

July 22-26, 2013



City Center Marriott
Portland, OR

Network Management Model

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Disclaimer

- The information in this presentation represents a snapshot of work in progress within the DMTF.
- This information is subject to change. The Standard Specifications remain the normative reference for all information.
- For additional information, see the Distributed Management Task Force (DMTF) Web site.



Agenda

- Introduction
- Network Management Model
- Network Management Use Cases
- Network Policy Service Model
- Network Policy Service Use Cases
- Summary and Q&A

Goals

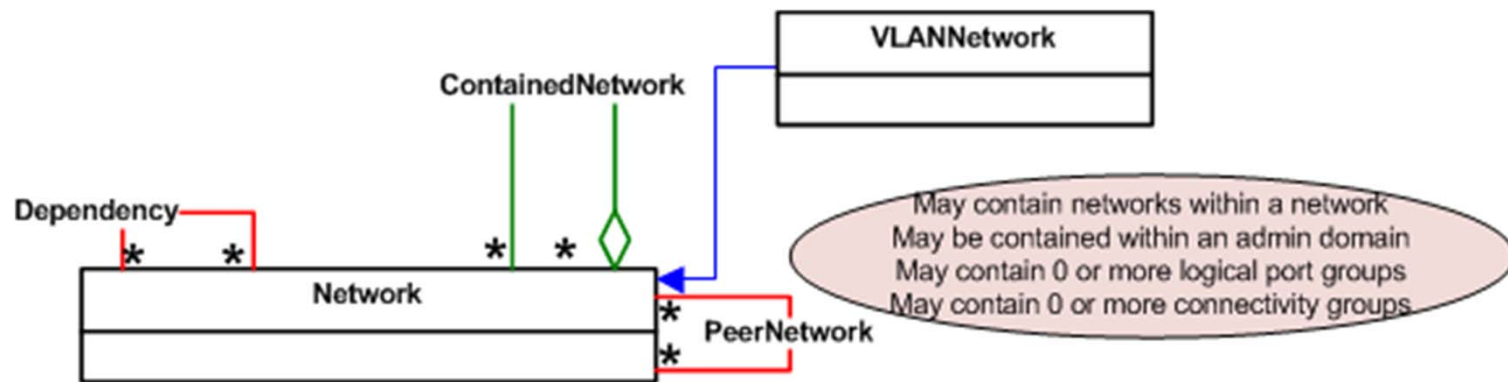
- Define a model to cover management of:
 - Physical networks
 - Logical networks
 - Virtual networks
 - Software Defined Networks (SDNs)
- Define a model to:
 - Represent network policy services
 - Manage network policies

Aspects of Network Management

- Discovery of networks & network resources
- Network configuration management:
 - Provisioning of networks
 - Dynamic configuration changes
 - etc.
- Network monitoring and troubleshooting
- Network policies management

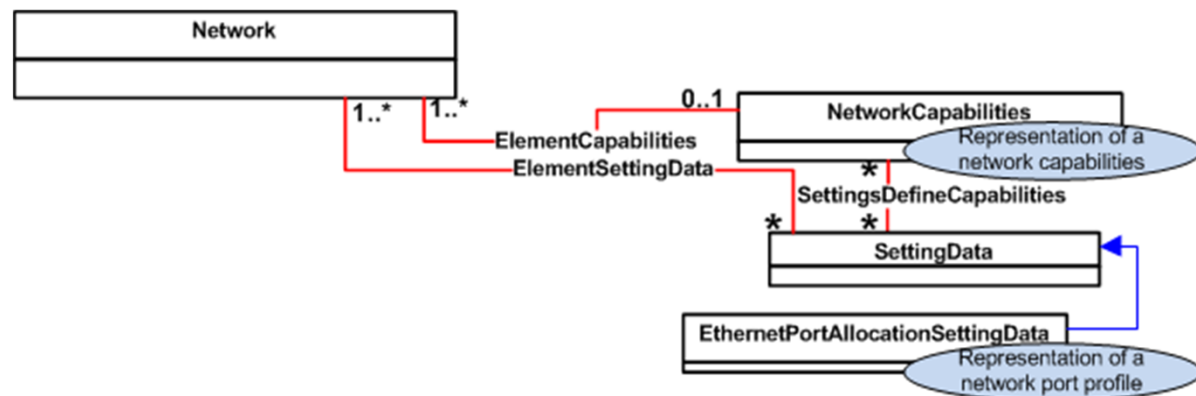
Network Representation

- An instance of CIM_Network represents a network
- Network Relationships:
 - Contained networks
 - Dependent networks
 - Peer networks



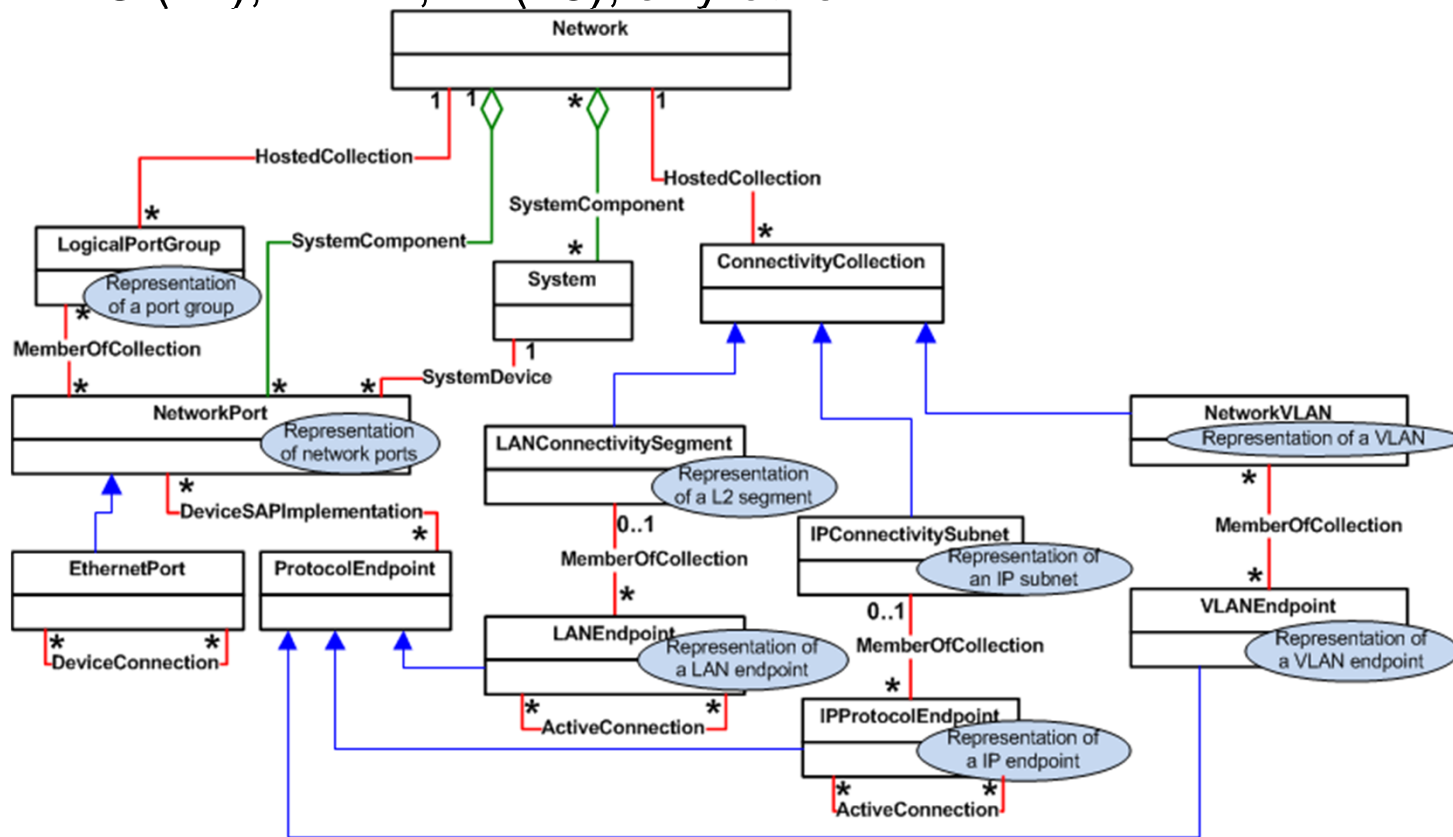
Network Settings and Configuration

- NetworkCapabilities class:
 - Represents capabilities of one or more networks
- Network Configuration:
 - Represented by one or more instances of SettingData:
 - Current, default, and pending configurations
 - EthernetPortAllocationSettingData:
 - Represents network port profiles configuration
 - Additional settings:
 - VLAN, DHCP, DNS



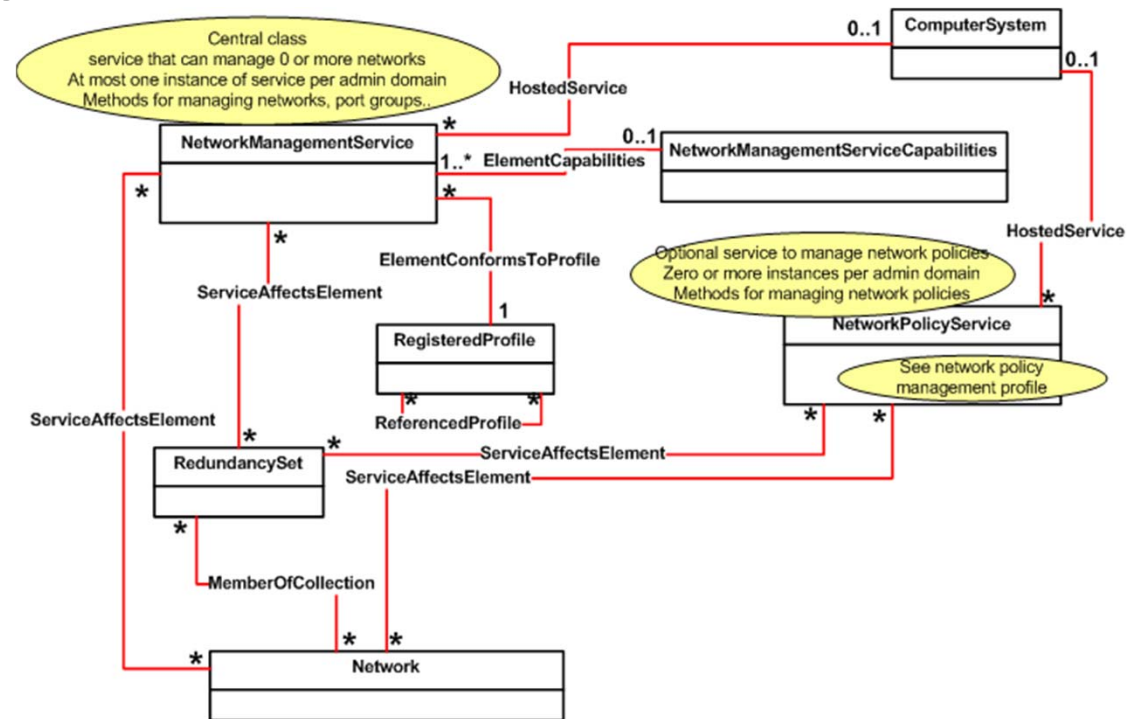
Network Components

- Network resources:
 - Ports, port groups, systems, L2 segments, IP subnets, VLANs
- Protocol Endpoints:
 - MAC (L2), VLAN, IP (L3), any other L4+



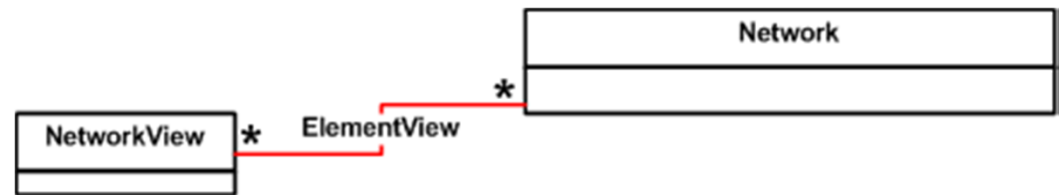
Network Services

- Network Management Service (central class):
 - Manages one or more networks
 - Extrinsic methods
- Network policy services:
 - Firewall
 - Load balancing
 - QoS
 - Routing...
- Redundancy:
 - Network failover
 - Network load balancing



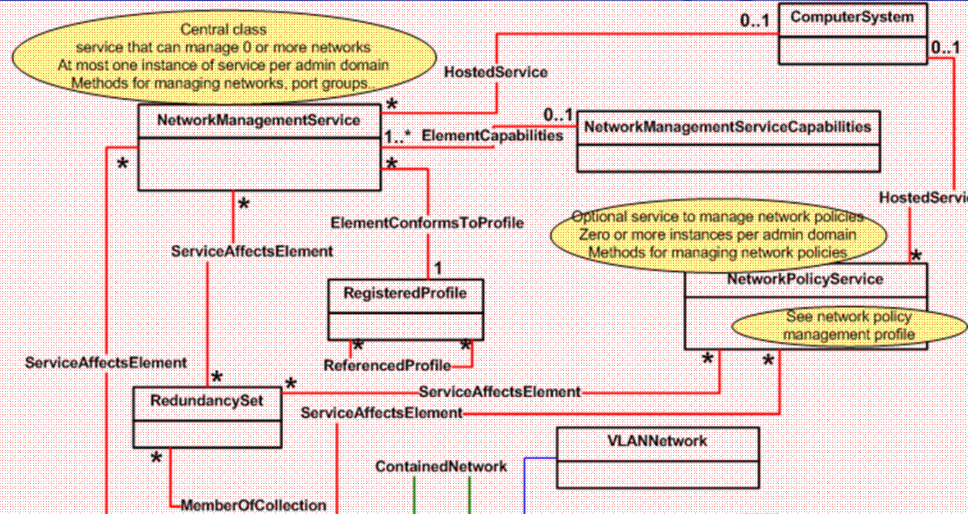
Network View

- Dashboard view of a network
- View class properties:
 - Number of ports
 - Network status
 - Type of network
 - Port information
 - Related networks
 - Status of related networks

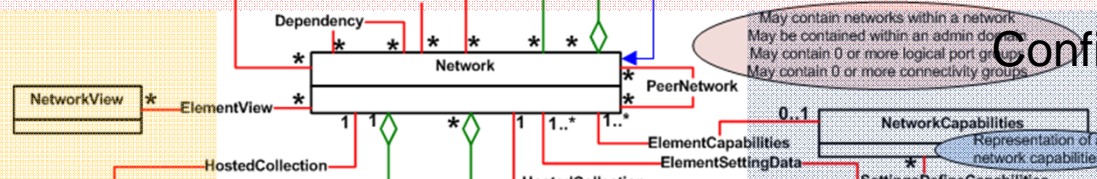


Network Management Profile Proposed Class Diagram

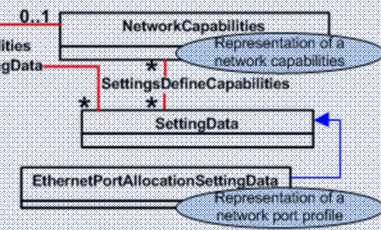
Services



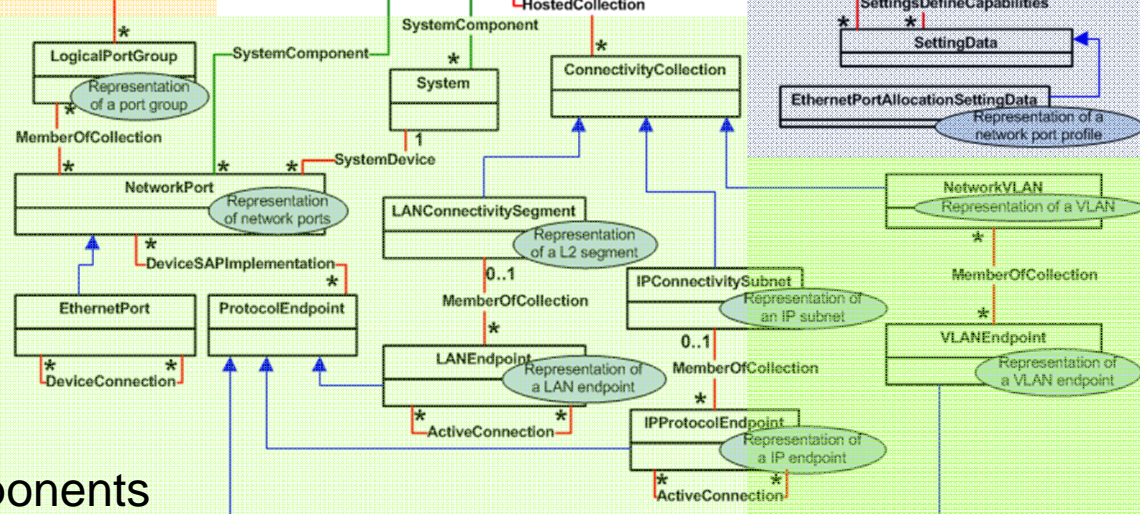
View



Configuration



Components





Network Management Operational Use Cases 1/3

- Enumerate networks (intrinsic method)
- Enumerate networks contained within a specific network:
 - Intrinsic method
 - Extrinsic method of network and/or network management service
- Create a network (intrinsic method)
- Create networks within a network:
 - Extrinsic method of network and/or network management service
- Create one or more networks:
 - Extrinsic method of network management service
- Delete a network (intrinsic method)
- Delete networks contained within a network:
 - Extrinsic method of network and/or network management service
- Modify a network (intrinsic method)



Network Management

Operational Use Cases 2/3

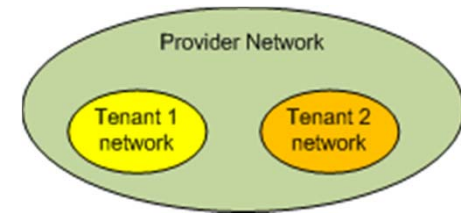
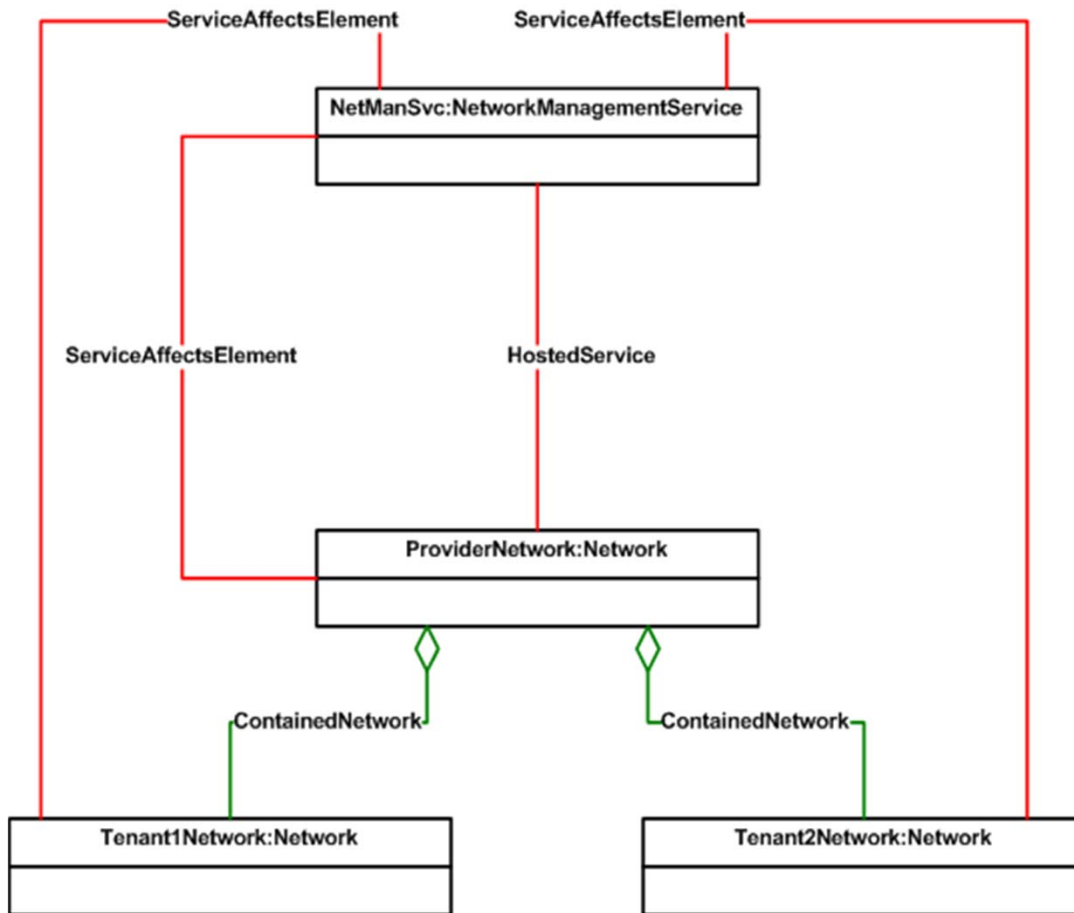
- Enumerate logical ports of a network (intrinsic)
- Enumerate logical port groups of a network (intrinsic)
- Enumerate IP subnets of a network (intrinsic)
- Enumerate VLANs of a network (intrinsic)
- Enumerate L2 segments of a network (intrinsic)
- Create/delete logical port groups of a network:
 - Extrinsic method of network management service
- Create/delete logical ports of a network:
 - Extrinsic method of network management service
- Create/delete IP subnets of a network:
 - Extrinsic method of network management service
- Create/delete VLANs of a network:
 - Extrinsic method of network management service
- Create/delete L2 segments of a network:
 - Extrinsic method of network management service



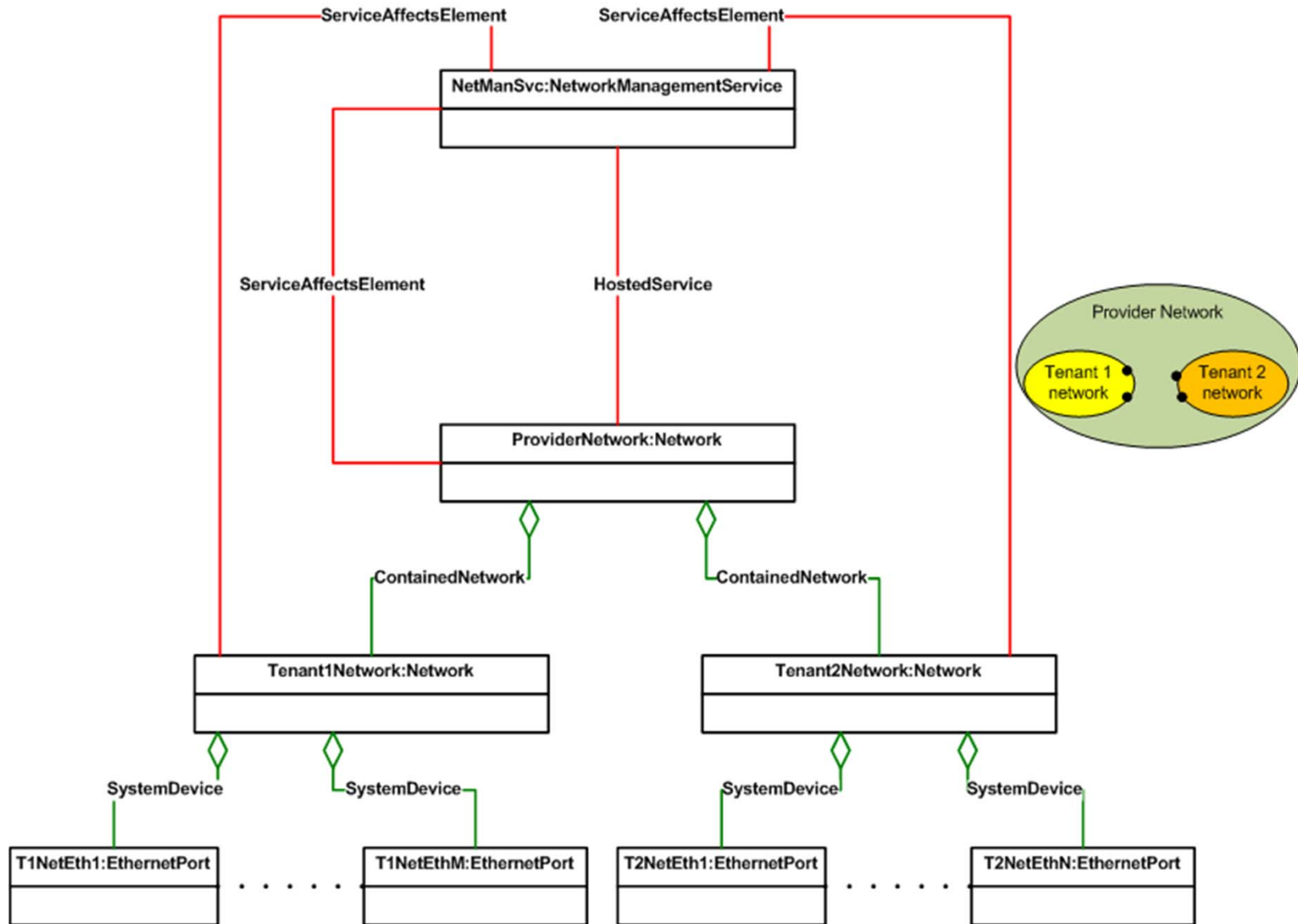
Network Management Operational Use Cases 3/3

- Modify a logical port group of a network:
 - Extrinsic method of network management service
 - Add or delete one or more ports
- Modify an IP subnet of a network:
 - Extrinsic method of network management service
 - Add or delete one or more IP protocol endpoints
- Modify a VLAN of a network:
 - Extrinsic method of network management service
 - Add or delete member VLAN endpoints
- Modify an L2 segment of a network:
 - Extrinsic method of network management service
 - Add or delete LAN endpoints
- Enumerate systems within a specific network:
 - Extrinsic method of network and/or network management service or both
 - Intrinsic method
- Create a network connection for a system:
 - Extrinsic method of network
 - Create network port and associations between the network/network port and the system
- Enumerate networks that a system is directly connected to (intrinsic method)

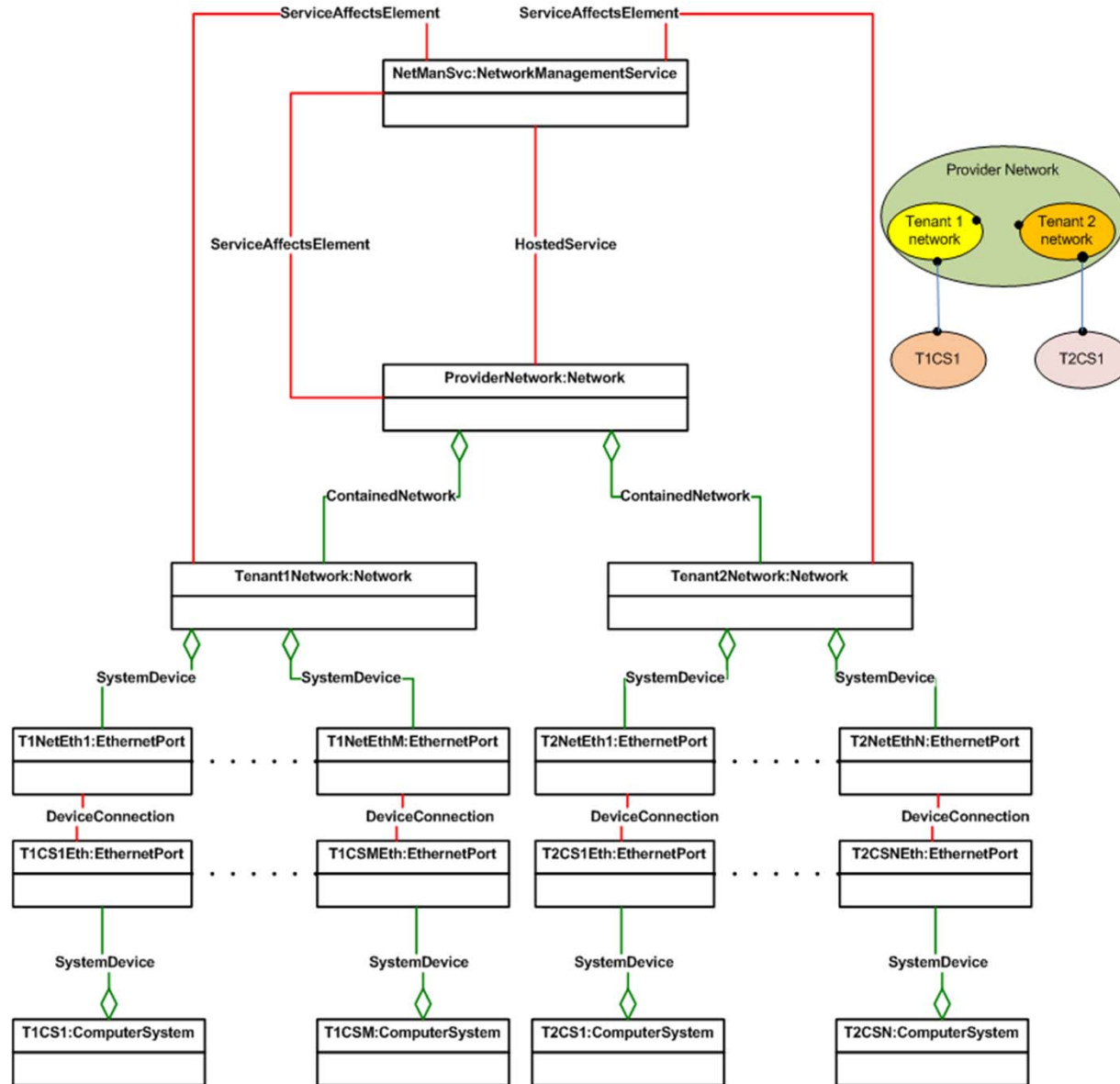
Use Case 1



Use Case 2



Use Case 3



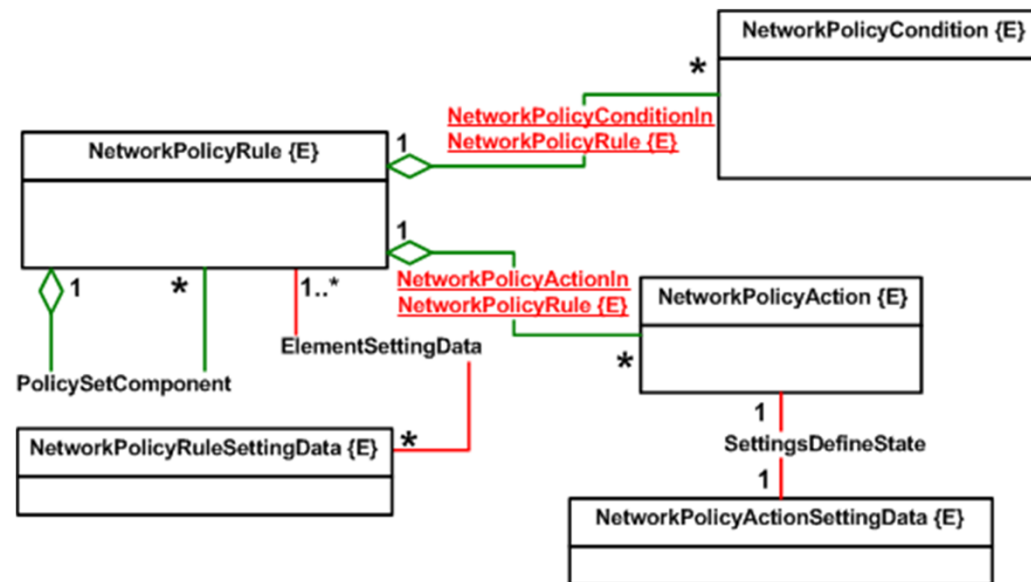


Network Policy Service Model

- Define an abstract, flexible, and extensible model for network policy management
- Initial network policy services considered:
 - Firewall
 - Load balancing
 - QoS
- Leverage DSP1003 Policy Profile

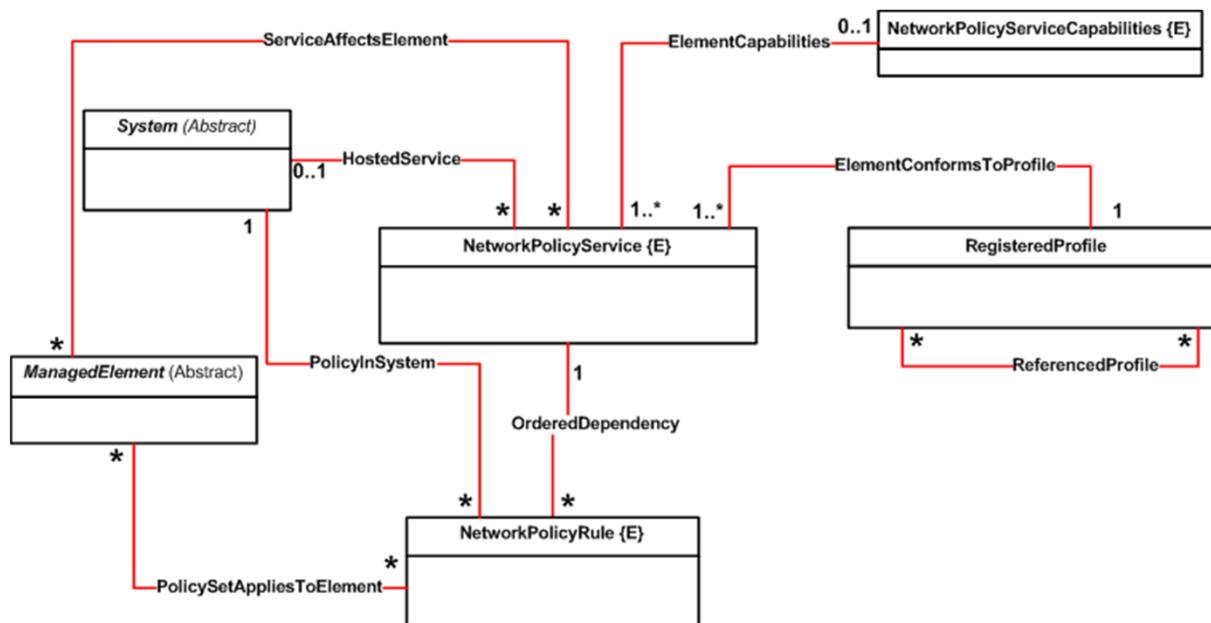
Representation of Network Policies

- Separation of policy rule, actions, and conditions
- Policy set – zero or more policy rules
- Setting data for rules and actions

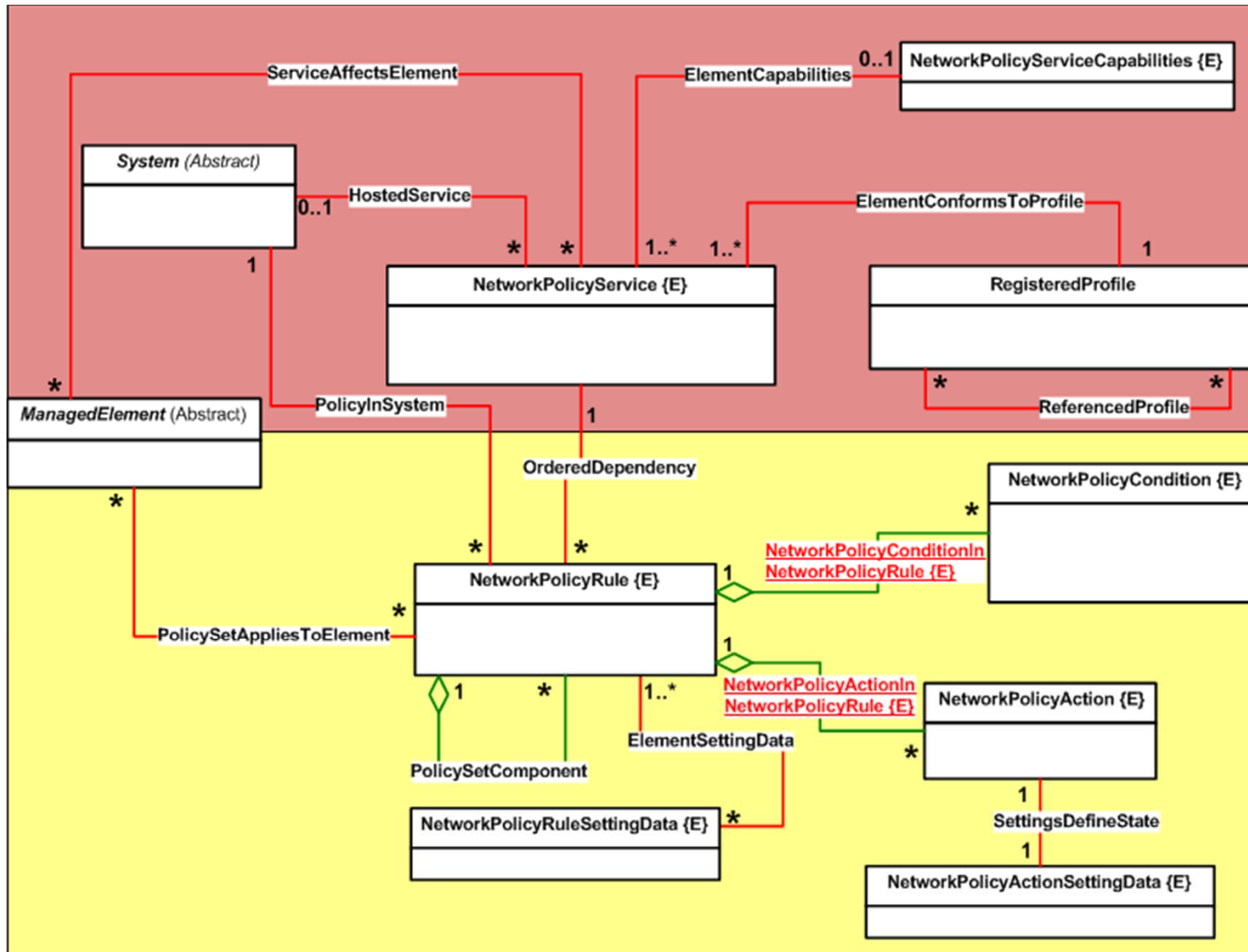


Network Policy Service

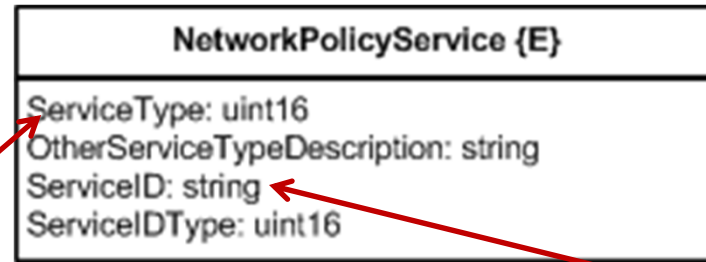
- NetworkPolicyService:
 - An abstract class as well as a central class
 - May have an associated capability
 - Can be hosted on a system
 - Manages network policy rules (that apply to managed elements)
 - Affects managed elements



Network Policy Service Profile Class Diagram



Network Policy Service Class

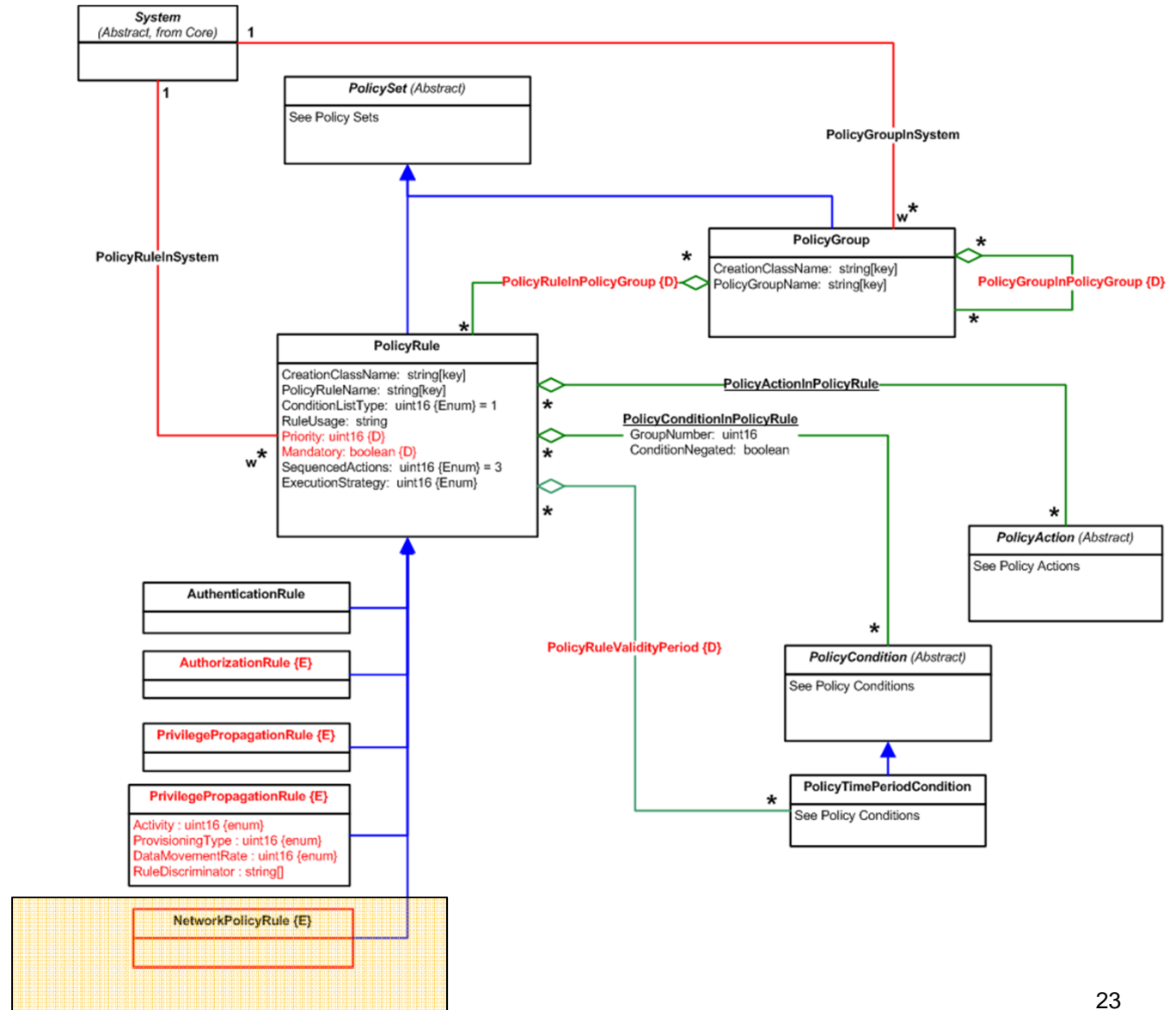


- Describes the type of network policy service
- Defined types:
 - Load Balancer
 - QoS
 - Firewall
 - VPN
 - DHCPv4
 - DHCPv6
 - DNS
 - NAT
 - Gateway
 - Layer4 Port Forwarding
 - IP routing

Unique identifier of the service

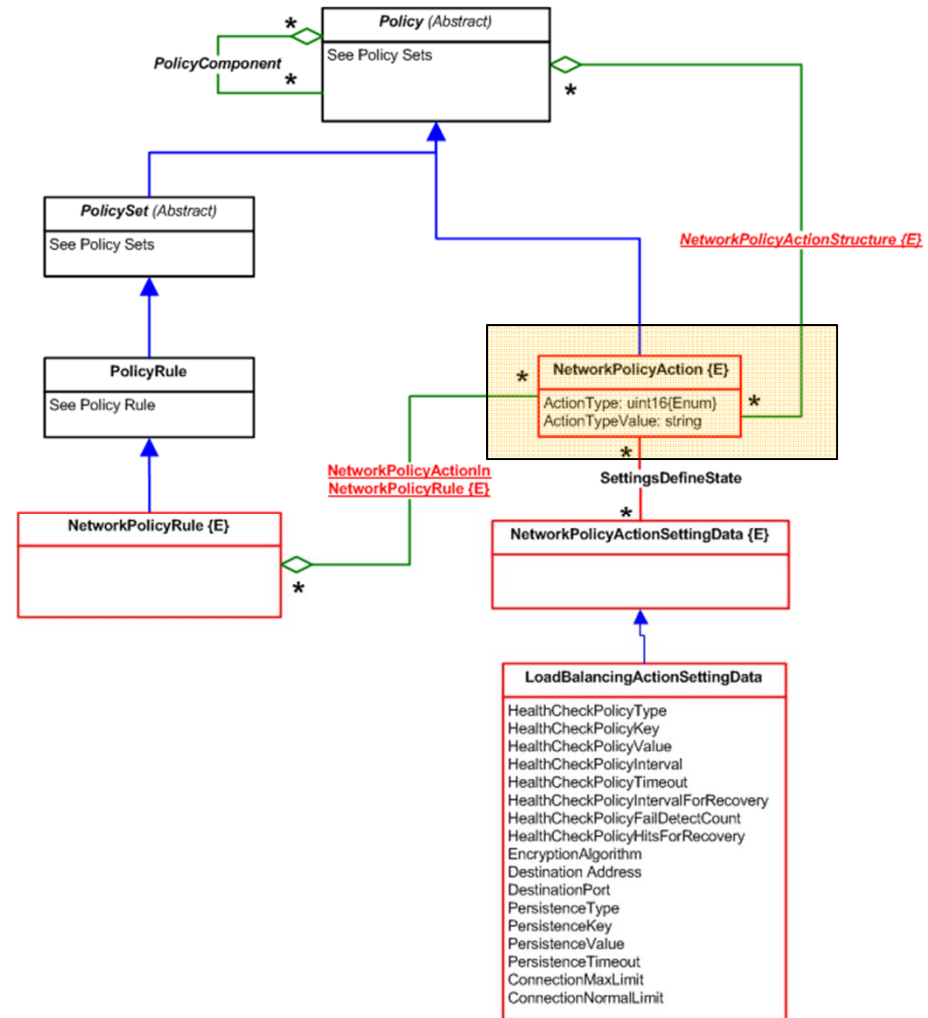
NetworkPolicyRule Class

- Derived from PolicyRule
- No additional properties



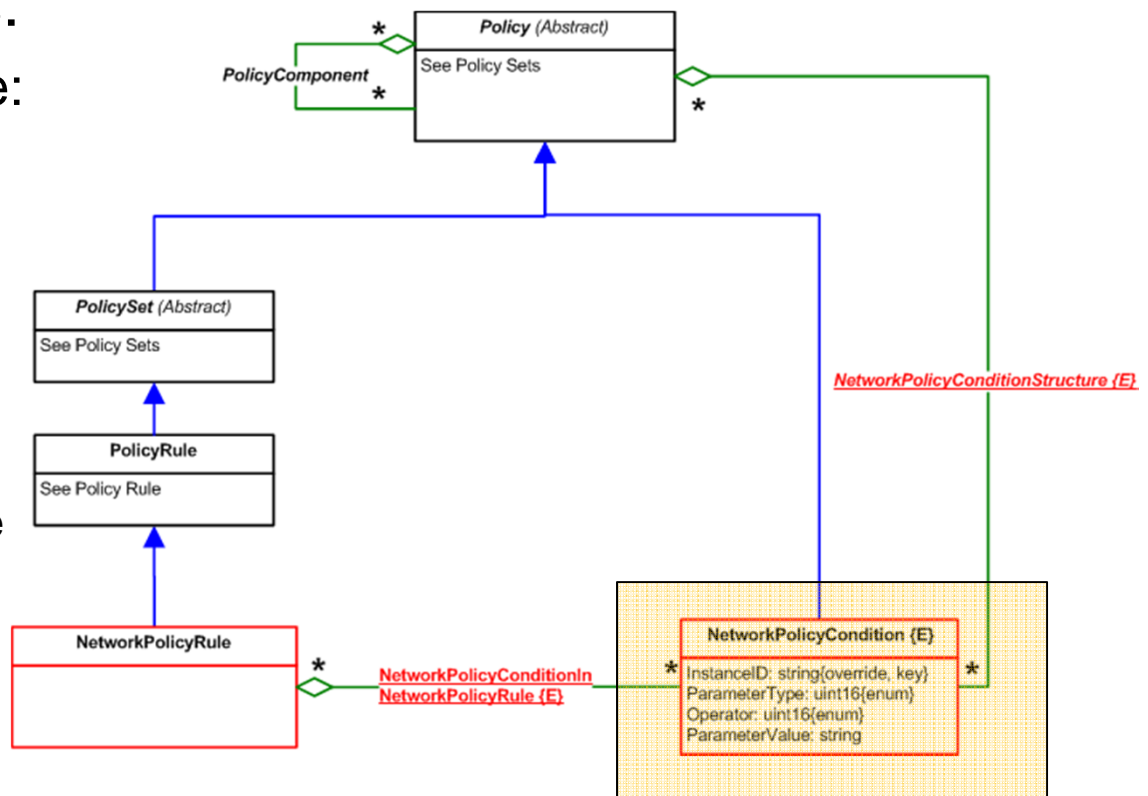
NetworkPolicyAction

- Derived from Policy
- Additional properties:
 - Action type and value
 - Defined types:
 - Permit
 - Deny
 - LoadBalance
 - ForwardOnly
 - Persistence
 - HealthCheck
 - RewriteHTTPHeader
 - InsertHTTPHeader
 - CompressHTTP
 - SSLProxy
 - SourceNAT
 - DestinationNAT
 - ...

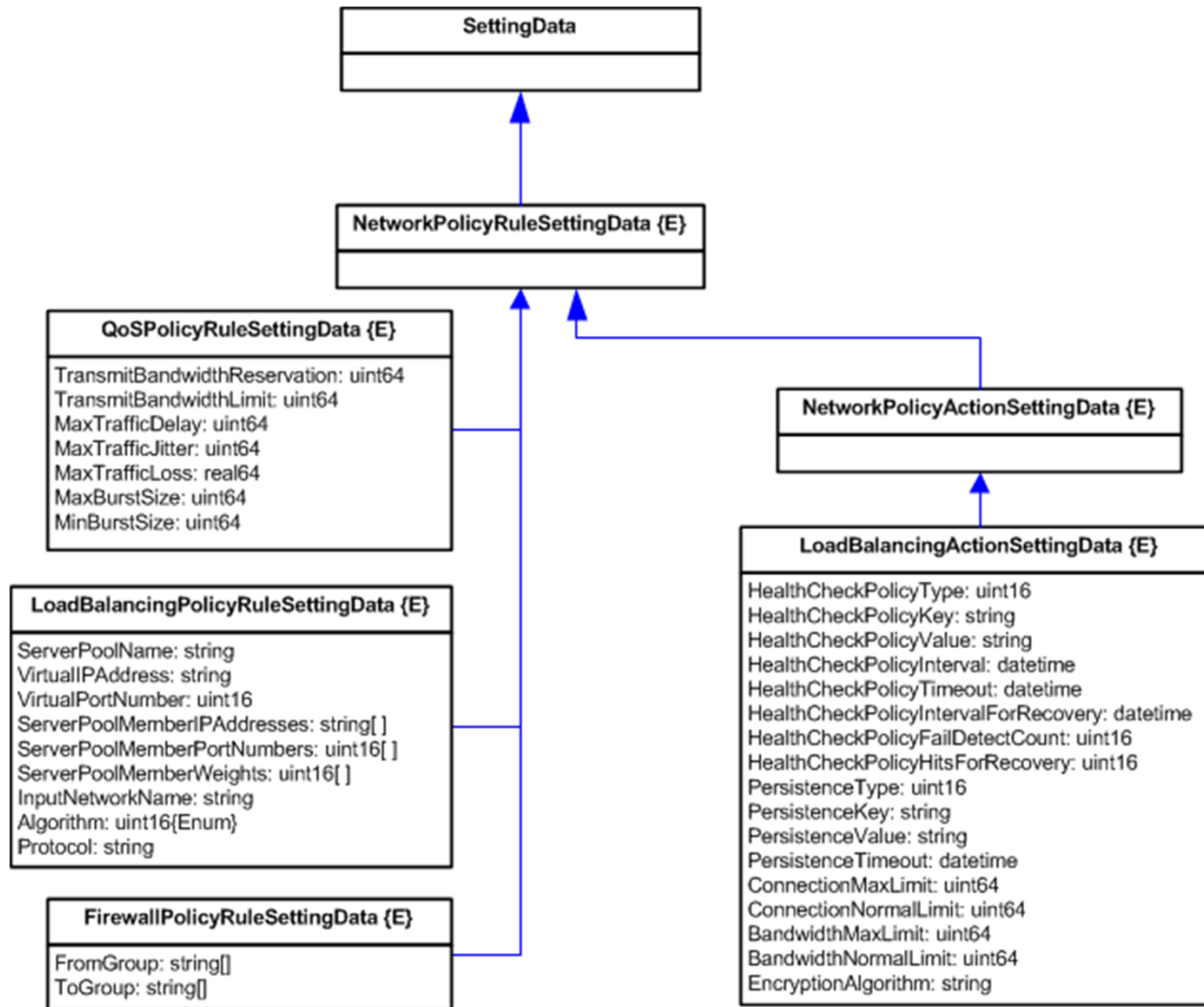


NetworkPolicyCondition Class

- Derived from Policy
- Additional properties:
 - Parameter type/value:
 - SourceIPAddress
 - DestinationIPAddress
 - VirtualIPAddress
 - SourcePort
 - SourcePortRange
 - DestinationPort
 - DestinationPortRange
 - HTTPURL
 - ...
 - Operator:
 - =, <, >, <=, =>....

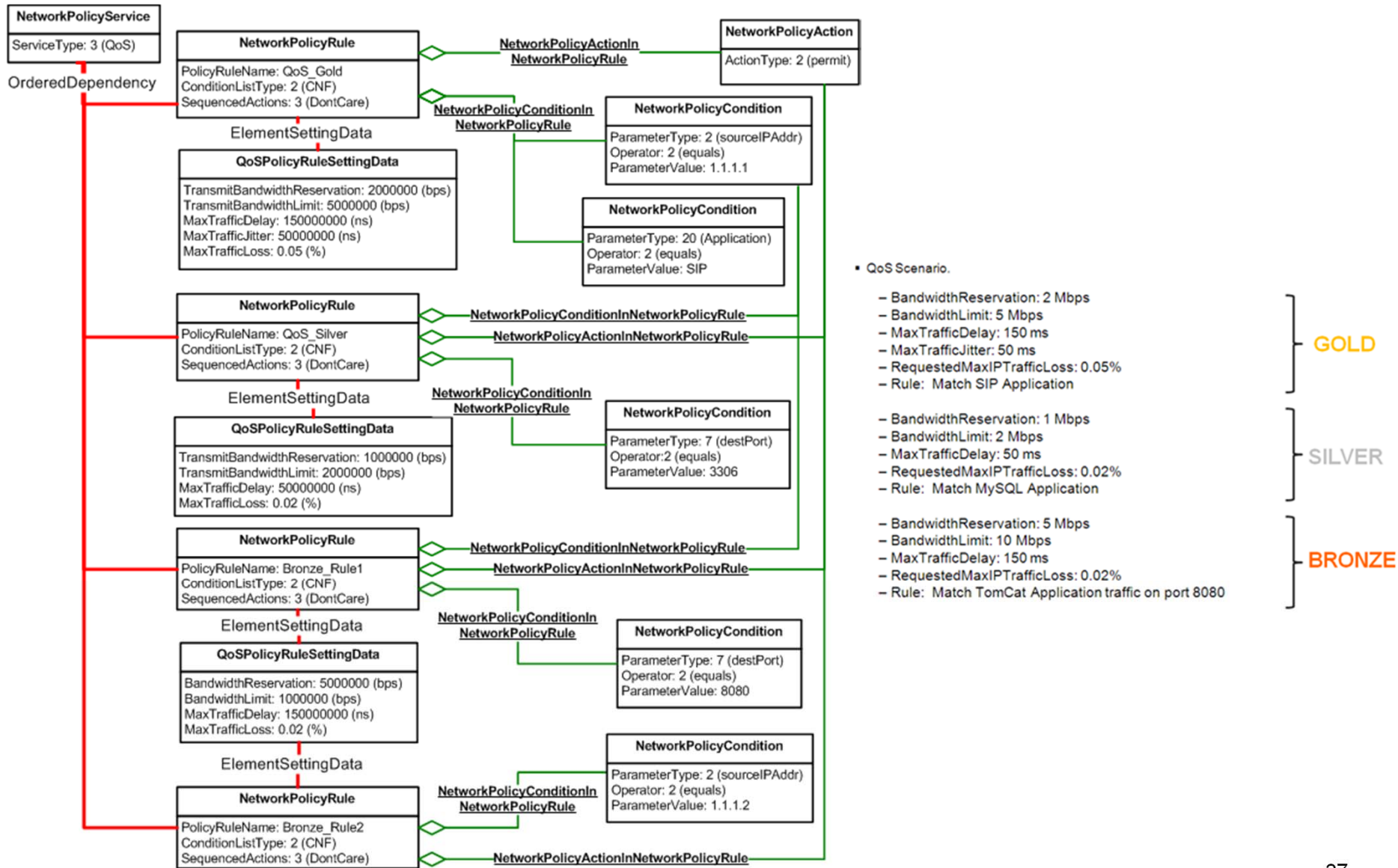


SettingData Classes for Network Policies

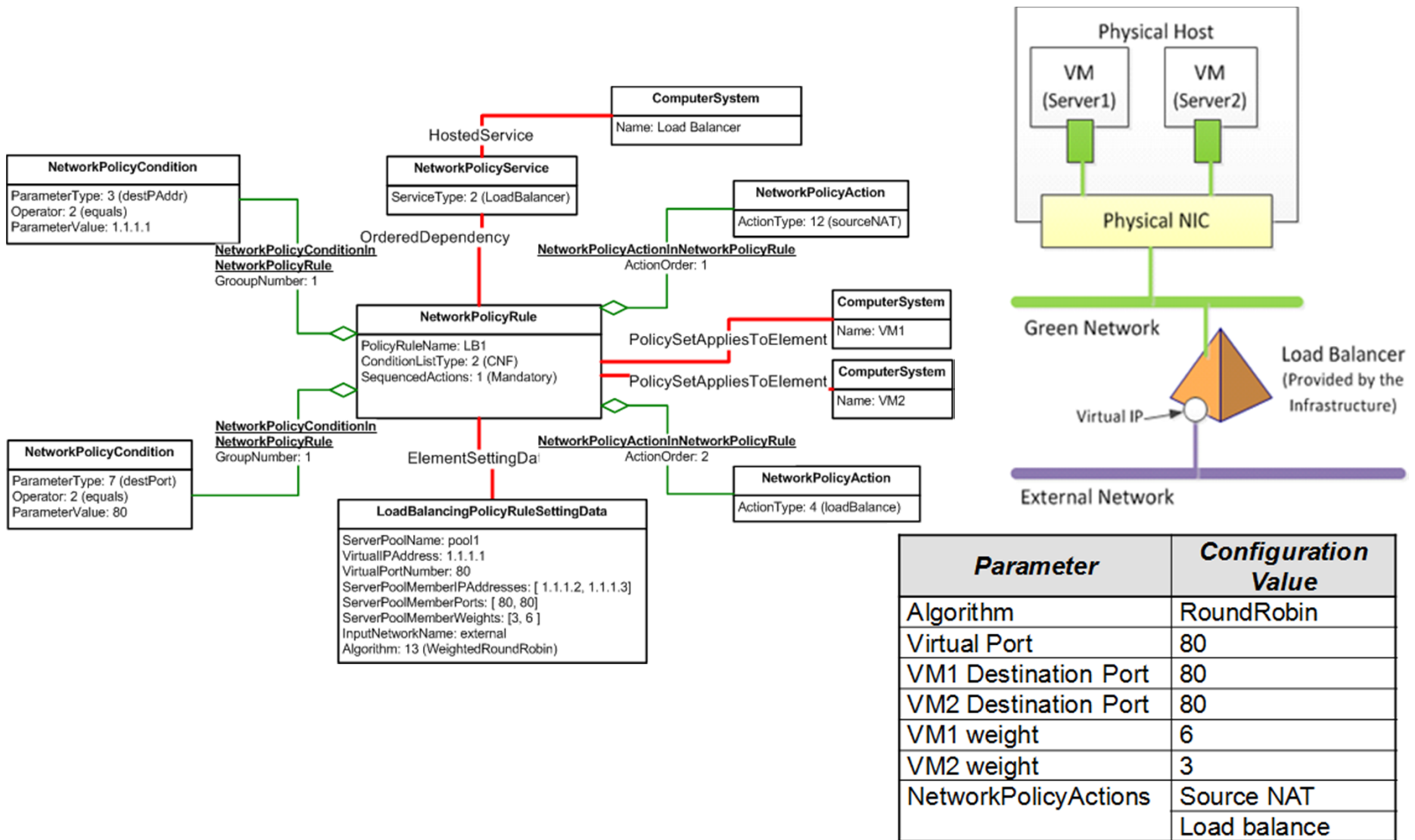


Network Policy Service

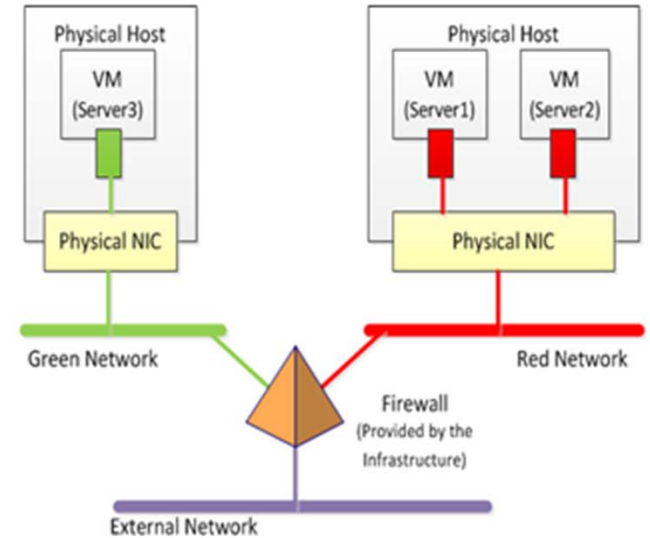
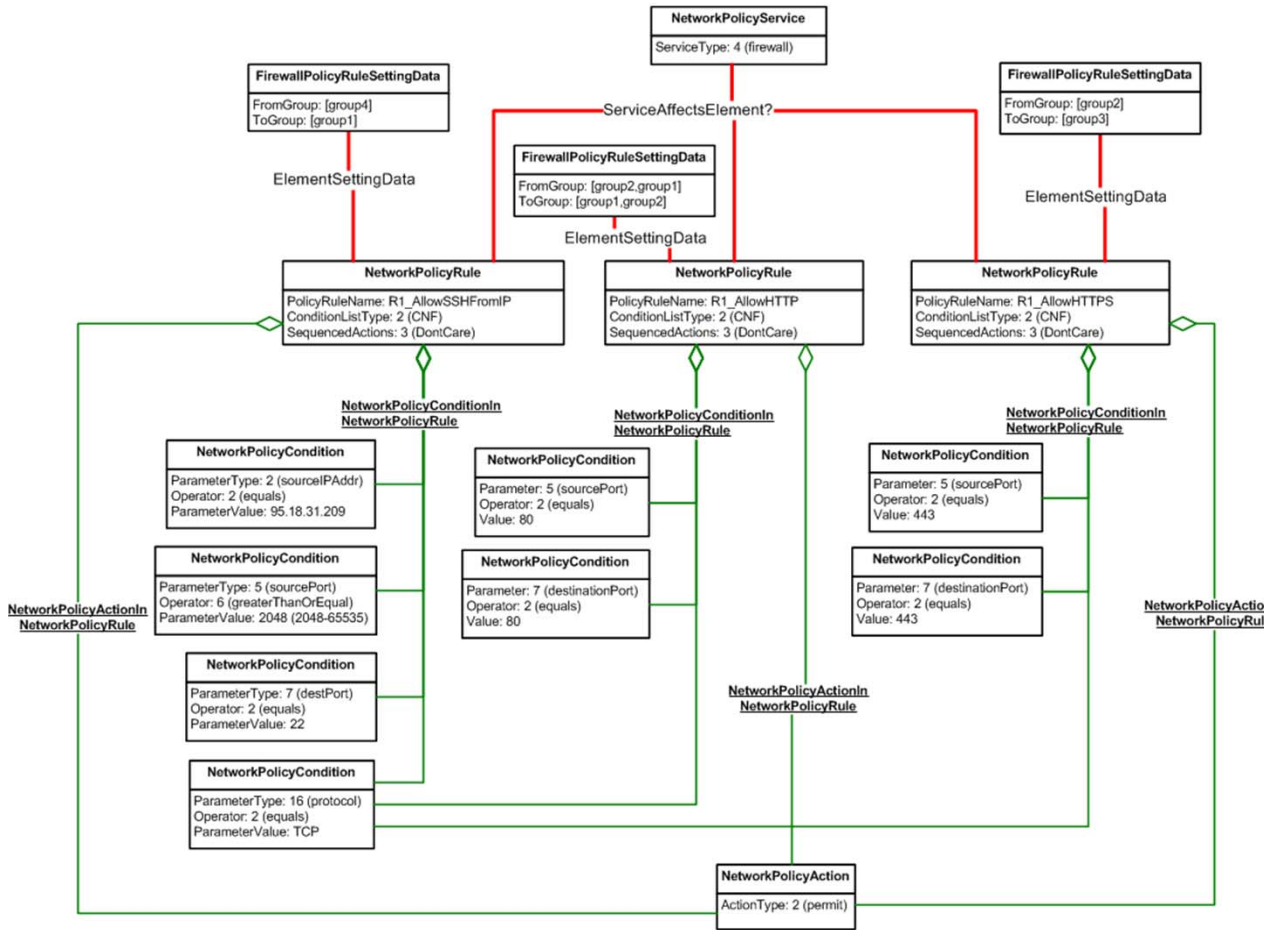
Use Case 1 - QoS



Network Policy Service Use Case 2 (Load Balancer)



Network Policy Service Use Case 3 (Firewall)



Group Name	Description
Group1	Red Network
Group2	Green Network
Group3	Server1 in red Network
Group4	External Network

Firewall Rules		
From	To	Description
Group2	Group1	Allow HTTP
Group4	Group1	Allow SSH from a concrete IP
Group1	Group2	Allow HTTP
Group2	Group3	Allow HTTPS



Summary and Call to Action

- Summary:
 - A consistent network management model needed for today's network environments
 - DMTF is driving CIM-based network management models
 - Plan to publish initial specs in the near future
- Call to Action:
 - Participate in the NSMWG
 - Provide feedback on models for network management

Q&A Session

Thanks to all the members of the NSMWG for all their contributions!