Control Plane Considerations for Enhanced VPN (VPN+)
draft-dong-teas-enhanced-vpn-control-plane

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Introduction

• VPN+ Framework is described in draft-ietf-teas-enhanced-vpn
  • A layered architecture with candidate technologies in data plane, control plane and management plane
  • To meet the requirements of 5G network slicing and other generic scenarios

• This document analyses the requirements, functions and considerations of VPN+ control plane
  • To guide the design of control plane mechanisms and potential extensions
Control Plane Requirements

• Support of isolation
  • Data plane isolation
    • Control plane needs to collect and distribute network information needed for both soft and hard isolation
  • Control plane isolation
    • Different mechanisms can provide different isolation characteristics with different overhead
      • E.g., multi-topology, multi-instance, logical systems etc.

• Support the attributes of transport network slice
  • Two major types of attributes: topology and resource

• Support the number of network slices required in different phases/scenarios
  • Relevant to the scalability considerations
Control Plane Functions

• A hybrid of distributed and centralized control plane

• Distributed control plane
  • Overlay
    • Distribution of routing information of VPN+ tenants
  • Underlay
    • Advertisement of customized topology and resource attributes of each network slice
    • Compute routing and forwarding entries for each network slice

• Centralized controller
  • Collect the network topology and resource attributes of each network slice
  • Provide global computation and optimization of TE paths within each network slice
Control Plane Scalability Considerations

• The scalability of distributed control plane needs to be considered with:
  • Number of protocol instances on each node
  • Number of protocol sessions on each node
  • Number of routes to be advertised in the network
  • Amount of information and attributes associated with each route
  • Number of route computation (i.e. SPF) to be executed on each node

• Optimization needs to be considered to meet the requirement of increasing network slices
Optimization Suggestions

• Reduce the amount of control sessions
  • Using a shared control plane for information distribution of multiple network slices
  • Need identifiers to distinguish information of different network slices

• Decouple the advertisement and processing of different types of attributes
  • For example, the topology attributes and resource attributes can be decoupled
  • For network slices with the same topology attribute, SPF computation could be shared and the total amount of computation could be reduced

• Divide the load between centralized and distributed control plane
Next Steps

• Solicit comments and feedbacks

• Coordinate on the protocol work in relevant WGs