Configurando a sobrecarga de NAT de roteador para roteador IPSec pré-compartilhada entre uma rede privada e uma rede pública

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Introduction

Esta configuração de exemplo mostra como criptografar o tráfego entre uma rede privada (10.103.1.x) e uma rede pública (98.98.98.x) com o uso de IPsec. A rede 98.98.98.x conhece a rede 10.103.1.x pelos endereços particulares. A rede 10.103.1.x conhece a rede 98.98.98.x via endereços públicos.

Prerequisites

Requirements

Este documento requer uma compreensão básica do protocolo de IPSec. Para saber mais sobre o IPSec, consulte Uma introdução à criptografia de segurança de IP (IPSec).

Componentes Utilizados

As informações neste documento são baseadas nestas versões de software e hardware:

- Software Cisco IOS® versão 12.3(5)
- Cisco 3640 Routers

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.

Conventions

Para obter mais informações sobre convenções de documento, consulte as Convenções de dicas técnicas Cisco.

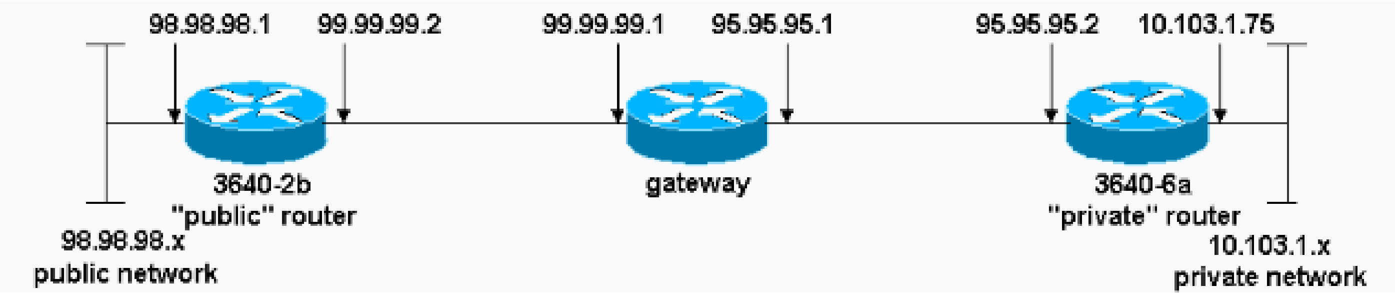
Configurar

Nesta seção, você encontrará informações para configurar os recursos descritos neste documento.

Observação: para encontrar informações adicionais sobre os comandos usados neste documento, use a ferramenta Command Lookup Tool (somente clientes registrados).

Diagrama de Rede

Este documento utiliza a configuração de rede mostrada neste diagrama.



Configurações

Este documento utiliza as seguintes configurações:

- 3640-2b Roteador "público"
- Roteador “privado” 3640-6a

3640-2b Roteador "público"

```
rp-3640-2b#show running config
Building configuration...

Current configuration:
!
version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rp-3640-2b
!
ip subnet-zero
!
```

```
!
!--- Defines the Internet Key Exchange (IKE) policies.
crypto isakmp policy 1

!--- Defines an IKE policy. Use the crypto isakmp policy
!--- command in global configuration mode. IKE policies
!--- define a set of parameters !--- that are used
during the IKE phase I negotiation.


hash md5
authentication pre-share

!--- Specifies preshared keys as the authentication
method. crypto isakmp key cisco123 address 95.95.95.2

!--- Configures a preshared authentication key, used in
!--- global configuration mode. ! crypto ipsec
transform-set rtpset esp-des esp-md5-hmac

!--- Defines a transform-set. This is an acceptable !---
combination of security protocols and algorithms, !---
which has to be matched on the peer router. ! crypto map
rtp 1 ipsec-isakmp

!--- Indicates that IKE is used to !--- establish the
IPSec security associations (SAs) that protect !--- the
traffic specified by this crypto map entry. set peer
95.95.95.2

!--- Sets the IP address of the remote end. set
transform-set rtpset

!--- Configures IPSec to use the transform-set !---
"rtpset" defined earlier. match address 115

!--- This is used to assign an extended access list to a
!--- crypto map entry which is used by IPSec !--- to
determine which traffic should be protected !--- by
crypto and which traffic does not !--- need crypto
protection. ! interface Ethernet0/0 ip address
98.98.98.1 255.255.255.0 no ip directed-broadcast !
interface Ethernet0/1
ip address 99.99.99.2 255.255.255.0
no ip directed-broadcast
no ip route-cache

!--- Enable process switching for !--- IPSec to encrypt
outgoing packets. !--- This command disables fast
switching. no ip mroute-cache crypto map rtp

!--- Configures the interface to use !--- the crypto map
"rtp" for IPSec. ! . . !--- Output suppressed. . . ip
classless ip route 0.0.0.0 0.0.0.0 99.99.99.1

!--- Default route to the next hop address. no ip http
server ! access-list 115 permit ip 98.98.98.0 0.0.0.255
10.103.1.0 0.0.0.255

!--- This access-list option causes all IP traffic !---
that matches the specified conditions to be !---
protected by IPSec using the policy described by !---
the corresponding crypto map command statements.
```

```
access-list 115 deny ip 98.98.98.0 0.0.0.255 any

!
line con 0
transport input none
line aux 0
line vty 0 4
login
!
end
```

Roteador “privado” 3640-6a

```
rp-3640-6a#show running config
Building configuration...

Current configuration:
!
version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rp-3640-6a
!

!
ip subnet-zero



!--- Defines the IKE policies. ! crypto isakmp policy 1

!--- Defines an IKE policy. !--- Use the crypto isakmp
policy !--- command in global configuration mode. IKE
policies !--- define a set of parameters !--- that are
used during the IKE phase I negotiation.


hash md5
authentication pre-share

!--- Specifies preshared keys as the authentication
method. crypto isakmp key cisco123 address 99.99.99.2

!--- Configures a preshared authentication key, !---
used in global configuration mode. ! crypto ipsec
transform-set rtpset esp-des esp-md5-hmac

!--- Defines a transform-set. This is an !--- acceptable
combination of security protocols and algorithms, !---
which has to be matched on the peer router. crypto map
rtp 1 ipsec-isakmp

!--- Indicates that IKE is used to establish !--- the
IPSec SAs that protect the traffic !--- specified by
this crypto map entry. set peer 99.99.99.2

!--- Sets the IP address of the remote end. set
transform-set rtpset

!--- Configures IPSec to use the transform-set !---
```

```
"rtpset" defined earlier. match address 115

!--- Used to assign an extended access list to a !---
crypto map entry which is used by IPSec !--- to
determine which traffic should be protected !--- by
crypto and which traffic does not !--- need crypto
protection. . . !--- Output suppressed. . . ! interface
Ethernet3/0 ip address 95.95.95.2 255.255.255.0 no ip
directed-broadcast ip nat outside

!--- Indicates that the interface is !--- connected to
the outside network. no ip route-cache

!--- Enable process switching for !--- IPSec to encrypt
outgoing packets. !--- This command disables fast
switching. no ip mroute-cache crypto map rtp

!--- Configures the interface to use the !--- crypto map
"rtp" for IPSec. ! interface Ethernet3/2 ip address
10.103.1.75 255.255.255.0 no ip directed-broadcast ip
nat inside

!--- Indicates that the interface is connected to !---
the inside network (the network subject to NAT
translation). ! ip nat pool FE30 95.95.95.10 95.95.95.10
netmask 255.255.255.0

!--- Used to define a pool of IP addresses for !--- NAT.
Use the ip nat pool command in !--- global configuration
mode.


ip nat inside source route-map nonat pool FE30 overload

!--- Used to enable NAT of !--- the inside source
address. Use the ip nat inside source !--- command in
global configuration mode. !--- The 'overload' option
enables the router to use one global !--- address for
many local addresses.


ip classless
ip route 0.0.0.0 0.0.0.0 95.95.95.1

!--- Default route to the next hop address. no ip http
server ! access-list 110 deny ip 10.103.1.0 0.0.0.255
98.98.98.0 0.0.0.255
access-list 110 permit ip 10.103.1.0 0.0.0.255 any

!--- Addresses that match this ACL are NATed while !---
they access the Internet. They are not NATed !--- if
they access the 98.98.98.0 network. access-list 115
permit ip 10.103.1.0 0.0.0.255 98.98.98.0 0.0.0.255

!--- This access-list option causes all IP traffic that
!--- matches the specified conditions to be !---
protected by IPSec using the policy described !--- by
the corresponding crypto map command statements.


access-list 115 deny ip 10.103.1.0 0.0.0.255 any

route-map nonat permit 10
match ip address 110
```

```
!

!
line con 0


line vty 0 4

!
end
```

Verificar

Esta seção fornece informações que você pode usar para confirmar se sua configuração está funcionando adequadamente.

A Output Interpreter Tool (somente clientes registrados) oferece suporte a determinados comandos show, o que permite exibir uma análise da saída do comando show.

Para verificar essa configuração, tente um comando **ping** estendido originado da interface Ethernet no roteador privado 10.103.1.75, destinado à interface Ethernet no roteador público 98.98.98.1

- ping —Usado para diagnosticar a conectividade básica da rede.
  ```
  rp-3640-6a#ping
  Protocol [ip]:
  Target IP address: 98.98.98.1
  Repeat count [5]:
  Datagram size [100]:
  Timeout in seconds [2]:
  Extended commands [n]: y
  Source address or interface: 10.103.1.75
  Type of service [0]:
  Set DF bit in IP header? [no]:
  Validate reply data? [no]:
  Data pattern [0xABCD]:
  Loose, Strict, Record, Timestamp, Verbose[none]:
  Sweep range of sizes [n]:
  Type escape sequence to abort.
  Sending 5, 100-byte ICMP Echos to 98.98.98.1, timeout is 2 seconds:
  !!!!!
  Success rate is 100 percent (5/5), round-trip min/avg/max = 64/64/68 ms
  ```
- show crypto ipsec sa —Mostra as configurações usadas por SAs atuais (IPSec).
- show crypto isakmp sa —Mostra todas as SAs IKE atuais em um peer.
- show crypto engine —Mostra um resumo das informações de configuração para os mecanismos de criptografia. Use o comando **show crypto engine** no modo EXEC privilegiado.

Exemplo de saída de show

Esta saída é do comando **show crypto ipsec sa** emitido no roteador hub.

```
rp-3640-6a#show crypto ipsec sa

interface: Ethernet0/0
    Crypto map tag: rtp, local addr. 95.95.95.2
```

```
   protected vrf:
   local  ident (addr/mask/prot/port): (10.103.1.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (98.98.98.0/255.255.255.0/0/0)
   current_peer: 99.99.99.2:500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 5, #pkts encrypt: 5, #pkts digest 5
    #pkts decaps: 14, #pkts decrypt: 14, #pkts verify 14
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

     local crypto endpt.: 95.95.95.2, remote crypto endpt.: 99.99.99.2
     path mtu 1500, media mtu 1500
     current outbound spi: 75B6D4D7

     inbound esp sas:
      spi: 0x71E709E8(1910966760)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 2000, flow_id: 1, crypto map: rtp
        sa timing: remaining key lifetime (k/sec): (4576308/3300)
        IV size: 8 bytes
        replay detection support: Y

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0x75B6D4D7(1974916311)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 2001, flow_id: 2, crypto map: rtp
        sa timing: remaining key lifetime (k/sec): (4576310/3300)
        IV size: 8 bytes
        replay detection support: Y

     outbound ah sas:

     outbound pcp sas:
```

Este comando mostra o IPsec SAs construído entre peers. O túnel criptografado é construído entre 95.95.95.2 e 99.99.99.2 para o tráfego que vai entre redes 98.98.98.0 e 10.103.1.0. Você pode ver as duas SAs de Payload de Segurança de Encapsulamento (ESP) desenvolvidas interna e externamente. As SAs AH (Authentication Header, cabeçalho de autenticação) não são usadas, pois não há AHs.

Troubleshoot

Esta seção fornece informações que podem ser usadas para o troubleshooting da sua configuração.

Comandos para Troubleshooting

A Output Interpreter Tool (somente clientes registrados) oferece suporte a determinados comandos show, o que permite exibir uma análise da saída do comando show.

Observação: antes de emitir comandos **debug**, consulte Informações importantes sobre comandos debug.

- **debug crypto ipsec sa** —Usado para ver as negociações de IPSec da fase 2.
- **debug crypto isakmp sa** — Usado para ver as negociações ISAKMP da fase 1.
- **debug crypto engine** —Usado para exibir as sessões criptografadas.

Informações Relacionadas

- Ordem de Operação NAT
- Troubleshooting de Segurança de IP - Entendendo e Utilizando Comandos debug
- Página de suporte do IPSec
- Página de suporte de NAT
- Suporte Técnico - Cisco Systems