DP2 – INTRODUCTION TO THE TOPIC OF THE ASSIGNMENTS – A.Y. 2017-18

The NF-FG concept

A Network Function-Forwarding Graph (NF-FG) describes a *network service* requested by an end-user from a Service Provider. An NF-FG models the requested network service as a graph, where the nodes represent network functions (e.g., firewall, NAT, etc.…), clients, and servers composing the requested service, while the arcs represent packet forwarding paths.

In our exercise, an NF-FG is characterized by a name, which uniquely identifies it, a deploy time, which is the time when the NF-FG was deployed, and a set of Network Nodes. Each node has a name, which is unique, and is associated to a "functional type" that must be present in the Provider's catalog. The catalog of functional types includes, for each functional type, a name, which uniquely identifies it in the catalog, and the required amount of memory (expressed in Mbytes) and of disk storage (expressed in Mbytes). A node can be directly connected to a number of other nodes, by means of links. A link represents a unidirectional connection between two nodes and is characterized by a name, which uniquely identifies it within the NF-FG, and the source and destination nodes of the connection. Optionally, it may include a required minimum throughput (expressed in Mbps) and a required maximum latency (expressed in ms).

Example

This is an example of NF-FG, described by the following picture (where network nodes are represented by rectangles containing their name, and the links from one node to another one are represented by arrows):
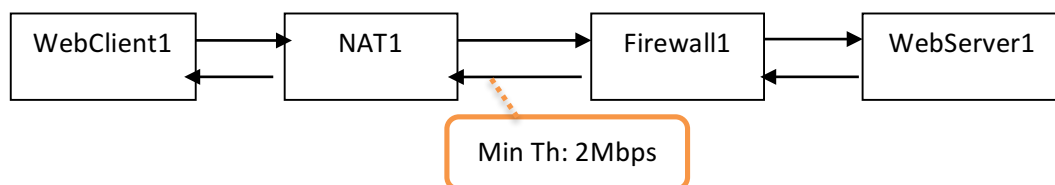
The IN Concept

An Infrastructure Network (IN) is a collection of interconnected infrastructure hosts, each one capable of hosting Virtual Network Functions (VNFs). A VNFs can be a network function, a client or a server.
Each infrastructure host is characterized by its name, which uniquely identifies the host in the infrastructure, the maximum number of VNFs that can be allocated to it, and the amount of memory (expressed in Megabytes) and of disk storage (expressed in Megabytes, too) available in the host.
For an IN, and for each pair of hosts belonging to the IN, it is possible to know the average throughput (expressed in Mbps) and latency (expressed in ms) of the physical channel that connects them.
An NF-FG can be allocated to an IN by allocating each node of the NF-FG onto one host of the IN.