

Korea Testbed Construction Plan for Future Internet Research and Experiments

Myung-Ki SHIN – ETRI
mkshin@etri.re.kr

July 18 2008

Note Well

- The current Internet architecture is under serious reconsideration and people started thinking about alternatives.
 - Redefining Internet architecture requires many challenged works
- It's necessary to support a variety of the new different architectures to accommodate the heterogeneity of Future Internet.
 - **A common means IS REQUIRED to accommodate the new heterogeneous architecture research and experiments in a shared infrastructure.**

Roadmap

- **Step 1. Private Domain**
 - GENI-compatible, but holding domestic a control center
- **Step 2. Domain Federation**
 - GENI <-> Korea Domain

Korea Testbed Requirements

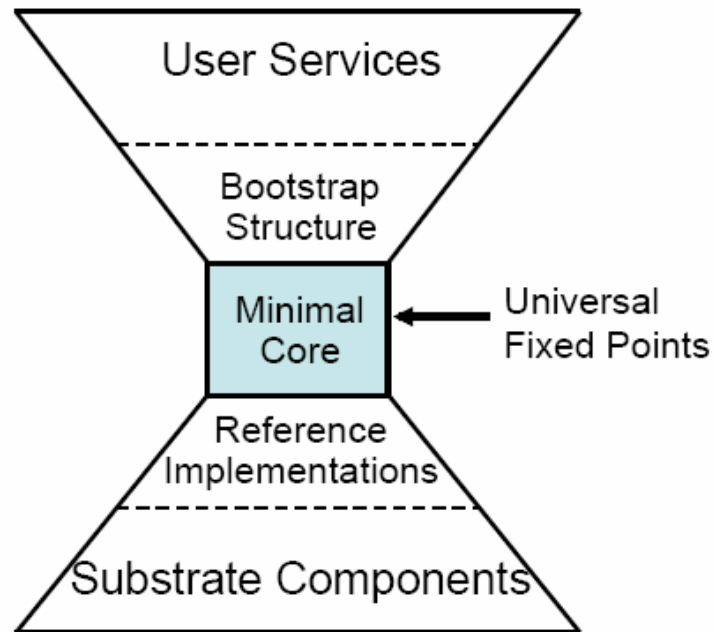
- **Multiple/Heterogeneous/Simultaneous Experiments Support**
- **Scalability (# of experiments)**
- **Threat-Zero**
- **Diverse Wireless Subnet Support**
- **GENI-compatible**
- **Private Domain + Domestic Control Center**
- **Domain Federation**
- **Inter-working with Today's Network (e.g., IPv6, BcN, IP-USN, etc. – ISP Peering)**

Why GENI-Compatible ?

- **Global Environment Support**
- **Global Partnership**
- **Quantum Jump**

- **Strategy-dependent**

GENI-Compatible Means --



- name spaces, registries, etc
 - for key system elements (users, slices, & components)
- set of interfaces
 - ("plug in" new substrate components)
- support for federation
 - ("plug in" new partners)

Why Private Domain (GENI) ?

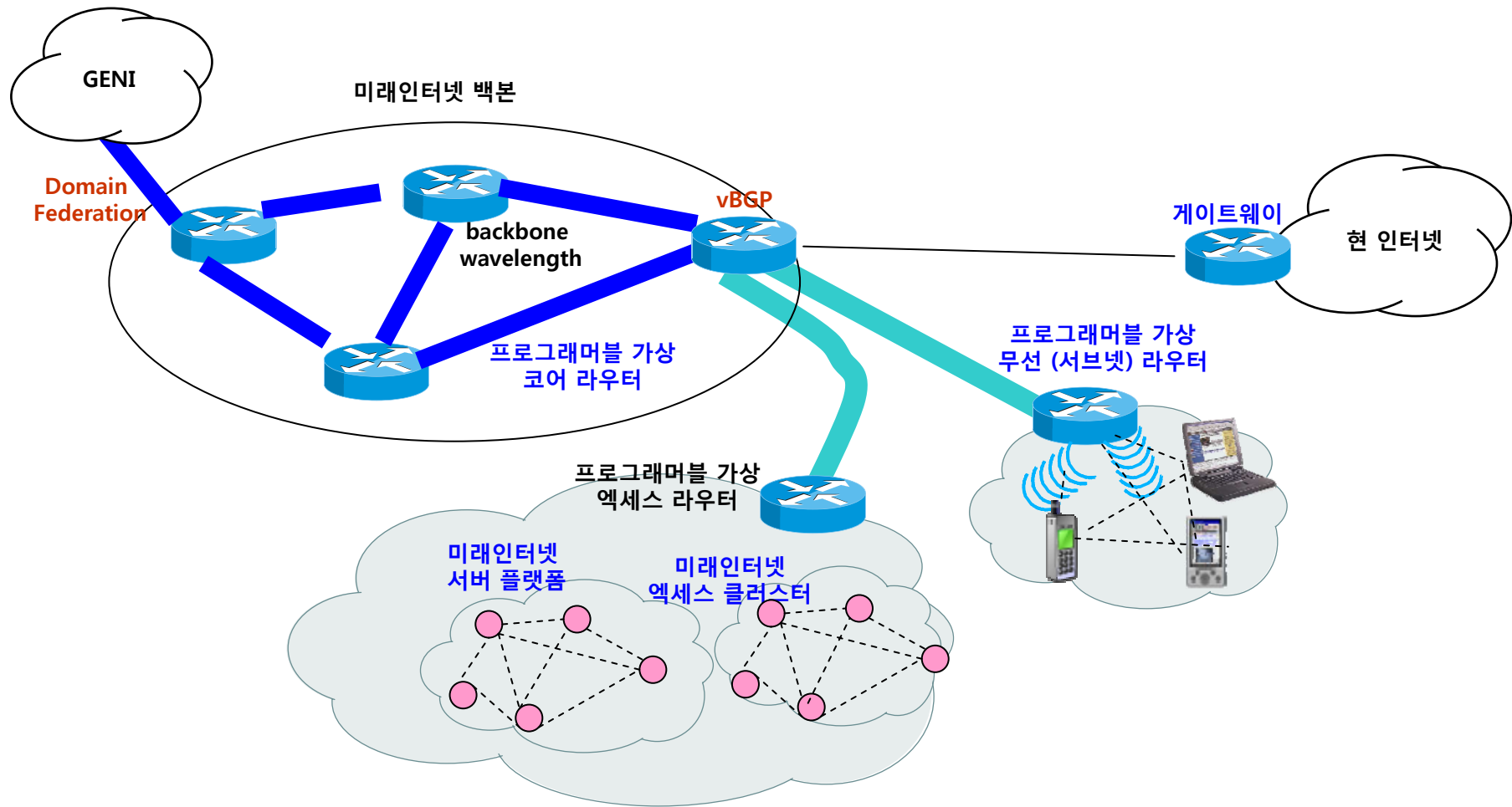
- **Domain Control Center**
- **Resource Sharing**
 - the gulf between rich and poor
- **Security / Policy**

- **E.g., Private PlanetLab**

Common Controls for mGENI-Compatibility

- Control framework
 - Two choices (**GEC's choice-dependent**)
 - PlanetLab extensions (*)
 - Completely New Controls defined
- **Resource federation**
 - Identity
 - Resource Specification (Rspec) (**mGENI + α**)

Construction Plan

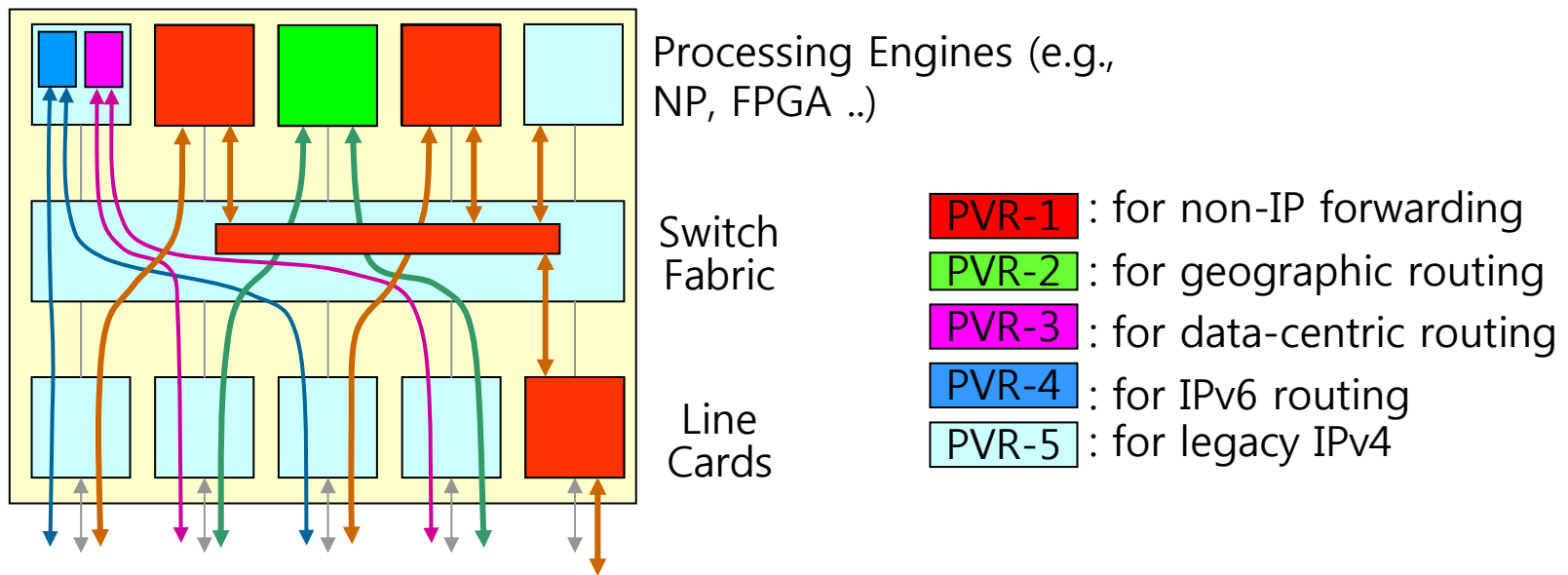


Korea Testbed Facilities

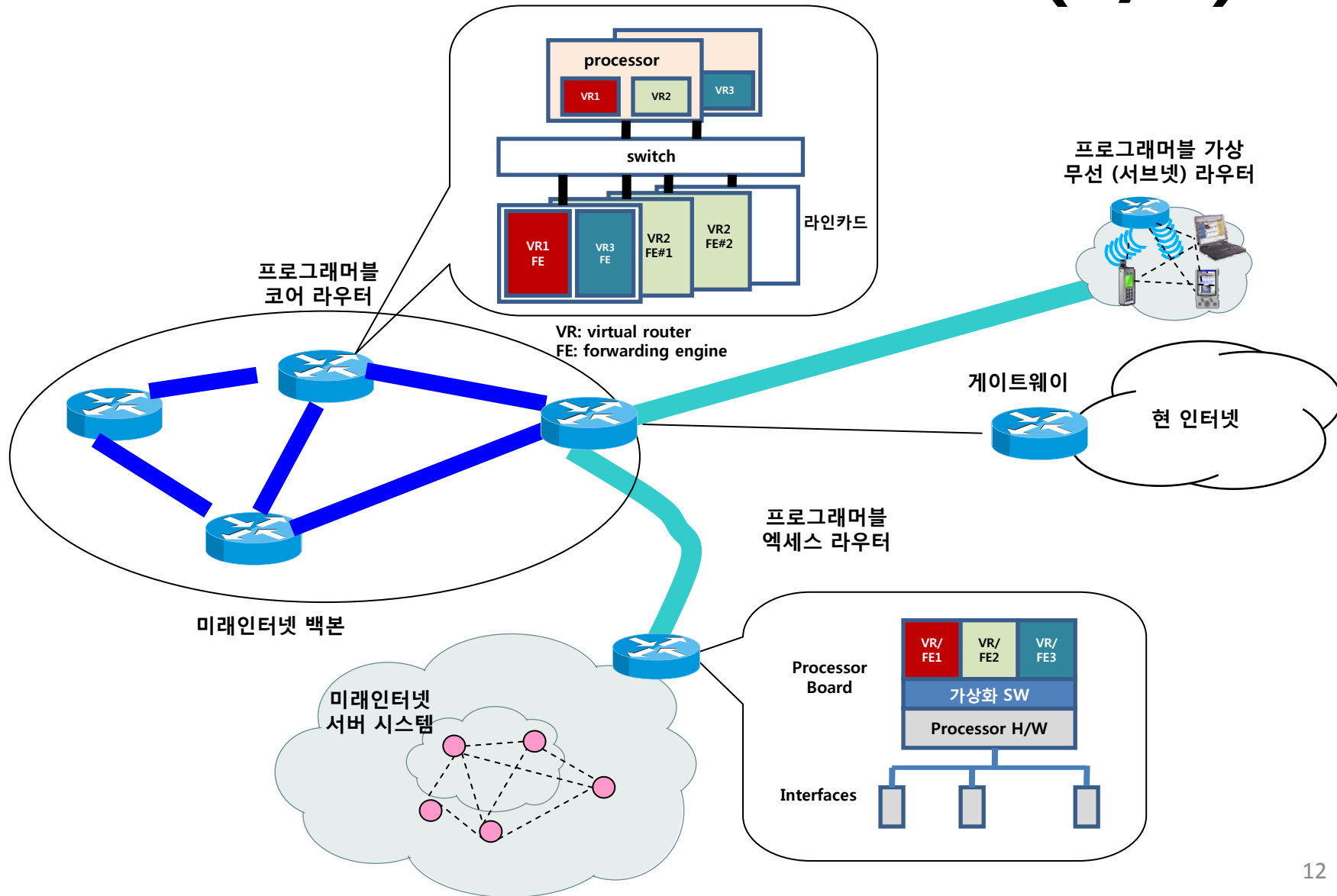
- **Router Virtualization**
- **Wireless Virtualization**
 - 3G/4G, WiBro
 - Mesh, Ad-hoc, Sensor ...
 - Cross-layer, cognitive radio ...
- **Server (Cluster) Virtualization**
- **Inter-working with Today's Network**
 - E.g., ISP peering (vBGP)
- **Security Virtualization**

Router Virtualization (1/2)

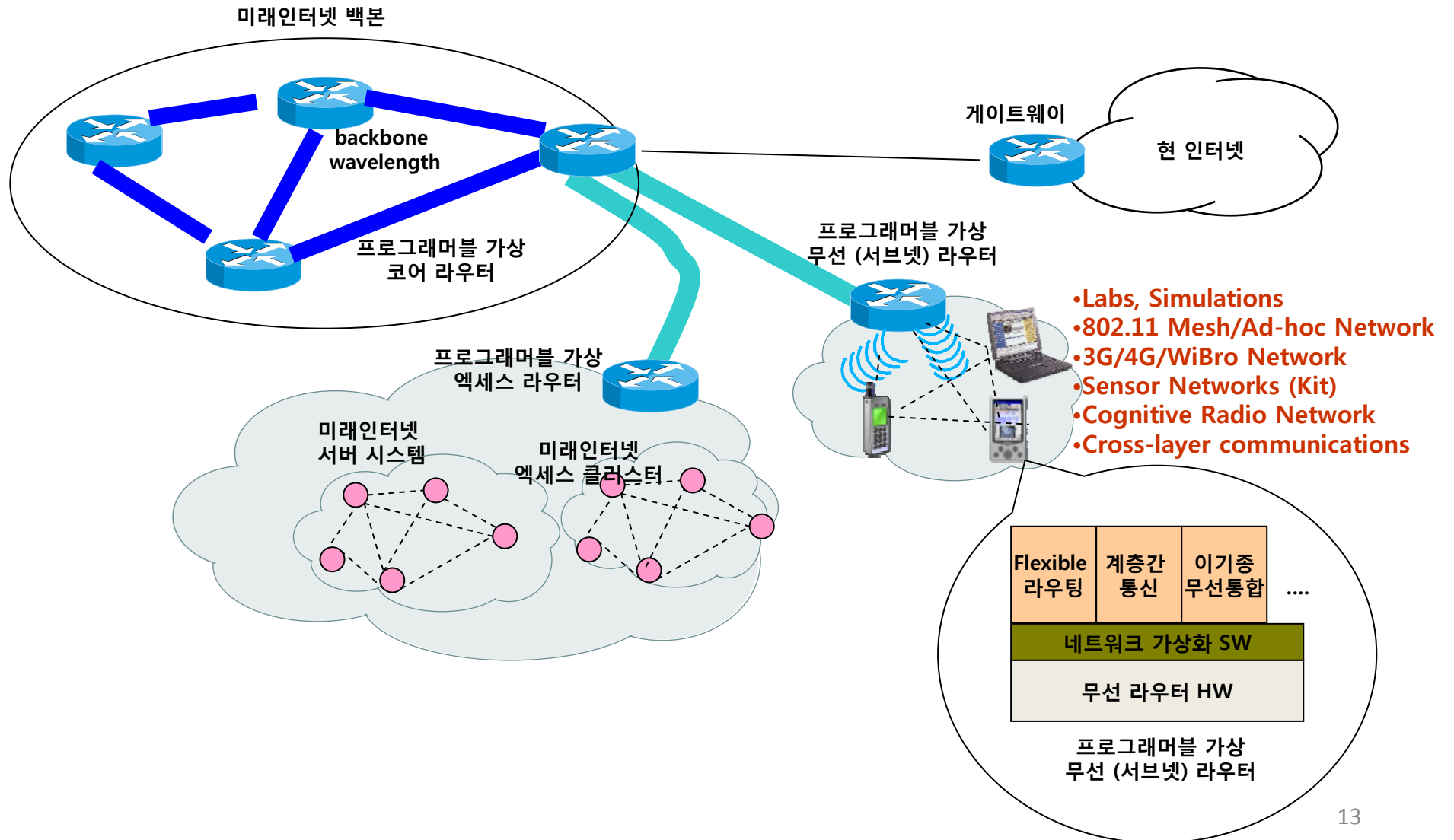
- Resource pool architecture



Router Virtualization (2/2)



Wireless Virtualization



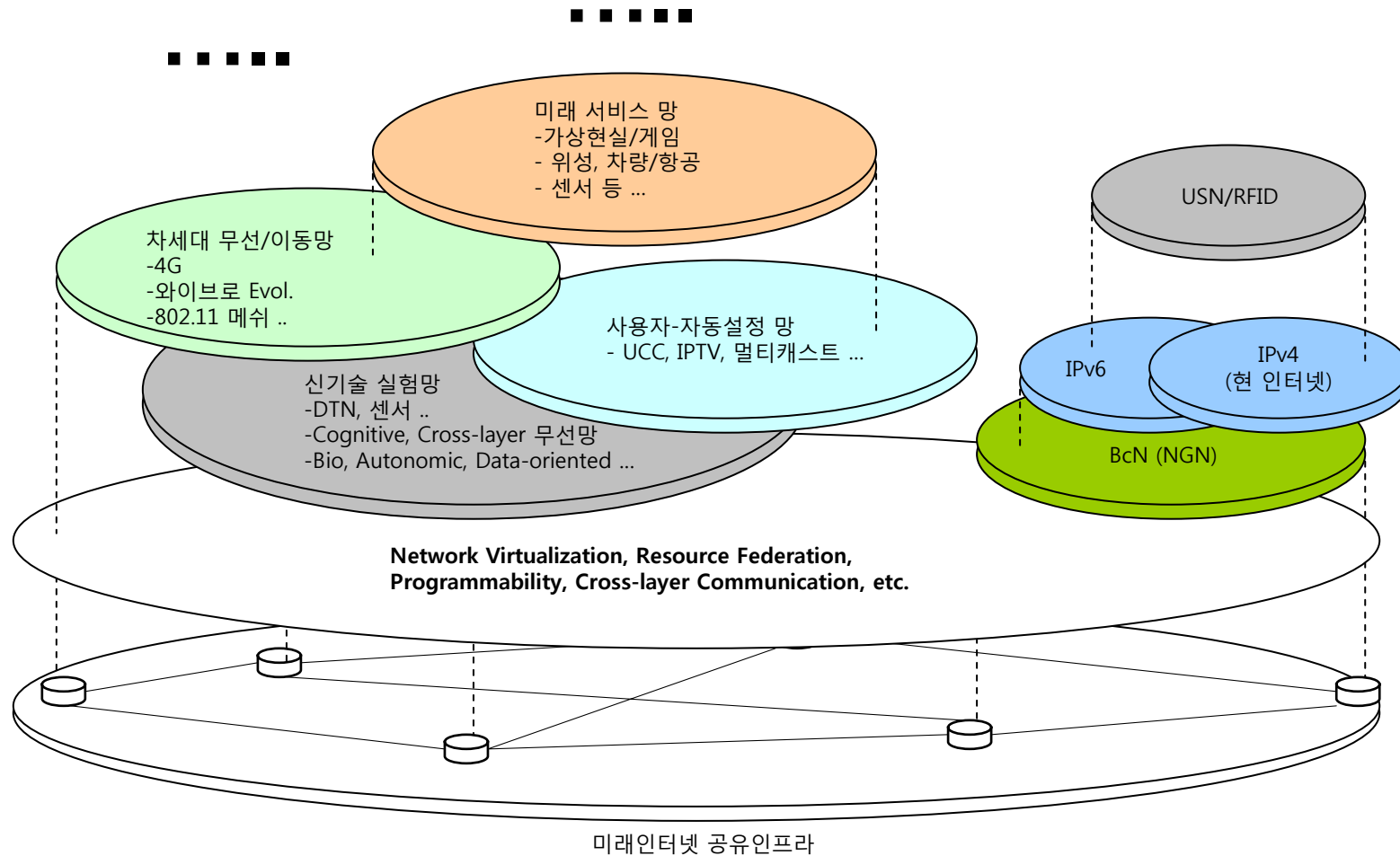
Common Infrastructure

- Two Backbone Providers (KOREN/KREONET2)
- General Requirements for KOREN/KREONET2
 - **GENI (NLR) Connectivity**
 - **Flexibility / Isolation / Equipment Position**
- cf) NLR Support for GENI
 - NLR owns its own national footprint dark fiber plant and its own DWDM optical systems.
 - NLR infrastructure has the flexibility to support a broad range of experiments, services and users
 - Support clean slate-based experiments

Infra + Facilities

- **Nation-wide Backbone**
 - Bandwidth Allocation (long-term vs. short term)
 - Network/Experiment Isolation
- **Decide whether existing equipments could be isolated/re-used or not ...**
- **Decide where can be new equipments in position ...**
 - Router/Switch
 - Wireless Subnet
 - Server/Access Cluster

Conceptual Design of FI Infrastructure



Milestone (1/2)

- **1st step (Private Domain)**
 - **Minimum GENI-compatible**
 - GENI Minimal Core (defined by GEC)
 - **Domain Control Center**
 - **Domain-Specific Reqs.**
 - Policy & security
 - Substrates
 - Operations, Management, and Monitoring
 - User Portal and services
 - Experiment Workflow

Milestone (2/2)

- **2nd step (Domain Federation)**
 - **Programmability**
 - Building blocks and dynamic plug-in
 - **Domain federation**
 - GENI – Korea Domain
 - **Architecture federation**
 - Diverse network inter-working (e.g, Internet vs. Future Internet) (ISP-peering)

Open Issue : Testbed Name

- Choice 1
 - **KENI** (Korea Environment for Network Innovation)
 - E,g,) *Planet*Lab <-> *G*-Lab, *One*Lab ...
 - Private **GENI** -> **KENI / JENI / CENI**
 - **AENI (Asia)**
- Choice 2
 - Completely different name from GENI
 - Don't use "K" ...