Roaming vNFs at the Network Edge using Glasgow Network Functions

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Next Generation Clients
Increase of connected devices

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Growth of network traffic

Cisco: “growth is due to mobile devices and wearables”
Requirements for the Next Generation Network

• Personalized services
  • security, QoS, parental control, rate limiter ...
  • reconfigured quickly
  • lower latency / higher throughput

• Support for new type of services
  • Machine-to-Machine communication
  • IoT

• Supporting mobility
  • Location agnostic services
Network Edge vNFs

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The other question is: What type of virtual Network Functions fit the Network Edge architecture?
vNFs at the Network Edge

- vNFs need to run on wide variety of devices
  - Most devices or capillary gateways are low cost (e.g., single chip computers)

- vNFs need to support fast lifecycle mgmt.
  - A vNF should be started in few seconds

- The virtualization overhead should be minimal

- vNFs should be as simple as possible
Glasgow Network Functions

- Glasgow Network Functions (GNF)
  - Research and development project from Netlab

- Main characteristics of GNF are:
  - Minimal footprint
  - Container-based
  - Supports function roaming
  - Transparent traffic handling
Containers

- Lightweight “virtualization”
  - Shared kernel on the host
- Fast create/start/stop/delete
- High performance
  - Small delay, high throughput, low memory usage
- Reusable / shareable
- Traditional software environment
- Micro-services architecture
Mobility use case: Supporting vNF roaming

I. Client moves from one network to another

II. Seamless migration of client's Network functions

- TP-Link commodity router with OpenWrt
- Client
- Linux kernel
- GNF Agent
- Open vSwitch

Server running GNF Manager, Router and UI

Internet

Backbone router
GNF User Interface
GNF User Interface
Example GNF vNFs

- Examples vNFs available on our website: [https://netlab.dcs.gla.ac.uk/projects/glasgow-network-functions](https://netlab.dcs.gla.ac.uk/projects/glasgow-network-functions)
  - Firewall
  - Parental control
  - HTTP proxy
  - Network measurement functions
  - Introducing delay
  - Rate limiter
  - DNS load balancer
  - SNORT
Thank you!