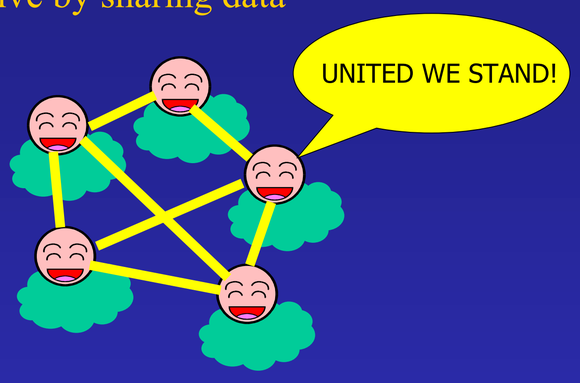
Sequoia – A Robust Communication Architecture for Collaborative Security Monitoring Systems

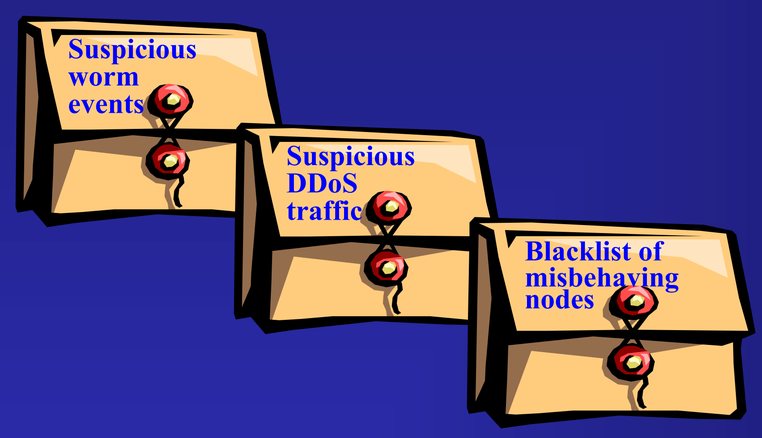
Motivation

Isolated security monitors are often less effective

Collaborative monitors will be more effective by sharing data



Example Information to Share



Goal and Design Guidelines

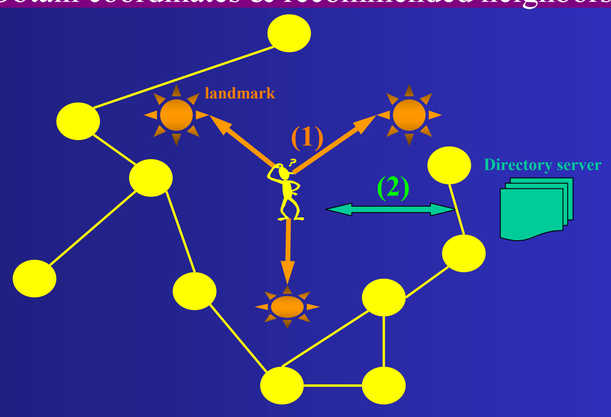
A fast, secure, robust and scalable structure of security monitors that supports a rich set of monitor communication patterns

- A two-level communication infrastructure
  - High trust, high performance dominators
  - Low trust, low performance dominees
- Topology-aware neighbor discovery for low latency
- Self-organization for adaptability
- *S*-certificates for monitor property certification
- Rich communication patterns
  - 1 to 1: unicast
  - 1 to n: dissemination
  - n to 1: subscription
  - m to n: collaboration

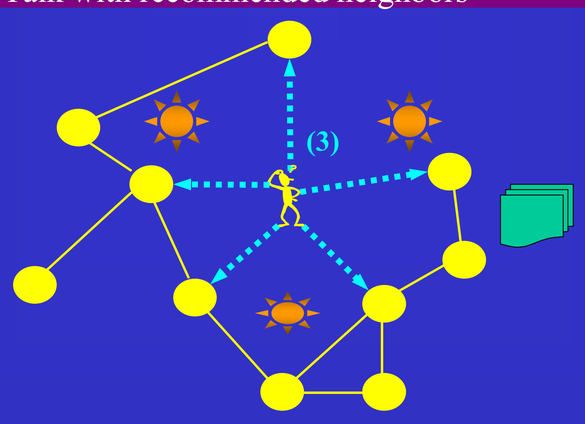
Approach

Monitor Neighbor Discovery

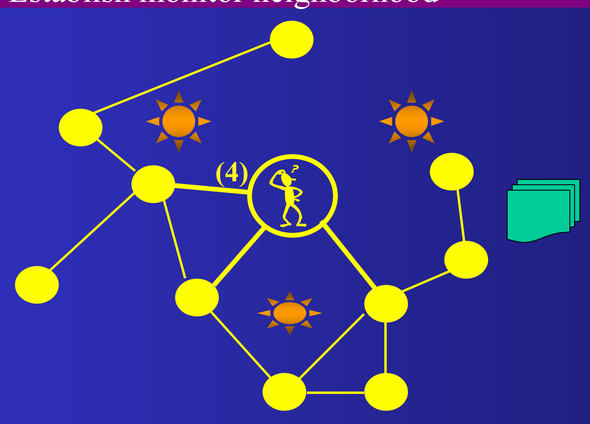
Obtain coordinates & recommended neighbors



Talk with recommended neighbors

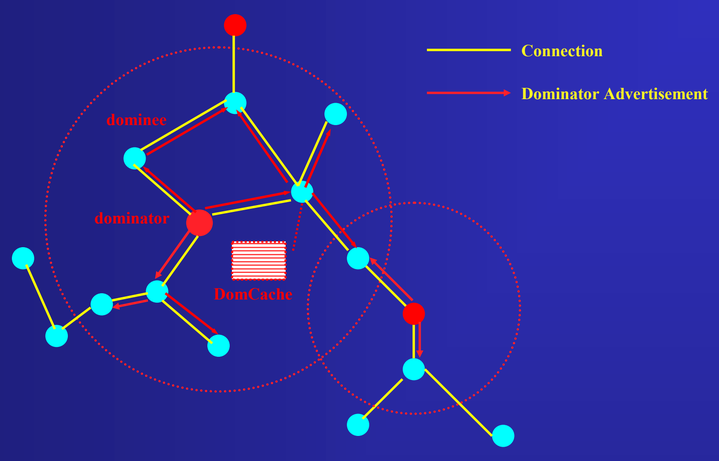


Establish monitor neighborhood

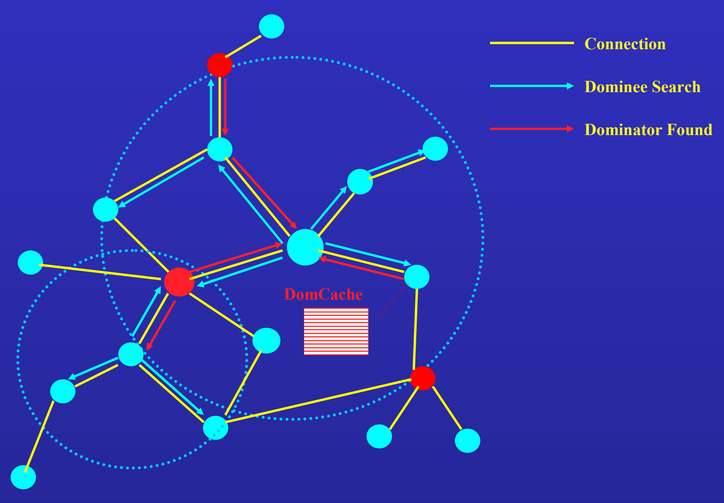


Distributed Dominator Selection

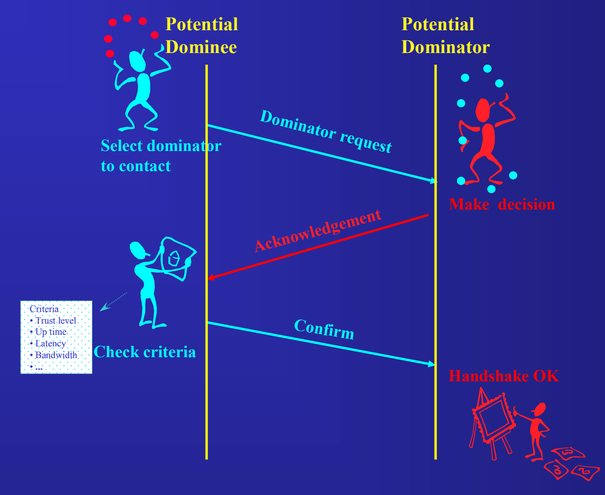
Scoped dominator advertisement



Scoped dominator search

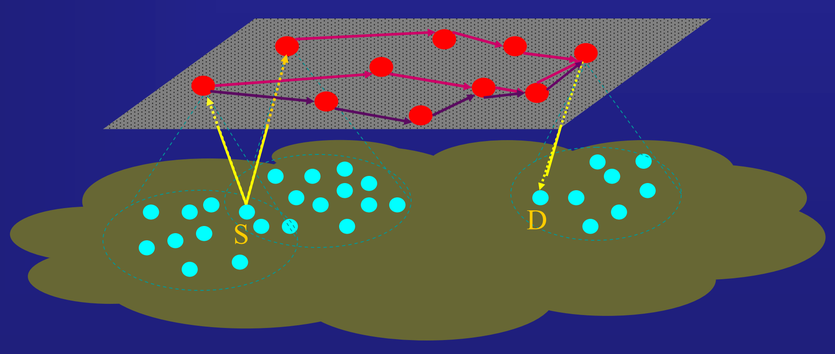


Handshake between dominator & dominee

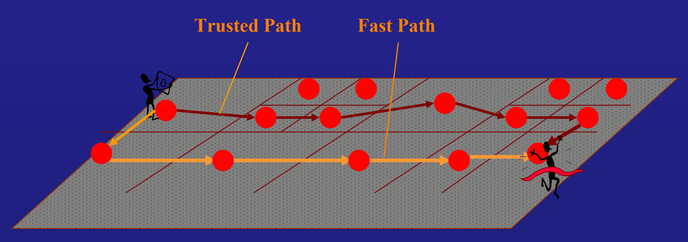


Communication Path Discovery

Two-level communication infrastructure



Fast & secure routing through hierarchical CAN



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