ICN-OMF : A Control, Management Framework for Information-Centric Network Testbed

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Introduction

Information-Centric Network (ICN)
- Retrieving the data by the information-centric way to achieve efficient and reliable distribution of content

Problem Definition
- To evolve the network, the concept of the ICN is useful because of today's distribution of contents. There is an application implementing CCN properties(CCNx) to test the operation of CCN, but only with it, we need to build the CCN network manually
- There are many testbeds following OMF throughout the world, such as NICTA and WINLAB
- So, the automatic and scable CCN testbed can be made

ICN-OMF
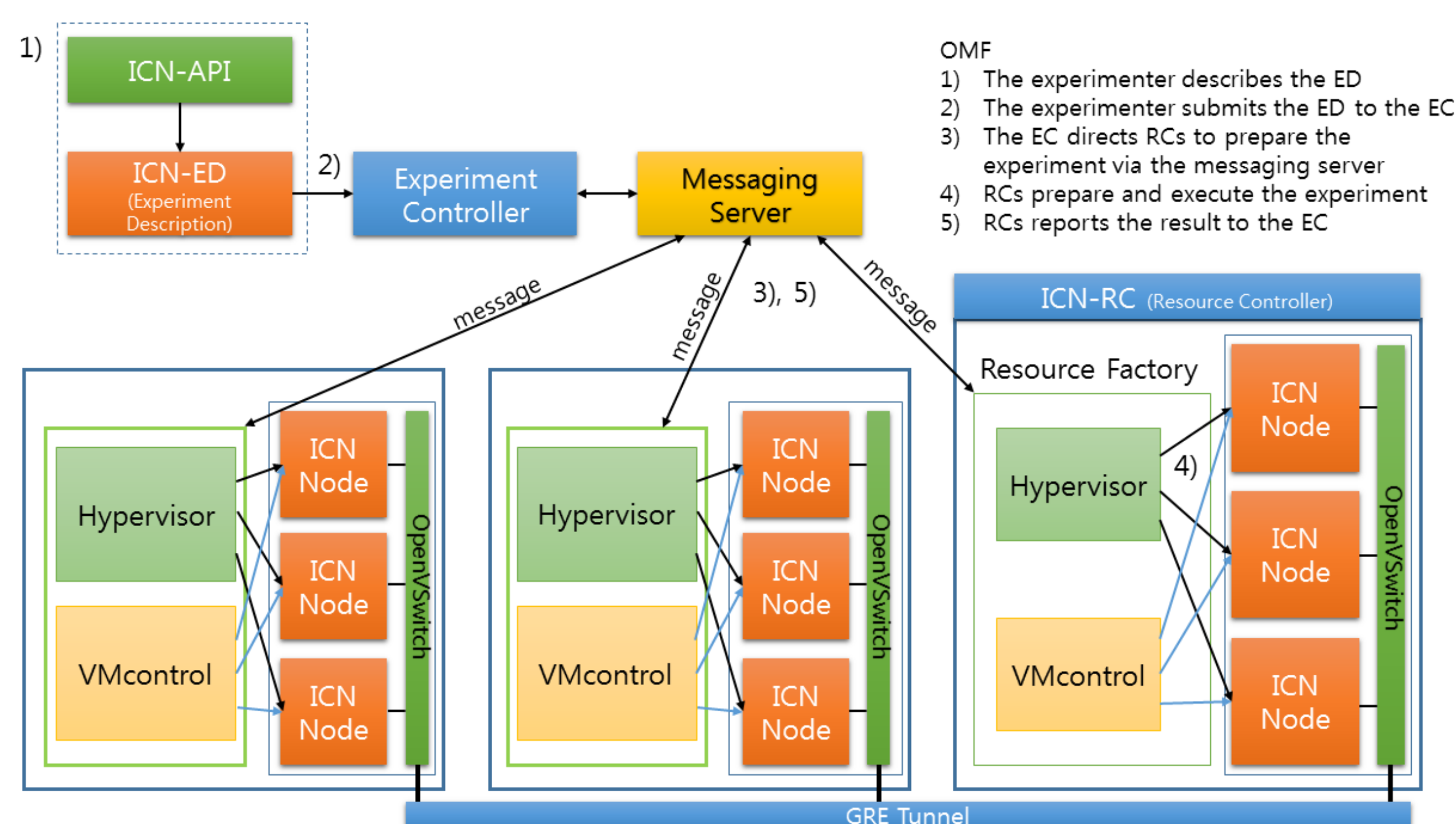A Control, Management Framework for Information-Centric Network Testbed

Design Objective
1) Scability
2) Easy configuration with the high level language
3) Low cost

Methodology
- We extend OMF(A Control, Management, and Measurement Framework) to build a CCN testbed with using CCNx on each nodes in the ICN overlay network made with some virtualization tools
- OMF : A framework to federate heterogeneous network with supplying the unified form of control, management and measurement tools to experimenters
- CCNx : The CCN application implementing CCN properties

Architecture & Scenario

Architecture

OMF
1) The experimenter describes the ED
2) The experimenter submits the ED to the EC
3) The EC directs RCs to prepare the experiment via the messaging server
4) RCs prepare and execute the experiment
5) RCs reports the result to the EC

Scenario
1) The experimenter describes an Experiment Description(ED) with the OMF Experiment Description Language(OEDL) and the ICN-API
2) The experimenter submits the ED to an Experiment Controller(EC)
3) The EC directs ICN-Resource Controllers(RCs) to prepare the experiments via the messaging server
4) ICN-RCs execute the experiments and report to the EC

Implementation

ICN-API
- ccnput : The publisher puts the file into its repository
- ccnget : The subscriber gets the file from the repository
- pingGW : Any node can ping to the gateway

ICN-RC : Deploying an ICN network on top of the generated overlay network
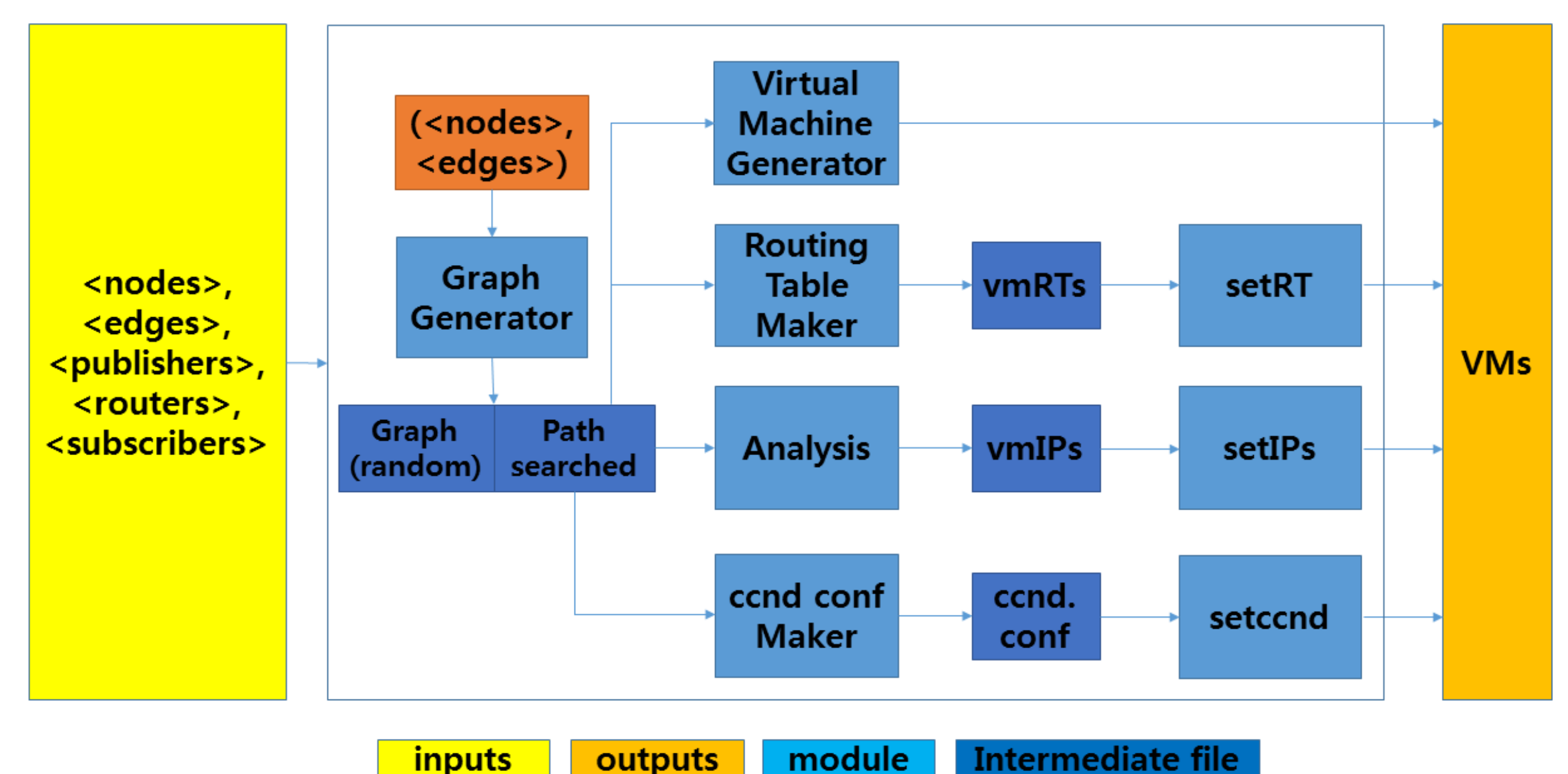
1) RC generates the random topology with the parameters (# of nodes, # of edges) the experimenter directs
2) RC analyzes the graph and generates nodes with virtual machines RC sets the IP address, the routing table, to make the IP network, and the CCN routing table, to make the CCN overlay network, for each nodes
3) RC executes the experiment

Experiment

↑ **Experiment Description**
ED using OEDL with ICN-API

↓**The Result of the Experiment**
- The consumption time when the node pings to the gateway
- The result of the ccnput/ccnget

Conclusion & Future Work

Conclusion
We propose the CCN testbed, as the first approach for developing the CCN network. By using ICN-OMF, we expect the development of the network adapting to the current tendency, the domination of the content distribution

Future Work
- The visualization process with some measurement
- More APIs for the configuration

Acknowledgment