

# IPv6 Distributed Security

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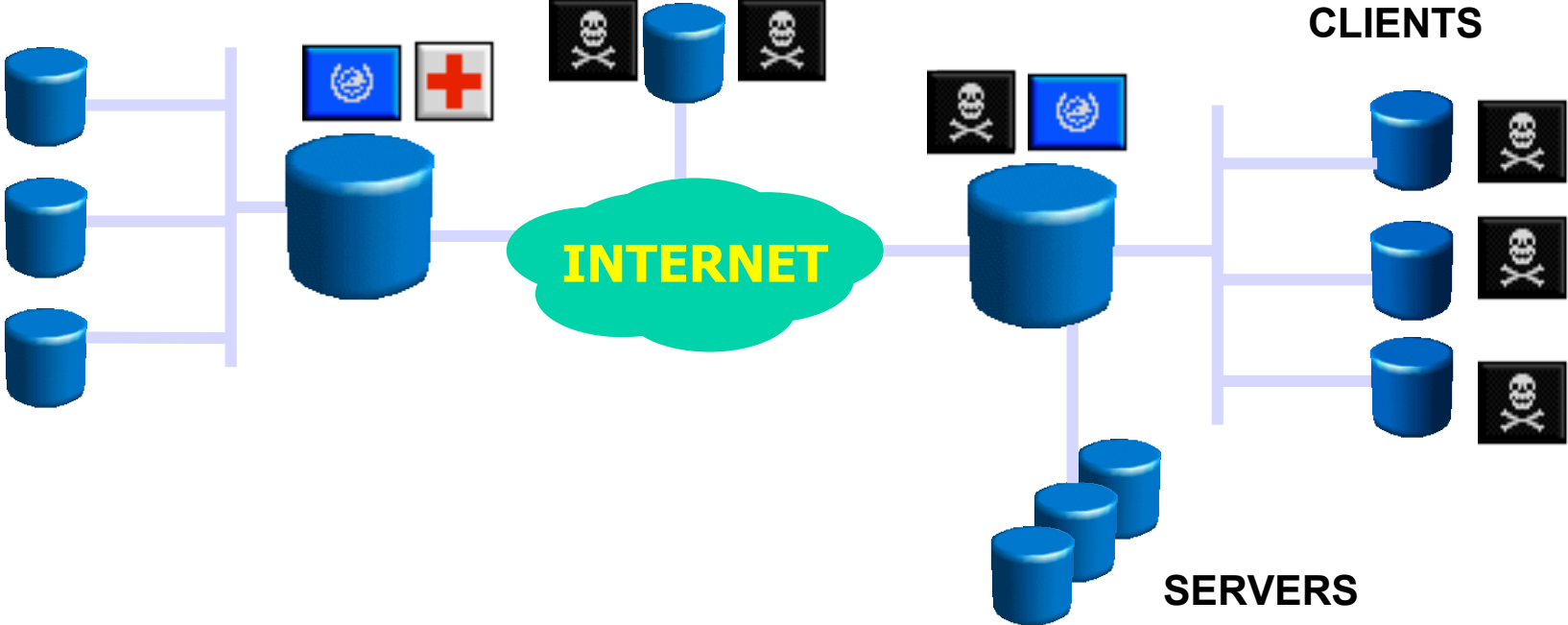
# Motivation

- How would the deployment of IPv6 affect the security of a network?
- IPv6 enabled devices and networks bring some issues to be taken into account by security administrators:
  - End-2-end communications
  - IPsec in all IPv6 stacks
  - Increased number of IP devices
  - Increased number of “nomadic” devices
- Identify IPv6 Issues that justify the need of a new security model

# What is Security ?

- Security in the "big scope" of the word, trying to include as much as possible
- A host, a network or some information, will be secure when no attacks could succeed against them
- A success will mean compromise of availability, integrity, confidentiality or authenticity
- The realistic objective is to be as much secure as possible in a precise moment

# Network-based Security Model (I)



 THREAT
  Sec. Policy 1
  Sec. Policy 2
  Policy Enforcement Point (PEP)

# Network-based Security Model (II)

- **Main Assumptions:**
  - Threats come from “outside”
  - Everybody from the same LAN segment is trusted
  - Protected nodes won’t go “outside”
  - No backdoors (ADSL, WLAN, etc.)
  - The hosts will not need to be directly accessed from outside (at least not in a general manner)

# Network-based Security Model (III)

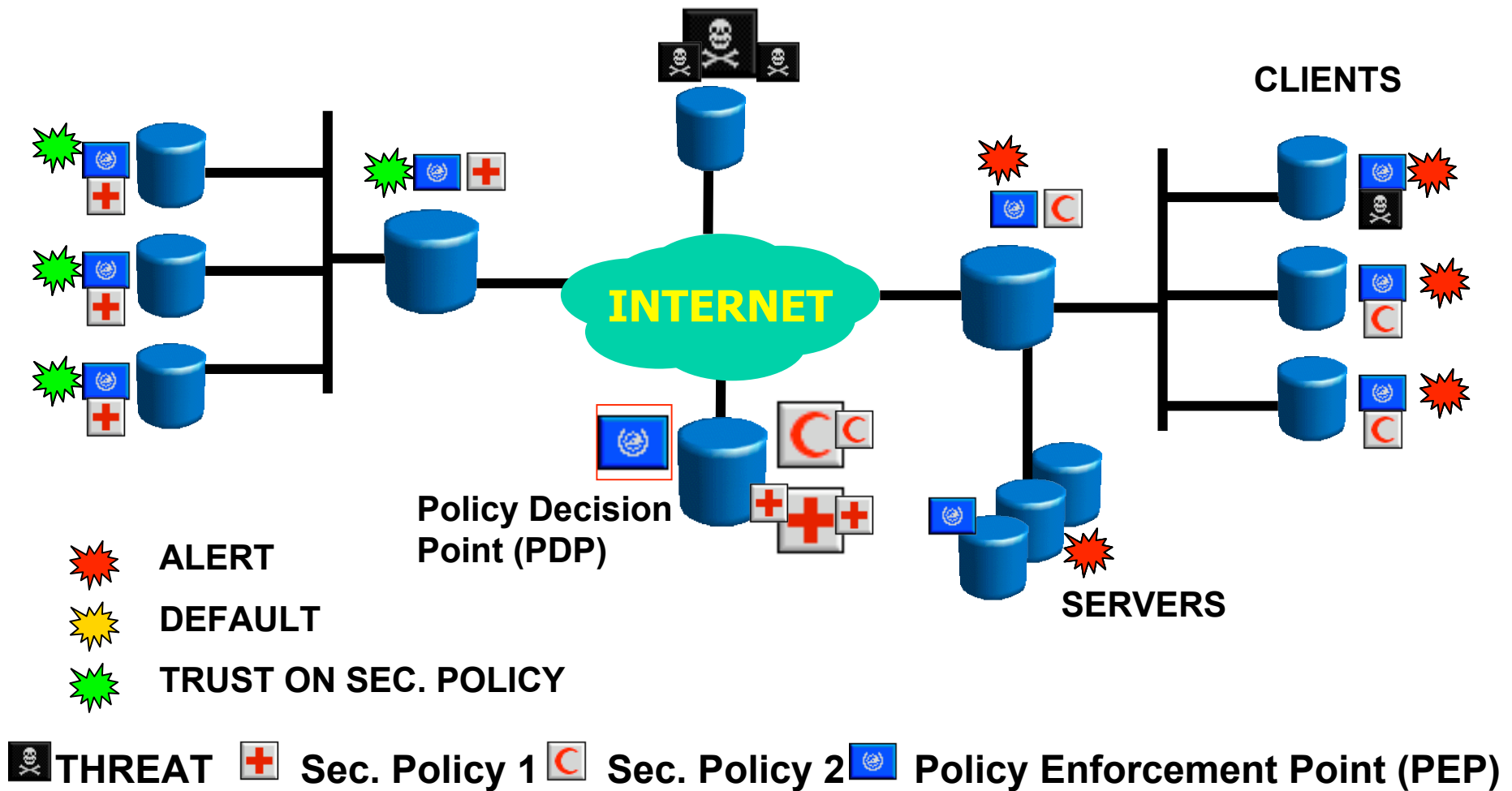
- **Advantages:**
  - Simplicity and easiness
  - Minimum points of configuration
  - Few/no protocols and mechanism to implement “security”

# Network-based Security Model (IV)

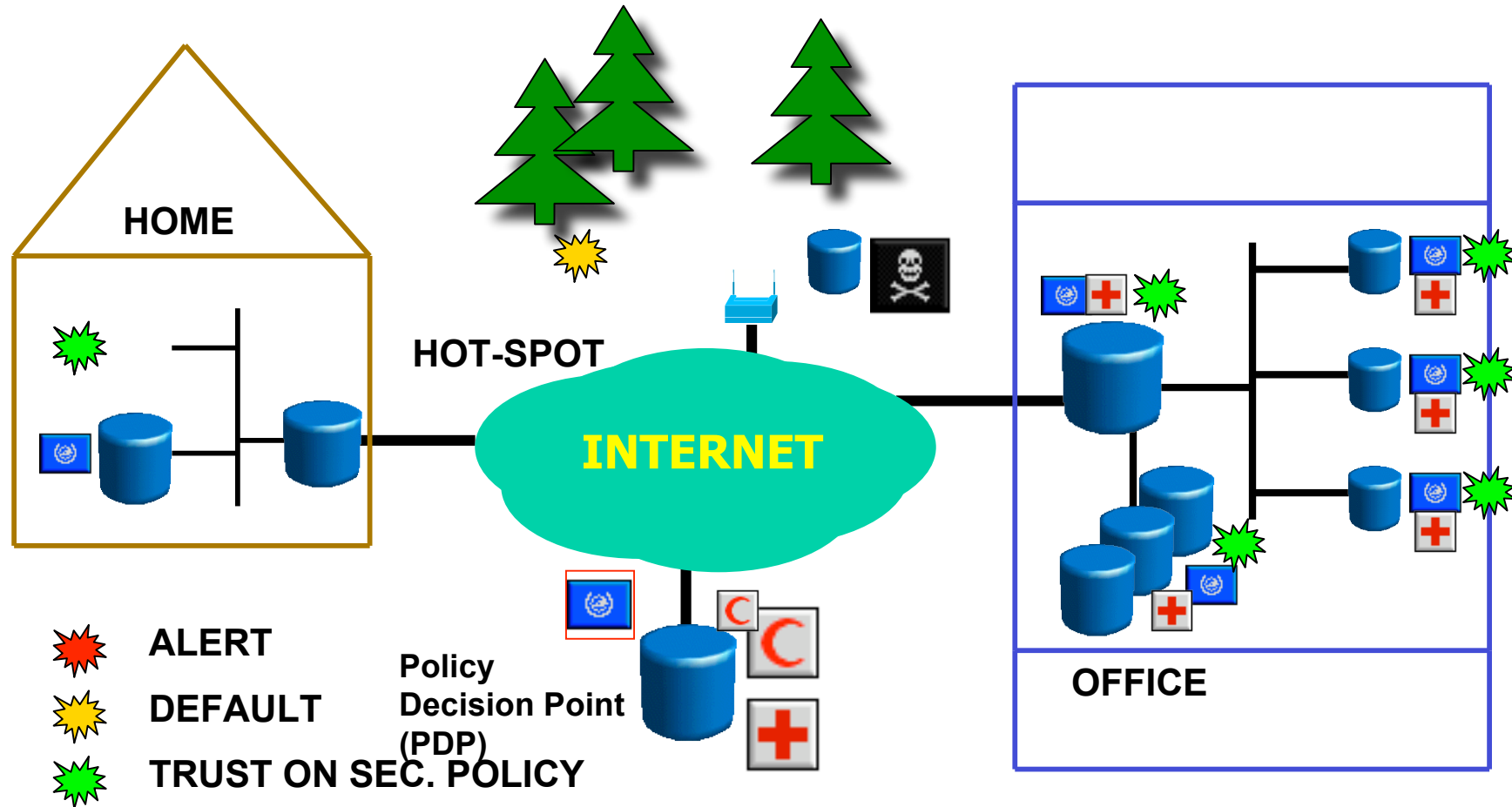
- **Main Drawbacks:**

- Centralized model: Single point of failure in terms of performance and availability
- Do not address threats coming from inside (even if more dangerous)
- FW usually acts as NAT/Proxy: No end-to-end
- Special solutions are needed for Transport Mode Secured Communications
- Virtual organizations (GRIDs) don't work
- Lack of secure end-to-end prevents innovation

# Host-based Security Model (I)



# Host-based Security Model (II)



**THREAT** **Sec. Policy 1** **Sec. Policy 2** **Policy Enforcement Point (PEP)**

# Host-based Security Model (III)

- **BASIC IDEA:** Security Policy centrally defined and distributed to PEPs. The network entities will authenticate themselves in order to be trusted.
- **THREE elements:**
  - Policy Specification Language
  - Policy Exchange Protocol
  - Authentication of Entities

# Host-based Security Model (IV)

- **Main Assumptions:**
  - Threats come from anywhere in the network
  - Each host can be uniquely and securely identified
  - Security could be applied in one or more of the following layers: network, transport and application
- **Main Drawbacks:**
  - Complexity
  - Uniqueness and secured identification of hosts is not trivial
  - Policy updates have to be accomplished in an efficient manner
  - A compromised host still is a problem
    - But “isolating” it could be a solution

# Host-based Security Model (V)

- **Main Advantages:**
  - Protects against internal attacks
  - Don't depend on where the host is connected
  - Still maintain the centralized control
  - Enables the end-2-end communication model, both secured or not
  - Better decision could be taken based on host-specific info.
  - Enables a better collection of audit info

# IPv6 Issues (I)

## 1. End-2-end

- Any host must be reachable from anywhere.  
NAT/Proxy is not desired.

## 2. Encrypted Traffic

- For example IPsec ESP Transport Mode Traffic

## 3. Mobility

- Both Mobile IP and the increase of “portable” IP devices will mean they will be in “out-of-control” networks

## 4. Addresses

- Much more addresses -> hosts with more than one
- Randomly generated addresses
- Link-local Addresses
- Multicast

# IPv6 Issues (II)

## 5. Neighbor Discovery

- RA, RS, NA, NS and Redirect Messages could be used in a malicious way -> SEND

## 6. Routing Header

## 7. Home Address Option

## 8. Embedded Devices

- Number of devices with almost no resources to perform security tasks -> should be taken into account in a possible solution

# Thanks !

## Questions ?