IPv6 Distributed Security

Activity Status

<draft-vives-v6ops-ipv6-security-ps-01>
(Problem Statement)
<draft-palet-v6ops-ipv6security-01>
(Requirements)

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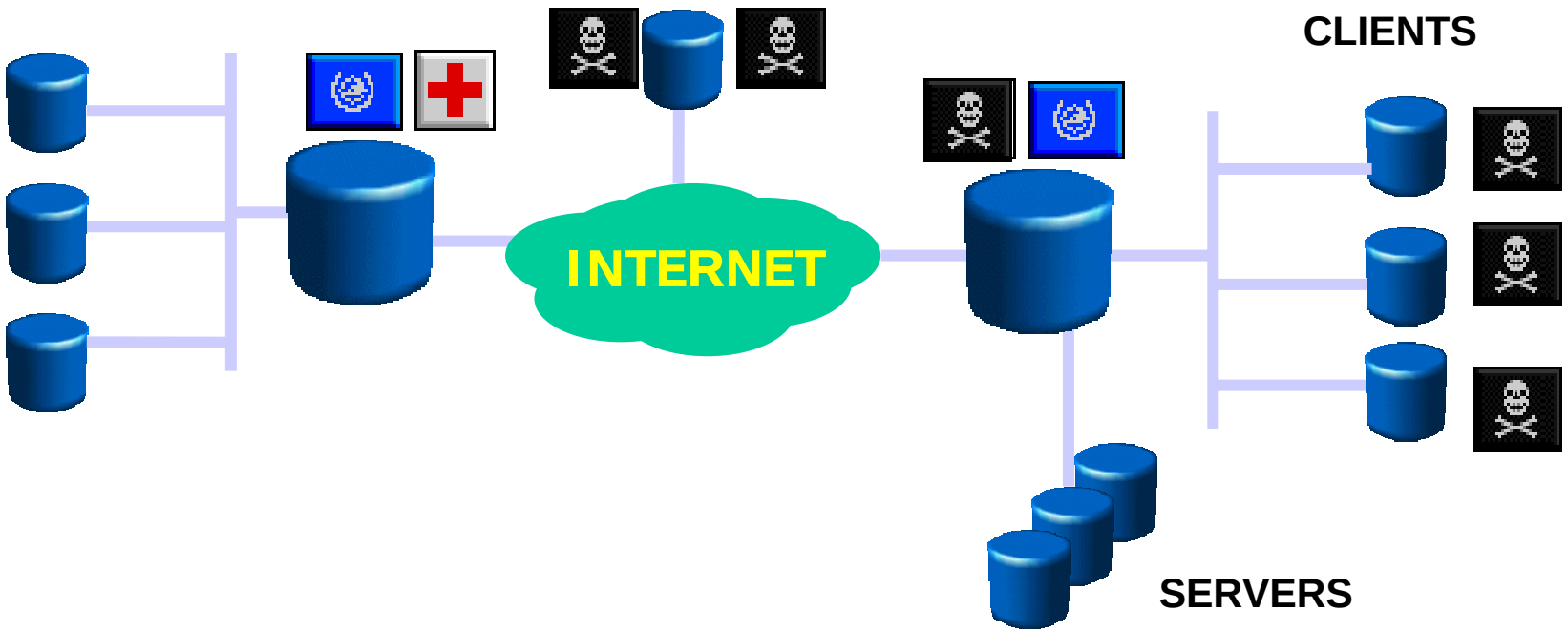
Motivation

- 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

Network-based Security Model (I)



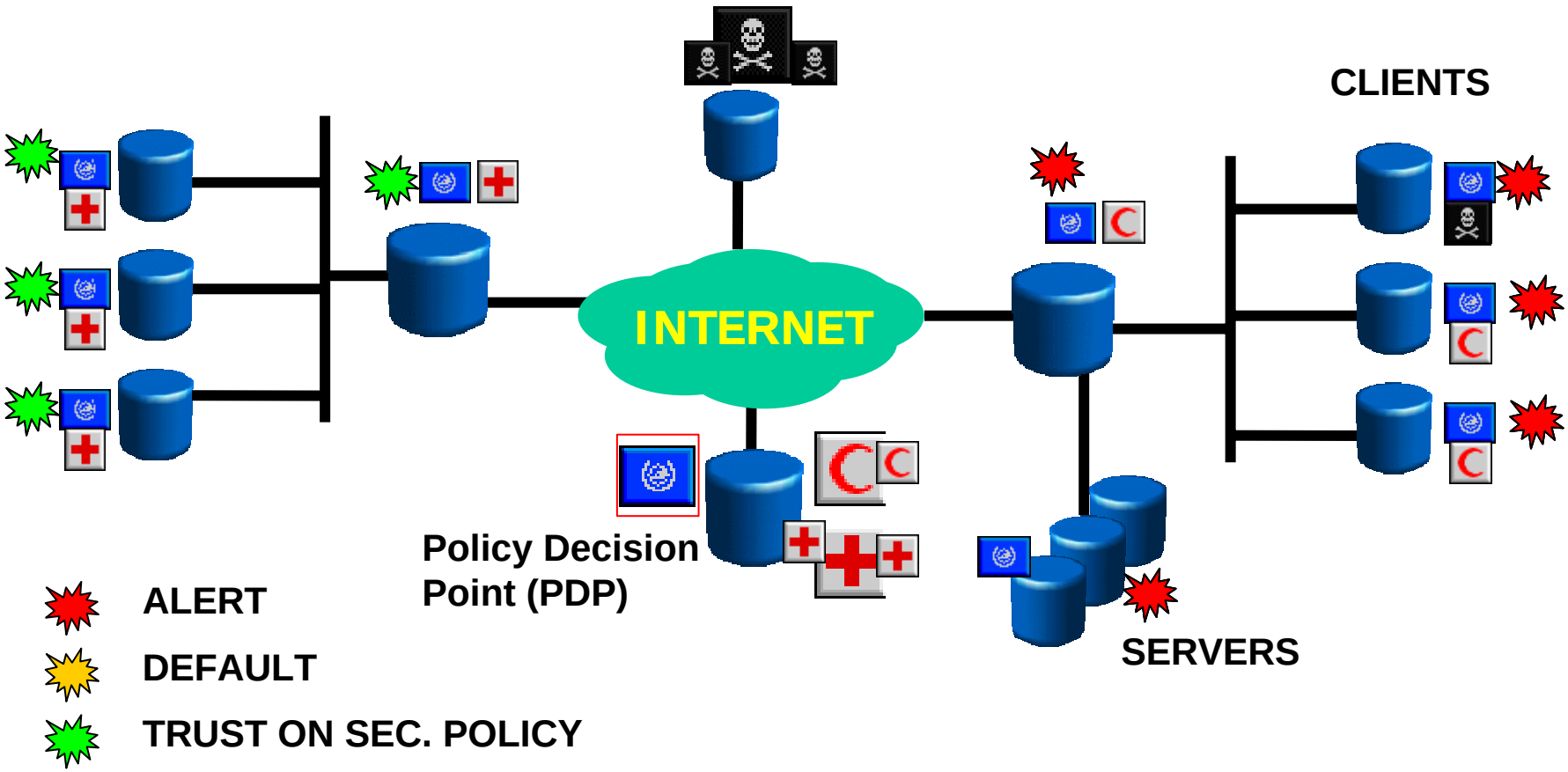
THREAT Sec. Policy 1 Sec. Policy 2 Policy Enforcement Point (PEP)

Network-based Security Model (II)

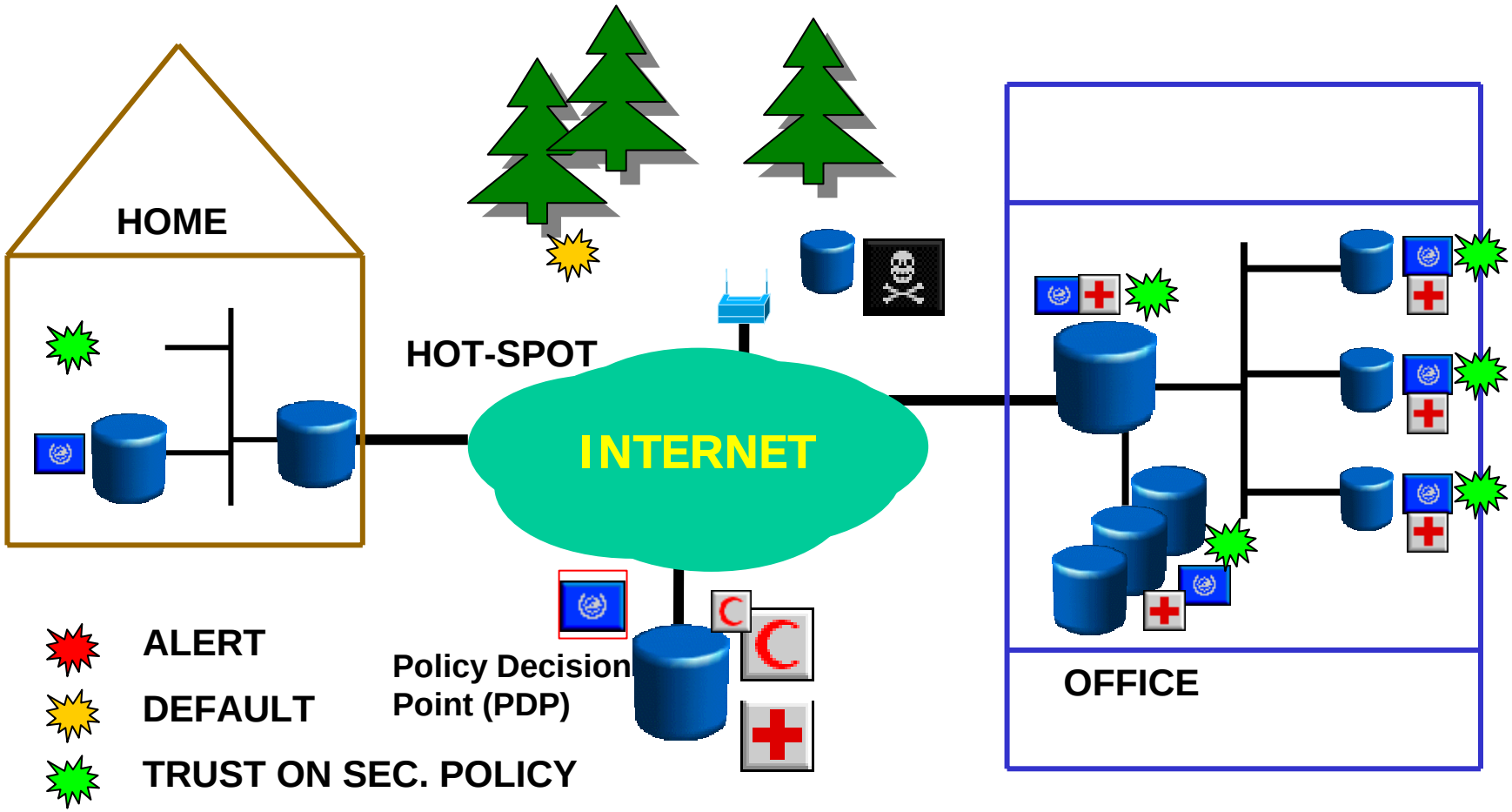
- **Main Assumptions:**
  - Threats come from “outside”
  - Protected nodes won’t go “outside”
  - No backdoors (ADSL, WLAN, etc.)

- **Main Drawbacks:**
  - Centralized model
  - Do not address threats coming from inside
  - FW usually acts as NAT/Proxy
  - Special solutions are needed for Transport Mode Secured Communications

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

IPv6 Issues (II)

5. **Neighbor Discovery**
   - RA, RS, NA, NS and Redirect Messages could be used in a malicious way -> SEND
6. **Embedded Devices**
   - Number of devices with almost no resources to perform security tasks -> should be taken into account in a possible solution

Requirements towards a Solution

- Dynamic security policy specification language, exchange protocol and server
- Authentication of entities
- Support of SEND protocol
- Support for unmanaged nodes/devices
- Control and node/network partition mechanism
  - Securization of the rest of the network in case of a thread, even if internal
- Alert/notification mechanism
  - Facilitate the inter-node and/or node-policy server communication
- Node or host firewall, with a secure “default configuration”, that can be updated by a trusted dynamic security policy server. Should also include functionalities such as:
  - Integral thread protection
  - Resolution and arbitration of conflicts between different security policies
  - Support for end-to-end application level security (i.e., Web Services security standards)
  - Intrusion detection
  - Collection of audit information
- Optionally it could also include:
  - Anti-virus
  - Anti-spam

Next Steps

- Get inputs from the WG and security area
- Continue the work
  - Solutions
  - Implementation
  - Trial in real networks, not just labs

Thanks !

Questions ?