# Networking Automation across Multi-site K-ONE Playground

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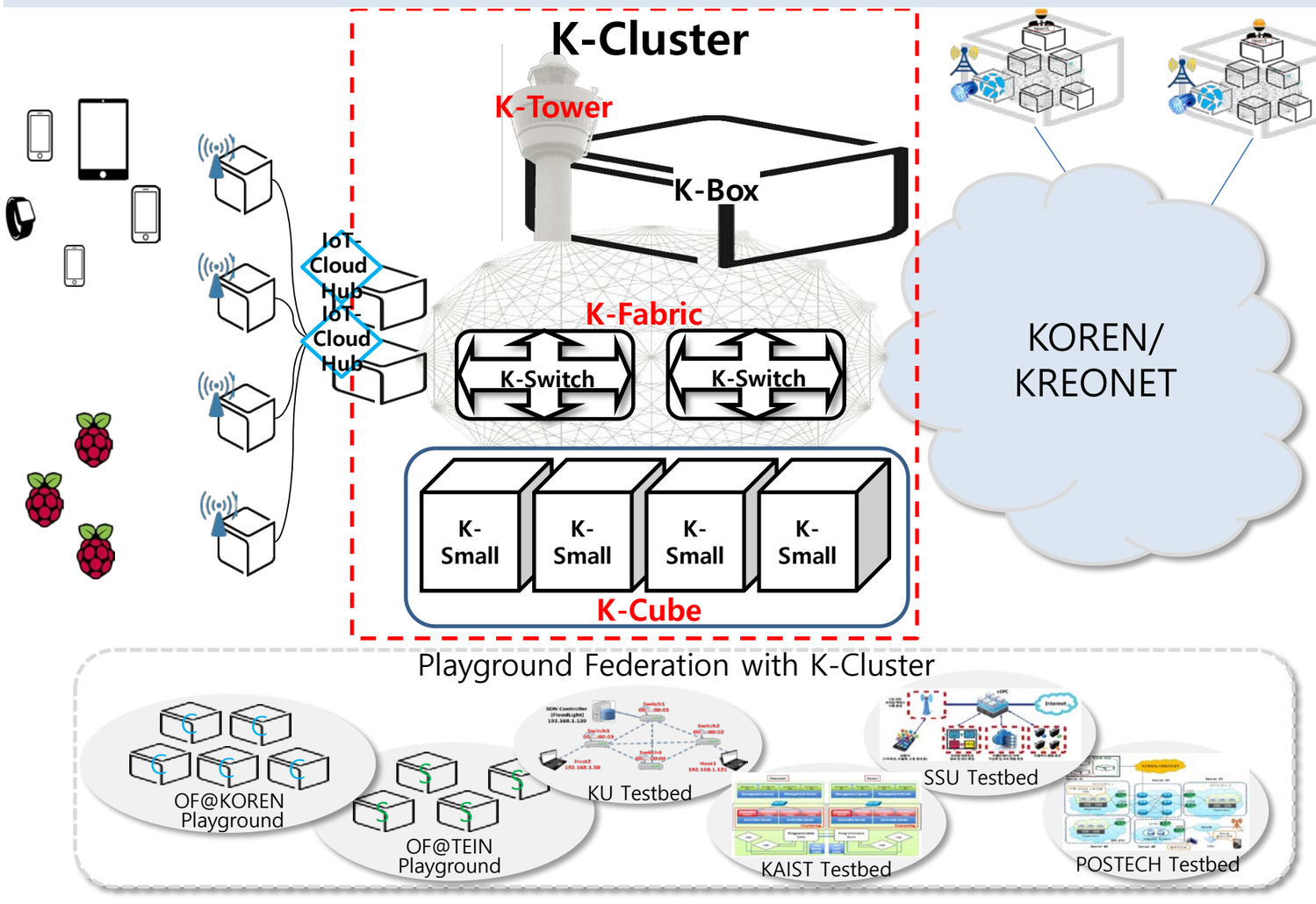
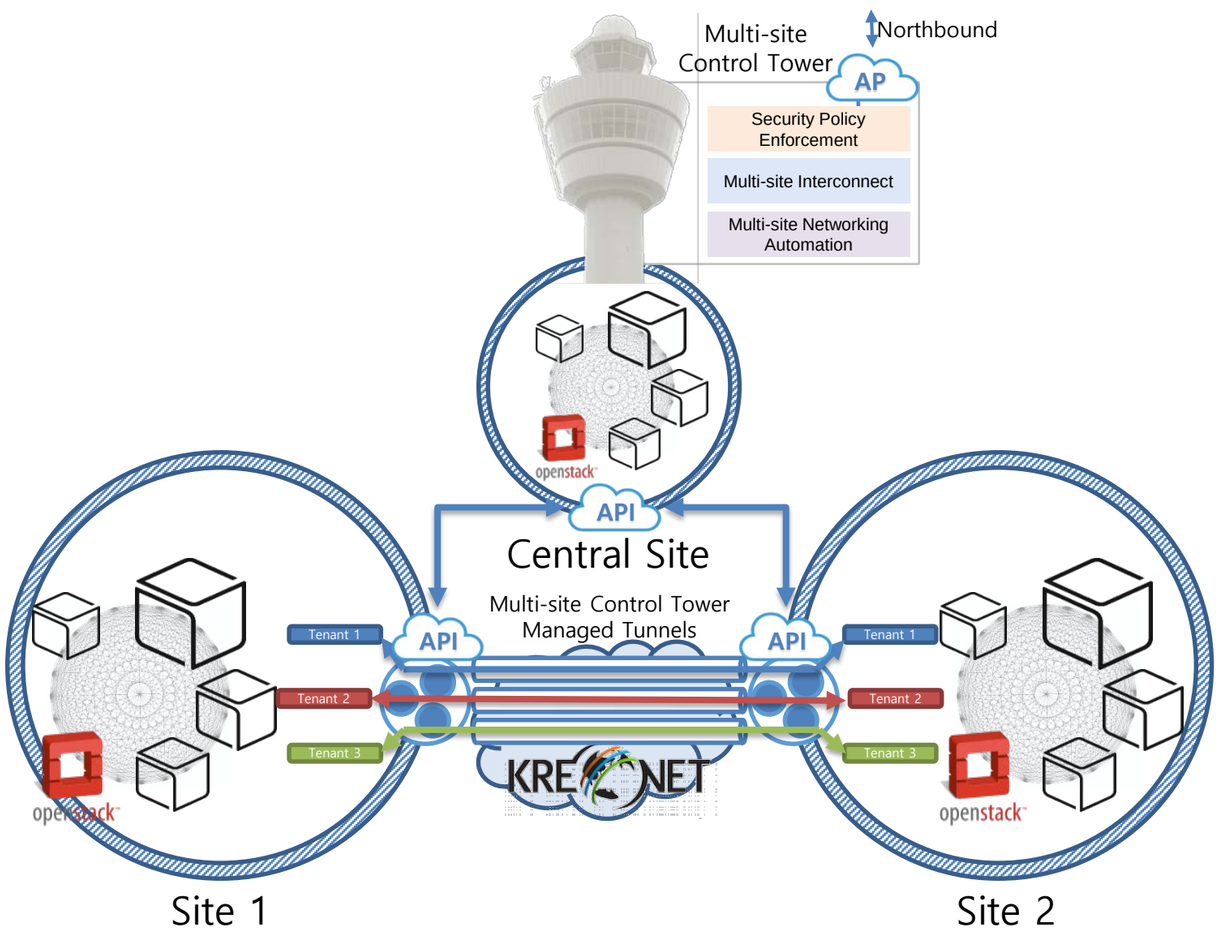
## K-ONE Open Playground: K-Cluster-centric Playgrounds Federation



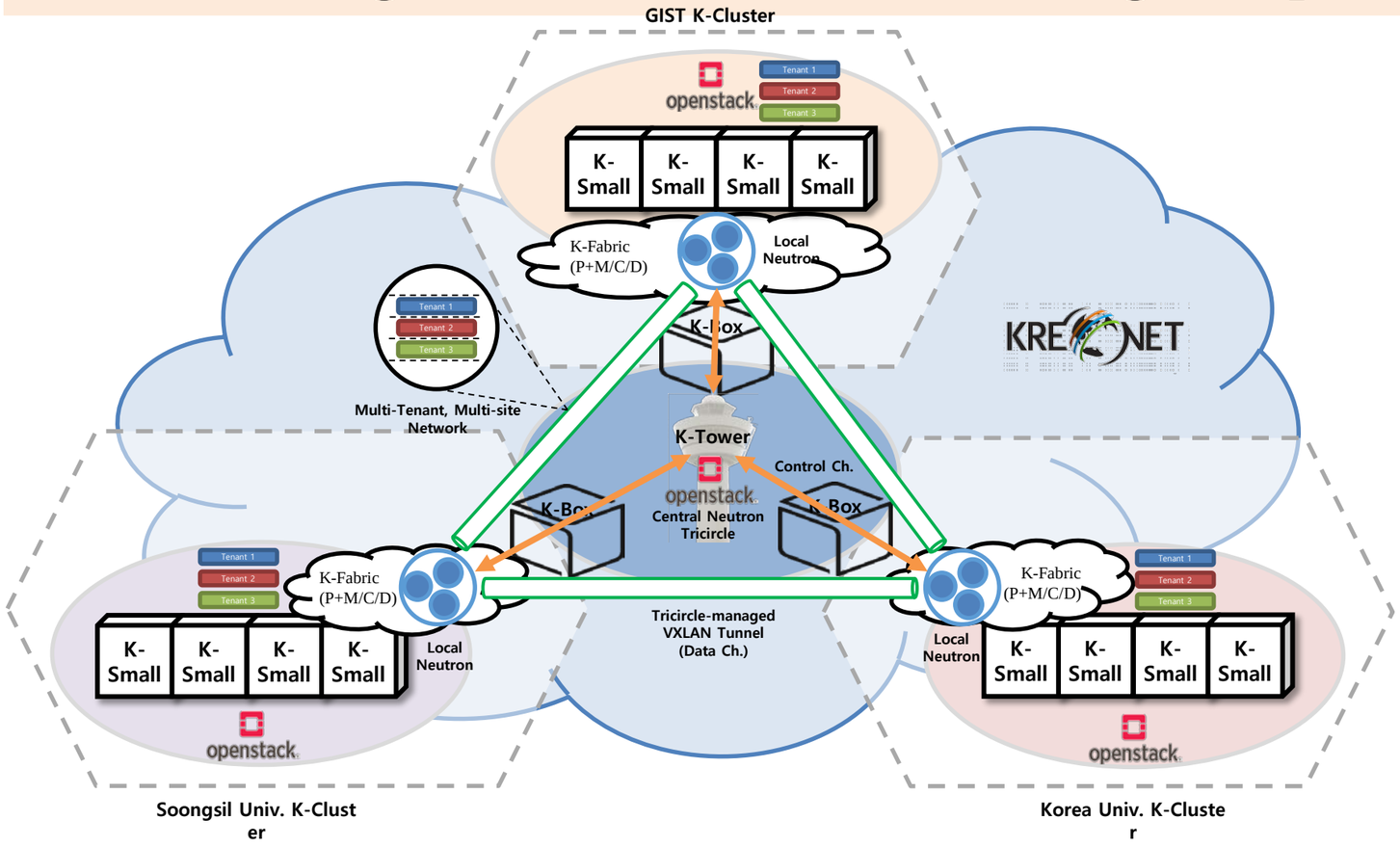

- K-Cluster
  1) Small-sized cluster testbed for SDN/NFV/Cloud
     - Flexible, economic logical testbed model which correspond to Edge-Cloud model, not physical configuration with fixed definition of HW, specification, model
  2) Characteristics
     - Software-based monitor & control automation
     - No vender-specific open hardware boxes
     - Networking that guarantees high-level stability/flexibility/bandwidth interconnect
     - One hardware bundle that handle various SDI verification
     - Economic Small testbed environment for researchers and developers who hard to obtain such environment
- K-ONE Playground
  1) Single K-Cluster has its limits for Multi-site/Domain-related verification
  2) K-Cluster prototypes are distributed to multiple K-ONE Consortium sites, including GIST, KU, SSU, POSTECH, KAIST, and interconnected over KOREN/KREONET to form K-ONE Playground

## Networking Automation across Multi-site Clouds




- Multi-site Cloud Networking
  1) Networking automation across multi-site clouds requires an entity that has control over all cloud sites for multi-site interconnect
     - Local sites themselves don't know each other and can't interconnect
  2) Therefore, multi-site control tower at the central site is introduced
     - Centralized control of all cloud sites' networking
     - Local cloud site networking via RESTful API
     - The tower itself is controlled by northbound API
  3) Tunnel from a local site to another local site, avoiding star-shape overlay networking
     - Central site only coordinates the inter-site networking to avoid traffic congestion

## Networking Automation across Multi-Region OpenStack clouds with OpenStack Tricircle




- Networking Automation for Multi-site K-ONE Playground
  1) Each site's K-Box gathers and forms the central site that populates K-Tower
     - K-Tower is the entity that controls all sites of K-ONE Playground
     - The tower uses OpenStack Tricircle to automate networking over multi-site clouds
  2) K-Tower holds centralized controls over all sites' networking
     - Local cloud site networking via RESTful API over separate control channel
     - All sites can be governed by the tower by just Northbound API to it
  3) VXLAN tunnel is formed between local sites over KREONET, excluding the central site
     - Only traffics from control channel reaches the central site