Global Visibility & Dynamic Rule placement (A Graybox Approach)  
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ABSTRACT

Rule placement in Enterprise Networks requires:
- Global network Visibility
- Topology with mix of Forwarding devices & middleboxes
- Automatic Network Abstraction
- Unified framework to support heterogeneous devices & generic APIs

Aspects to be handled for Optimum Rule placement:
- Heterogeneous devices with same features & functional capabilities
- Enterprise specific device deployment scenarios.
- Direction based rules & Automatic Rule conflict detection
- Adaptive to Network (Load & Topology)
- Post Rule Placement Adjustments (Device & Path Load)

CHALLENGES

Challenges to address Rule placement in Enterprise Networks:
- Lack of proper topology discovery with mix of forwarding devices and middleboxes.
- Lack of generic APIs to gain control on these third-party middleboxes.
- Lack of generic network infrastructure framework to verify its correctness.
- Automatic Network Abstraction

AUTOMATIC TOPOLOGY ABSTRACTION

Enterprise
LAN1 LAN2 LAN3

(b) LAN Properties Abstraction

Policy Grouping Abstraction Path Grouping Abstraction

Graph Based Rule Placement Technique
- Uses Policy Grouping Vs Path Grouping Graph Based Approach
- Device Ranking for Optimum Rule placement
- Adaptive & Auto Adjustment with Dynamic Network Topology & Load
- Adapts both Steering + Path Based Approach
- Post rule placement Adjustments

PRELIMINARY RESULTS

Applications that can be enabled on this Unified Network Infrastructure Framework:
- Policy Enforcement
- Function Chaining Enforcement & Verification
- Security Management Infrastructure
- Network-wide Monitoring

CONCLUSION & FUTURE WORK

Accomplishments:
- Secured Probe-based Topology Discovery in the Presence of Middleboxes
- Automatic Network Abstraction
- Policy Vs Path Grouping Mechanism
- Device Ranking for optimum rule placement.

Future Tasks:
- Optimize the Rule placement mechanism.
- Extend the conflicts in Rule placement
- Extend Test Environment to Larger Scale (Emulab Net)
- Support this framework on OpenStack