MyVINI: Virtual Network Functionality for GpENI

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- **GpENI**
  - Great Plains Environment for Network Innovation
  - An international programmable network test bed
- **MyVINI**
  - A private virtual network infrastructure on GpENI
  - Supports experiments with real routing software on customized network topologies on GpENI
  - This is developed by extending VINI-VERITAS available from Princeton University
- **MyVINI functional components:**
  - Trellis
  - IIAS
  - MyPLC
Trellis and IIAS

- Trellis
  - Customized OS for MyVINI nodes
  - combines two virtualization technologies and EGRE tunnel mechanism
  - Allows to define each VN
    - Topology
    - Control protocols
    - Forwarding tables

- IIAS: Internet In A Slice
  - A tool kit to create topologies inside a slice
  - Link & topology scripts: Creates topology network configuration
  - Topo & Optin scripts: Creates Virtual interfaces and Virtual links

- Virtual Networks Consists two components
  1. virtual hosts
  2. virtual links
MyVINI Architecture

User -> XML-RPC

Web Server -> XML-RPC

API Server

Boot Server

Database Server

Cron Job

MyVINI Central Server

IaaS Tools

Sliver-1

Sliver-2

Sliver-3

Node Manager

MyVINI Node

IaaS Tools

*based on VINI-VERITAS*
Slice with IIas

- Slice with nodes and attribute
  1. vini_topo tag with “iias”

After adding IIaaS, the following takes place:
Server side:
  1. scripts creates topology specification
Node side:
  2. topo script creates virtual links and virtual interfaces and configuration files
  3. optin script create openvpn configuration
VN creation

UMKC Node-1

Umkct-2 Sliver
Application
Kernel FIB
Vir if-4 Vir if-3

Vir if-4 Vir if-3
Vir if-1 Vir if-2

Bridge

Tun if-4 Tun if-3 Tun if-2

IP H + GRE H + Eth Packet

KSU Node-1

Umkct-2 Sliver
Application
Kernel FIB
Vir if-4 Vir if-3

Vir if-4 Vir if-3
Vir if-1 Vir if-2

Bridge

Tun if-4 Tun if-3 Tun if-2

*based on VINI-VERITAS
XORP/Quagga Integration

- XORP/Quagga
  - Routing software to make or use normal computers as routers
  - XORP/Quagga for routing control plane
  - Kernel routing table/Click for forwarding plane
- GpENI-VINI supports XORP and Quagga implementation inside a slice
- IIAS extended functionality
  - Installation and configuration scripts writes directly into sliver file system
Integration and Future work

• Experimenter/User can select
  • Create own topology: star, mesh, circular...
  • Routing control software: XOPR/Quagga
  • Select routing protocols: RIP/OSPF (BGP add soon)
  • Configuration: Default or Customized one
• So the experimenter can use XORP/Quagga very easily

• Future work
  • Working on creating GUI to customize Virtual topology