

# MAP-I PhD Proposal

## Realizing Information-Centric Networks inspired by Software Defined Networks

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### *Overview*

In recent years, new architectures for the Future Internet (FI) are being proposed as an evolutive way to provide better answers to current and future Internet utilization requirements. Information Centric Networking (ICN) is one such proposed architecture, focused on content access and delivery, improving over current host-to-host communications. However, this architectural concept is still based on static architectural structures, disregarding any provider-dependent dynamic control in these networks, as allowed in another novel paradigm, Software Defined Networks (SDNs).

This thesis aims at developing an ICN-driven framework that overcomes the static limitations of this architecture, in order to provide a more flexible and powerful framework for Future Internet deployments. The work to be addressed requires the study, identification and development of new mechanisms and algorithms that enhance ICNs with dynamic configuration aspects, addressing integration and implementation aspects of SDN -like architectures.

### *Objectives*

The deployment of clean-slate proposals naturally imposes a bigger investment by the network operators when compared with incremental proposals. Therefore, they have become hesitant to migrate to new architectures, unproved in real life. To increase network operator support in integrating new Internet architecture mechanisms, new solutions must be able to be incrementally deployed and, at the same time, compatible with the current IP networks. ICN has been conceived as a very promising solution. Moreover, an integration of ICN with SDN in a single framework will also enable researchers to test new protocols and architectures in real conditions over production networks, simplifying the validation of future evolutions, reducing the gap between research and deployment solutions.

This thesis will consider several paradigms for Future Internet, in particular it will explore ICN solutions, such as CCN, as clean-slate Internet designs, and SDN solutions, such as OpenFlow, as an incremental approach to enhance the current Internet. This PhD thesis has the objective of contributing to Future Internet network architectures by researching and providing a holistic framework able to realize ICN by resorting to SDN mechanisms, allowing the exploitation of cooperating functionalities of each paradigm. It aims to provide a bridge between the evolutions of novel clean-slate/disruptive Internet architectures and the evolution of incremental architectures.

The framework to be developed will be based on existing open-source ICN and SDN solutions, and will be evaluated to prove its feasibility and to identify the realizability benefits such a holistic approach can bring. Of particular interest will be mobile video, an area where multicast and mobility need to be seamlessly supported. This requires seamlessly interactions with different access network technologies and more complex kinds of content dissemination. The approach should lead to flexible middleware solutions adapting the configuration of ICN to support efficient mobility across different access networks of different technologies.

Moreover, the thesis will need to define mechanisms and algorithms enabling the dynamic configuration of such holistic networks, allowing the network to adapt to a multiplicity of video traffic. The network nodes should be able to recognize and apply intelligent behavior to the packets depending on their contents, optimizing the performance for having the content reaching the users.

To support this the work will have to develop measures for quantification of the overall dynamic control and content access performance, providing comparative mechanisms across different technical solutions. A further objective is to consolidate the framework prototype and to identify new improvement and possible evolutions.

### ***To probe further***

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