



GIORNATA DI INCONTRO BORSE DI STUDIO GARR "ORIO CARLINI"
MARTEDI' 12 DICEMBRE 2017 - ROMA



TOWARDS REMOTE ACCESS TO VIRTUALIZED TELECOM RESEARCH INFRASTRUCTURES

ABREHA, HAFTAY GEBRESLASIE

Supervisor

PROF. FABRIZIO GRANELLI



UNIVERSITÀ DEGLI STUDI
DI TRENTO



MOTIVATION

- SDN and NFV are emerging technologies
 - transform telecommunication and ICT industries
- During the 1st year project, a proper and secure solutions for virtualized telecom infrastructure within a single SDN/Openflow domain has been implemented and demonstrated





MOTIVATION

- Challenges in multi-domain network
 - An automated management and virtualization infrastructure
 - end-to-end (E2E) quality assurance
- adoption of SDN/OpenFlow multi-domain solutions for 5G to support the use of aggregated resources for research and end-users





OBJECTIVE

- analyze and implement a proper management and virtualization architecture of the
 - multi-domain SDN/openflow for the 5G networks while assuring the E2E connectivities with QoS





ACTIVITIES:

- Static slicing (1st year work):
 - Topology discovery is per slice
 - Inefficient resource usage
 - Not responsive for faults and lowering bandwidth (QoS & QoE)





ACTIVITIES:

- A dynamic and adaptive cognitive network solutions to assure end-to-end connectivity (i.e., slicing)
- dynamic and adaptive cognitive:
 - efficient resource usage
 - use free resource at any slice
 - Intelligent and smart to regain from faults and lowering bandwidth (QoS & QoE)





GIORNATA DI INCONTRO BORSE DI STUDIO GARR "ORIO CARLINI"
MARTEDI' 12 DICEMBRE 2017 - ROMA

ACTIVITIES:

The screenshot displays the Oracle VM VirtualBox Manager interface. On the left, a list of virtual machines is shown, with 'Flowvisor' selected and highlighted in purple. The main area shows the configuration for 'Flowvisor', which is running. The configuration is organized into several sections:

- General:** Name: Flowvisor, Operating System: Ubuntu (64-bit)
- System:** Base Memory: 2048 MB, Boot Order: Floppy, CD/DVD, Hard Disk, Acceleration: VT-x/AMD-V, Nested Paging
- Display:** Video Memory: 32 MB, Remote Desktop Server: Disabled, Video Capture: Disabled
- Storage:** Controller: IDE Controller, IDE Secondary Master: [CD/DVD] Empty, Controller: SATA, SATA Port 0: ETH Tutorial-disk1.vmdk (Normal, 8.00 GB)
- Audio:** Disabled
- Network:** Adapter 1: Intel PRO/1000 MT Desktop (NAT), Adapter 2: Intel PRO/1000 MT Desktop (Host-only Adapter, 'vboxnet0')
- USB:** Device Filters: 0 (0 active)
- Shared folders:** None
- Description:** None



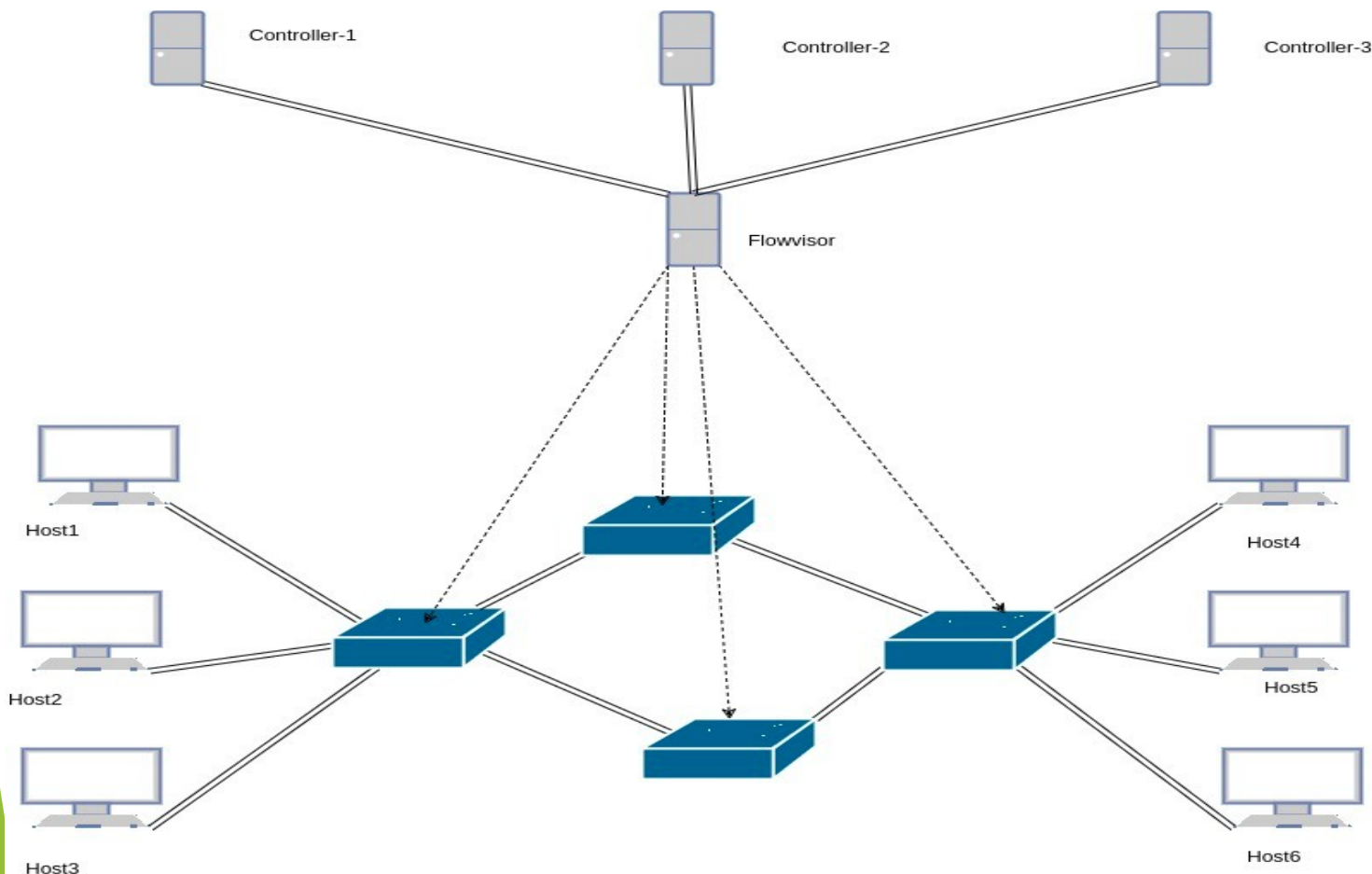
UNIVERSITÀ DEGLI STUDI
DI TRENTO



7

Nome Cognome

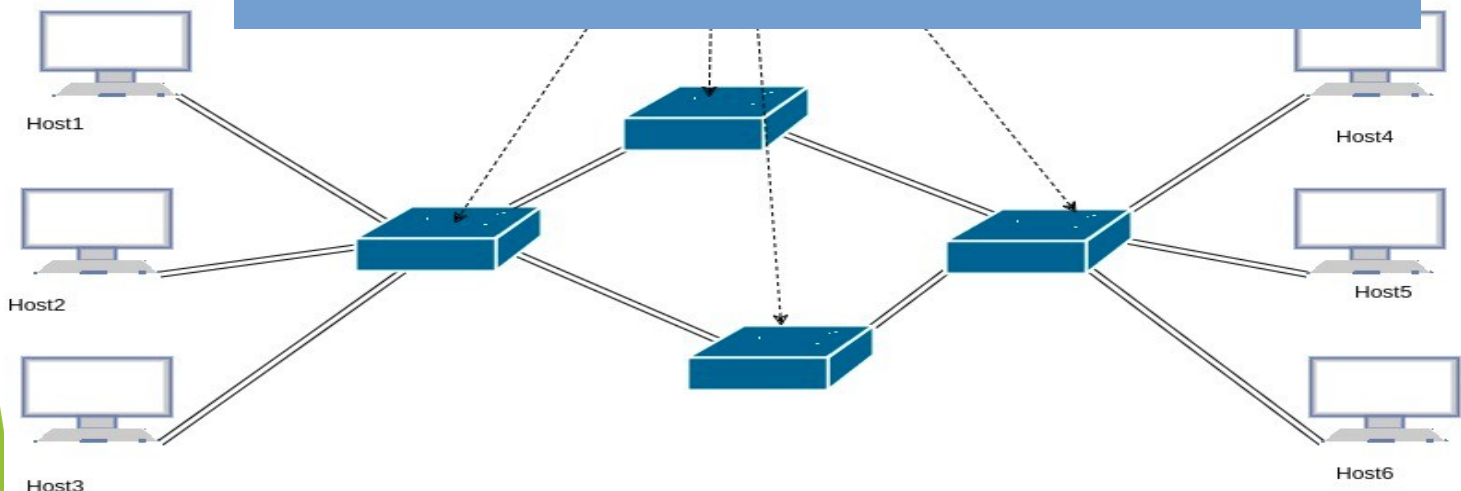
ACTIVITIES:



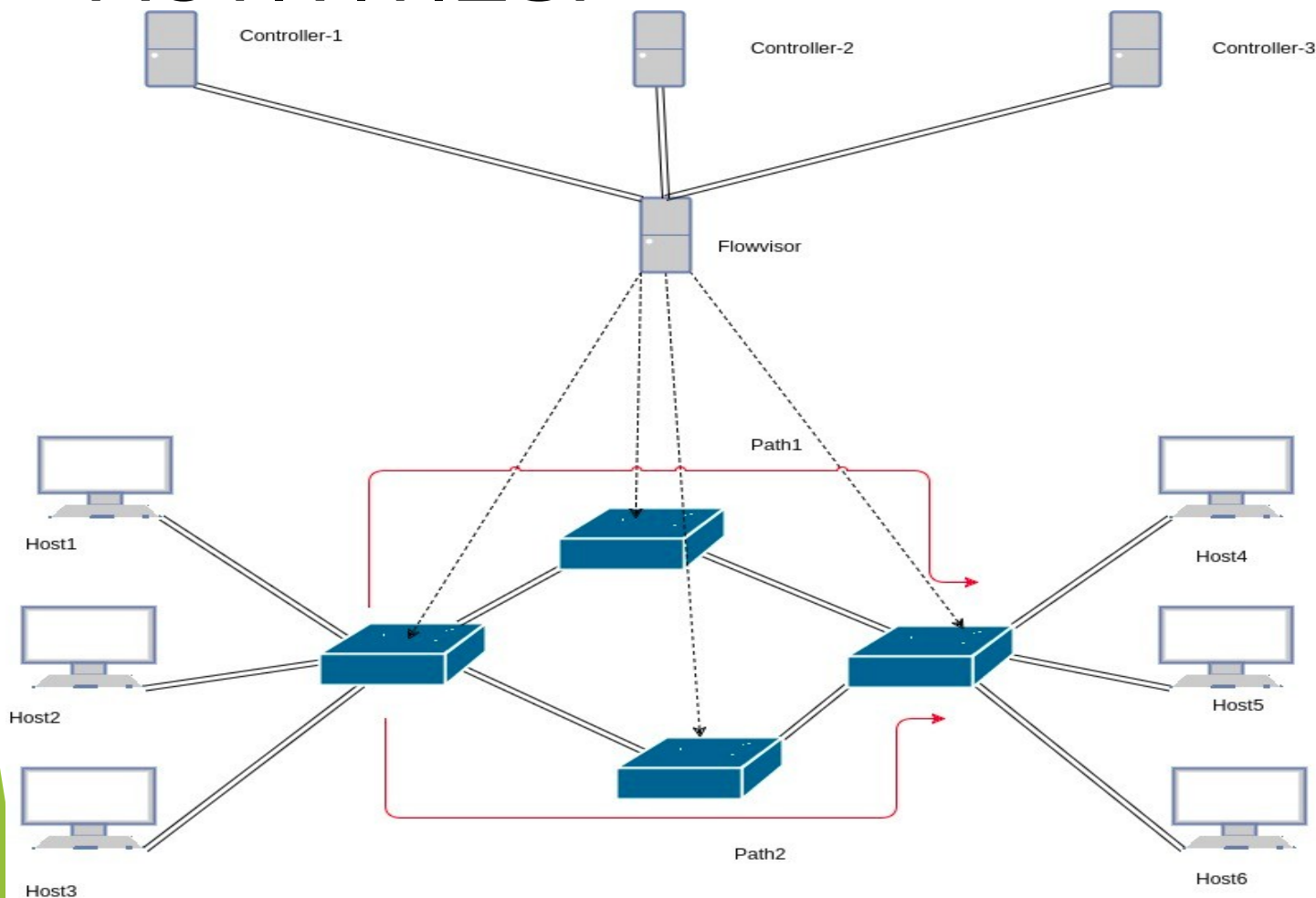
ACTIVITIES:



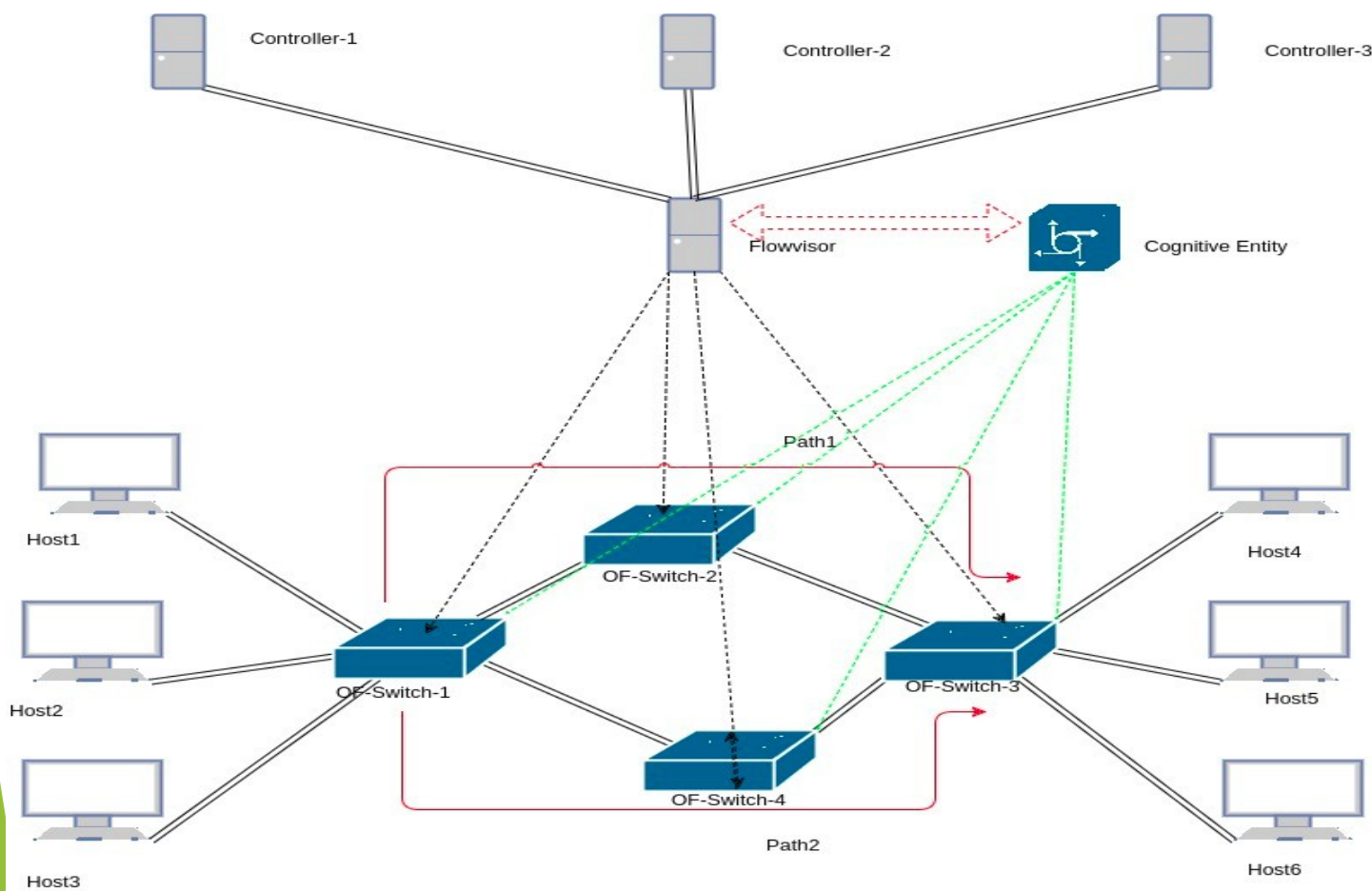
Slice Name	Hosts included	Hosts included	Assigned Controller
research1	10.0.0.1	10.0.0.4	192.168.51.111
research2	10.0.0.2	10.0.0.5	192.168.51.112
research3	10.0.0.3	10.0.0.6	192.168.51.116



ACTIVITIES:



ACTIVITIES:





ACTIVITIES:

- Cognitive Entity:
 - Accepts an E2E bandwidth from the data-plane periodically(Ex. 30sec)
 - Analyzes the required QoS in each slice
 - Sends command to the flowvisor to create flowspace on an appropriate slices when $BW < \text{threshold } BW$



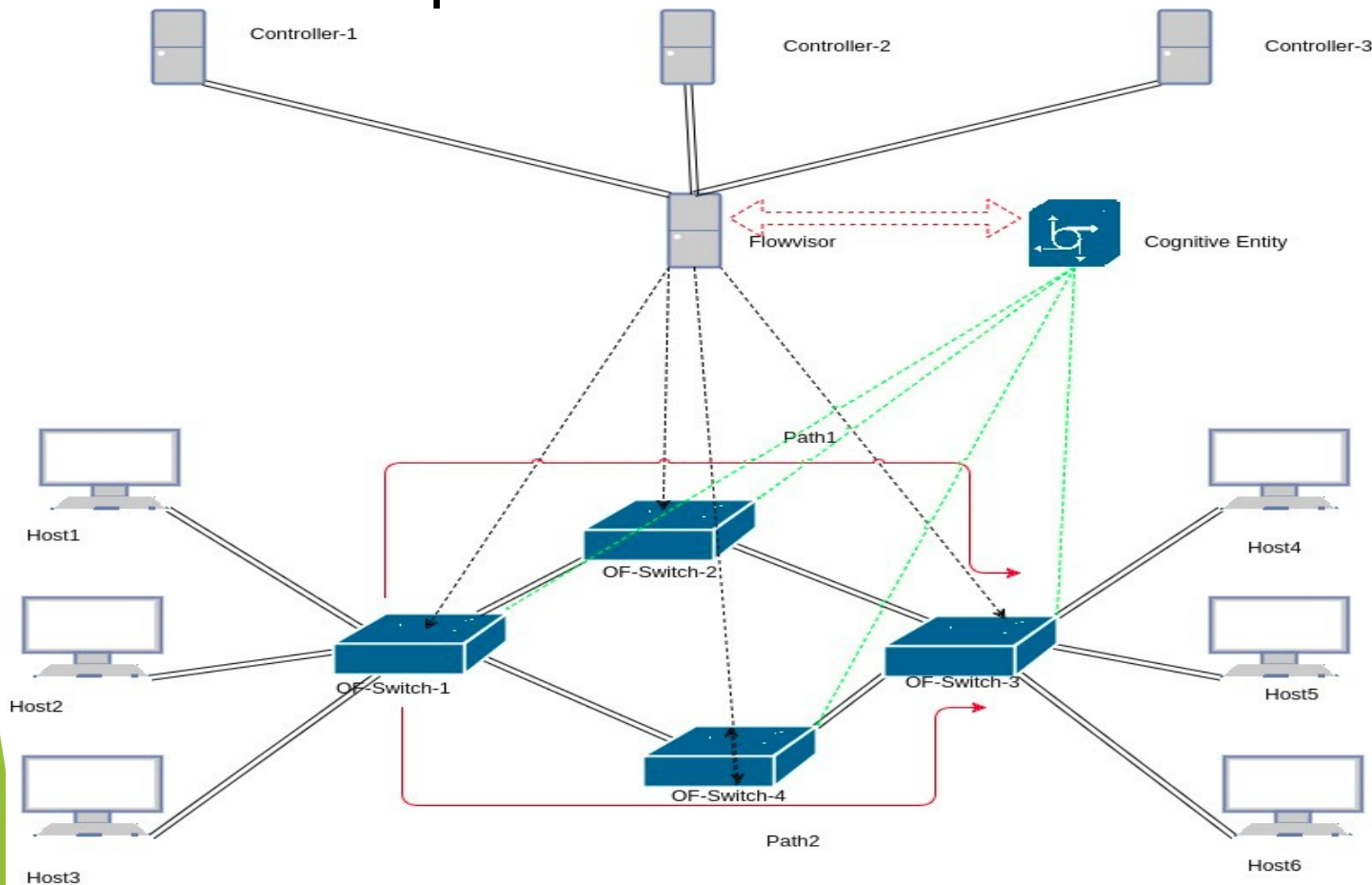


ACTIVITIES:

- Flowvisor:
 - communication with Cognitive entity(H)
 - communication with the switches (V)
- threshold BW = 10Mbps for slice research1

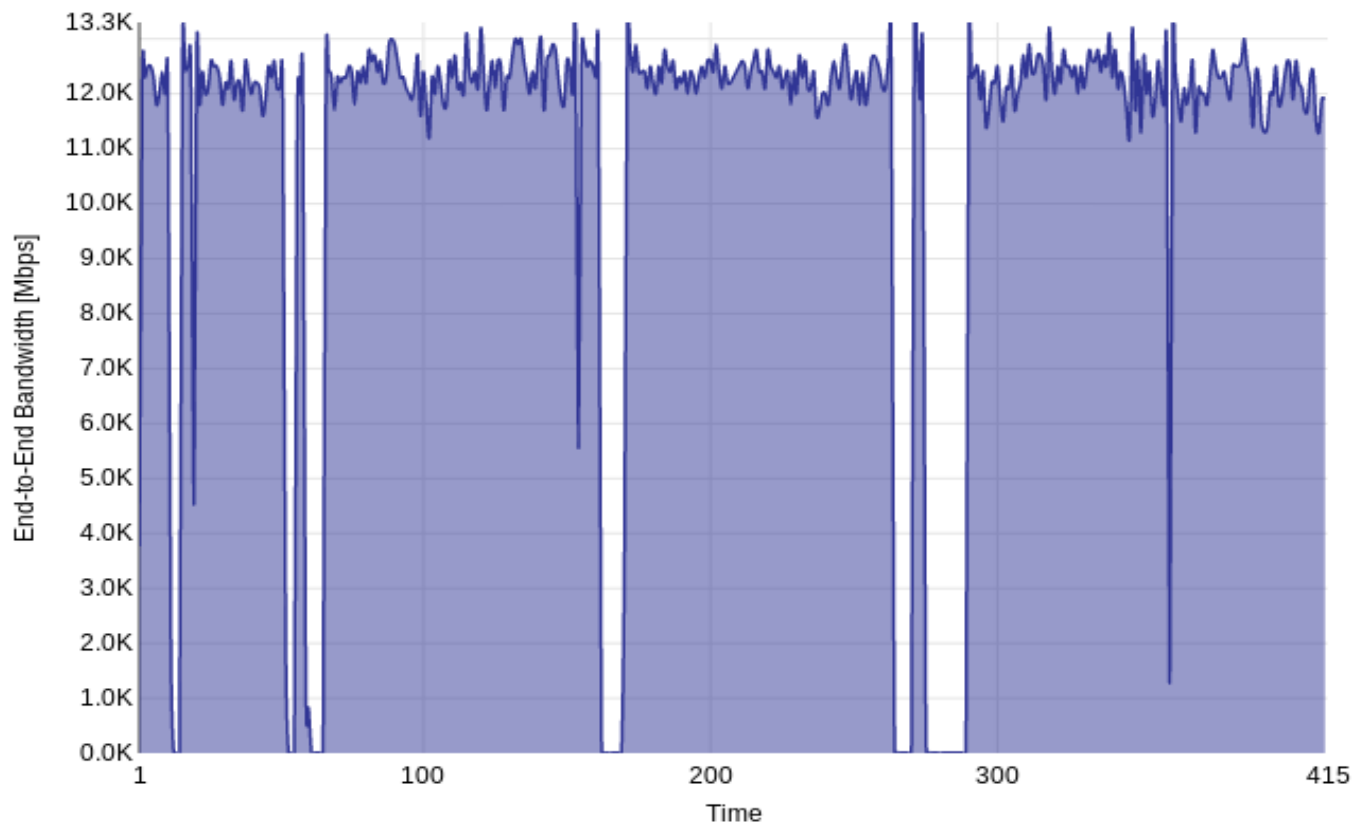


RESULT: Every 10m fault occurrence/
BW = 5Mbps



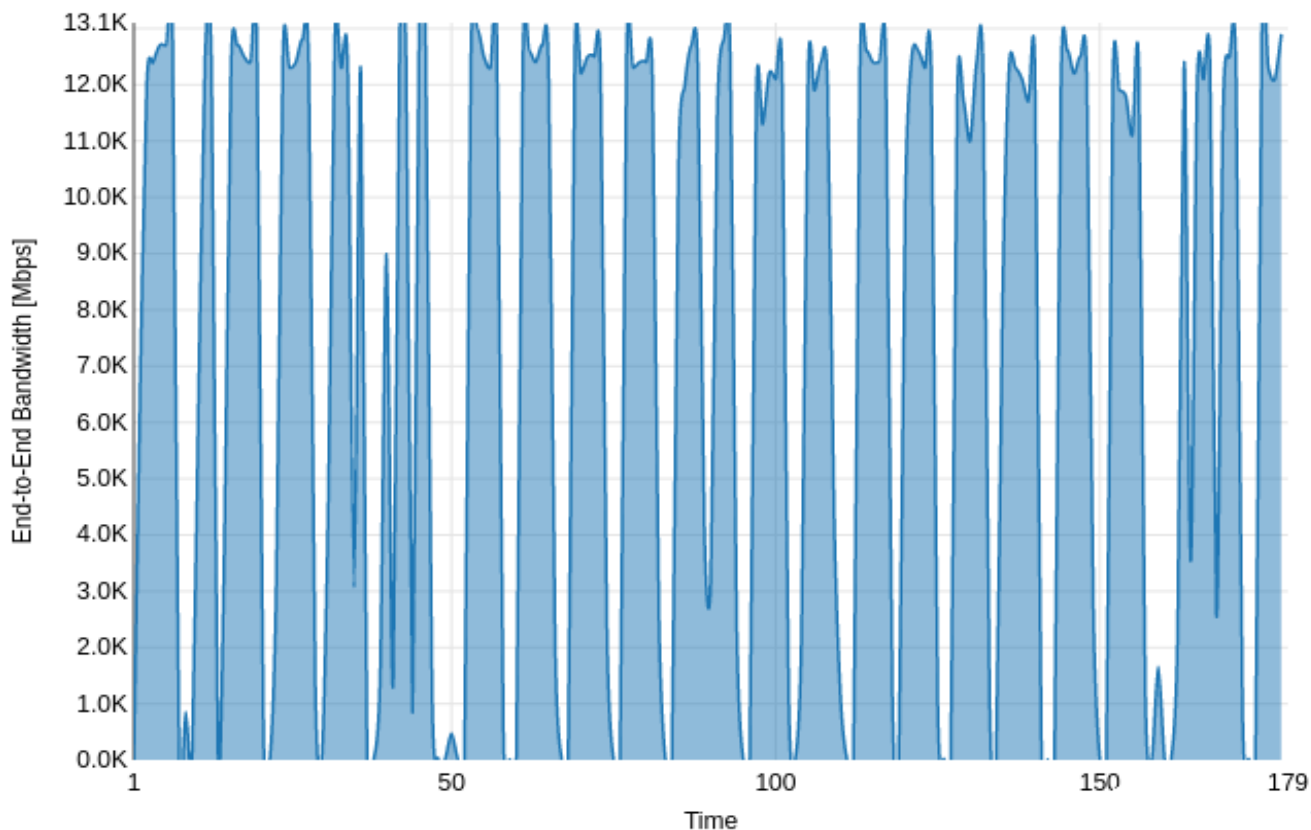
RESULT: Every 10m fault occurrence/ BW = 5Mbps

End-to-End Bandwidth in the first slice



RESULT: Every 1m fault occurrence/ BW = 5Mbps

End-to-End Bandwidth in the first slice



CONCLUSION AND FUTURE WORK

- three slices are created and the system performance is evaluated periodically with the developed cognitive entity
- flowvisor able to create and configure flowspaces automatically based the information obtained from a cognitive entity to keep the QoS and QoE on expected level

CONCLUSION AND FUTURE WORK

- flowvisor resolution: resolve any faults with in an interval not less than 30 seconds
- adaptive and dynamic cognitive algorithms for slicing multi- domain openflow/SDN is underway
- Future works:
 - Integrating the Adaptive and Dynamic cognitive solutions for 5G C-RAN



GIORNATA DI INCONTRO BORSE DI STUDIO GARR "ORIO CARLINI"
MARTEDI' 12 DICEMBRE 2017 - ROMA

Thank you



UNIVERSITÀ DEGLI STUDI
DI TRENTO



19

Nome Cognome