Deployment options for integrating cnBNG with Data Center Fabrics

This chapter describes how cnBNG integrates with modern data center fabrics to provide high availability, flexibility, and reliable services. To integrate cnBNG into the network, you need a few Bridge Domains (BDs) and Border Gateway Protocol (BGP). The underlying infrastructure can be Layer 2 only—with routing managed by Data Center Routers (DCRs)—or a mix of Layer 2 and Layer 3. The main goal is to enable cnBNG to communicate with both the northbound and southbound networks, as well as with other cnBNG clusters.

You can choose from several integration options based on your data center infrastructure, such as VXLAN EVPN, Cisco ACI, or traditional vPC. Use this information to select the solution that best meets your network and business requirements.

Flexible deployment models

Cisco cnBNG is inherently fabric-agnostic and performance-sensitive, making it suitable for a variety of deployment scenarios:

Supported deployment models:

- Modern VXLAN-based fabrics
- Cisco ACI policy-driven fabrics
- Traditional vPC + LACP designs

cnBNG offers deployment flexibility. It operates on a Kubernetes cluster of servers, which can be as simple as a single node (All-in-One) or scaled across multiple nodes for higher availability. Each node is dual-homed to the data center fabric, ensuring both link and device redundancy for uninterrupted service.

Figure 1: Topology: cnBNG with VXLAN-based fabrics or ACI policy-driven fabrics

Figure 2: Topology: cnBNG with L2 domain or vPC LACP networks

cnBNG on VXLAN BGP EVPN Fabric

For organizations leveraging VXLAN BGP EVPN, cnBNG integrates with a spine-leaf architecture built on Cisco Nexus switches.

Architecture overview

- **Spines** provide Layer-3 routing, ECMP transport, and act as BGP Route Reflectors.
- **Leafs** serve as VXLAN Tunnel Endpoints (VTEPs) and connect directly to cnBNG servers.

Fabric structure

- The underlay uses OSPF or eBGP to ensure IP reachability across all fabric nodes.
- The overlay leverages VXLAN encapsulation and MP-BGP EVPN to manage tunnel endpoints and advertise service routes.

Resiliency and convergence

- EVPN multihoming (ESI-based) ensures active-active connections between cnBNG servers and leaf pairs.
- In the event of a link or leaf failure, traffic immediately converges to available paths without service interruption.

Control and data plane efficiency

- EVPN BGP broadcasts MAC/IP bindings, VTEP membership, and routed prefixes.
- VXLAN encapsulation provides a fully routed Layer-3 underlay and eliminates spanning-tree complexity.
- Distributed Anycast Gateway (DAG) maintains a consistent gateway presence across the fabric.
- ARP/ND optimization supports rapid Kubernetes service discovery.

cnBNG on Cisco ACI Fabric

Cisco ACI uses VXLAN as its underlying data plane and provides a policy-driven architecture managed by the APIC controller. In this setup, cnBNG servers connect as ACI endpoints within Endpoint Groups (EPGs). These EPGs are mapped to Bridge Domains and linked by Contracts, which control traffic policies.

Key benefits of deploying cnBNG on Cisco ACI

- **Integrated security:** ACI contracts enable Layer 4–Layer 7 micro-segmentation for enhanced security.
- **Visibility:** APIC provides detailed flow telemetry for each pod and node.
- **Fabric-wide mobility:** The solution uses a consistent VXLAN overlay across the entire fabric.

Suitability

This solution is ideal for enterprise or multi-tenant environments that require strong compliance, segmentation, and centralized policy management.

cnBNG on Traditional vPC and LACP Networks

For smaller sites or brownfield environments, cnBNG can operate over vPC-based Layer-2 domains. In this scenario, each host bonds its NICs using LACP and connects to a pair of vPC peer switches.

Key benefits of deploying cnBNG on traditional vPC and LACP networks

- **Redundancy:** Provides active-active operation facilitated by vPC peer-link coordination.
- **Compatibility:** Hosts require no overlay configuration, simplifying network integration.
- **Simplicity:** Deploys cnBNG nodes as a VLAN subnet over the vPC fabric, with gateways available at routers.

Advantages

- Straightforward deployment with immediate compatibility for legacy infrastructures.
- Reduces operational complexity by leveraging existing L2 technologies.

Suitability

This approach is optimal for legacy environments where rapid deployment and compatibility are priorities, but may be unsuitable for large-scale, highly scalable network fabrics requiring advanced routing capabilities.