Internet Protocol Security -IPSec

Chris King

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Agenda

- Evolution
- Technical Aspects
- Analysis
- References

IPSec Evolution

- Started in November ‘92 as IP next generation (IPng)
  - Now referred to as IPv6
- Firewall consortium started in June of ‘95

IPv6 Overview

- Expanded routing and addressing capabilities
- Header format simplification
- Improved support for extensions and options
- Flow labeling capability
- Authentication and privacy capabilities (IPSec)

IPSec Technical Aspects

- IP Authentication Header (AH)
- IP Encapsulating Security Payload (ESP)
- Security Association (SA)
- Key management
  - Photuris
  - SKIP

IP Authentication Header (AH)

- Provides IP datagram integrity and authentication
  - Keyed MD5 (Key-Data-Key)
  - Computation performed before fragmentation and after reassembly
- Does not provide non-repudiation (symmetric algorithm) and privacy

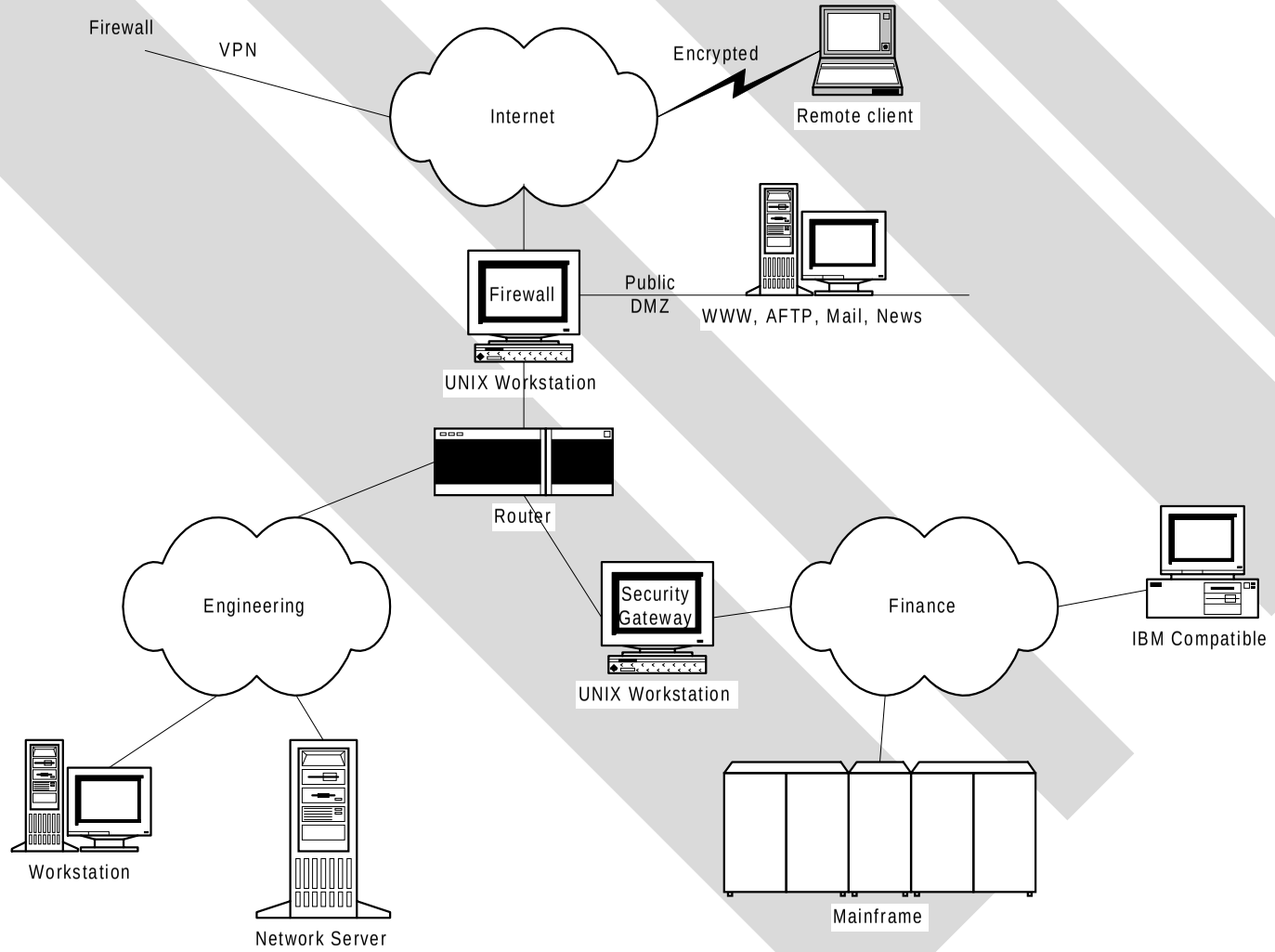
IP Encapsulating Security Payload (ESP)

- Provides IP datagram integrity, authentication, and privacy
  - Tunnel and Transport modes
    - » Tunnel encapsulates an entire IP datagram within the ESP header
    - » Transport encapsulates an upper-layer protocol inside ESP and then prepends a cleartext IP header
  - DES Cipher Block Chaining (CBC)
  - RC2 or RC4 for international use

Security Association (SA)

- A security association defines a one way association between a sender to receiver
  - AH and ESP algorithm and mode
  - Size of cryptographic synchronization (IV)
  - AH and ESP crypto keys and lifetimes
  - Source address(es) of the security association
  - Sensitivity level
  - The destination address and Security Parameters Index (SPI) identify the SA

The Big Picture



IPSec Analysis

- Remote access will benefit if the networking software is IPSec compliant (client-VPN)
- IPSec compliant gateways must perform packet filtering on unauthenticated packet (a.k.a. Firewall)
- VPN interoperability among heterogeneous firewalls and remote clients

IPSec Analysis (Concluded)

- Internet and Intranet Firewalls will use IPsec to validate the network data used for the access control decisions (security policy update)
  - Authenticated IP headers could allow source routing
- The combination of IPSec, Firewalls and security tokens provide a complete network security solution.

IPSec Key Management

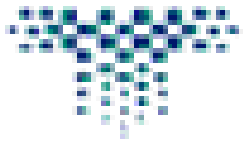
Qualcomm's Photuris

- Scaleable to very large environments
- Based on Firefly
- Session oriented
- Perfect Forward Secrecy
- Traffic anonymity

Sun's SKIP

- Most suitable for small environments and established relationships
- Stateless
- No Forward Secrecy
- No anonymity due to certified public values (DNSSEC)

IPSec Vendors

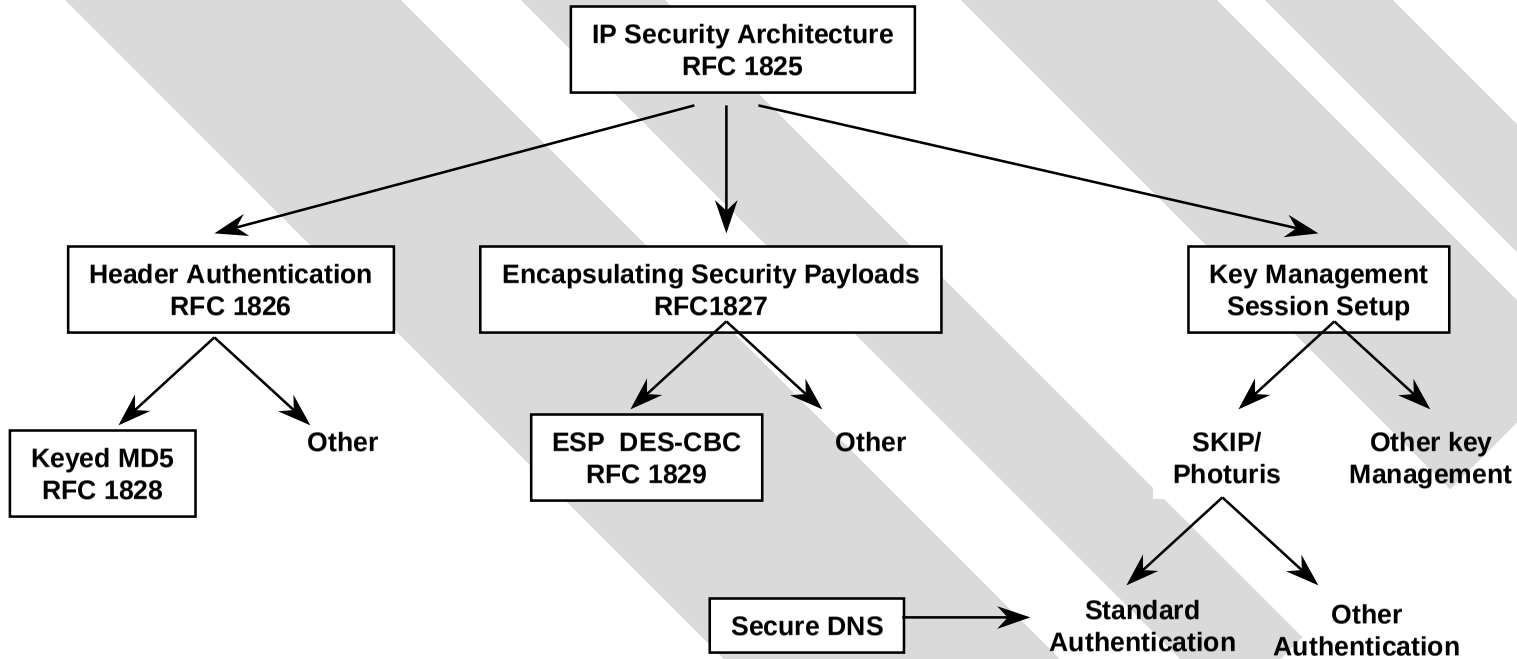


TimeStep

Check Point
Software Technologies Ltd.

Morning Star Technologies

IPSec Standard Evolution



IPv6 RFCs

- IP Version 6 Addressing Architecture (RFC 1884)
- Internet Protocol, Version 6 (IPv6) Specification (RFC 1883)
- Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) (RFC 1885)

IPv6 RFCs (Concluded

- An Architecture for IPv6 Unicast Address Allocation (RFC 1887)
- DNS Extensions to support IP version 6 (RFC 1886)
- IPv6 Testing Address Allocation (RFC 1897)

Emerging Security Technologies for ‘96

- IPSec
  - Heterogeneous VPN
  - Remote client VPN
- RADIUS authentication protocol
- JAVA
- Secure Electronic Transactions (SET)

INFOSEC Engineering Consulting Services

- Security policy generation/review
- Security audit/assessment
- Security penetration/vulnerability analysis
- Information security planning