# I2NSF Framework

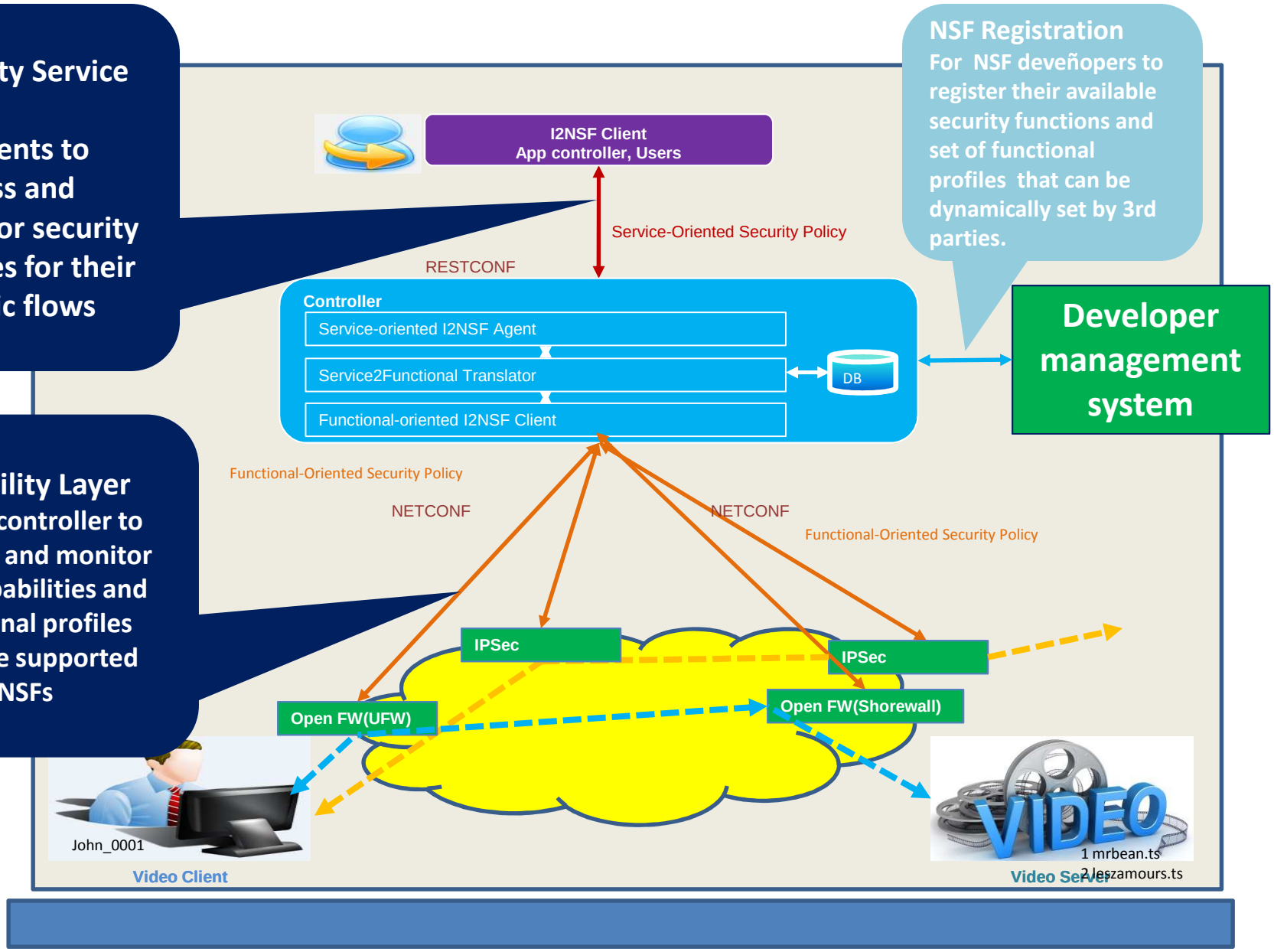
July, 2015

Edward Lopez (elopez@fortinet.com)
Diego R. Lopez (diego.r.lopez@telefonica.com)
XiaoJun Zhuang (zhuangxiaojun@chinamobile.com)
Linda Dunbar (linda.dunbar@huawei.com )
John Strassner (John.sc.Strassner@huawei.com)
Joe Parrott (joe.parrott@bt.com)
Ramki Krishnan (ramki_krishnan@dell.com)
Seetharama Rao Durbha (S.Durbha@cablelabs.com)

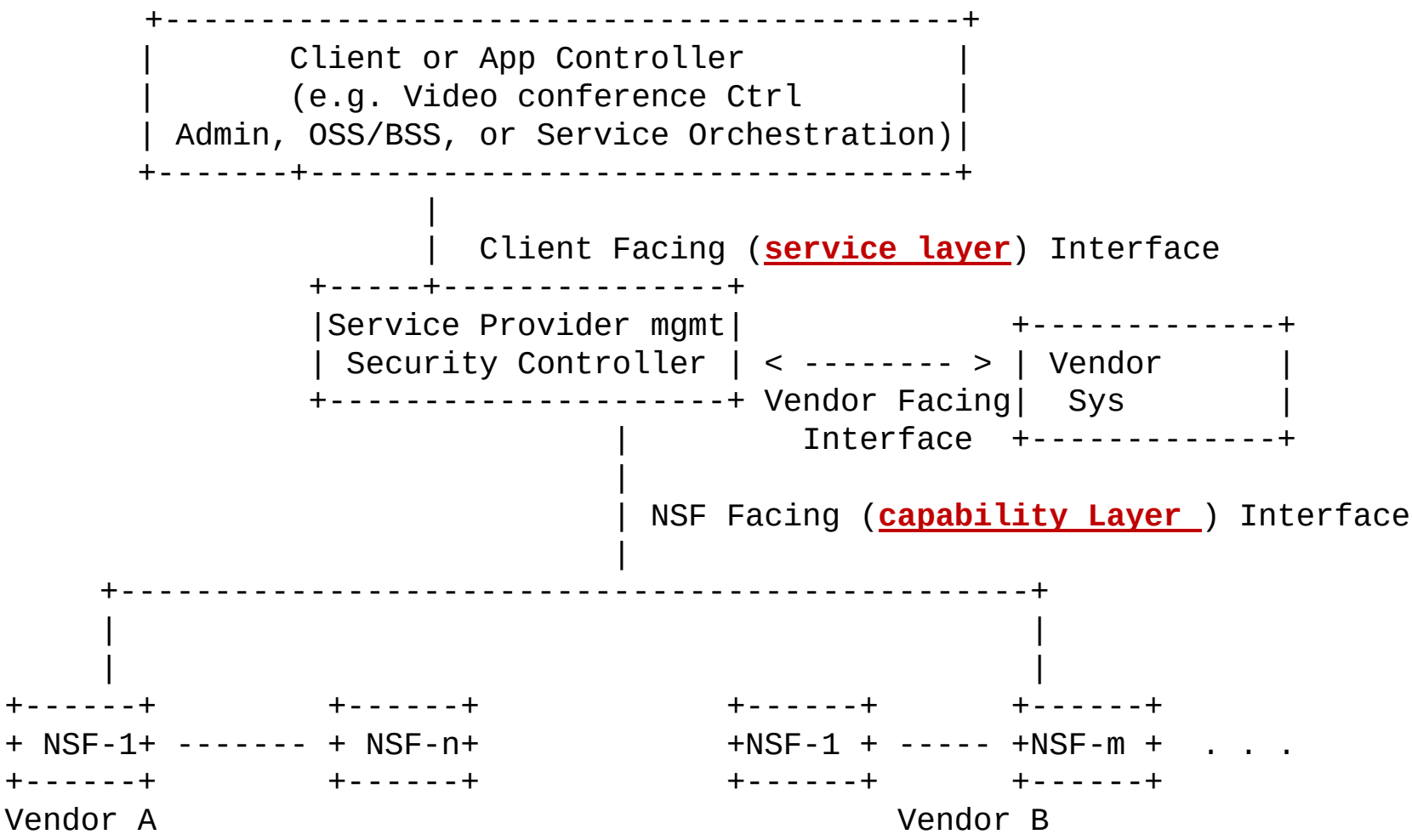
# Major Component of I2NSF

**Security Service Layer**
For clients to express and monitor security policies for their specific flows

**Capability Layer**
For controller to specify and monitor the capabilities and functional profiles that are supported by the NSFs



# Figure in the draft: Major Components of I2NSF



# Capability Layer Interface

# Problems

- Unlike traditional networking device, network-based security functions (NSFs) do not operate relative to standards
  - Many evaluative bodies exist, which review the efficacy of network security product
  - Many regulatory/compliance directives call for the use of loosely defined classes of network security
- How do we define interfaces to devices that have no standardized implementations?

# Potential for Imposed Constraints

- Narrowly defined NSF categories, or their roles when implemented within a network
- Attempts to impose functional requirements or constraints, either directly or indirectly, upon NSF developers
- Result in a limited lowest-common denominator approach, where interfaces can only support a limited set standardized functions, without allowing for specific functional profiles
- Results in endorsing a best-common-practice for the implementation of NSFs

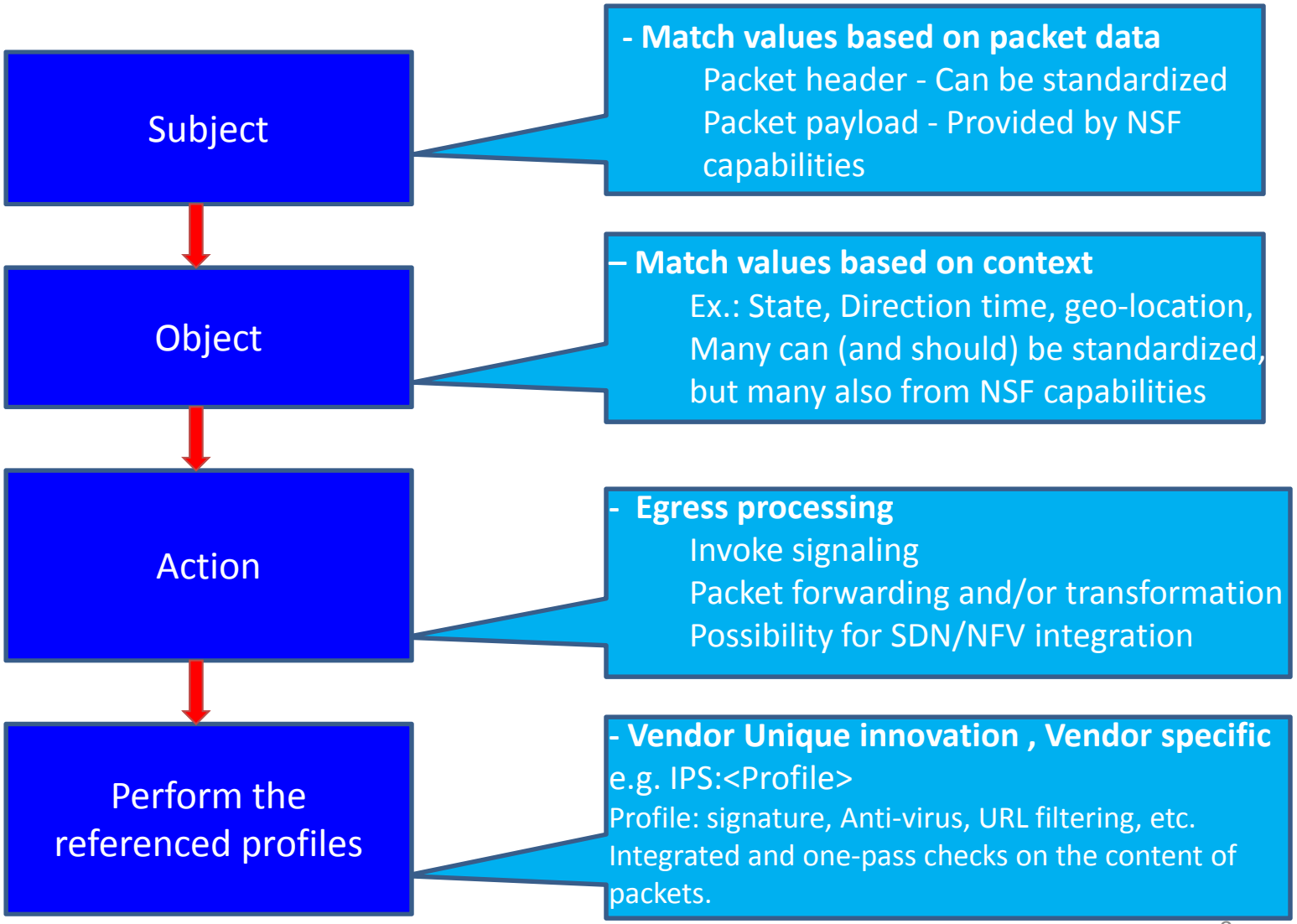
# Packet-Based Paradigm for FlowBased NSF

- Rather than attempting to create a standard based on NSF classes, a solution may exist in provisioning packet processing
- All NSFs, regardless of function, process:
  - Packet headers
  - Packet payloads
  - Contextual and state information associated with packets

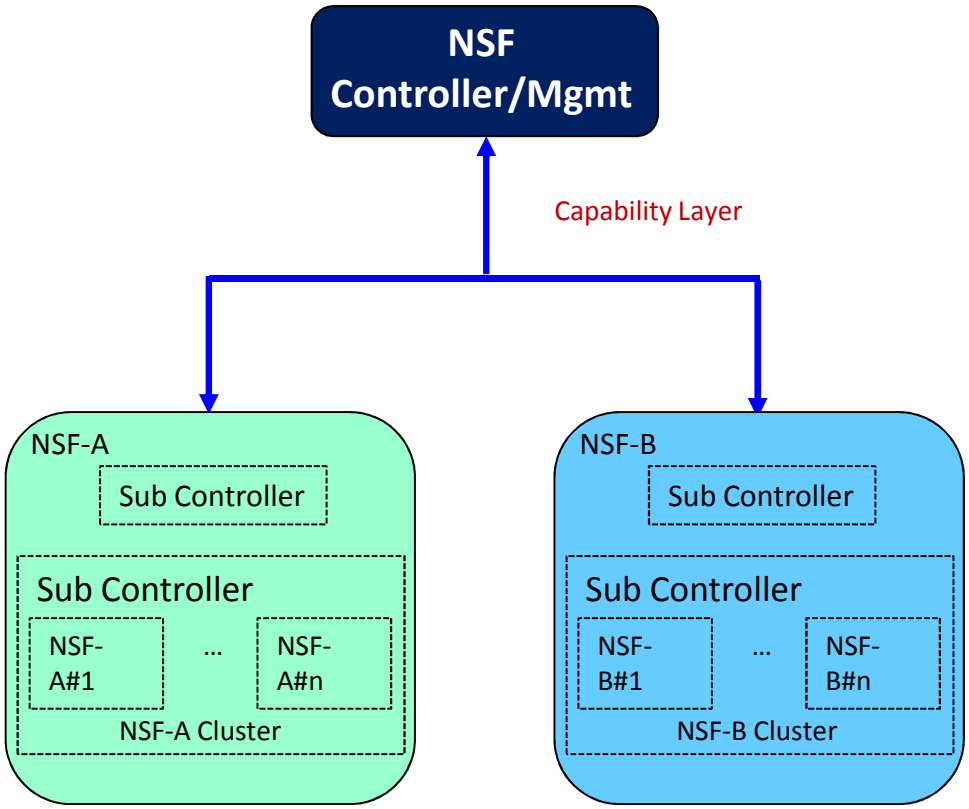
# Three Sub-Interface Types

- Configuration
  - Device configuration
  - Network configuration
- Signaling
  - Status
  - Counters
  - Queries
  - Alerts
- **Rules Provisioning**
  - **Capabilities**
  - **Policy**
  - **Object Configuration**

# Suggested Rules Provisioning Structure



# Controller Hierarchy




Characteristics:

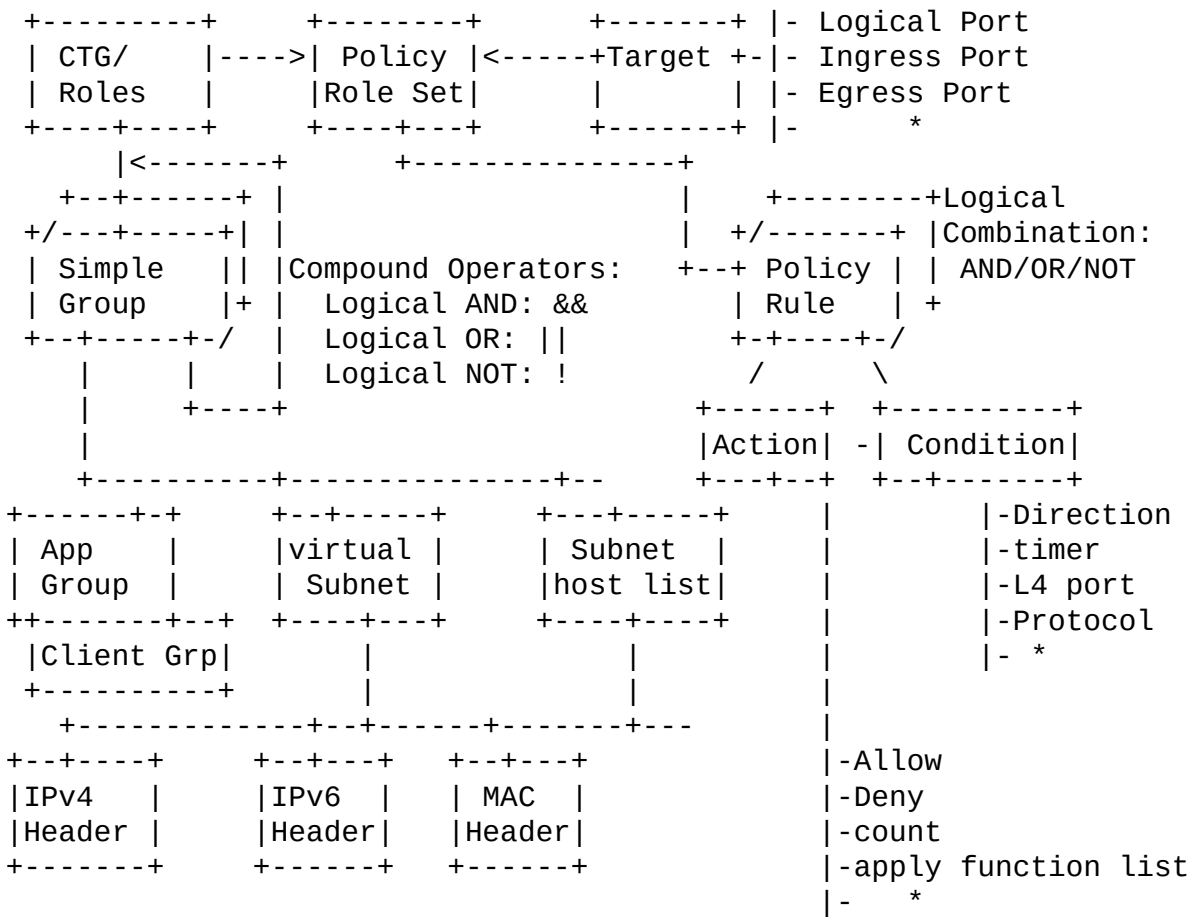
- Single NSF can have multiple instantiations that are distributed across the network.
- Different rules/policies could be imposed to different instantiations.
- Each NSF may have its own sub-controller for any cluster of its instantiations
- Policies to one cluster can be moved/copied to another NSF cluster
- Multiple NSFs collectively together to enforce the rules for large flows

# Service Layer Interface

# Simple service layer rule structure

- Composite Groups or Roles (I2NSF-Role):
  - This is a group of users, applications, virtual networks, or traffic patterns to which a service layer policy can be applied. An I2NSF-Role may be mapped to a client virtual Subnet (i.e. with private address prefix), a subnet with public address families, specific applications, destinations, or any combination of them with logical operators (Logical AND, OR, or NOT). An I2NSF-Role can have one or more Policy Rule Sets.
- Target.
  - This is used by the application client to establish communications over the network. A Target can be mapped to a physical/logical ingress port, a set of destinations, or a physical/logical egress port.
- Policy Rule Set.
  - A Policy Rule Set is used to determine how the traffic between a pair of I2NSF-Role and Target is to be treated. A Policy Rule Set consists of one or more Policy Rules.
- Policy Rule.
  - A Policy Rule consists of a Policy Conditions and a set of Actions to be applied to the traffic.
- Policy Condition.
  - Describes when a Policy Rule set is to be applied. It can be expressed as a direction, a list of L4 ports, time range, or a protocol, etc.
- Policy Action:
  - This is the action applied to the traffic that matches the Conditions. An action may be a simple ACL action (i.e. allow, deny, mirroring), applying a well known statistics functions (e.g. X minutes count, Y hours court), applying client specified functions (with URL provided), or may refer to an ordered sequence of functions.

# Service Layer Policy Structure



# Service Layer extension from PCIM (RFC3060) or ITU-T X.1036