

The background of the slide features a large, faint watermark of the seal of the Politecnico di Torino. The seal is circular and contains the text "POLITECNICO DI TORINO" around the perimeter. In the center, there is a depiction of a classical building with a dome and a figure holding a laurel wreath.

**Configuring
IPsec
on Cisco Routers**

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IPsec Configuration Steps

- Encryption and authentication algorithms and parameters
- Encapsulation mode
- Key negotiation
- Secure traffic selection
- Remote tunnel end-point
- Interface on which to apply
- Security association lifespan

Encryption and authentication

```
# crypto ipsec transform-set name  
  TS1 [TS2 [TS3]]
```

→ Enters crypto transform configuration mode

→ Sample *TS_i* values:

→ ah-md5-hmac

→ esp-des

→ esp-md5-hmac

→ Not any combination is allowed

Encapsulation Mode

```
# mode [tunnel | transport]
```

- **Crypto transform configuration mode command**
- **Only for traffic for which the router is the IPsec tunnel endpoint**

Key Negotiation

```
# crypto map name num [ipsec-  
manual | ipsec-isakmp]
```

→ Enters crypto map configuration mode

→ ipsec-manual

→ Secret shared keys

→ Manually configured

→ ipsec-isakmp

→ IKE negotiation is deployed

AH Key Configuration

```
# set session-key {inbound |  
outbound} ah spi key
```

- Crypto map configuration mode command
- Specifies key used for
 - Verification (inbound)
 - Authentication (outbound)

ESP Key Configuration

```
# set session-key {inbound |  
outbound} esp spi cipher e-key  
[authenticator a-key]
```

- Crypto map configuration mode
- Specifies key used for
 - Encryption (*e-key*)
 - Authentication (*a-key*)

ISAKMP Negotiation Policy

```
# crypto isakmp policy priority
```

→ Enter ISAKMP configuration mode

→ If other policies do exist and can be used, the one with highest priority is applied

ISAKMP Negotiation Policy

```
# encr {des|3des}
```

→ Encryption algorithm

```
# hash {sha|md5}
```

→ Hash algorithm

```
# authentication {rsa-sig|rsa-  
encr|pre-share}
```

→ Authentication method

→ ISAKMP configuration mode

ISAKMP Shared Key

```
# crypto isakmp key a_key address  
an_address
```

→ *an_address*: remote end of IPsec tunnel

→ ISAKMP configuration mode

Security Options

set transform-set *name*

→ Crypto map configuration mode command

→ Specifies which of the previously defined encryption and authentication options to use

Secure Traffic Selection

match address *list-num*

- Crypto map configuration mode command
- Only traffic matching access list *list-num* is secured
- One security association is created for each rule of the access list
 - Only one rule is allowed when key negotiation is not used

Remote Tunnel End-Point

set peer *device*

→ Crypto map configuration mode command

→ *device* can be a name or address

Dynamic Parameters

```
# crypto dynamic-map name num
```

→ Enters crypto map configuration mode

→ IKE negotiation must be deployed

Dynamic Parameters

- Remote tunnel end-point specification (`set peer`) optional
- Secure traffic selection (`match address`) is optional
 - Traffic filter provided by remote end-point
 - If specified must match remote end-point's

Interface Specification

crypto map *name*

→ Interface configuration mode command

→ Tunnel interface should be created to implement an IPsec tunnel

Security Association Lifespan

```
# crypto ipsec security-  
association lifetime {seconds  
sec / kilobytes kb}
```

→ Global configuration mode

→ IKE re-negotiation takes place before expiration

→ Whichever of the two limits is reached first

Security Association Lifespan

```
# set security-association  
lifetime {seconds sec |  
kilobytes kb}
```

- Crypto map configuration mode
- Refers to a specific security association