

FiRST@ETRI Virtualized Programmable Platform

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Virtual Network RG meeting @ IETF79

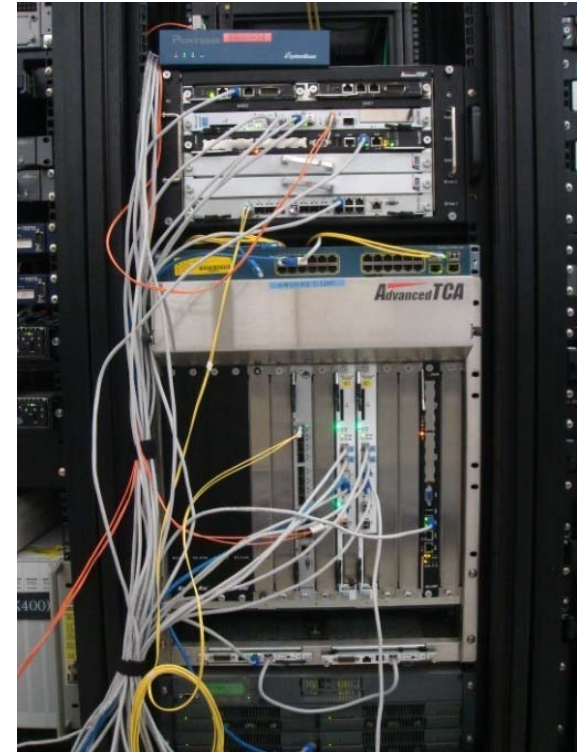
Our problem statement:

Why virtualized programmable platform?

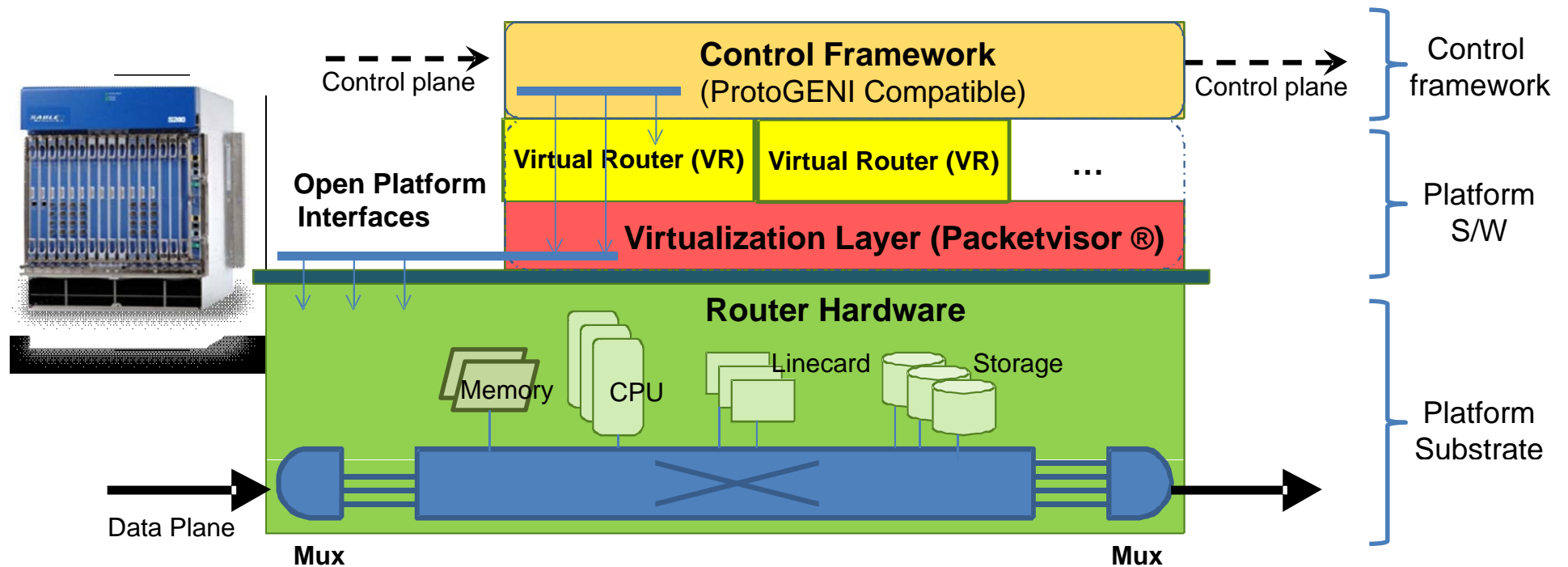
- The current Internet architecture is under serious reconsideration and people started thinking about alternatives
 - Redefining Internet architecture requires many challenges
- It's necessary to support a variety of the new different architectures to accommodate the heterogeneity of future networks
 - A common means should be provided to accommodate the new heterogeneous architecture researches and experiments in a shared infrastructure

What is FiRST@ETRI virtualized programmable platform?

- NP-based hardware platform
 - Virtualized programmable substrate that operate at high speed
- Virtualized programmable routers
 - Researcher-defined “Silver-based Virtual Routers”
- Common platform APIs
 - Programming APIs for researchers
 - Open substrate interfaces
- Capabilities and functions
 - Dynamic end-to-end slice operations
 - Allocate Rspec to sliver and link
 - Provides compatibility with GENI control framework (ProtoGENI)
 - Programmability
 - Allow users to download user’s program to the platform



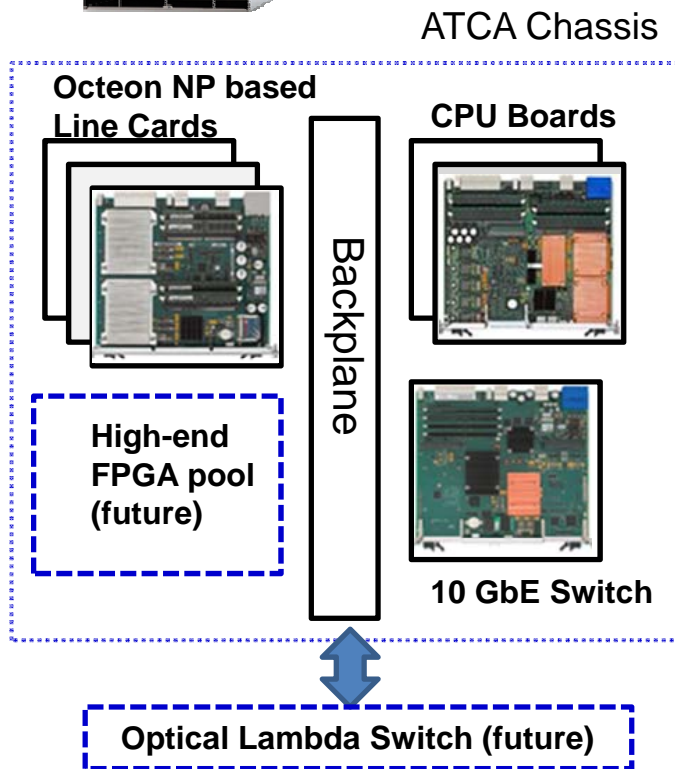
FiRST@ETRI virtualized programmable platform architecture



FiRST@ETRI platform H/W spec.



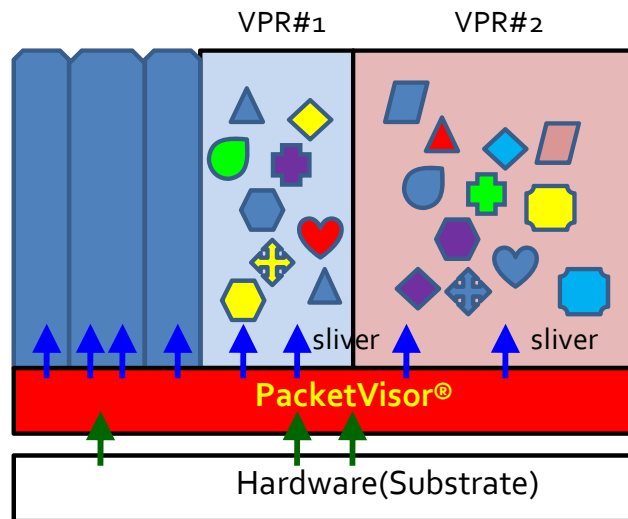
- COTS blades – ATCA
- Octeon Processor



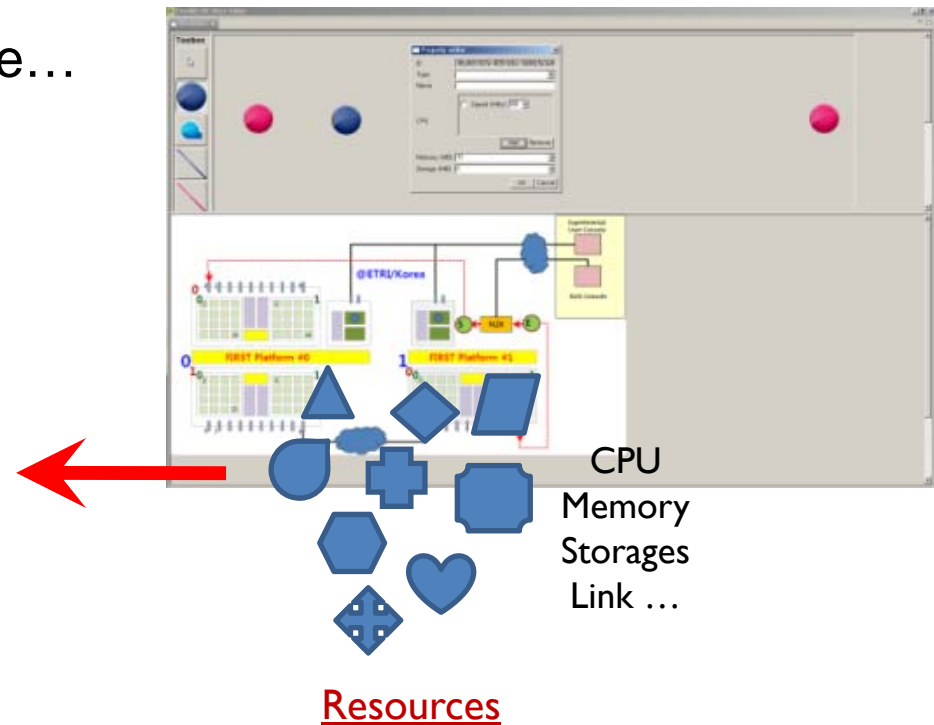
Cards	Specification
Line Card	<ul style="list-style-type: none"> - Dual Octeon NP 5860 - 2x 10GbE, 10x 1GbE
Ethernet-switch Card	<ul style="list-style-type: none"> - 16-slot 10GbE and 100/1000Base-T fabric switch - More than 100Gbps of external connectivity - Non-blocking Layer 2 switching
Processor Card	<ul style="list-style-type: none"> - Intel Xeon dual core - Dual 1GbE Ethernet controller - 2x 10/100/1000Base-T

Researcher-defined “Virtualized Programmable Routers (VPR)”

- Dynamic resource allocation to sliver/link
 - Computing resources
 - CPU, memory, storage...
 - Network resources
 - Bandwidth/Link ...

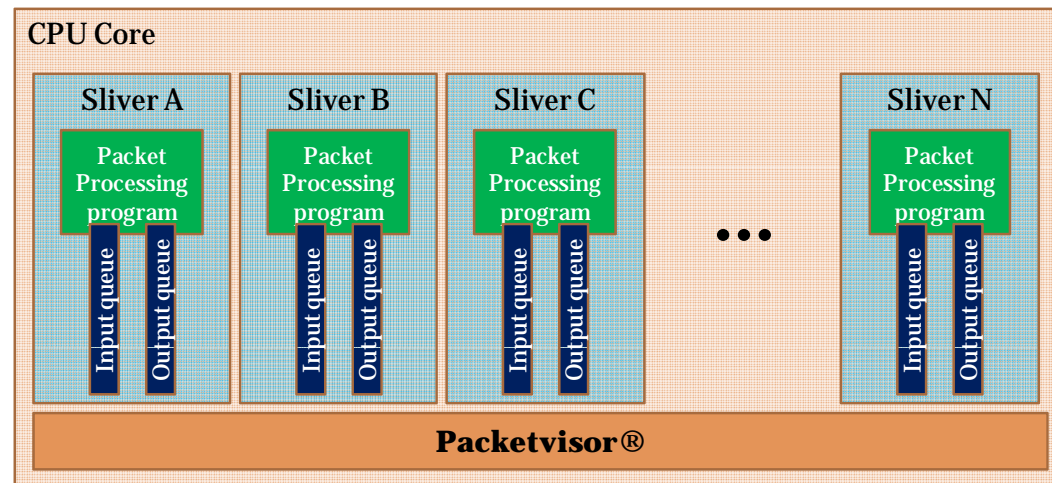


VPR - Virtualized Programmable Router

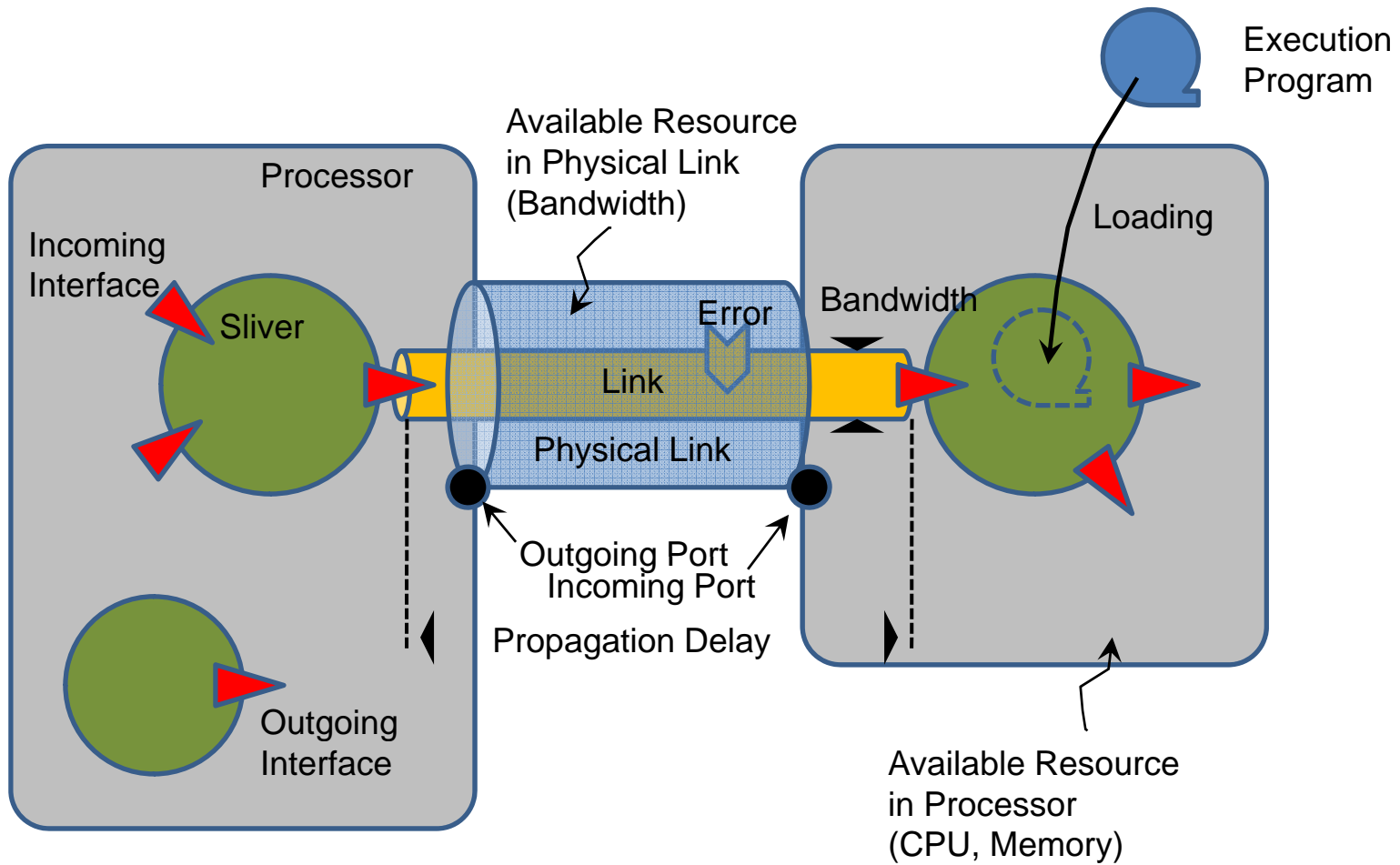


Packetvisor

- (Simple) Packetvisor
 - Load multiple images (experiments) on 1 CPU Core
 - Multiple slivers scheduling
 - **Dynamic CPU resource allocation on slivers**
 - I/O queues virtualization
 - Memory, storage ...
 - Bandwidth/Link



Example of slice (VN) creation



What is VN?

- A network of virtual resources where the resources can be separated from other virtual resources and their capabilities can be dynamically (re)configured.
 - Virtual resource: physical or logical resource and its partition
 - Programmability
 - Aggregation or federation with other VNs

Acid test for VN

- Partitioning: physical resource can be shared among multiple virtual resources
- Isolation: the clear isolation among VNs (control plane, data plane)
- Programmability: dynamic update on the capability of virtual resource
- Federation: federation with multiple virtual resources (VNs)

Open issues

- Support for
 - Federation of multiple VNs
 - Programmability