameif DMZ security-level 90 ip address

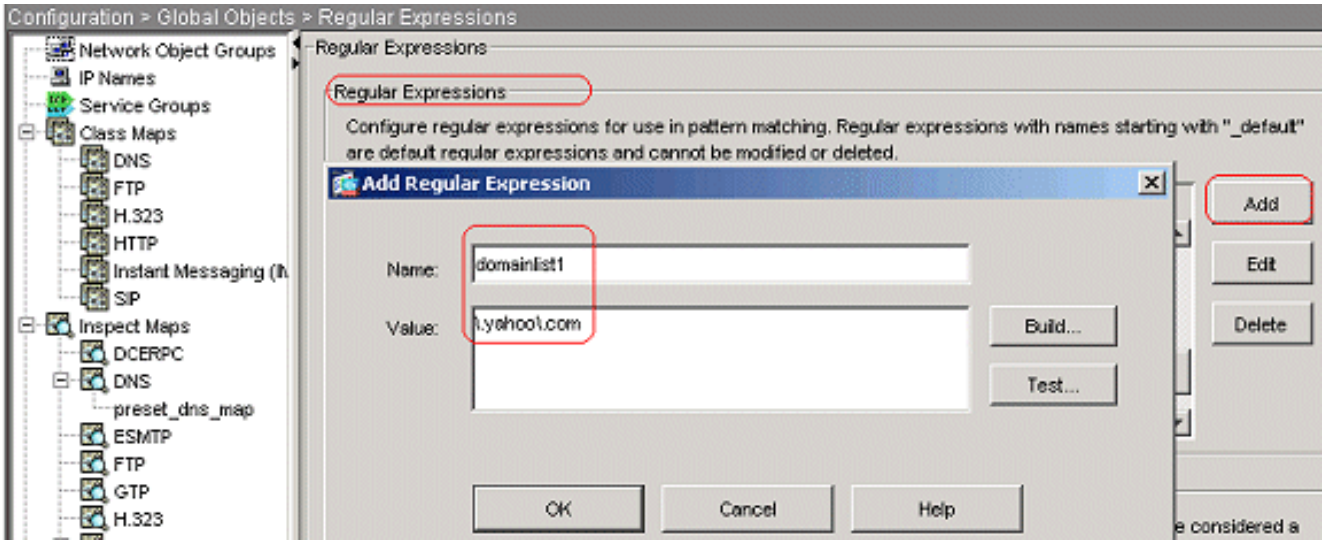
```
10.77.241.142 255.255.255.192 ! interface Ethernet0/3
shutdown no nameif no security-level no ip address !
interface Management0/0 shutdown no nameif no security-level
no ip address ! passwd 2KFQnbNIdI.2KYOU encrypted regex
urllist1 ".*\.([Ee][Xx][Ee]|[Cc][Oo][Mm]|[Bb][Aa][Tt])
HTTP/1.[01]" !--- Extensions such as .exe, .com, .bat to be
captured and !--- provided the http version being used by web
browser must be either 1.0 or 1.1 regex urllist2
".*\.([Pp][Ii][Ff]|[Vv][Bb][Ss]|[Ww][Ss][Hh]) HTTP/1.[01]" !-
-- Extensions such as .pif, .vbs, .wsh to be captured !---
and provided the http version being used by web browser must
be either !--- 1.0 or 1.1 regex urllist3
".*\.([Dd][Oo][Cc]|[Xx][Ll][Ss]|[Pp][Pp][Tt]) HTTP/1.[01]" !-
-- Extensions such as .doc(word), .xls(ms-excel), .ppt to be
captured and provided !--- the http version being used by web
browser must be either 1.0 or 1.1 regex urllist4
".*\.([Zz][Ii][Pp]|[Tt][Aa][Rr]|[Tt][Gg][Zz]) HTTP/1.[01]" !-
-- Extensions such as .zip, .tar, .tgz to be captured and
provided !--- the http version being used by web browser must
be either 1.0 or 1.1 regex domainlist1 "\.yahoo\.com" regex
domainlist2 "\.myspace\.com" regex domainlist3
"\.youtube\.com" !--- Captures the URLs with domain name like
yahoo.com, !--- youtube.com and myspace.com regex contenttype
"Content-Type" regex applicationheader "application/.*" !---
Captures the application header and type of !--- content in
order for analysis boot system disk0:/asa802-k8.bin ftp mode
passive dns server-group DefaultDNS domain-name
default.domain.invalid access-list inside_mpc extended permit
tcp any any eq www access-list inside_mpc extended permit tcp
any any eq 8080 !--- Filters the http and port 8080 !---
traffic in order to block the specific traffic with regular
!--- expressions pager lines 24 mtu inside 1500 mtu outside
1500 mtu DMZ 1500 no failover icmp unreachable rate-limit 1
burst-size 1 asdm image disk0:/asdm-602.bin no asdm history
enable arp timeout 14400 route DMZ 0.0.0.0 0.0.0.0
10.77.241.129 1 timeout xlate 3:00:00 timeout conn 1:00:00
half-closed 0:10:00 udp 0:02:00 icmp 0:00:02 timeout sunrpc
0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat
0:05:00 timeout sip 0:30:00 sip_media 0:02:00 sip-invite
0:03:00 sip-disconnect 0:02:00 timeout uauth 0:05:00 absolute
dynamic-access-policy-record DfltAccessPolicy http server
enable http 0.0.0.0 0.0.0.0 DMZ no snmp-server location no
snmp-server contact snmp-server enable traps snmp
authentication linkup linkdown coldstart no crypto isakmp
nat-traversal telnet timeout 5 ssh timeout 5 console timeout
0 threat-detection basic-threat threat-detection statistics
access-list ! class-map type regex match-any DomainBlockList
match regex domainlist1 match regex domainlist2 match regex
domainlist3 !--- Class map created in order to match the
domain names !--- to be blocked class-map type inspect http
match-all BlockDomainsClass match request header host regex
class DomainBlockList !--- Inspect the identified traffic by
class !--- "DomainBlockList" class-map type regex match-any
URLBlockList match regex urllist1 match regex urllist2 match
regex urllist3 match regex urllist4 !--- Class map created in
order to match the URLs !--- to be blocked class-map
inspection_default match default-inspection-traffic class-map
type inspect http match-all AppHeaderClass match response
header regex contenttype regex applicationheader !--- Inspect
the captured traffic by regular !--- expressions "content-
type" and "applicationheader" class-map httptraffic match
access-list inside_mpc !--- Class map created in order to
match the !--- filtered traffic by ACL class-map type inspect
http match-all BlockURLsClass match request uri regex class
```

```
URLBlockList ! !--- Inspect the identified traffic by class
!--- "URLBlockList" ! policy-map type inspect dns
preset_dns_map parameters message-length maximum 512 policy-
map type inspect http http_inspection_policy parameters
protocol-violation action drop-connection class
AppHeaderClass drop-connection log match request method
connect drop-connection log class BlockDomainsClass reset log
class BlockURLsClass reset log !--- Define the actions such
as drop, reset or log !--- in the inspection policy map
policy-map global_policy class inspection_default inspect dns
preset_dns_map inspect ftp inspect h323 h225 inspect h323 ras
inspect netbios inspect rsh inspect rtsp inspect skinny
inspect esmtp inspect sqlnet inspect sunrpc inspect tftp
inspect sip inspect xdmcp policy-map inside-policy class
httptraffic inspect http http_inspection_policy !--- Map the
inspection policy map to the class !--- "httptraffic" under
the policy map created for the !--- inside network traffic !
service-policy global_policy global service-policy inside-
policy interface inside !--- Apply the policy to the
interface inside where the websites will be blocked prompt
hostname context
Cryptochecksum:e629251a7c37af205c289cf78629fc11 : end
ciscoasa#
```

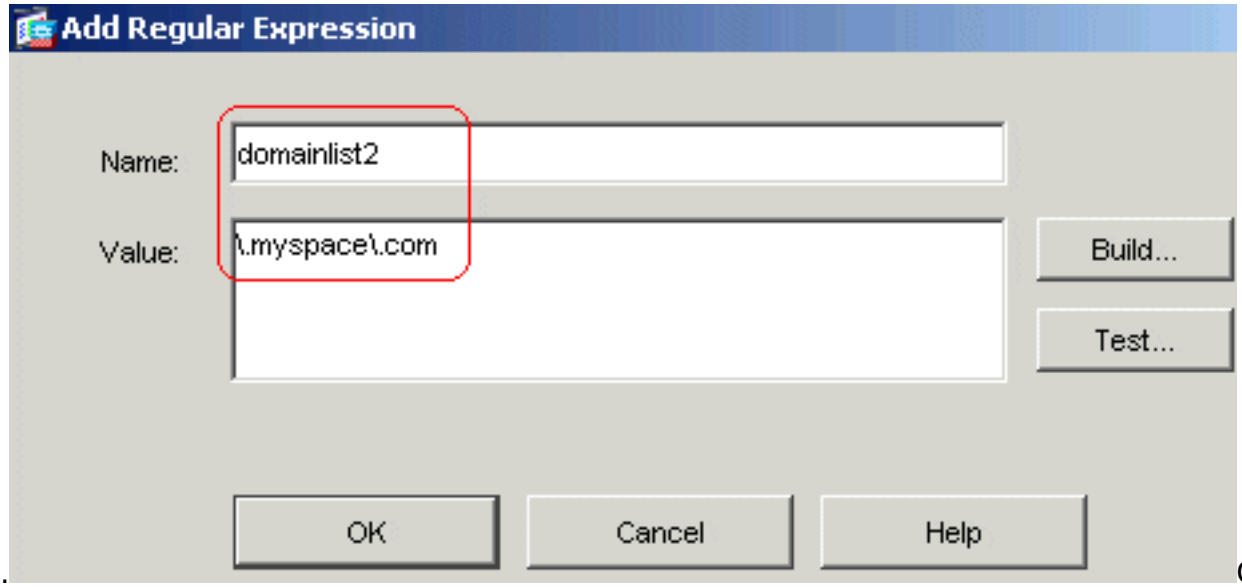
ASA Configuration 7.2(x) with ASDM 5.2

Complete these steps in order to configure the regular expressions and apply them to MPF to block the specific websites:

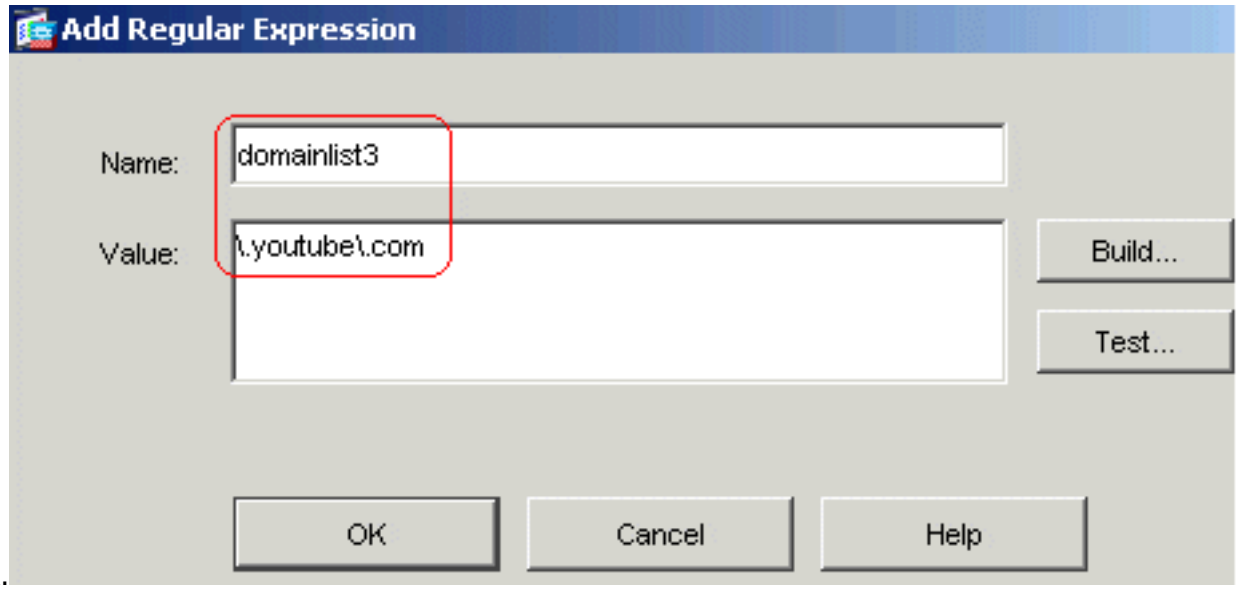
1. **Create Regular Expressions**Choose **Configuration > Global Objects > Regular Expressions** and click **Add** under the Regular Expression tab in order to create regular expressions.Create a regular expression **domainlist1** in order to capture the domain name **yahoo.com**. Click
OK.



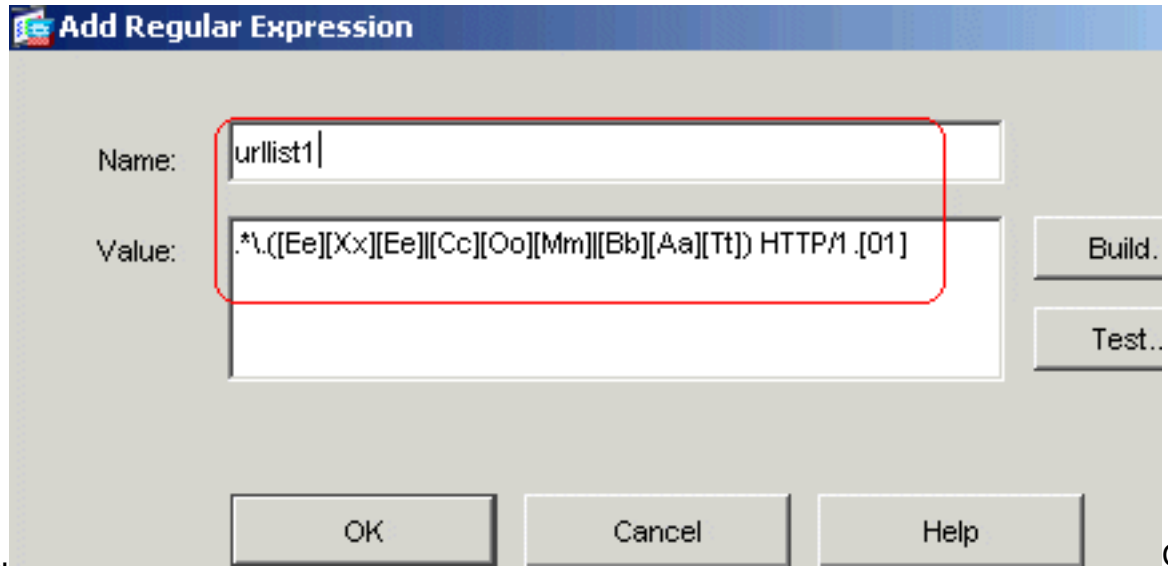
Create a regular expression **domainlist2** in order to capture the domain name **myspace.com**. Click



OK. Create a regular expression **domainlist3** in order to capture the domain name **youtube.com**. Click

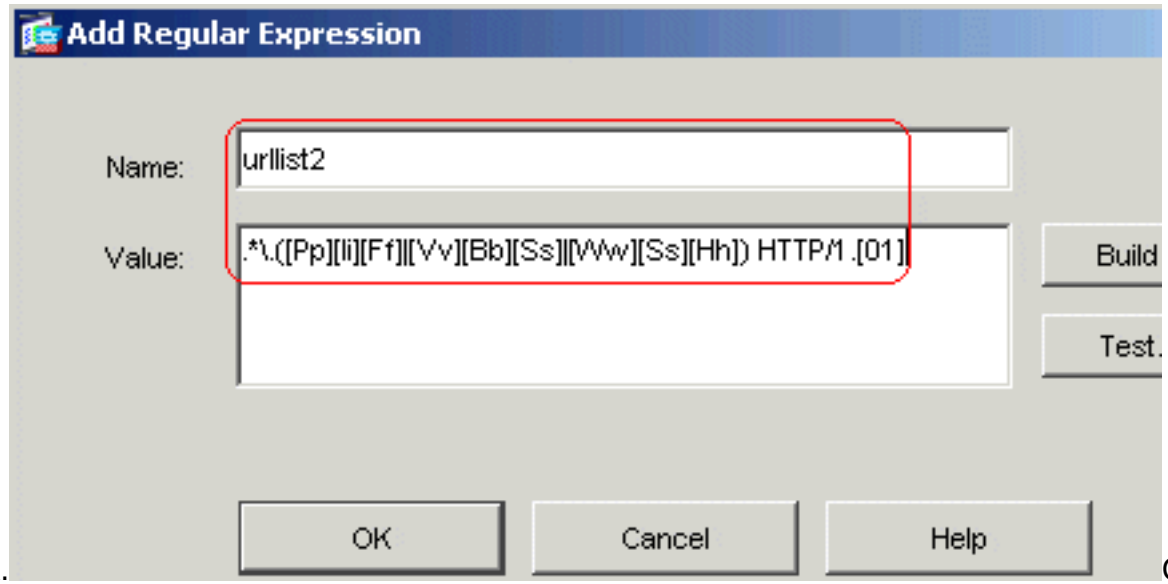


OK. Create a regular expression **urllist1** in order to capture the file extensions such as **exe**, **com**, and **bat** provided that the http version used by the web browser must be either 1.0 or 1.1. Click

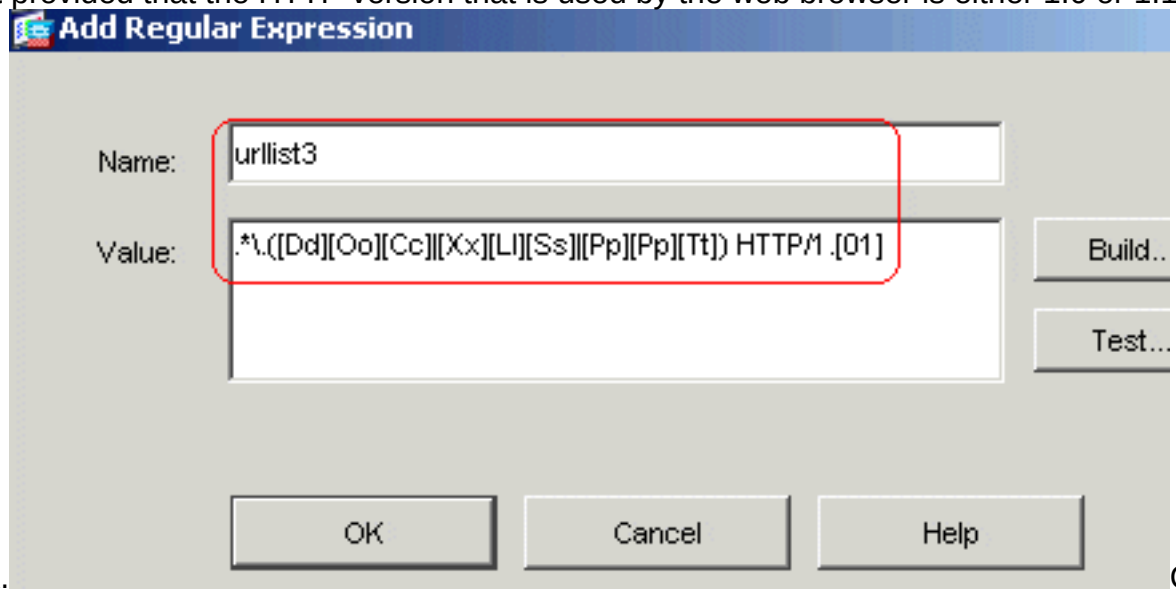


OK. Create a regular expression **urllist2** in order to capture the file extensions, such as **pif**, **vbs**, and **wsh** provided that the HTTP version that is used by the web browser is either 1.0 or 1.1.

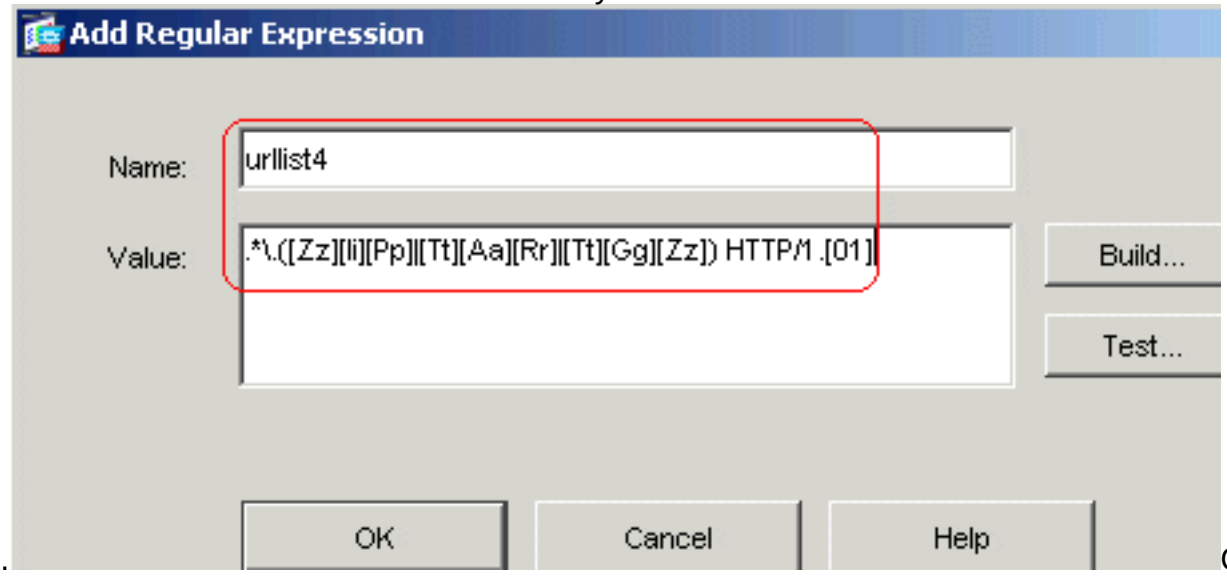
Click



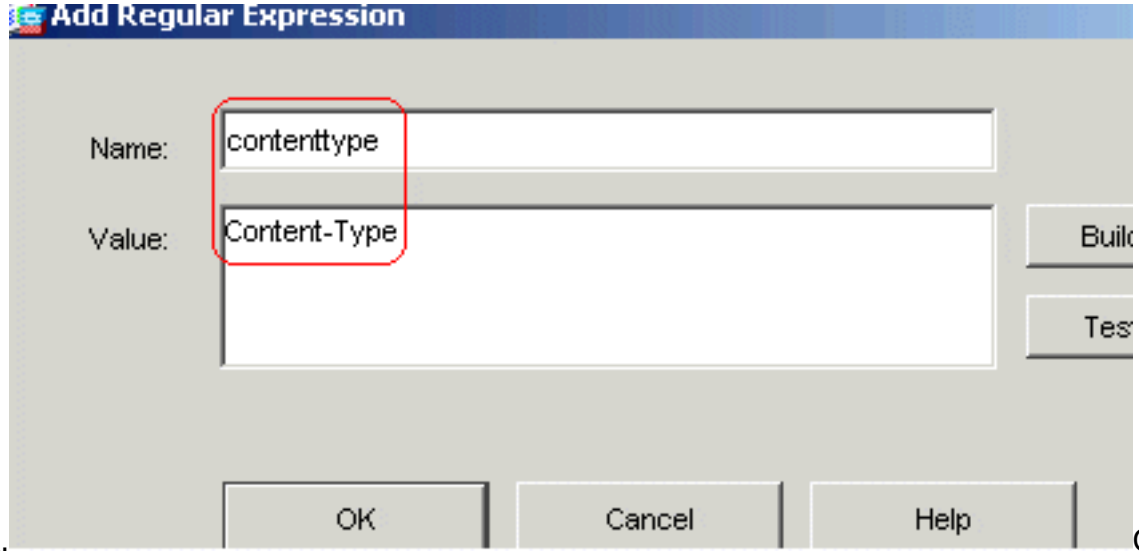
OK. Create a regular expression **urllist3** in order to capture the file extensions, such as **doc**, **xls**, and **ppt** provided that the HTTP version that is used by the web browser is either 1.0 or 1.1. Click



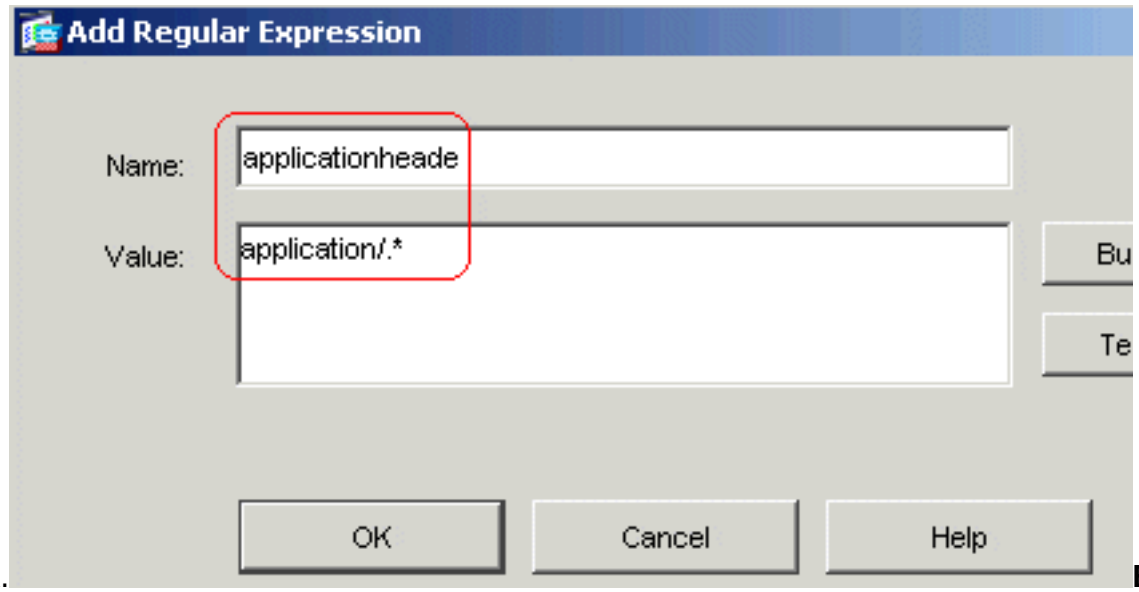
OK. Create a regular expression **urllist4** in order to capture the file extensions, such as **zip**, **tar**, and **tgz** provided that the HTTP version that is used by the web browser is either 1.0 or 1.1. Click



OK. Cr eate a regular expression **contenttype** in order to capture the content type. Click

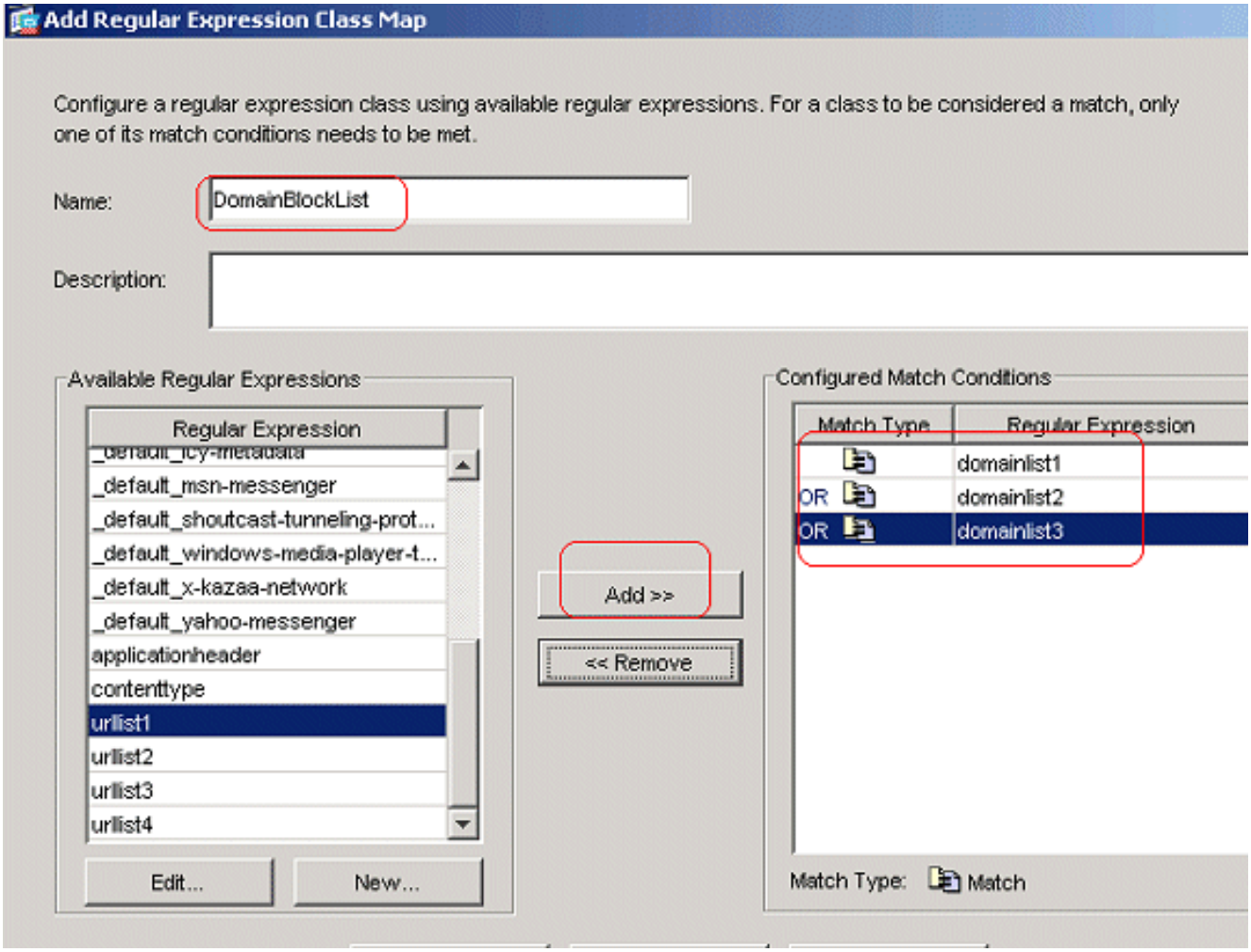


OK.Create a regular expression **applicationheader** in order to capture the various application header. Click

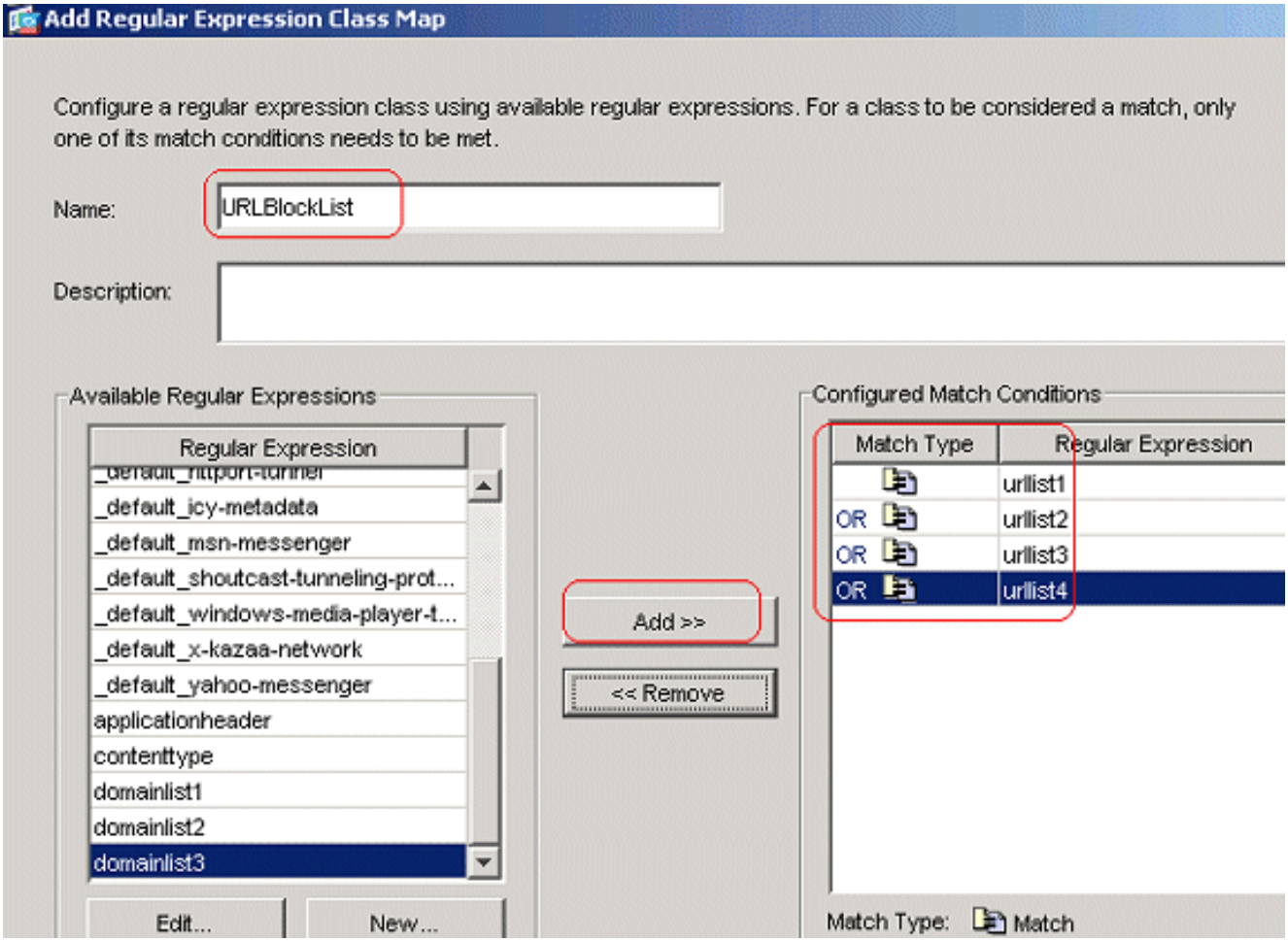


OK.**Equivalent CLI Configuration**

2. **Create Regular Expression Classes**Choose **Configuration > Global Objects > Regular Expressions**, and click **Add** under the **Regular Expression Classes** tab in order to create the various classes.Create a regular expression class **DomainBlockList** in order to match any of the regular expressions: domainlist1, domainlist2, and domainlist3. Click **OK**.

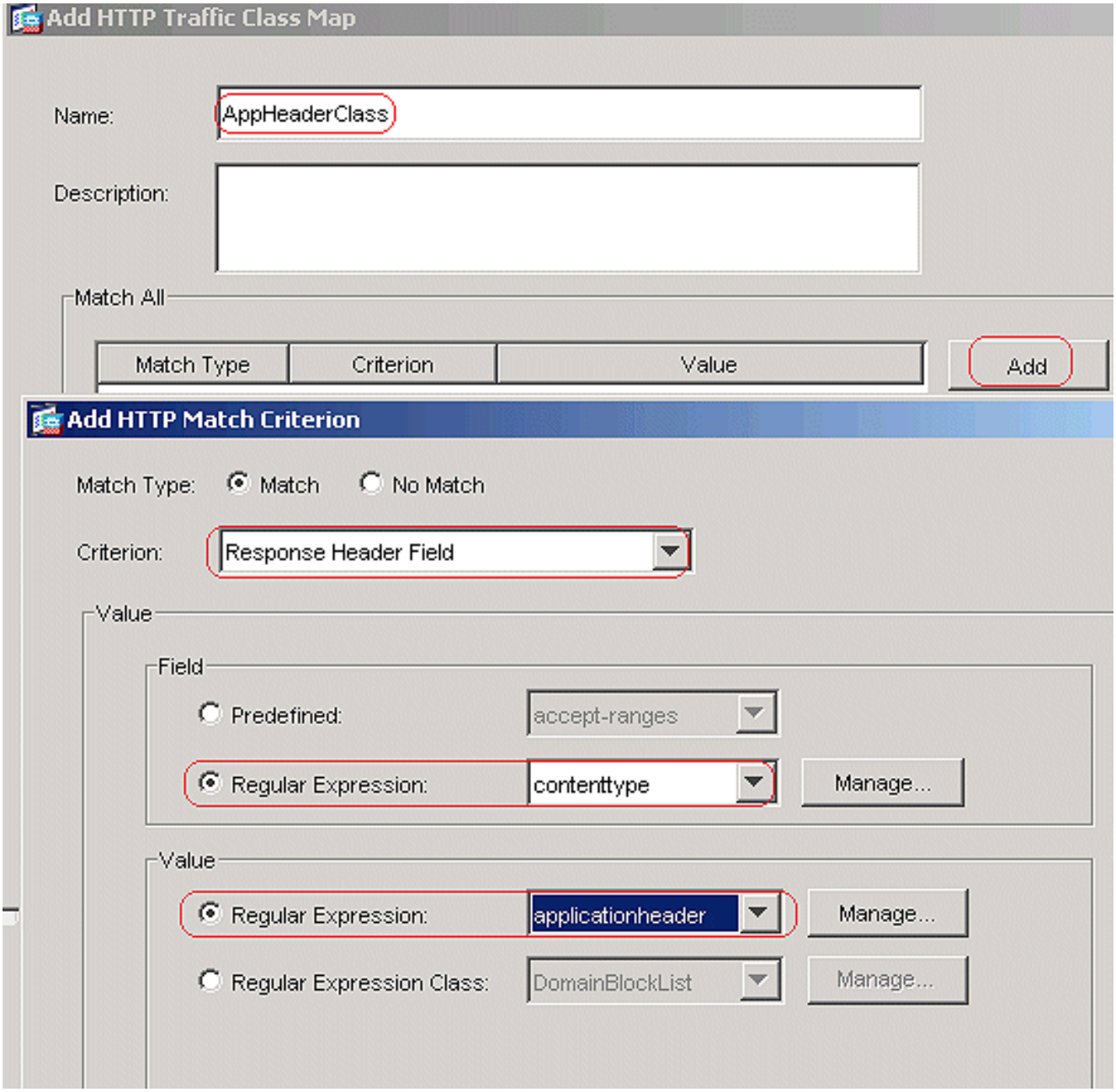


Create a regular expression class **URLBlockList** in order to match any of the regular expressions: urllist1, urllist2, urllist3, and urllist4. Click **OK**.

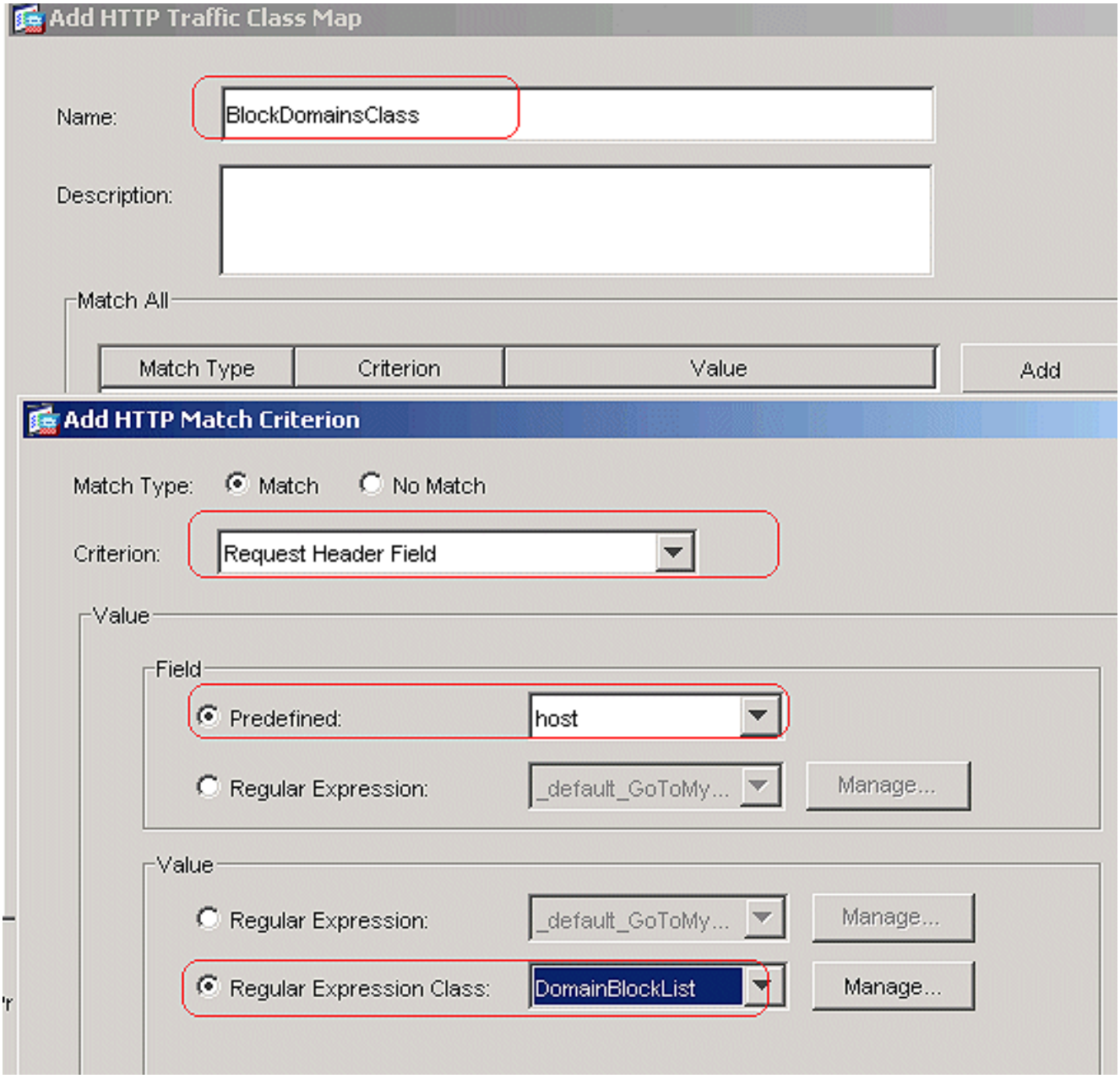


Equivalent CLI Configuration

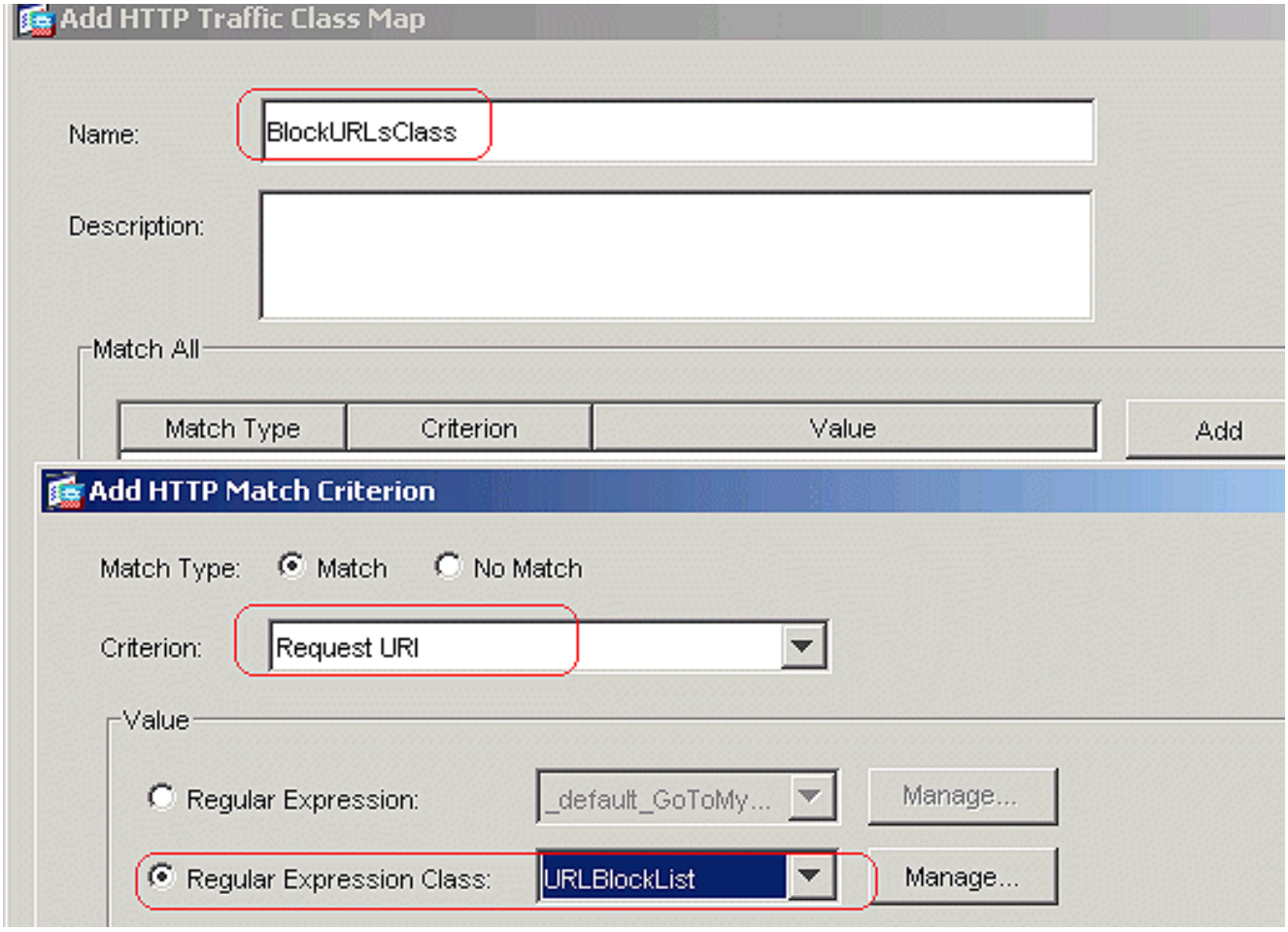
3. **Inspect the identified traffic with Class maps**Choose **Configuration > Global Objects > Class Maps > HTTP > Add** in order to create a class map to inspect the HTTP traffic identified by various regular expressions.Create a class map **AppHeaderClass** in order to match the response header with regular expression captures.



Click **OK**.Create a class map **BlockDomainsClass** in order to match the request header with regular expression
captures.

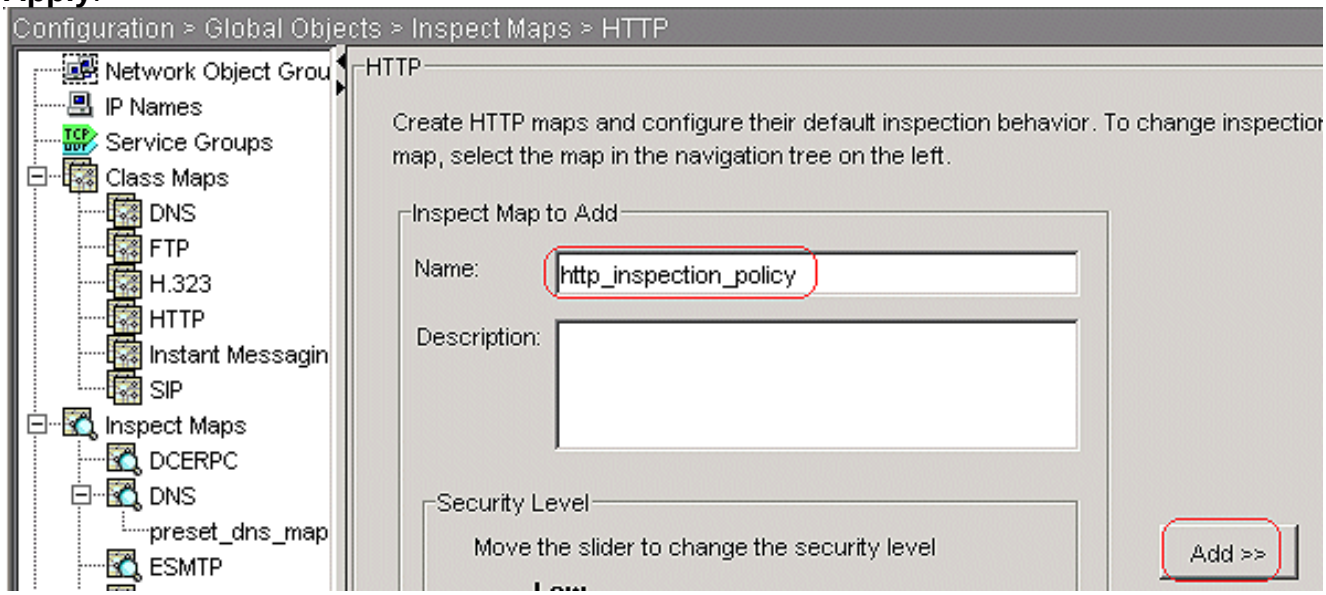


Click **OK**.Create a class map **BlockURLsClass** in order to match the request URI with regular expression
captures.

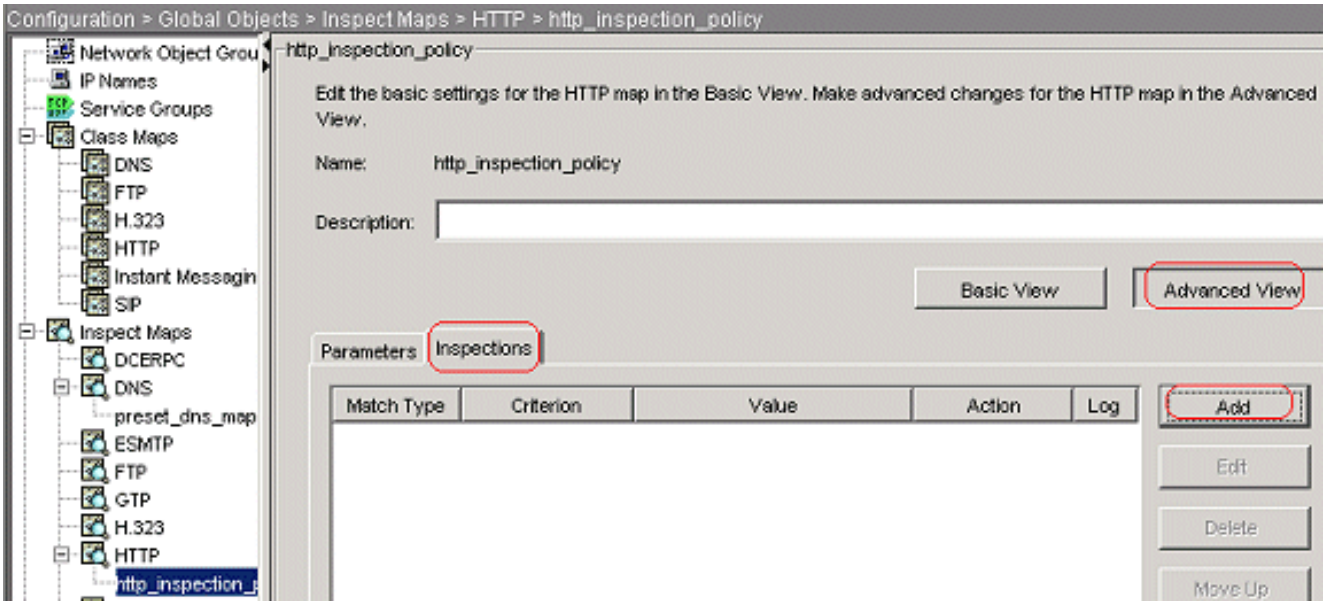


Click **OK**.**Equivalent CLI Configuration**

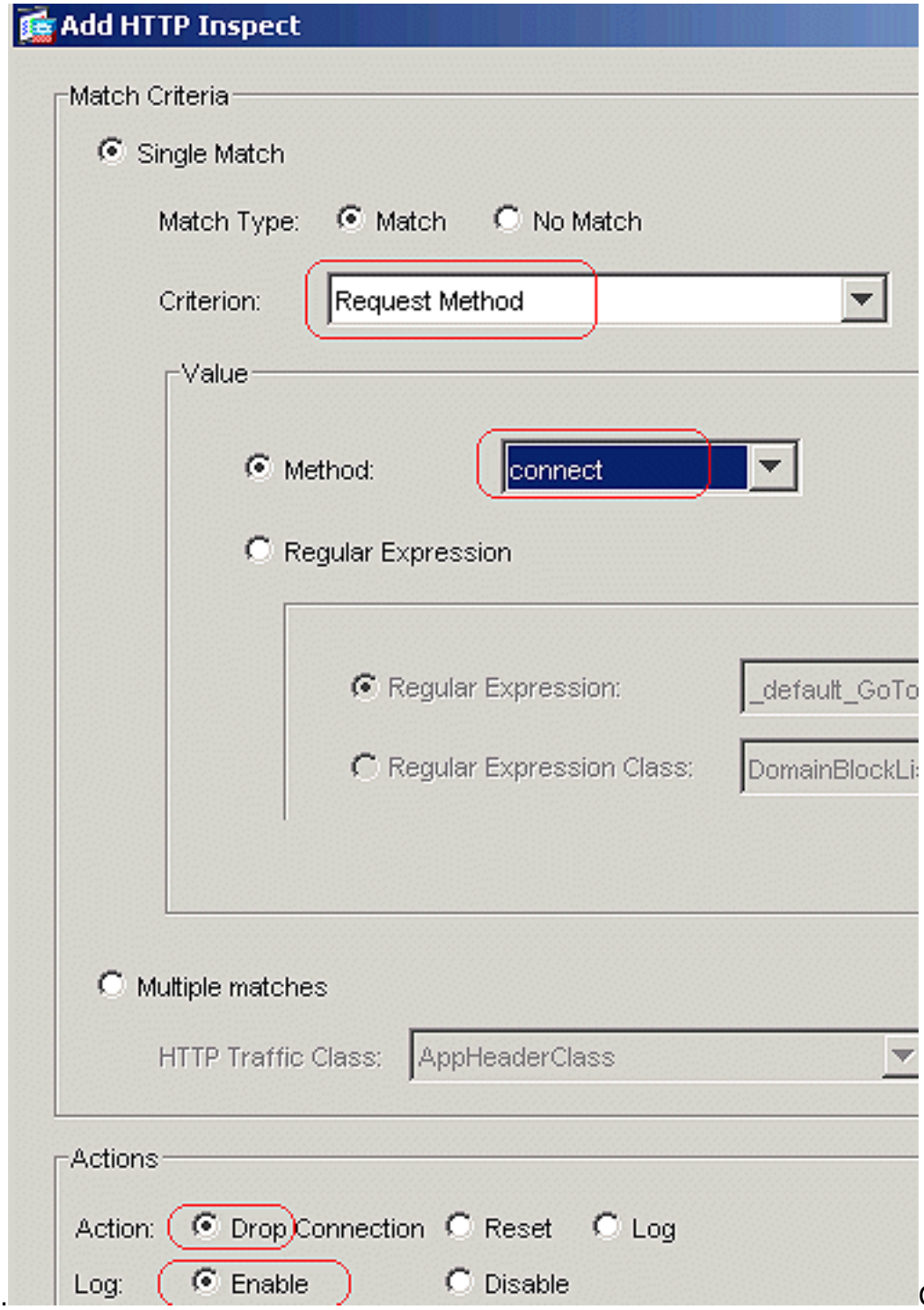
4. **Set the actions for the matched traffic in the inspection policy**Choose **Configuration > Global Objects > Inspect Maps > HTTP** in order to create a **http_inspection_policy** to set the action for the matched traffic. Click **Add** and **Apply**.



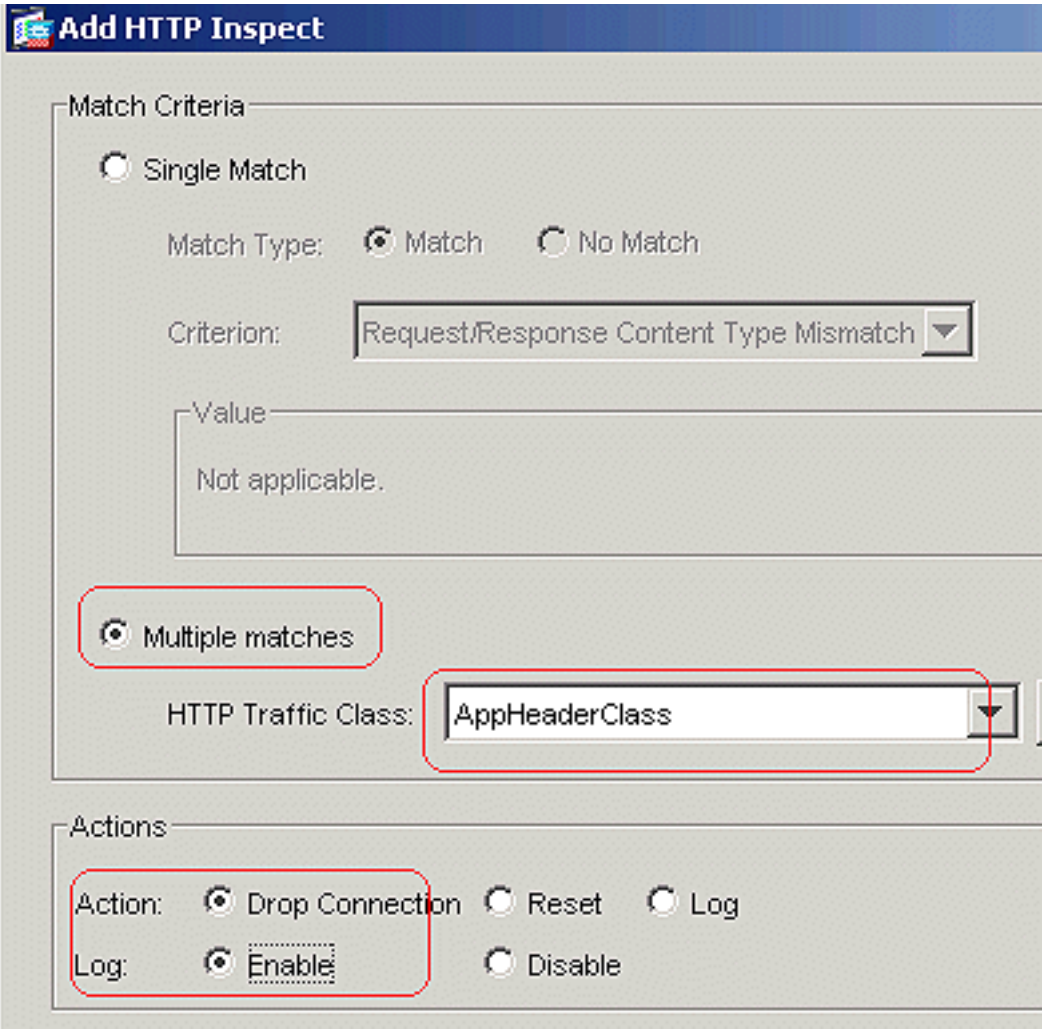
Choose **Configuration > Global Objects > Inspect Maps > HTTP > http_inspection_policy** and click **Advanced View > Inspections > Add** in order to set the actions for the various Classes created so far.



Click **OK**.Set the action as **Drop Connection**; **Enable** the logging for the Criterion as Request Method and Value as

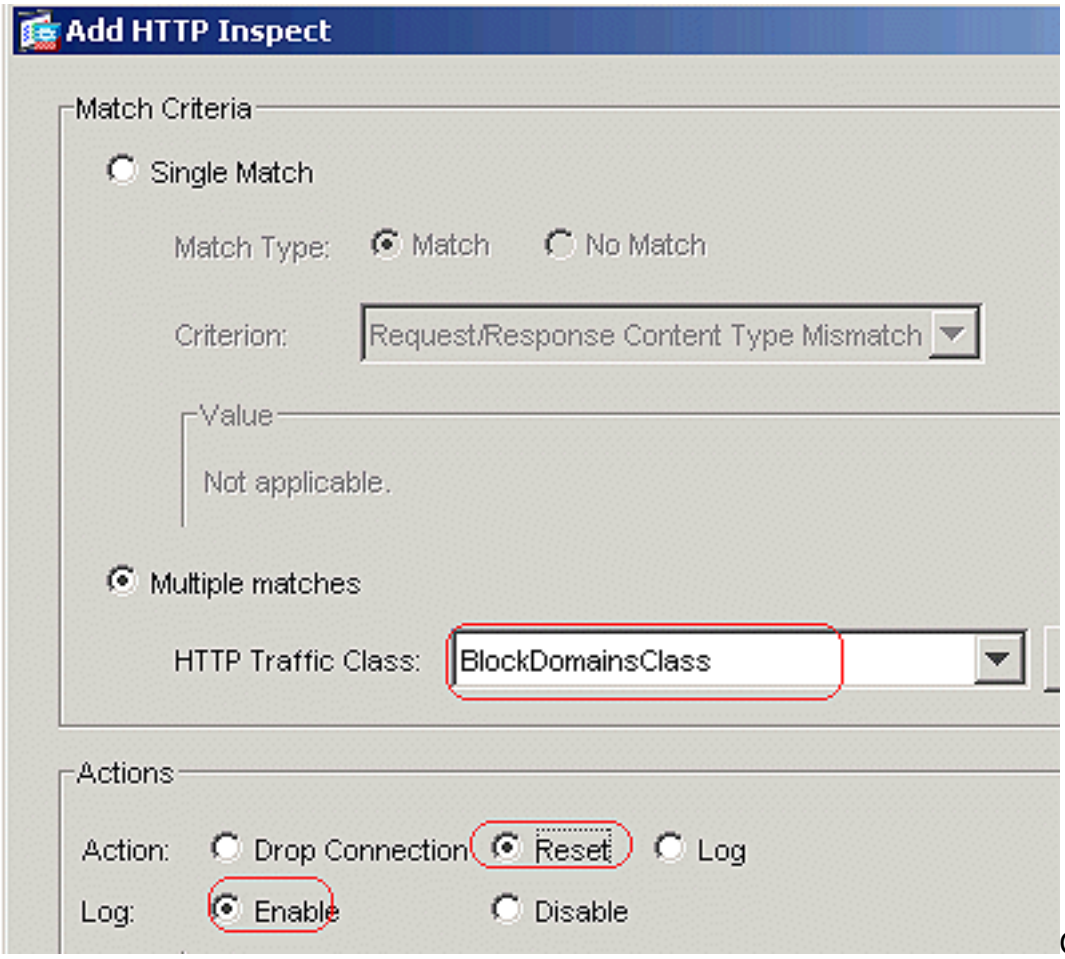


connect. Click **OK**.Set the action as **Drop Connection**, and **Enable** the logging for the class

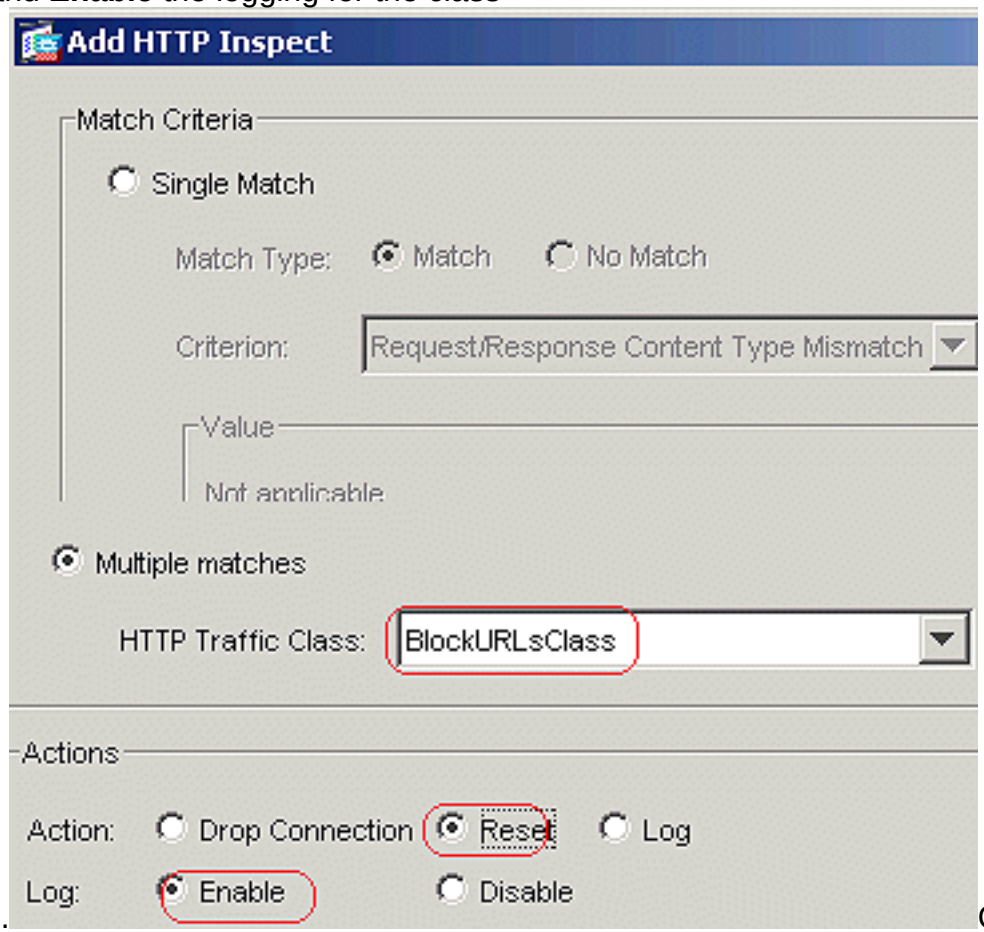


AppHeaderClass.

Click **OK**.Set the action as **Reset**, and **Enable** the logging for the class **BlockDomainsClass**.



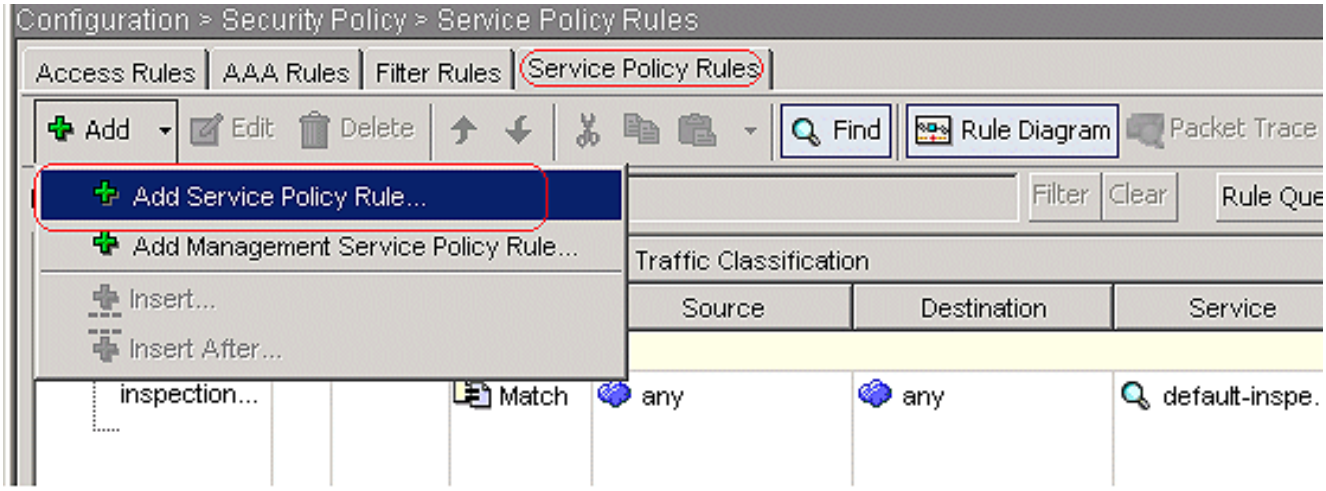
Click **OK**.Set the action as **Reset**, and **Enable** the logging for the class



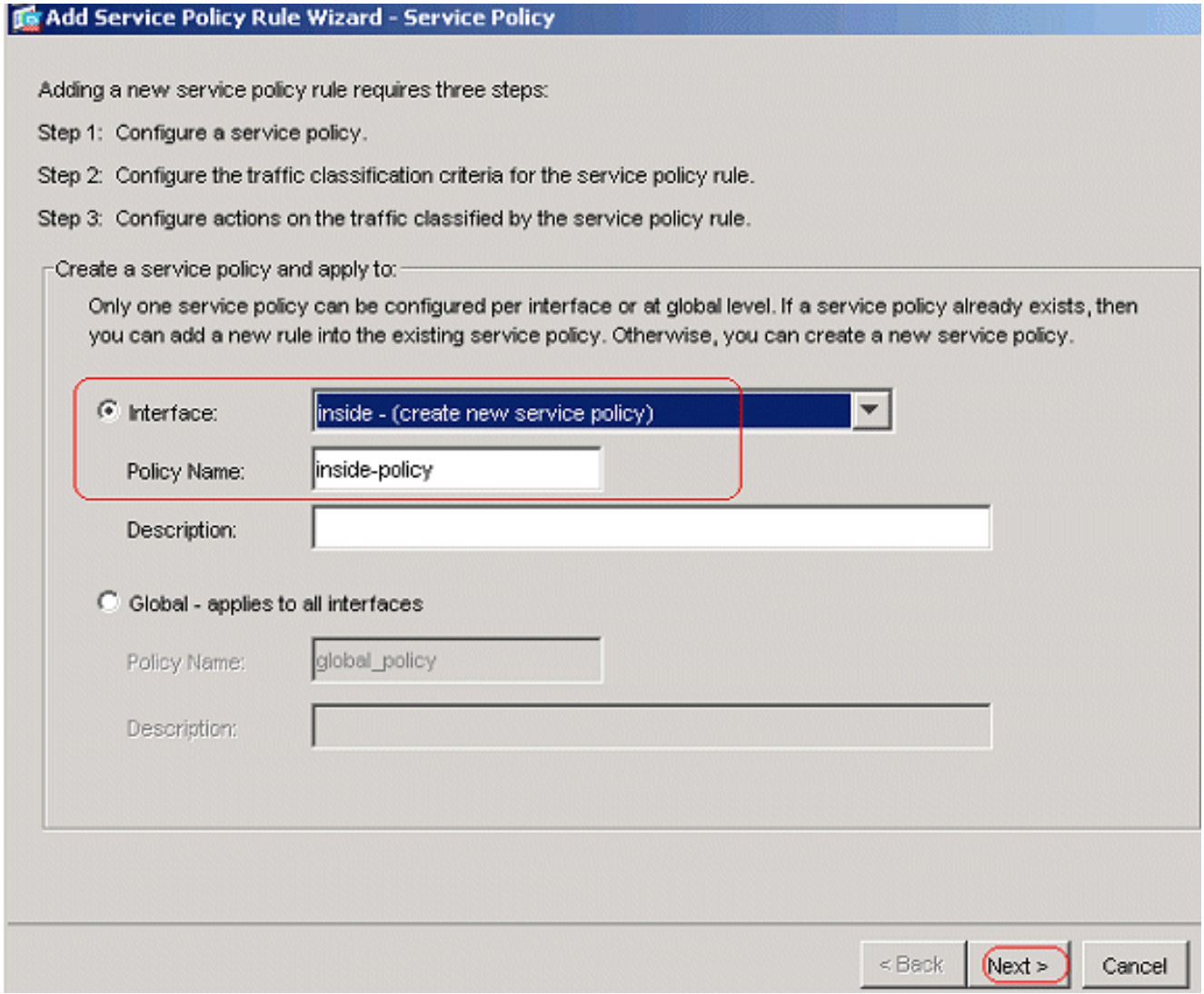
BlockURLsClass. Click **OK**.Click **Apply**.**Equivalent CLI Configuration**

5. **Apply the inspection http policy to the interface**Choose **Configuration > Security Policy > Service Policy Rules > Add > Add Service Policy Rule** under the Service Policy Rules

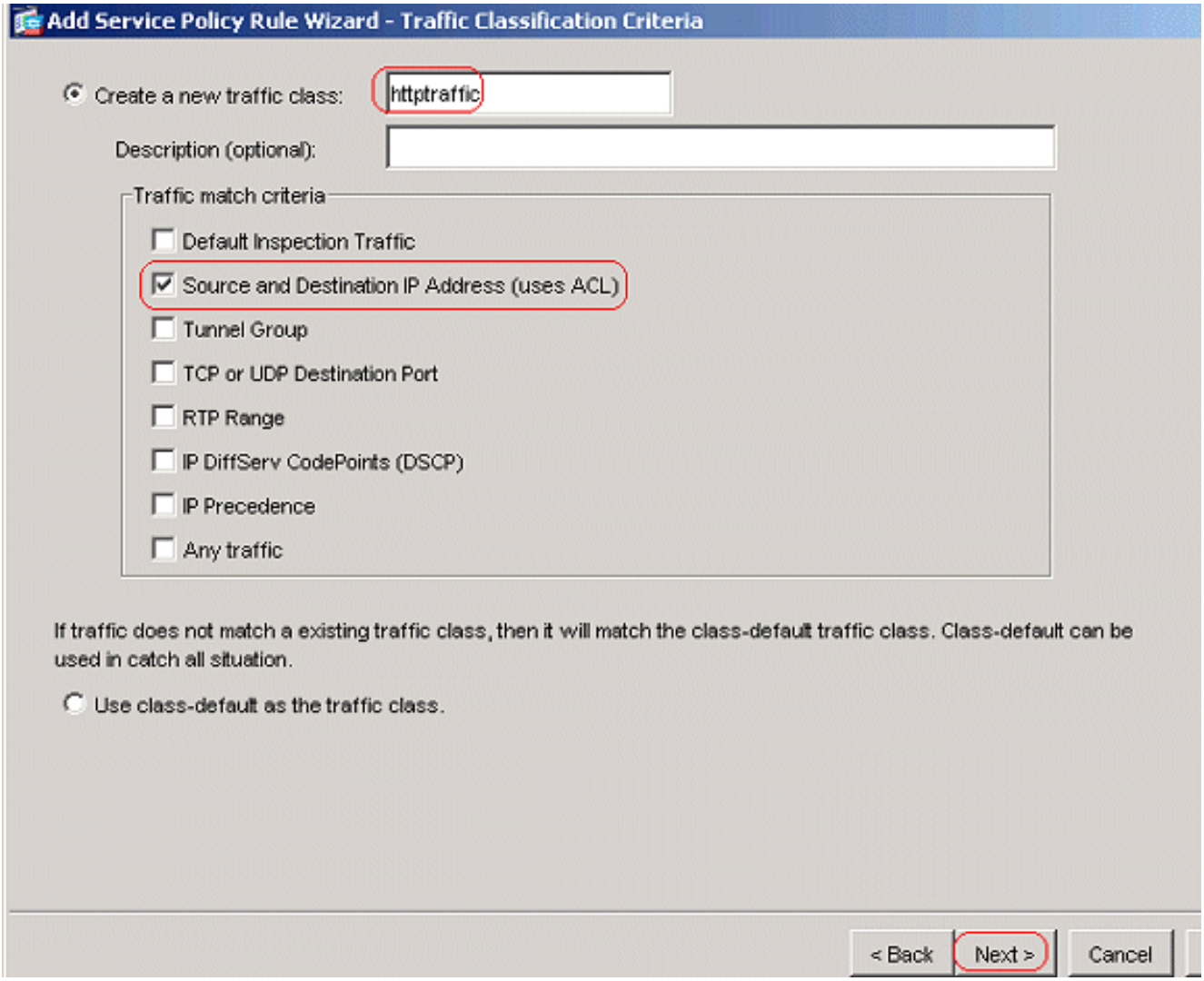
tab.



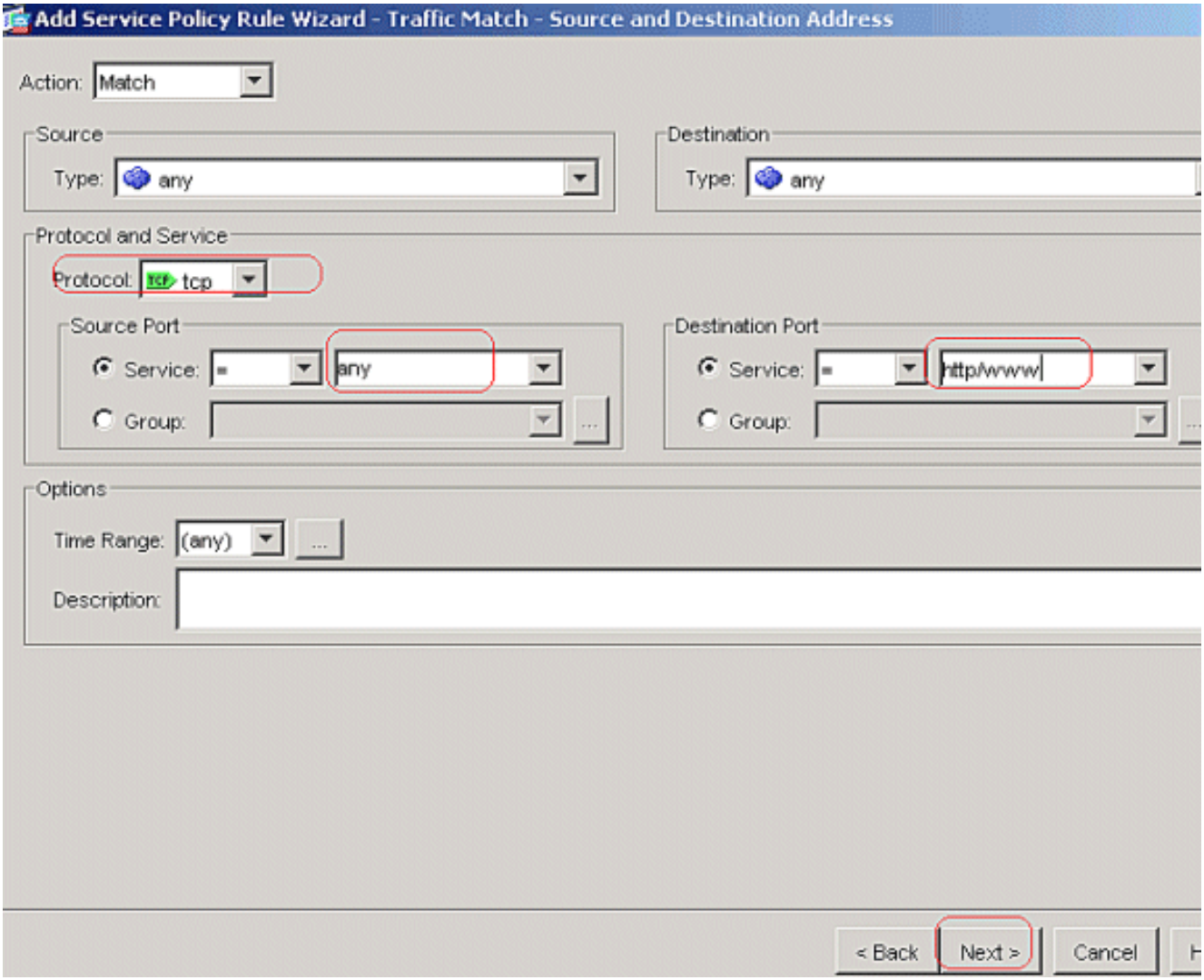
HTTP Traffic Choose the **Interface** radio button with the **inside** interface from the drop-down menu and the Policy Name as **inside-policy**. Click
Next.



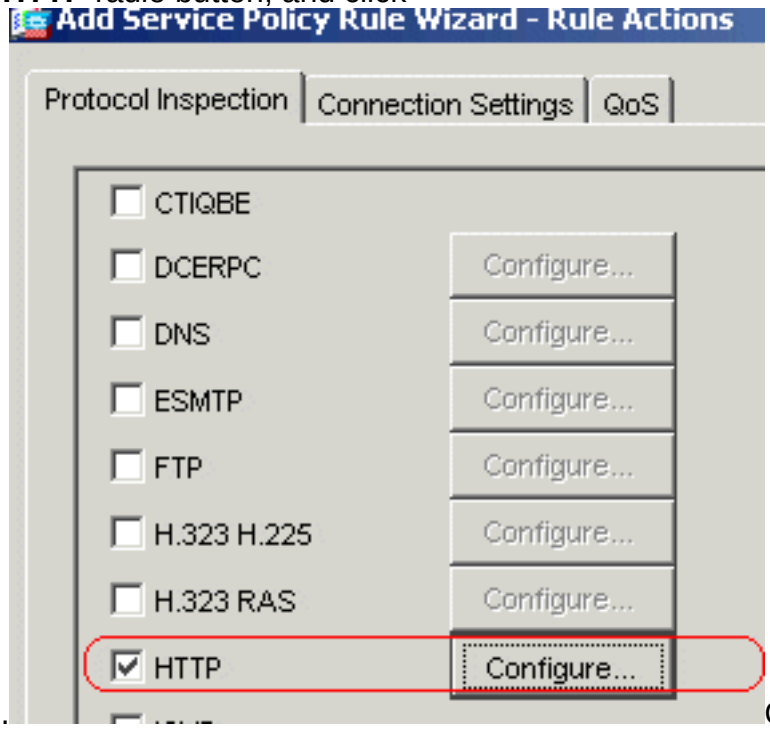
Create a class map **httptraffic**, and check the **Source and Destination IP Address (uses ACL)**. Click
Next.



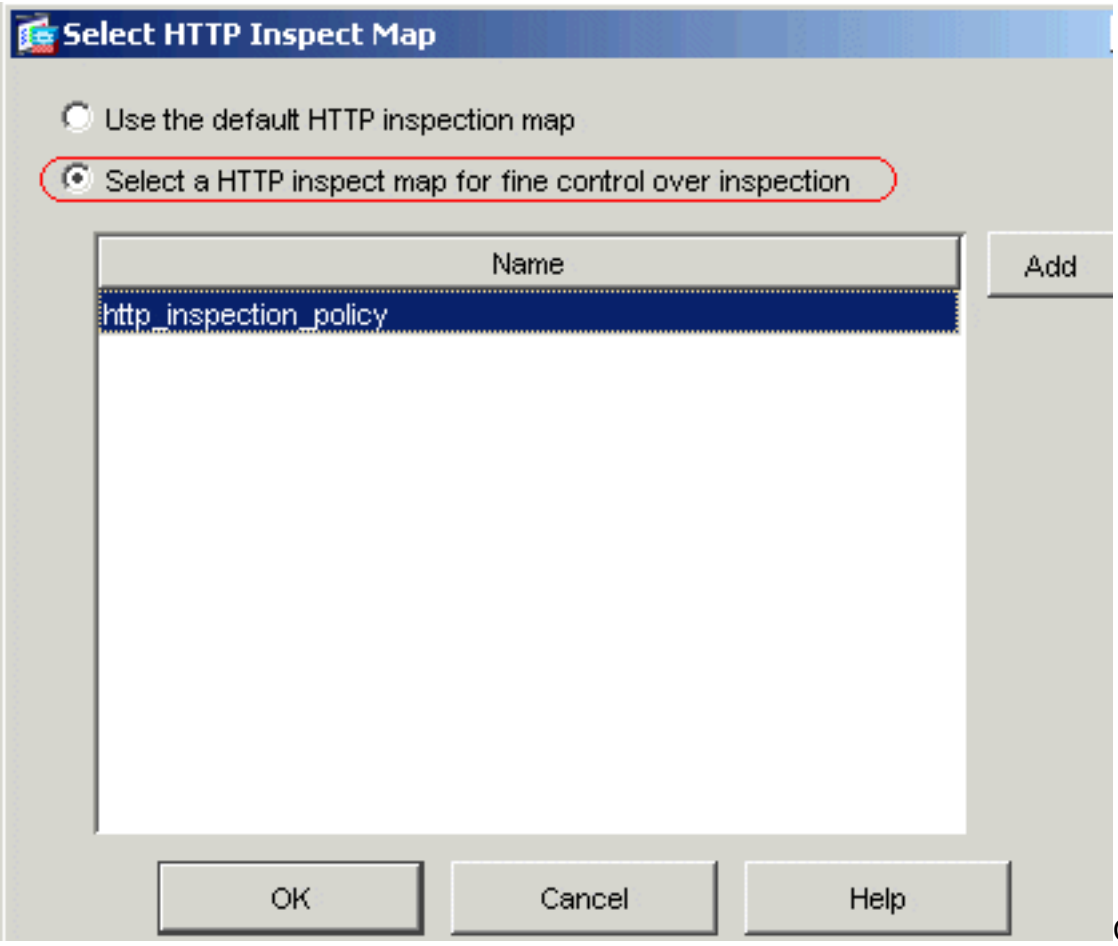
Choose the Source and Destination as **any** with the TCP port as **HTTP**. Click **Next**.



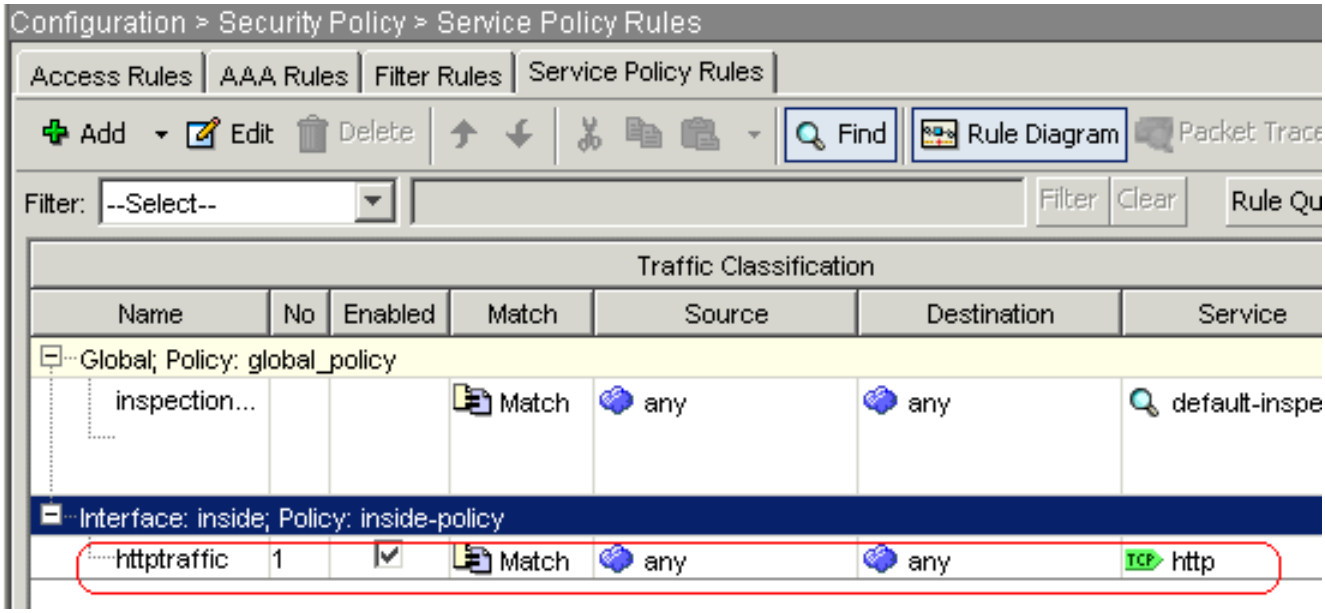
Check the **HTTP** radio button, and click **Configure**.



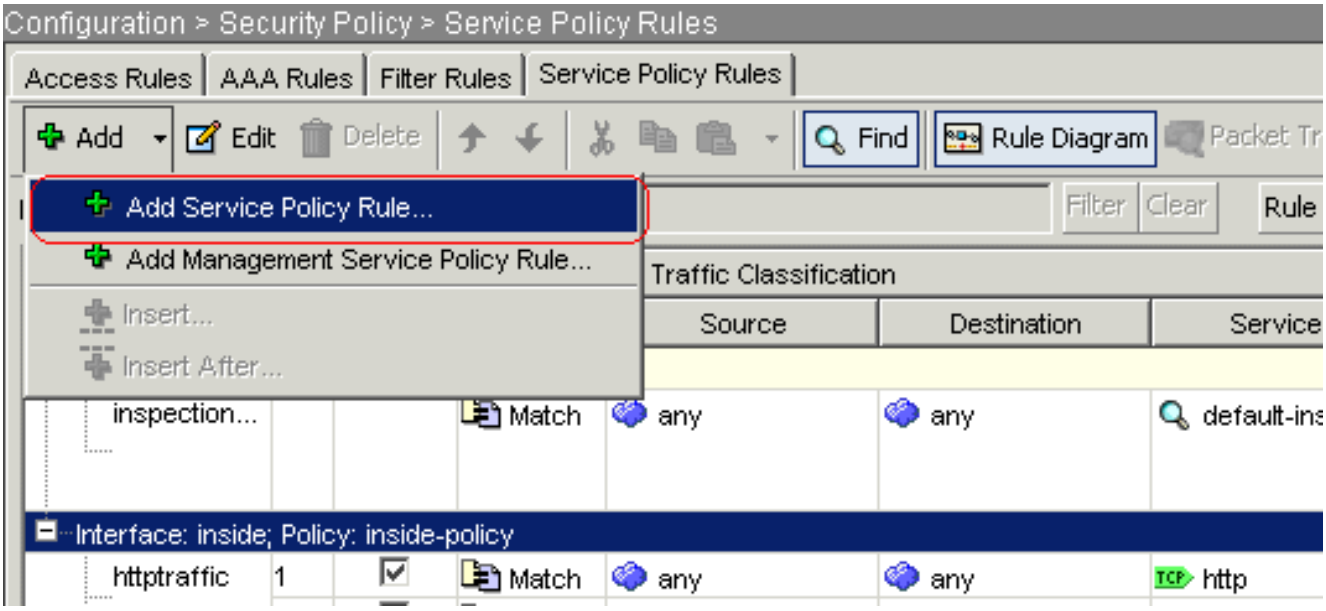
Check the radio button **Select a HTTP inspect map for the control over inspection**. Click



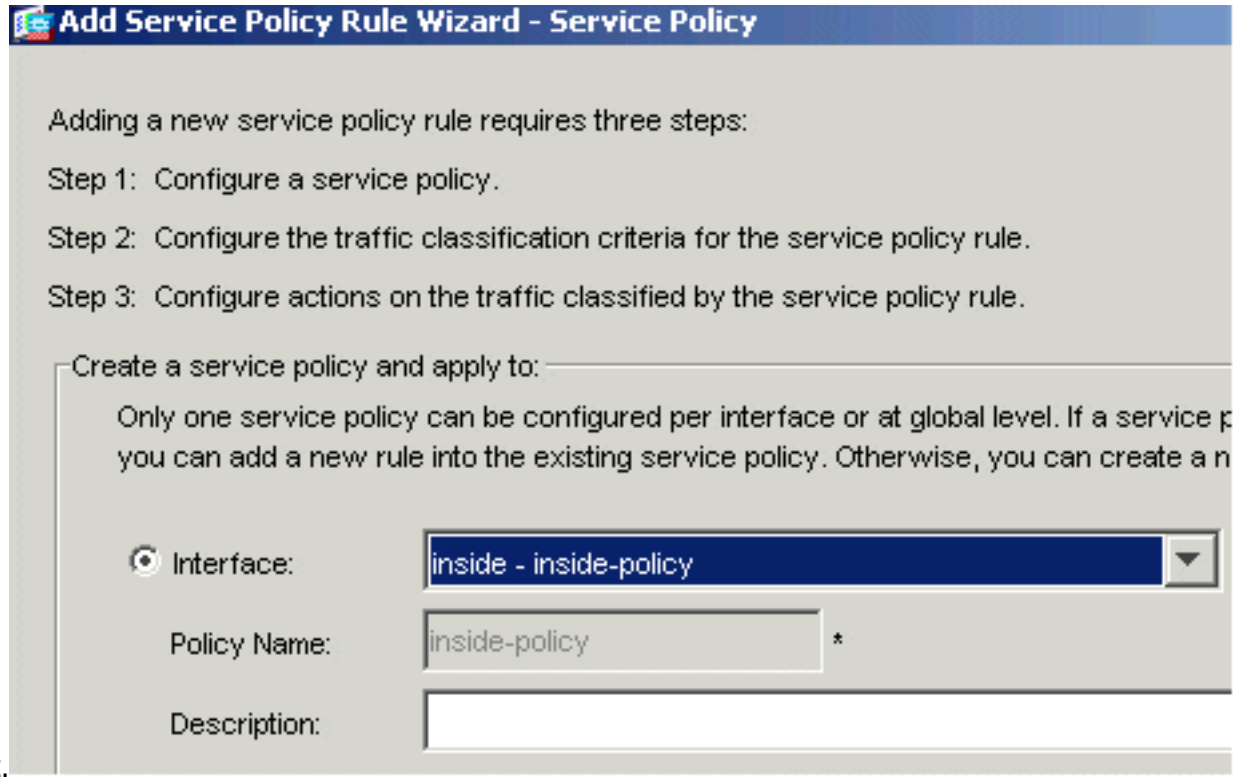
OK. Click **Finish**.



Port 8080 Traffic Again, click **Add > Add Service Policy Rule**.



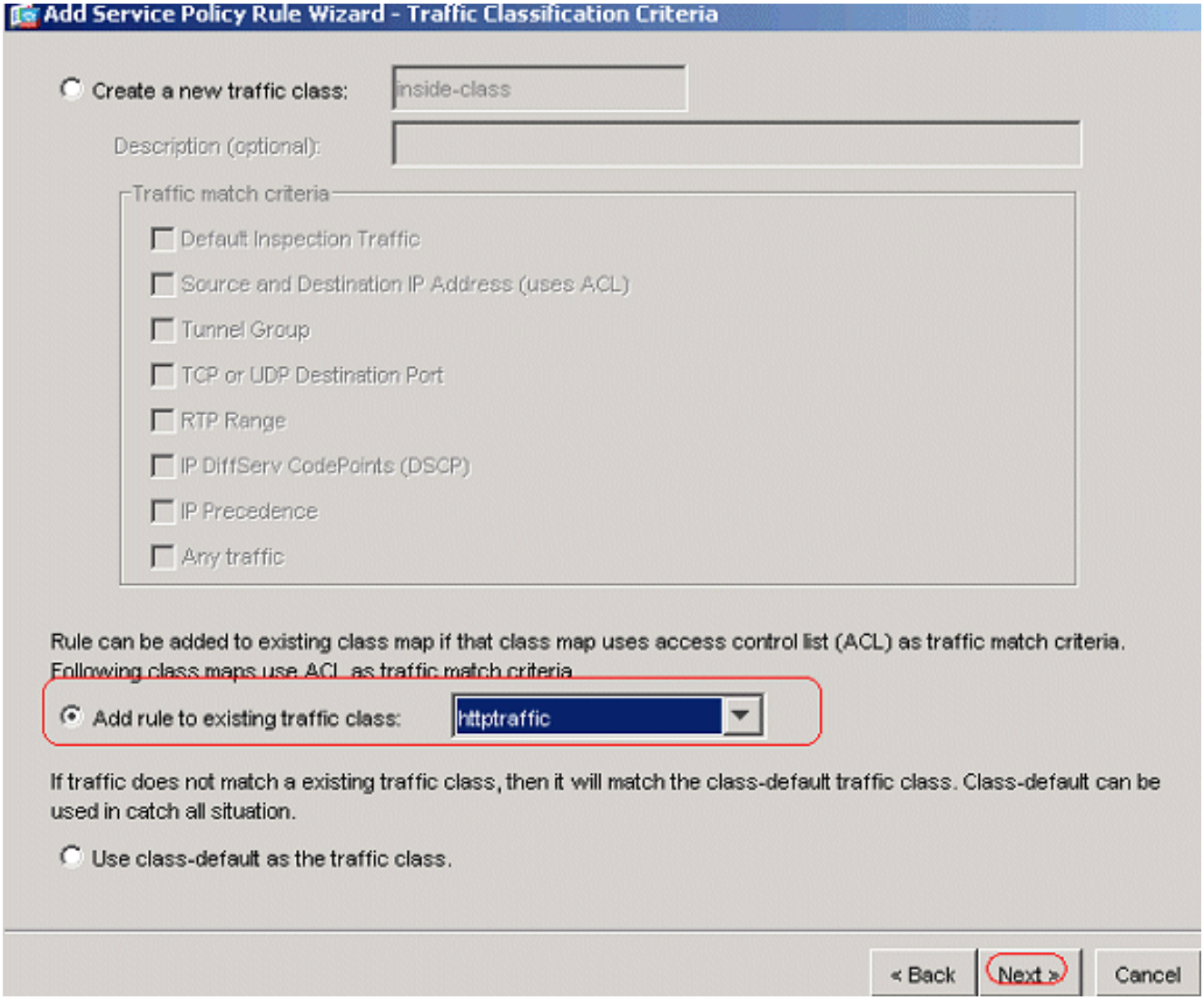
Click



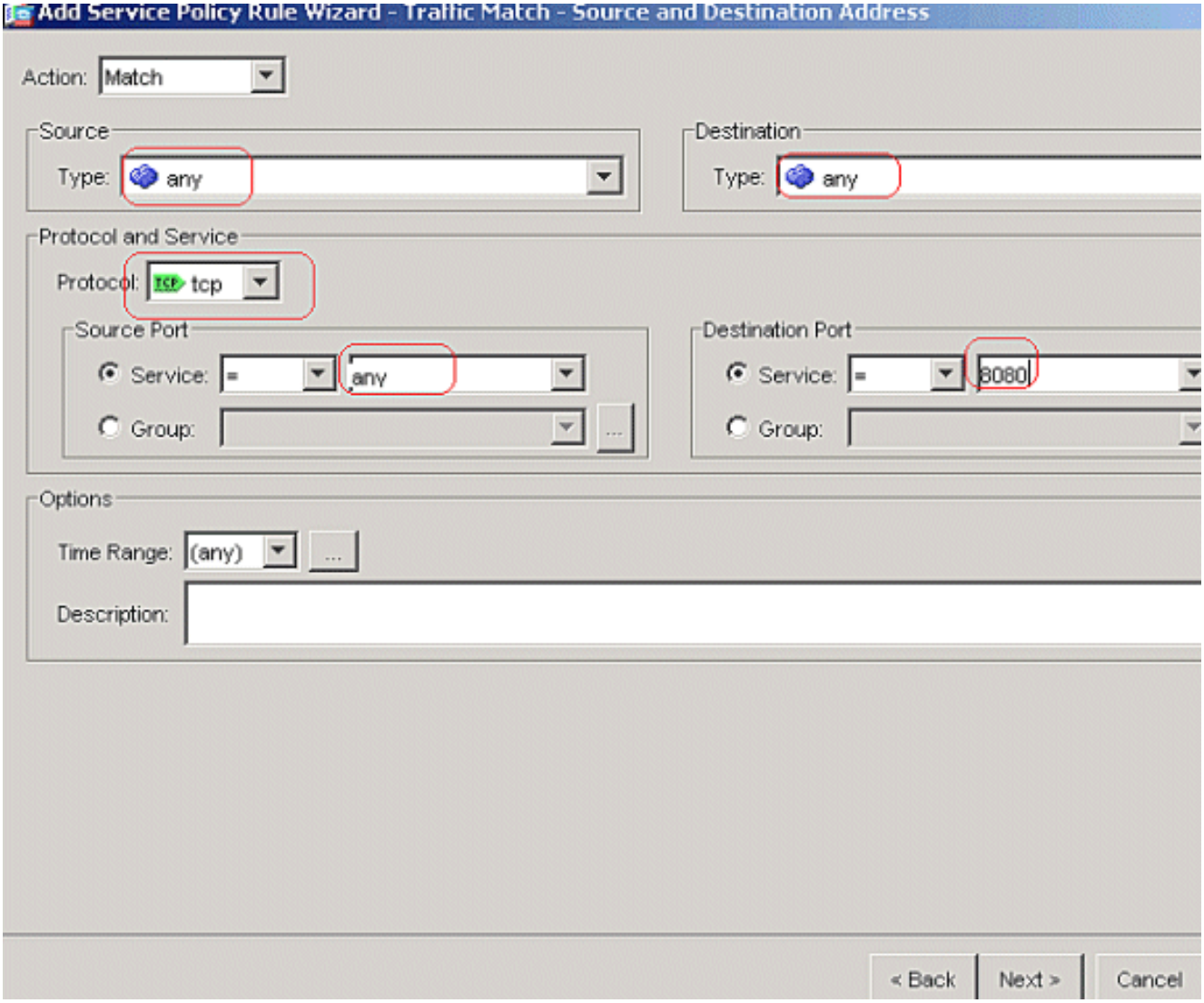
Next.

Choose the **Add rule to existing traffic class** radio button, and choose **httptraffic** from the drop-down menu. Click

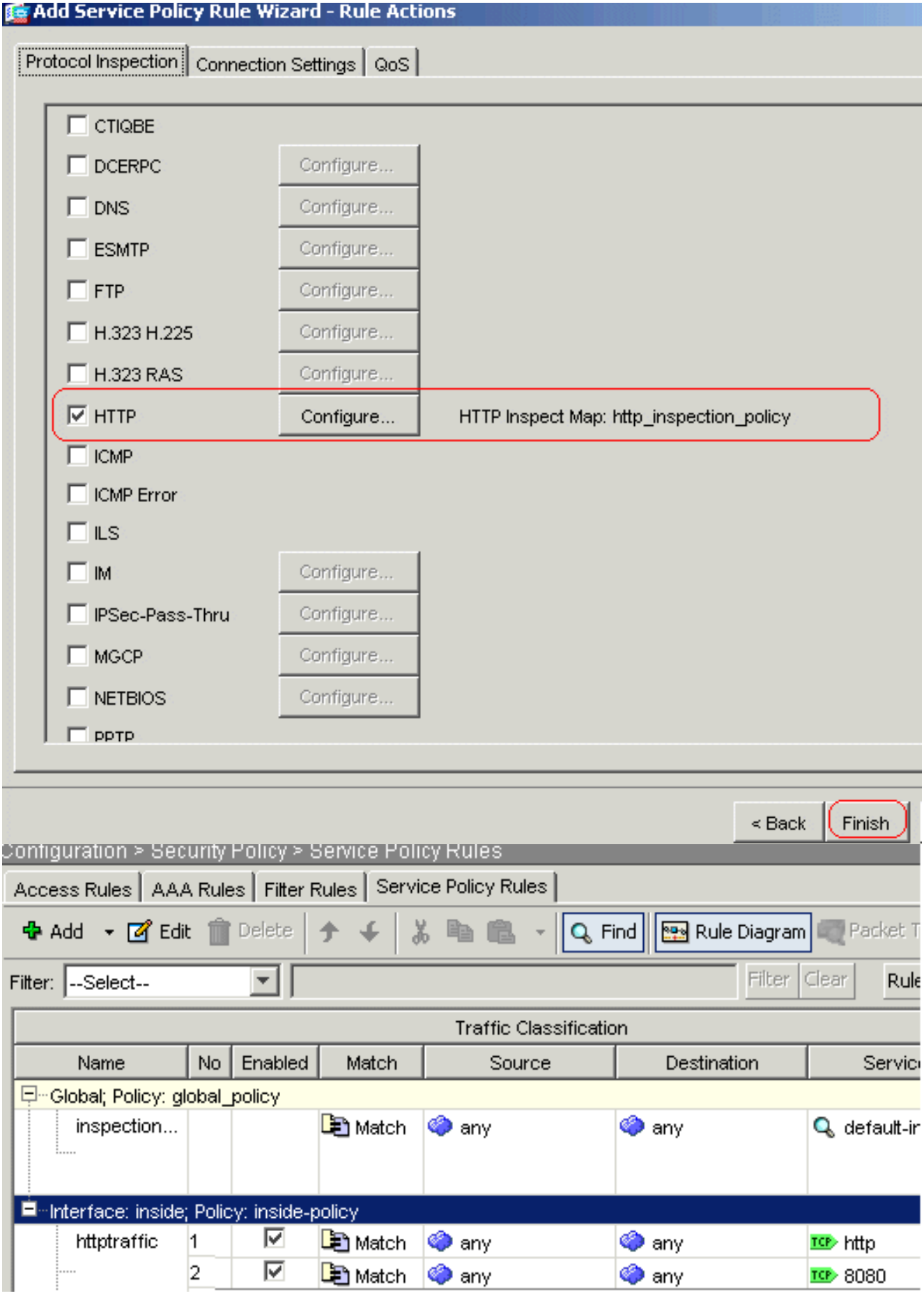
Next.



Choose the Source and Destination as **any** with the TCP port as **8080**. Click **Next**.



Click
Finish.



Click **Apply**.**Equivalent CLI Configuration**

Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

- **show running-config regex**—Shows the regular expressions that have been configured
```
ciscoasa#show running-config regex regex urllist1
".*\.([Ee][Xx][Ee]|[Cc][Oo][Mm]|[Bb][Aa][Tt]) HTTP/1.[01]" regex urllist2
".*\.([Pp][Ii][Ff]|[Vv][Bb][Ss]|[Ww][Ss][Hh]) HTTP/1.[01]" regex urllist3
".*\.([Dd][Oo][Cc]|[Xx][Ll][Ss]|[Pp][Pp][Tt]) HTTP/1.[01]" regex urllist4
".*\.([Zz][Ii][Pp]|[Tt][Aa][Rr]|[Tt][Gg][Zz]) HTTP/1.[01]" regex domainlist1 "\.yahoo\.com" regex
domainlist2 "\.myspace\.com" regex domainlist3 "\.youtube\.com" regex contenttype "Content-Type"
regex applicationheader "application/.*" ciscoasa#
```
- **show running-config class-map**—Shows the class maps that have been configured
```
ciscoasa#show running-config class-map ! class-map type regex match-any DomainBlockList
match regex domainlist1 match regex domainlist2 match regex domainlist3 class-map type inspect http
match-all BlockDomainsClass match request header host regex class DomainBlockList class-map type
regex match-any URLBlockList match regex urllist1 match regex urllist2 match regex urllist3 match
regex urllist4 class-map inspection_default match default-inspection-traffic class-map type inspect
http match-all AppHeaderClass match response header regex contenttype regex applicationheader class-
map httptraffic match access-list inside_mpc class-map type inspect http match-all BlockURLsClass
match request uri regex class URLBlockList ! ciscoasa#
```
- **show running-config policy-map type inspect http**—Shows the policy maps that inspects the http traffic that have been configured
```
ciscoasa#show running-config policy-map type inspect http
! policy-map type inspect http http_inspection_policy parameters protocol-violation action drop-
connection class AppHeaderClass drop-connection log match request method connect drop-connection log
class BlockDomainsClass reset log class BlockURLsClass reset log ! ciscoasa#
```
- **show running-config policy-map**—Displays all the policy-map configurations as well as the default policy-map configuration
```
ciscoasa#show running-config policy-map ! policy-map type inspect
dns preset_dns_map parameters message-length maximum 512 policy-map type inspect http
http_inspection_policy parameters protocol-violation action drop-connection class AppHeaderClass
drop-connection log match request method connect drop-connection log class BlockDomainsClass reset
log class BlockURLsClass reset log policy-map global_policy class inspection_default inspect dns
preset_dns_map inspect ftp inspect h323 h225 inspect h323 ras inspect netbios inspect rsh inspect
rtsp inspect skinny inspect esmtp inspect sqlnet inspect sunrpc inspect tftp inspect sip inspect
xdmcp policy-map inside-policy class httptraffic inspect http http_inspection_policy ! ciscoasa#
```
- **show running-config service-policy**—Displays all currently running service policy configurations
```
ciscoasa#show running-config service-policy service-policy global_policy global
service-policy inside-policy interface inside
```
- **show running-config access-list**—Displays the access-list configuration that runs on the security appliance
```
ciscoasa#show running-config access-list access-list inside_mpc extended permit
tcp any any eq www access-list inside_mpc extended permit tcp any any eq 8080 ciscoasa#
```

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

- **debug http**—Shows the debug messages for HTTP traffic.

Related Information

- **Cisco Adaptive Security Appliance Support Page**

- **Cisco Adaptive Security Device Manager (ASDM) Support Page**
- **Cisco 500 Series PIX Support Page**
- **Technical Support & Documentation - Cisco Systems**