# Sea-Cloud Innovation Environment (SCIE)

## Computer Network Information Center, Chinese Academy of Sciences

China Science & Technology Network

中国科学院
计算机网络信息中心
Computer Network Information Center ,
Chinese Academy of Sciences

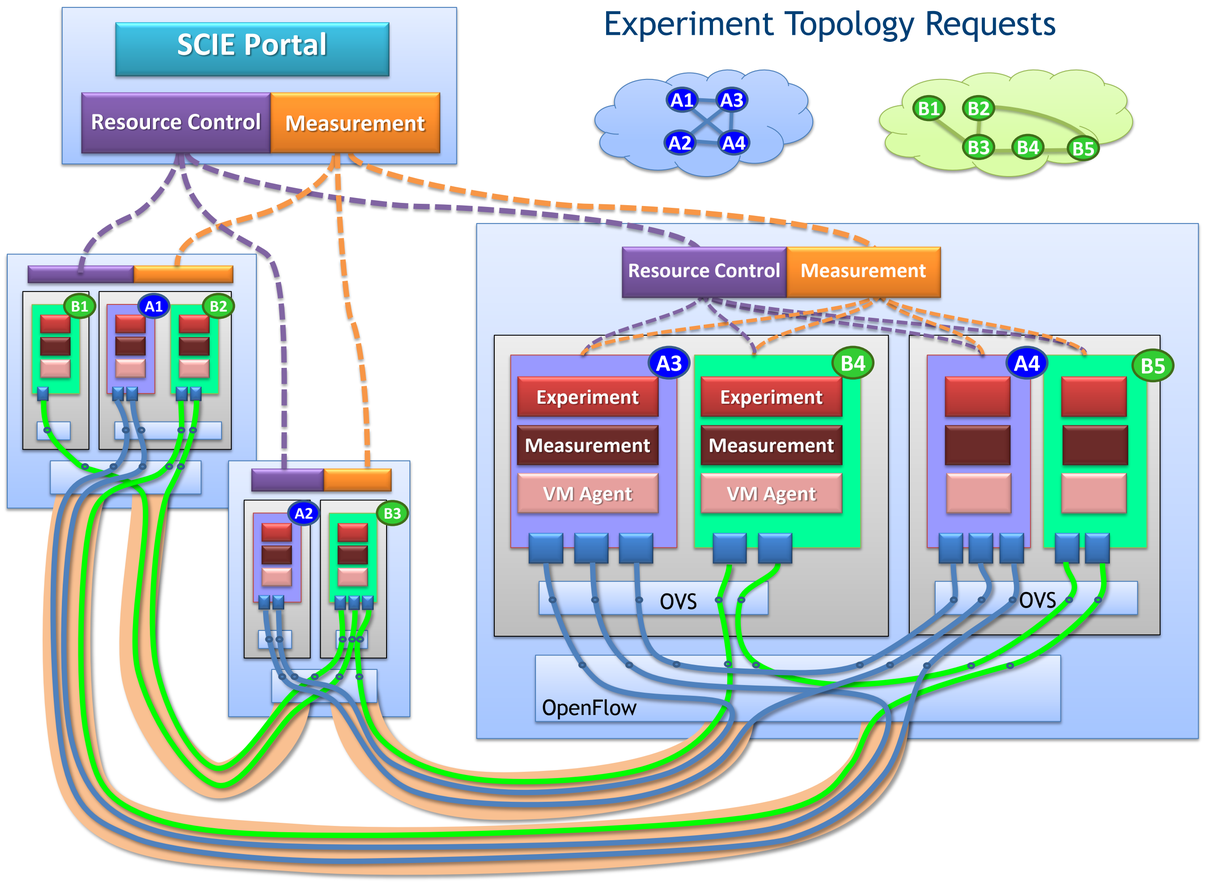
CHINESE ACADEMY OF SCIENCES

## Introduction

Sea-Cloud Innovation Environment, a national wide testbed supported by the “Strategic Priority Research Program - New Information and Communication Technology”(SPRP-NICT) of the Chinese Academy of Sciences, is aiming to build an open, general-purpose, federated and large-scale shared experimental facility to foster the emergence of new ICT.

- Providing shared and sliceable experimental facilities for academia and industry to bridge the gap between visionary research and large-scale experimentation.
- Establishing and practicing the methodology of experimentally -driven innovation for the clean-slate architecture of ICT.
- Evaluating and validating new protocols, devices and research achievements of SPRP-NICT.

## Architecture

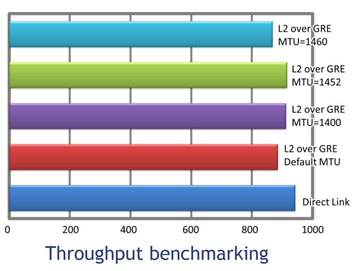



- SCIE portal
- Resource control framework
- Experiment measurement system
- SDN/VLAN-based network slicing

## Device

### Smart-Flow Switch

- OpenFlow 1.2
- GRE tunnel
- QoS supported
- 24*GE & 1*10GE
- Four-slot chassis

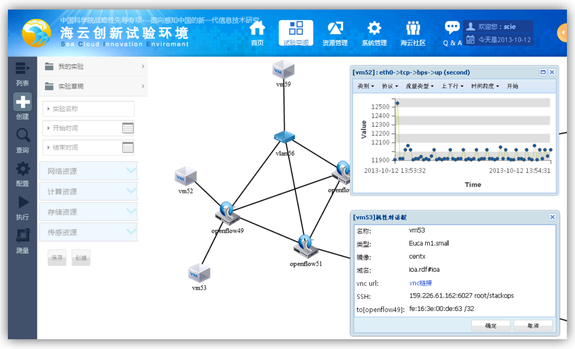



Throughput benchmarking

### SCIE Rack

- Integrated network, computing and storage
- Built-in site management module
- Virtualization and dynamic scheduling

## Software




### SCIE Portal

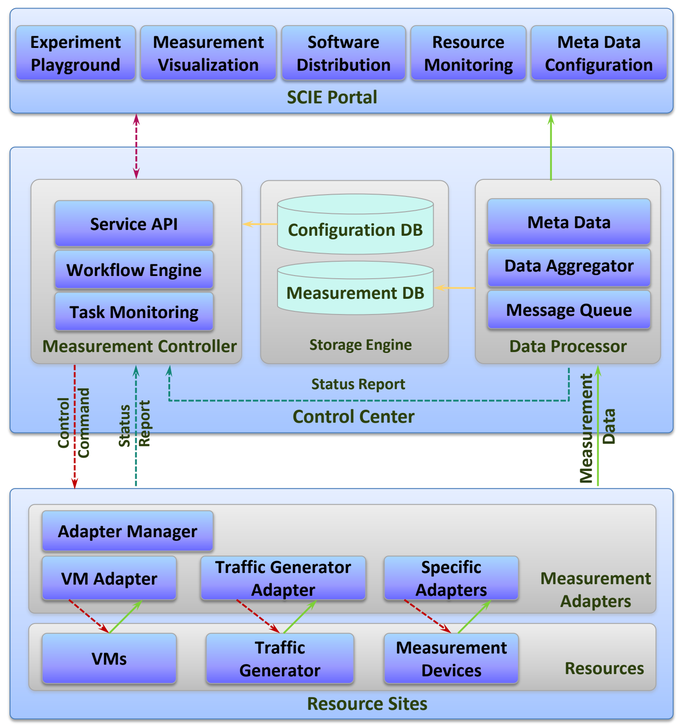
- Experiment life cycle management
- Experiment service
- Topology & measurement visualization
- Experiment playground

### Resource Control Framework

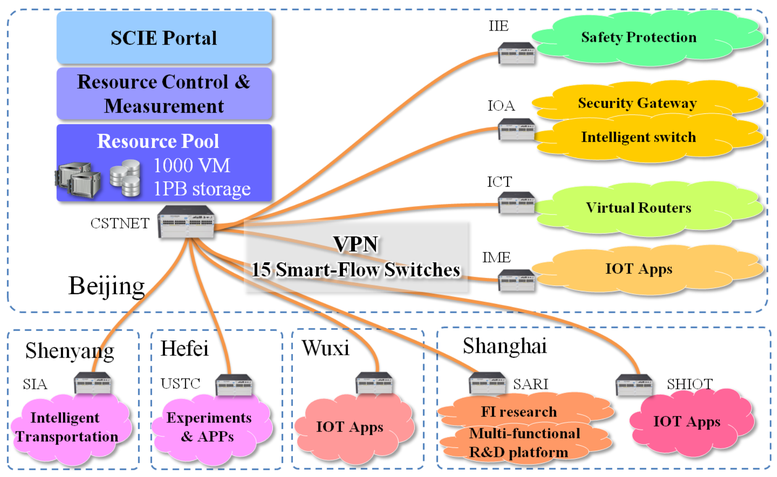
- A branch of ORCA
- Customized XML-RPC controller
- Cross-domain VLAN resource reservation
- VM, storage, VLAN and layer 2 port provision

### Experiment Measurement System

- Measurement controller
- Message-based data processor
- MongoDB as storage engine
- Distributed resource adapters
- Embedded agent & probes




## Deployment



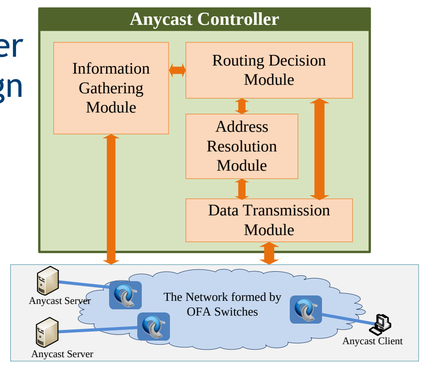

### SCIE Deployment

- Five cities
- 15 sites
- Data plane via GRE tunnel
- Control plane via L3 network

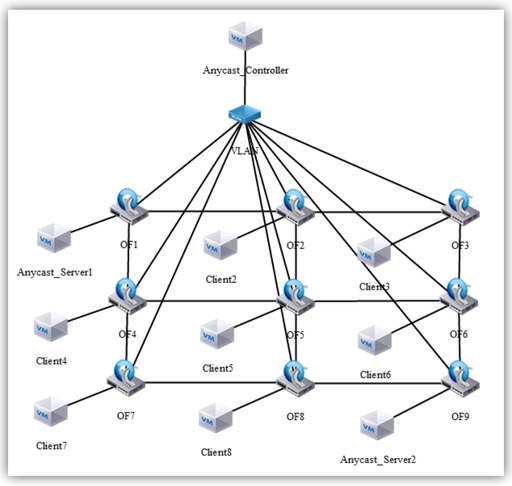
## Experimentation

### Anycast Implementation in OpenFlow Networks

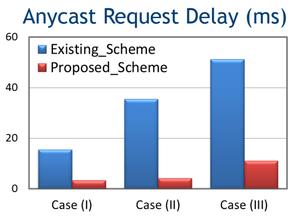
Controller Design



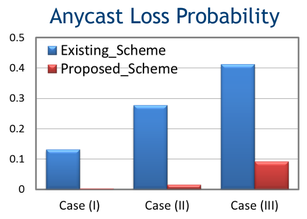

Topology Construction in SCIE




Anycast Request Delay (ms)




Anycast Loss Probability




The performance of developed anycasting scheme outperforms that of existing solutions in terms of request delay and loss probability.