

BECS Data Center Management



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Globally, enormous amounts of data are generated on a daily basis and the number of cloud-based services is growing at a record pace.

Increasing Demand and Operational Challenges

The industry is moving towards software driven infrastructure in which virtualization is one of the key elements. One of the challenges most operators face is Time-To-Service related. In addition, maintenance windows are shrinking due to around-the-clock operations.

Within the IT environment, automation is today widely spread and enables VM, application and virtual switch deployments in minutes. On the network side, however, configuration is still mostly managed manually. This leads to long lead times, increased risk for errors and lack of accurate documentation.

Even in traditional data centers, the demand for delivering more advanced services and applications increases. To align with this development, operators upgrade their infrastructure to more advanced Fabrics. The drawback is that advanced networks add more complexity and require technical staff to acquire new skills.



BECS

PacketFront's data center network automation solution is suitable for **any network topology** (L2, L3 or a combination) based on **any vendor hardware**.

The solution includes **Plan and Deployment** of data centers. BECS enables zero-touch configuration of all network elements, which includes base configuration, adding resources and building a full underlay, all in a simple and easy to follow GUI.

BECS simplifies the **Service Provisioning** of network services. The provisioning can be done directly in BECS GUI or from any OSS/BSS system using an API. The service model provides a structured way to provision and view each tenant's services and resources by simply adding your Bridge Domains, VRFs, resources, policies and Ports. The result is a complete overlay including DCI connections.

Compared to most other systems, BECS keeps track of your configuration, so that it automatically updates your network when you modify, move or delete services. This means that you always have an updated and fully documented data center network at your disposal and in sync with the service life-cycle.



Challenges

Regardless if your datacenter is for internal use or your core business, the top challenges are the same:

Time to Service (TTS)

Waiting days is no longer acceptable and the target is self service and 24/7 availability.

OPEX Reduction

High workload can not be solved anymore by adding more people to the organization.

No room for errors

Datacenters are today more complex and have more services to manage, thus increasing vulnerability.

NFV is knocking on the door

Time to automate the network services is now.

BECS Datacenter Solution main features:

Plan, Build and Deployment Deploy a complete DC within minutes, with zero-touch element configuration and full network underlay.

Service Provisioning

Add, delete and modify tenants, services and resources such as Bridge Domains, VRFs, IP addresses, Ports and Policies.

BECS creates VLAN on leaf ports, VXLAN, data plane and fully meshed overlay for EVPN.

Benefits

- Vendor agnostic solution
- Fast service provisioning
- No configuration errors
- Always up-to-date configuration
- Full network documentation

BECS Structure

The topology tree enables the creation of complex logical relations between network elements and provides a detailed view down to the physical and logical interface levels.



Tree Topology

The BECS database is structured in a tree topology that reflects the topology of the network. This structure enables fast network-wide configuration changes as well as absolute control of the configuration of every single network element. The location of an object dictates how service configuration is applied, i.e. which elements are affected and how resources are allocated. Based on this information BECS renders new configuration for each element. And as every change is – just a change – modifying and removing configuration is as easy as adding it. You have an always up-to-date and fully documented view of your data center deployment. The power of BECS allows you mix different hardware and network topologies, from classic L2 to L3 IP Fabrics.

Resources

Deploying elements or services, resource management is one of the key areas to avoid errors. BECS has a built-in resource manager, which allows you to align IP addresses, VLANs and all other resources with the actual network topology.

As the resource manager utilizes the tree structure, a value is always allocated from the correct resource pool. You can let BECS take the next available resource automatically, or choose a value yourself. BECS will not allow you to make duplicates of any unique resources that most likely would cause problems.

Tenants

BECS provides a clear view of configuration, (such as Bridge Domains, VRF's and policies) and resources allocated for a tenant.

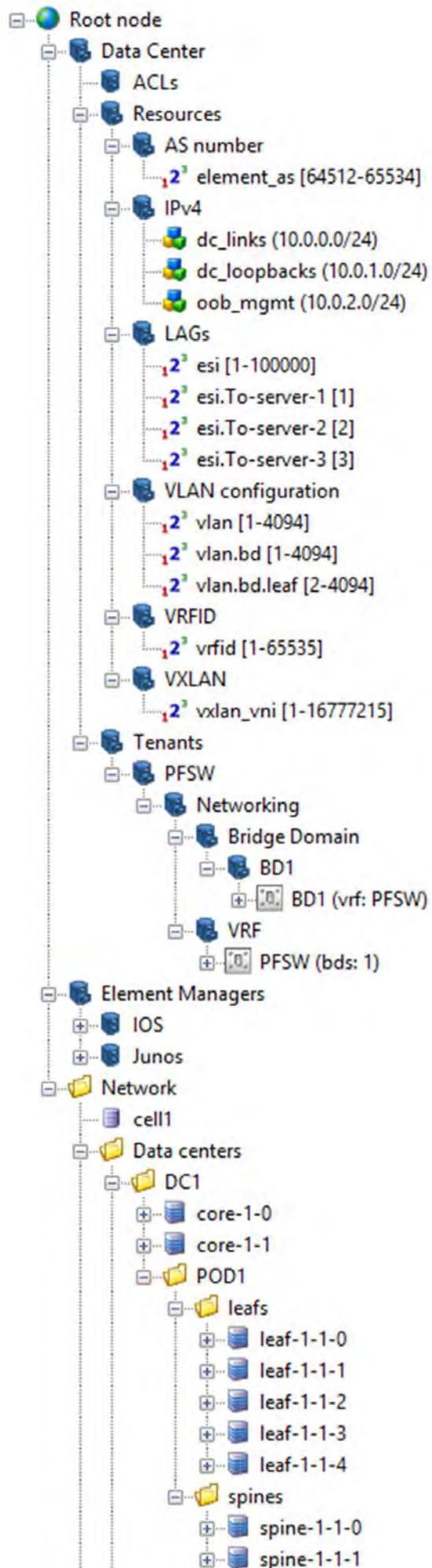
Element Managers

An element manager includes configuration templates and models for network elements of a certain hardware vendor. These are used by BECS to, in real-time, generate configuration for any type of hardware in any type of scenario.

Network Element

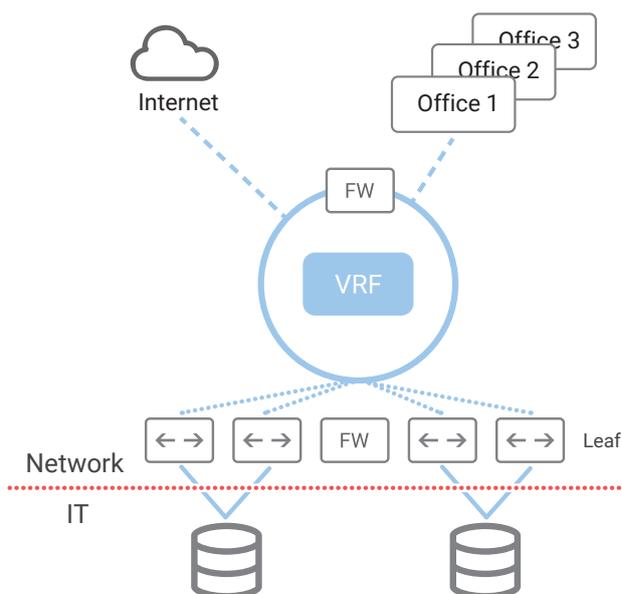
The topology tree enables creation of complex logical relations between network elements making sure that every provisioning triggers right configuration in right network elements using right resources.

It also provides a detailed view down to physical and logical interface level. This means that you have full control of how every element is used and what resources you have at your disposal.



BECS in Action

Let's take an L3 IP Fabric as an example of how BECS can help you manage your network.



Plan and Build

Zero-touch element configuration together with the network deployment functions sets up and configures an IP Fabric with anything from a single Leaf to an entire POD, completely automated and without any element pre-configuration. The Plan and Build tool comes with a library of predefined routers and switches, their base configuration, chassis/slot combinations, and supported data center network topologies. This means that you can add or replace a Leaf or a POD with just a few clicks.

After adding your network element(s), BECS automatically builds the IP fabric underlay, which ensures IP connectivity and BGP relationships between Leaf, Spine and core elements. On top of the underlay BECS creates a fully meshed overlay for the EVPN control plane between the new and existing elements.

Using the established EVPN control plane, BECS creates the VXLAN infrastructure that acts as the data plane for forwarding in the IP fabric. When applicable, BECS also creates and manages the MPLS VPN connection between multiple data centers that carries VXLANs between the EVPN/VXLAN islands.

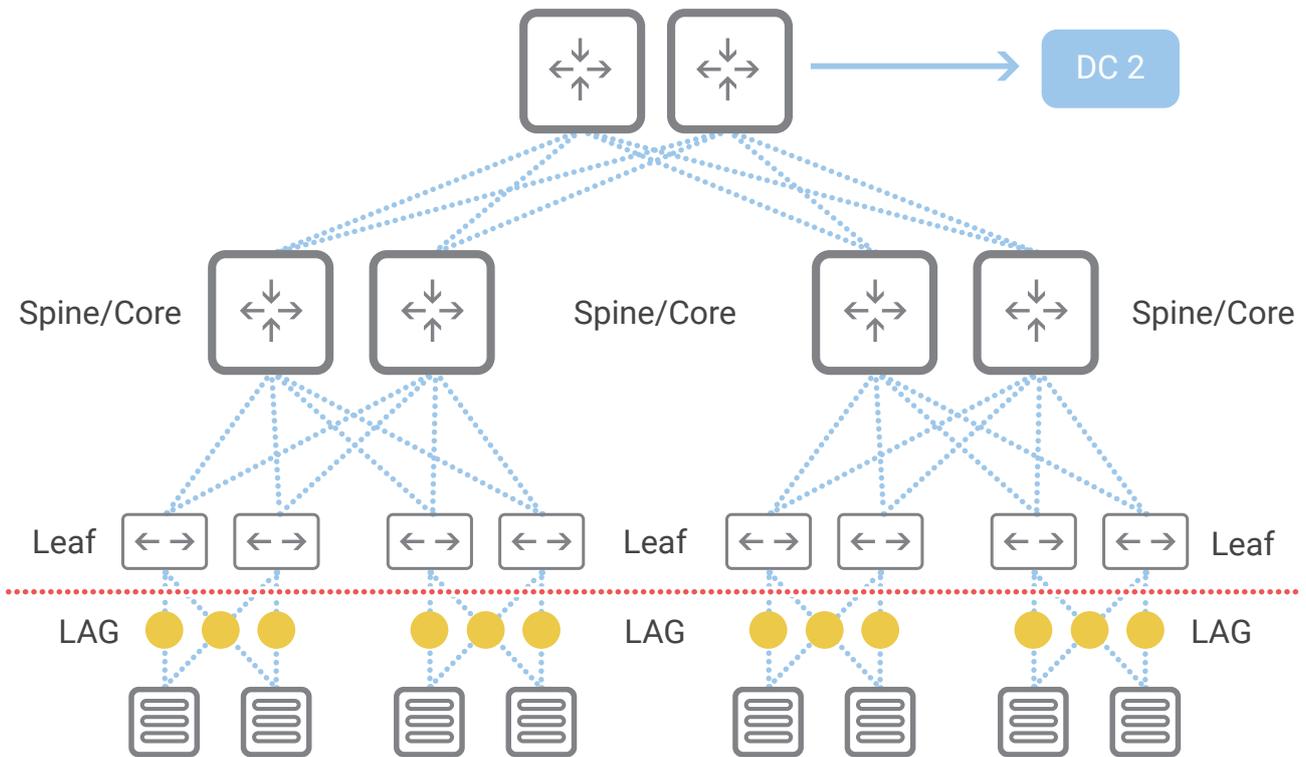
Resource Management

When adding network elements, BECS assigns any necessary resources based on a predefined hierarchical resource structure (e.g. IP address, VLAN id, VXLAN id, routing parameters as route targets for EVPN and route targets for MPLS VPN interconnecting data centers). The same applies when provisioning services. The end result is a fully automated resource management of MPLS, routing, VPN tunnels, EVPN, VXLAN and more.

Tenant Provisioning

Let us look at a common use case. I am going to deploy my business application in my Data Center. It will be accessible by the sales department in three remote offices. The application itself consists of two front-end servers and two back-end servers, hosting a database.

In order for this to be set up, a work order usually comes in from the IT department in charge of applications. They let us know there are four servers going to be connected, they should be segmented into two groups, business frontend and business backend. The frontend should be accessible over TCP/443 and the backend should only be accessible on TCP/1433 from the front-end servers. On



- 1 Create your resource pools
- 2 Add your configuration templates for your HW
- 3 Design your data center topology
- 4 Decide your routing and RR
- 5 Decide LAG and multi-homing

- 1 Add a POD, Spine, Leafs, aggregation etc.
- 2 Base configuration from your HW templates
- 3 All resources added from its right pools
- 4 Create EVPN Links add LAGs
- 5 Connect other DC's (DCI)

top of this, a VPN setup should exist, that connects three branch offices so that they can access this application.

This is a simple example of a common setup, but still, it means quite a bit of configuration. The leaf switches must be configured with VLANs, VXLANs, Bridge Domains, VRFs and policies. The MPLS VPN has to be configured in at least four different equipments. So a simple task easily builds up to a not so simple configuration.

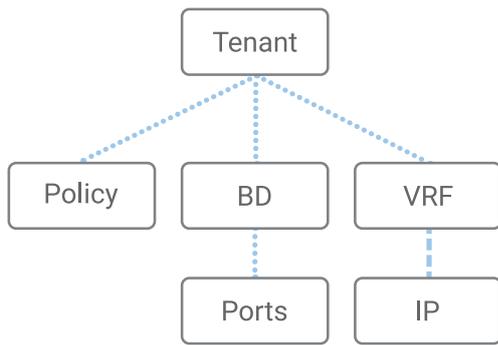
In BECS Data Center solution, this is very easy to accomplish. You start by creating a Tenant, let's call it Sales. When that is done, you will be asked to create Bridge Domains.

In this case, we will create two Bridge Groups, called Business Front-end and Business Back-End. At this

point, we have created two LANs, one for the front-end and one for the back-end. Next we will create a policy, called db-access. This policy will control access between the two groups. After that we will create a policy called frontend. Here we will allow only traffic to the front-end application port and nothing else.

Once these policies are configured, we will add a VRF so that we can access this application. At this moment, my application is up and running. But we still have one more thing to do. We need to connect the three branch offices. For this, we will add the MPLS VPN add-on service and connect it to the VRF. When that is done, we then provision the MPLS VPN service on the three branch offices and voilà, the connectivity has been established. The time to do all this configuration is less than two minutes from start to finish.

Network Services



Besides, when IT comes back later and asks for another port or VLAN to be added to, e.g., the frontend group, all you have to do is assign a port into the Bridge Domain and all settings will be automatically configured. No need to think about policies or what VXLAN ids were used etc. By configuring the Bridge Domain and not single ports, scaling up or down is simple, fast and automated.



BECS - Generic Features

System Requirements

- RedHat or CentOS
- Bare-metal or virtual server

Scalability

- Max. 1,000 Leafs and Spines per BECS cell server
- Max. number of cell servers: 100

API

- SOAP/XML
- Extendable by users
- PAM authentication

Generic BECS Functions

- Multi-vendor support
- Tree-structured database
- Network documentation
- Resource management
- Script Engine for user customizations
- Zero Touch provisioning

Data Retrieval Framework

- Real-time retrieval
- Subscription based retrieval, for example:
 - Interface counters
 - Routing tables
 - CPU and memory usage
 - or any information that elements can provide...

Resource Management

- IPv4 and IPv6 addresses
- VLAN ID
- VXLAN ID
- AS numbers
- Any other scalar resource

BECS - Data Center

Specific Features

Infrastructure

- Build and deployment tool
- Element replacement and decommissioning tool
- Topology migration tool
- IP fabric/Virtual-chassis/L2 topologies
- EVPN Multihoming
- LAG/MLAG configuration
- Base and underlay configuration

Tenant Management

- Bridge-domain
- VRF
- L3/L4 policies
- Route-leaking
- Policy-based routing
- Overlay configuration

SDN/NFV

- OpenDaylight integration
- Open source MANO integration
- OPNFV integration

Add-on Services

- L2/L3 VPN
- Firewall
- And any other add-on services