

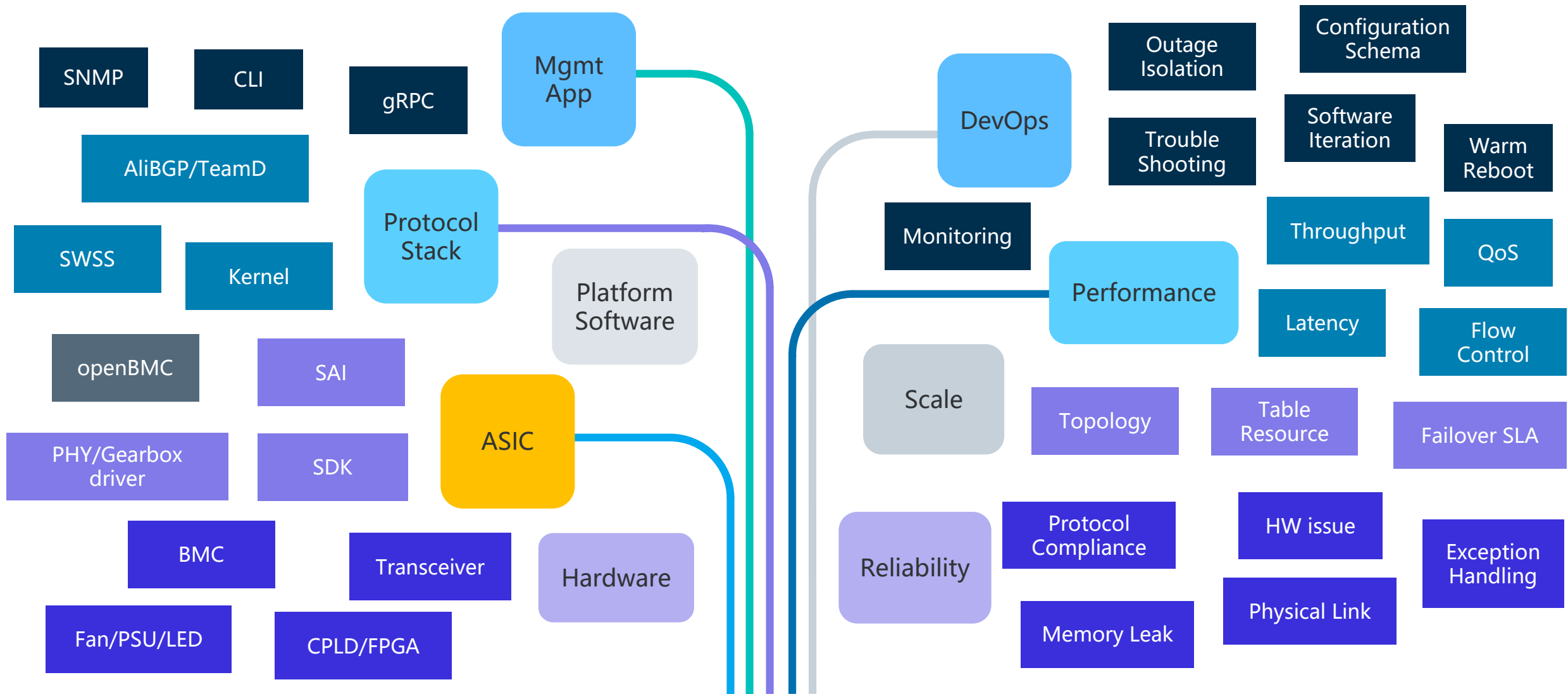
SONiC Data Plane Emulation



Yongfeng Liu

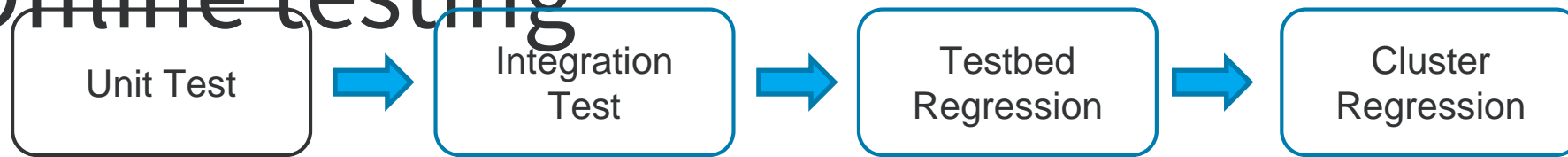
Alibaba

Scope of switch NOS development

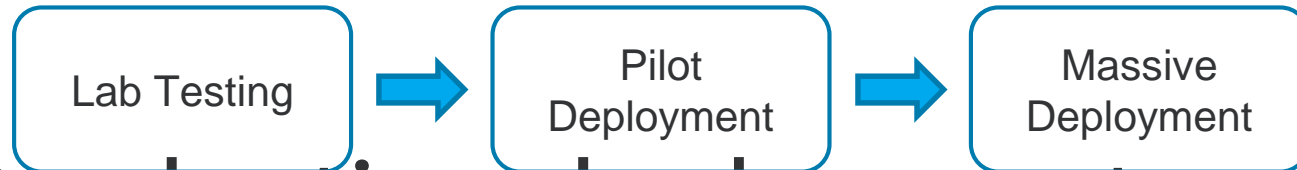


Regular flow for testing and deployment

Offline testing



Software works differently at different scales

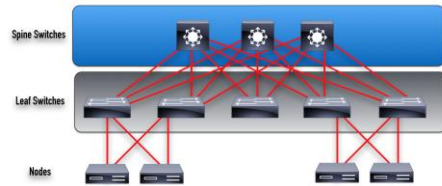


Production deployment

Reduce risk through staged deployment and fast iteration

model:

Realistic production environment based on



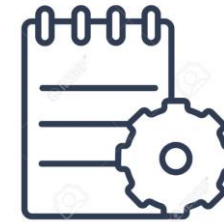
Real
Topology



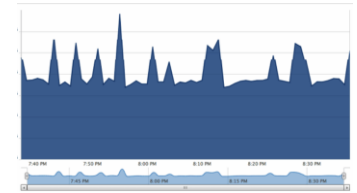
Real
Hardware (ASIC)



Real
Software



Real
Configuration



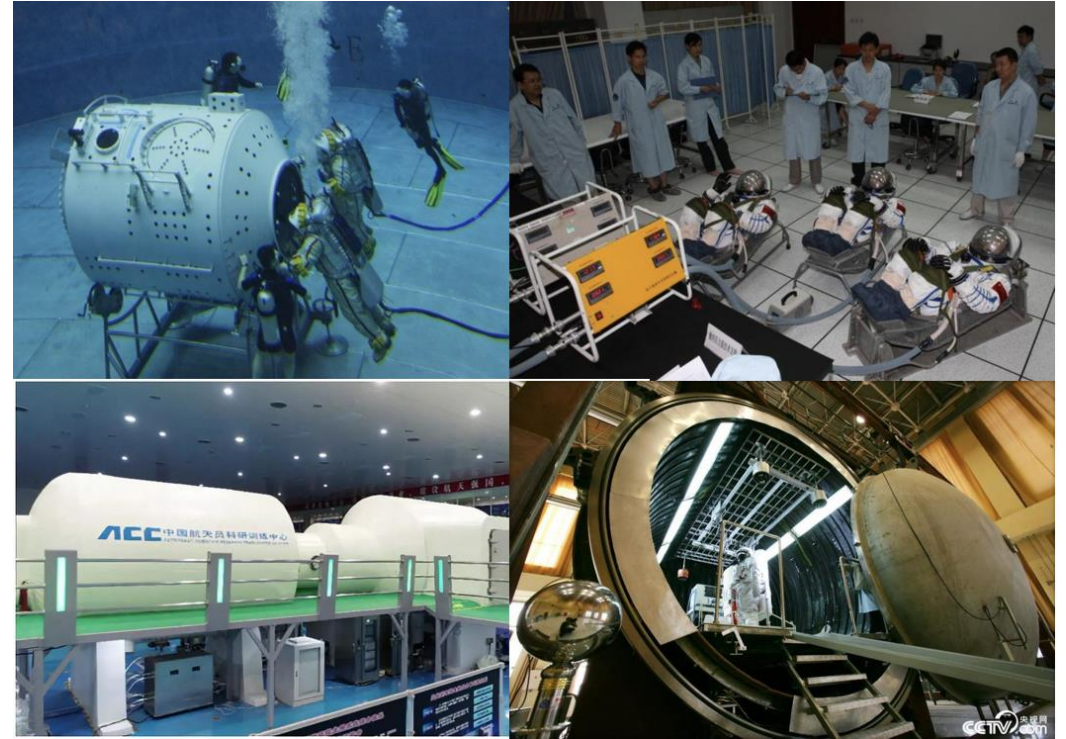
Real
Traffic Model

While, to duplicate production environment is **IMPOSSIBLE** and **NOT NECESSARY**

A good example for reference

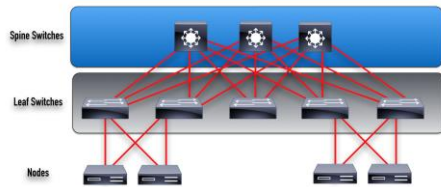


Relies On ...

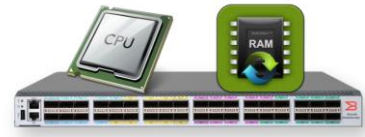


Purposed practical approach

Network device emulator:



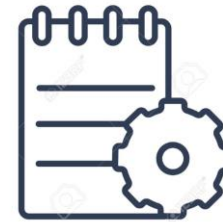
**Virtual
Topology**



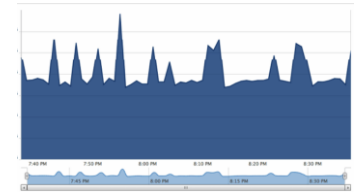
**Virtual HW(ASIC)
+
Software Runtime Env**



**Real
Software**

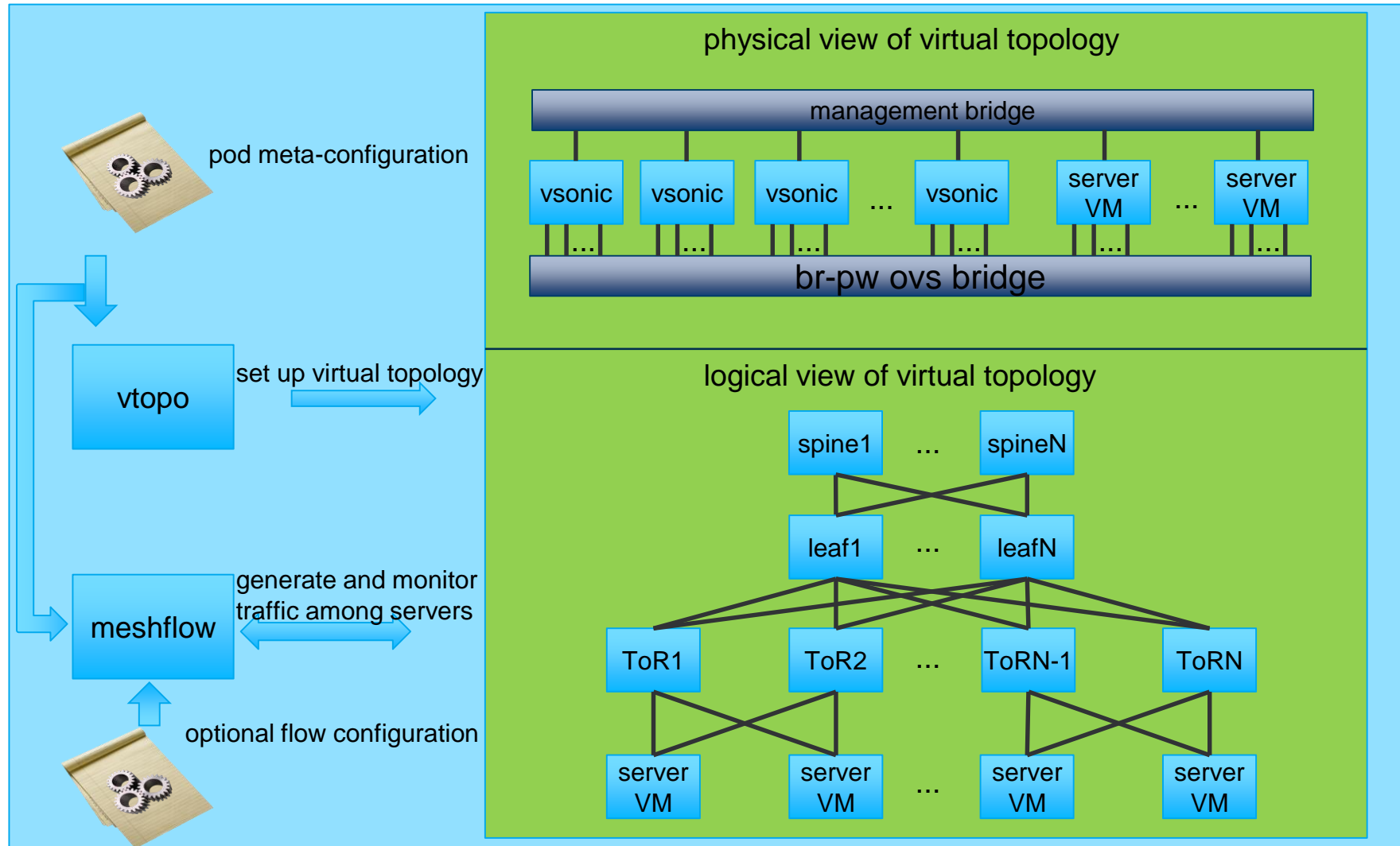


**Real
Configuration**



Simulated Traffic

SONiC Dataplane Emulation Overview



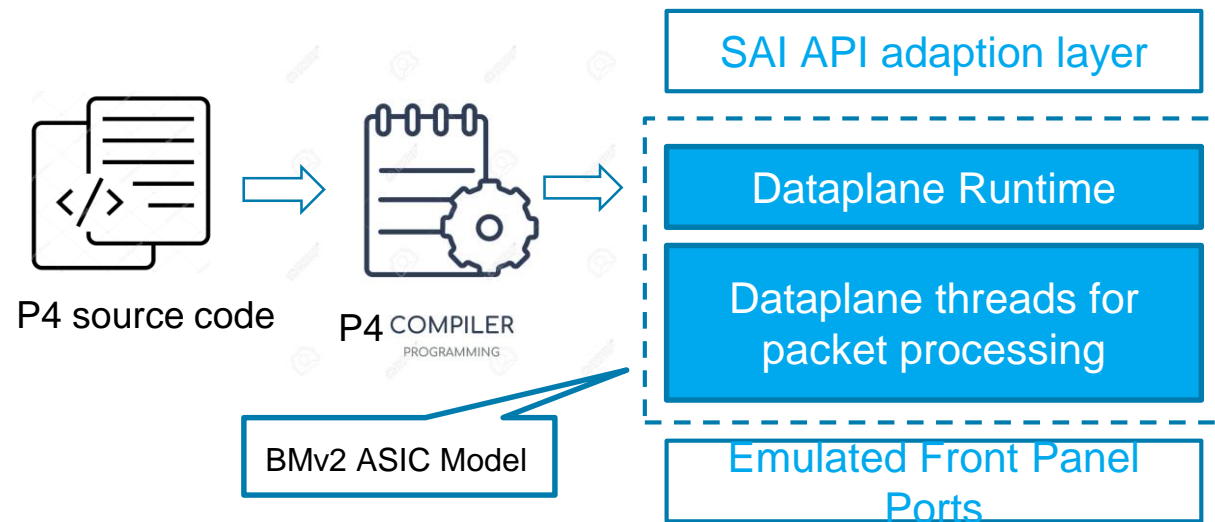
Virtual Topology

vTopo

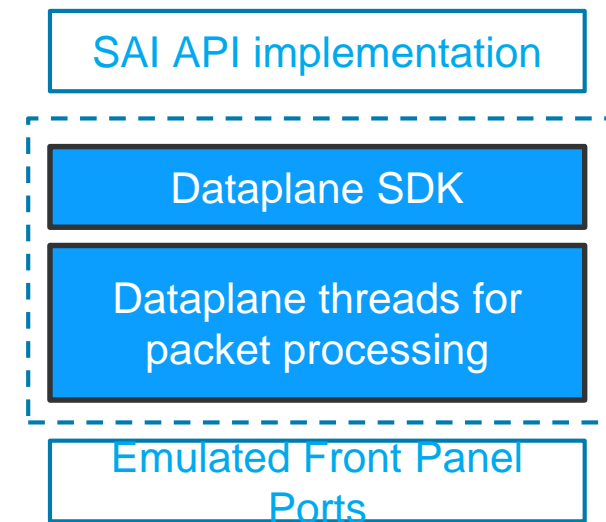
- Topology generation
 - Topology generation based on POD meta-configuration (No. of nodes and base IP address), build connection between instances and apply configurations;
 - Virtual links between vSONiC and vServer is connected through OVS based match-action rules;
- Virtual device lifecycle management
 - parse_config,
 - setup_connection, teardown_connection
 - config_vSONiC
 - start_VM, shutdown_VM, destroy_VM

Virtual Hardware (vASIC)

vASIC – ASIC Behavior Model



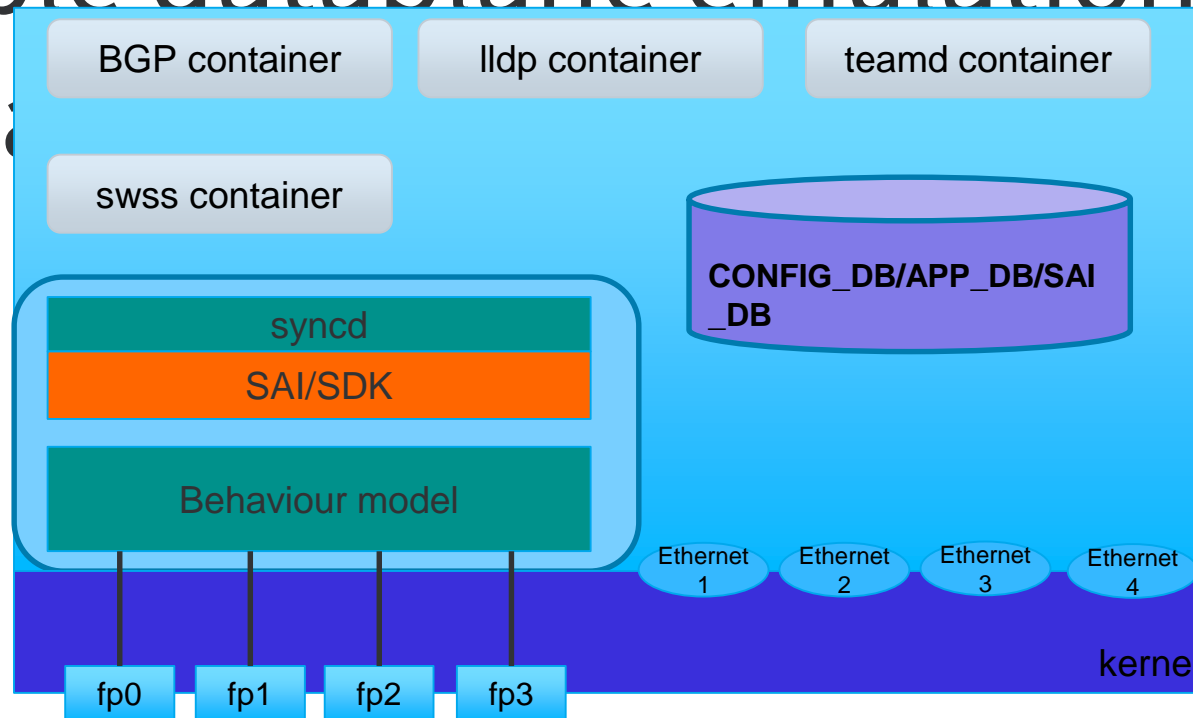
P4 bmv2 based ASIC model



Vendor specific ASIC model like BCMSIM

Virtual Software Runtime Environment

Enable dataplane emulation with SONiC
virtual



Simulated Traffic

Meshflow

Data plane Traffic generator and analyzer;

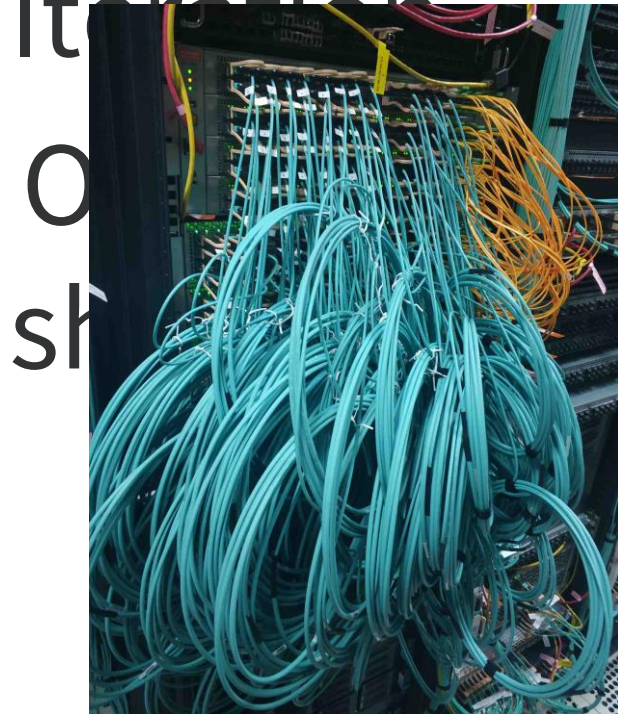
Generation full mesh traffic across all virtual nodes according to POD meta-configuration info;

Statistical info gathering and monitoring;

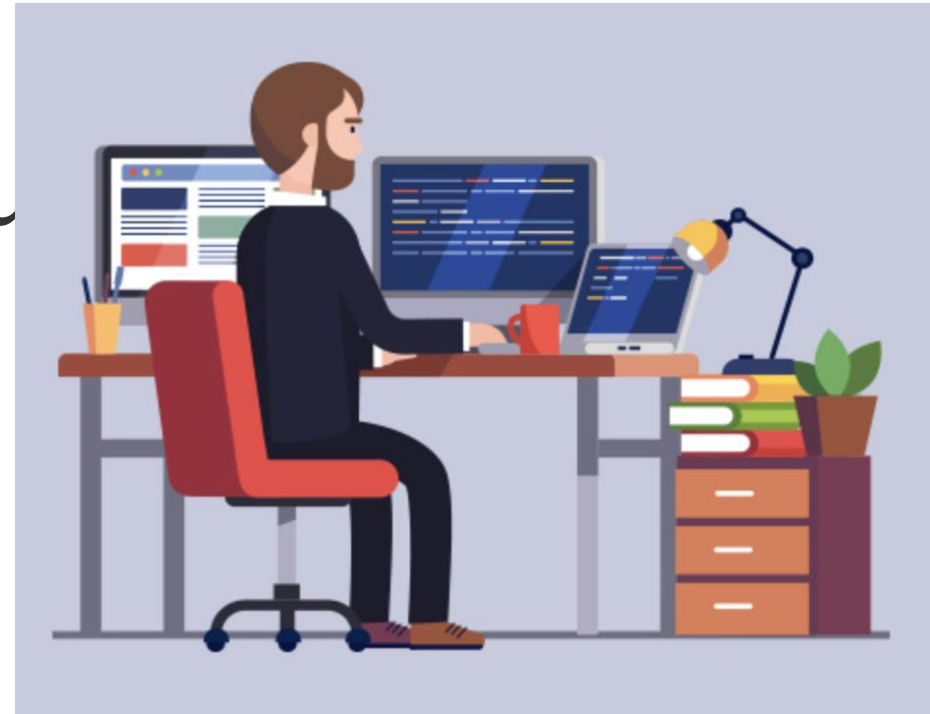
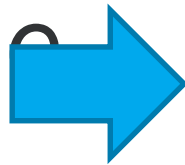
flow						tx_cnt	rx_cnt	drop_rate
6	VM0802=>VM0800	(12.0.0.1	192.1.0.2	17	54183 56525)	30	30	0
3	VM0800=>VM0801	(192.1.0.2	192.1.0.66	17	54183 56525)	30	30	0
4	VM0800=>VM0802	(192.1.0.2	12.0.0.1	17	54183 56525)	30	30	0
5	VM0802=>VM0801	(12.0.0.1	192.1.0.66	17	54183 56525)	30	30	0
1	VM0801=>VM0800	(192.1.0.66	192.1.0.2	17	54183 56525)	30	30	0
2	VM0801=>VM0802	(192.1.0.66	12.0.0.1	17	54183 56525)	30	30	0

Application Scenario I

Daily Development, Testing and
Iteration



reproducing
baseline



Application Scenario II

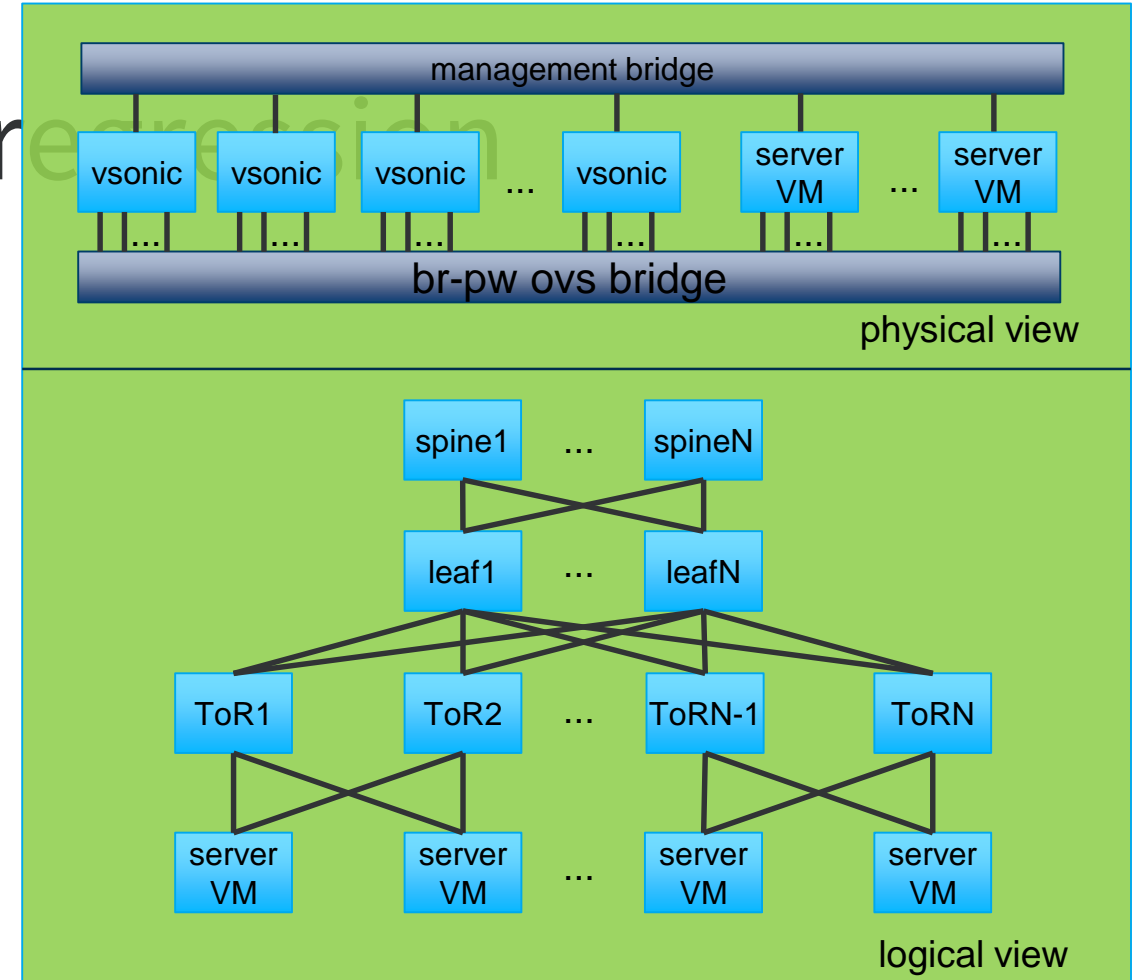
Full image testbed regression



Physical test bed

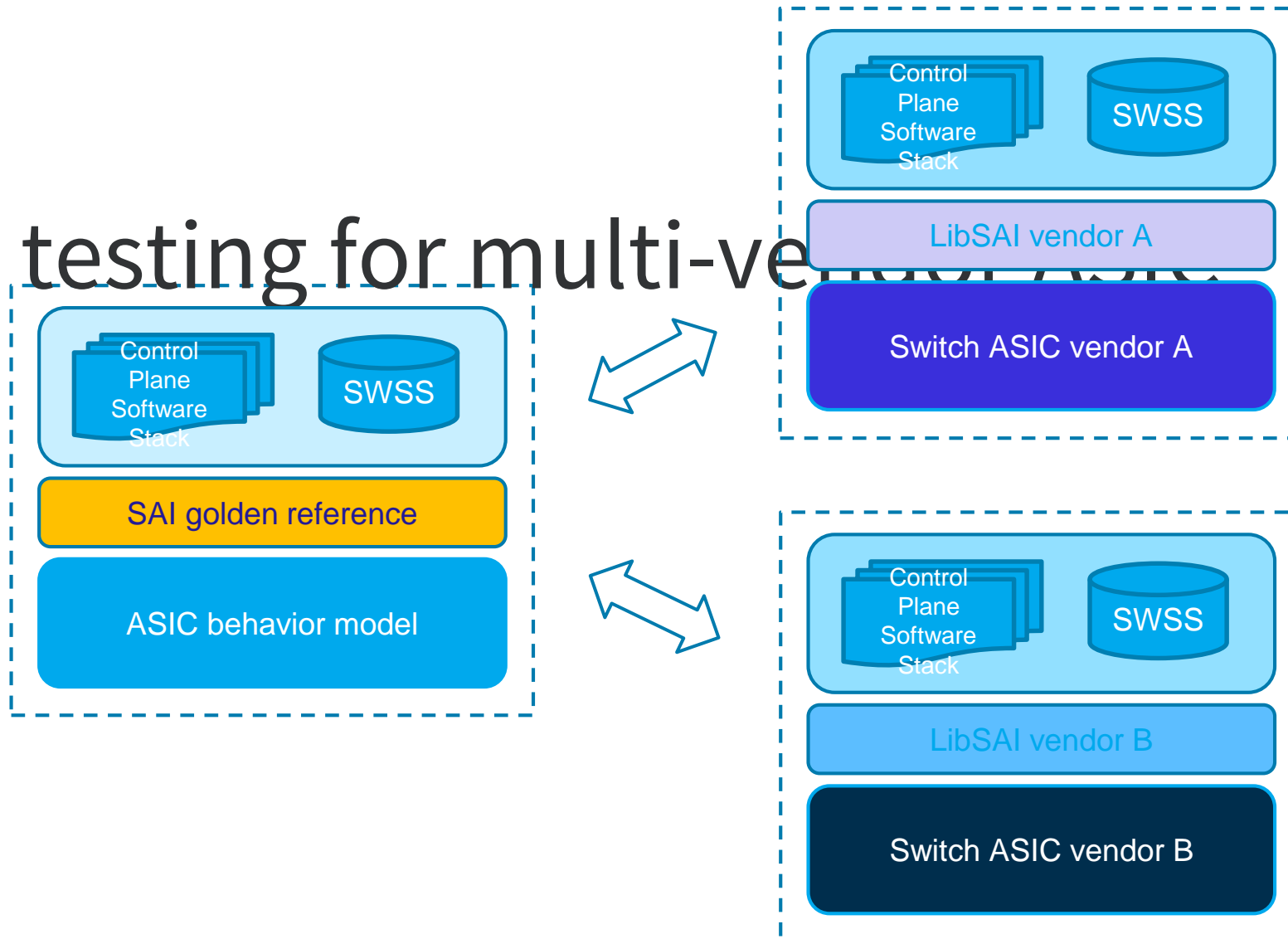


All in one server



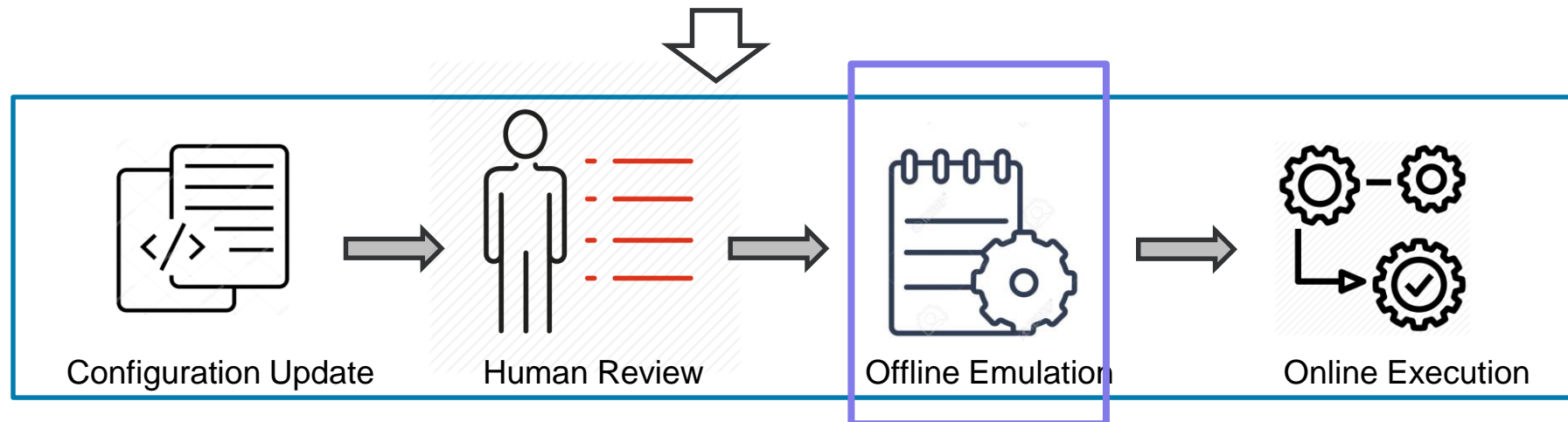
Application Scenario III

SAI testing for multi-vendor



Application Scenario IV

Rehearsal **Configuration Update** and **Image grade** ~~offline~~



Case Study

Online Software Upgrade

