

BECS VPN Management



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PacketFront provides a vendor neutral VPN management solution that automates and simplifies the deployment and provisioning of L2 and L3 VPN services.

New Demands and Operational Challenges

Increasing competition in the B2B VPN market means price pressure and shrinking margins. This is typically compensated for by offering higher bandwidth for the same price and by introducing new value add services. Today, we see many operators focus on OpEx reduction to compensate price drops, but with new services, constant customer changes and an increasing customer base makes it difficult to reduce cost. At the same time, high customer loyalty is the key to success, so NPS (Net-Promoter-Scores) is important in order to achieve a low churn rate and to keep EBITDA levels up.

So, how can PacketFront help operators to achieve these most common targets, i.e.

- 1) Revenue Growth
- 2) Higher EBITDA
and
- 3) Reduced Churn?

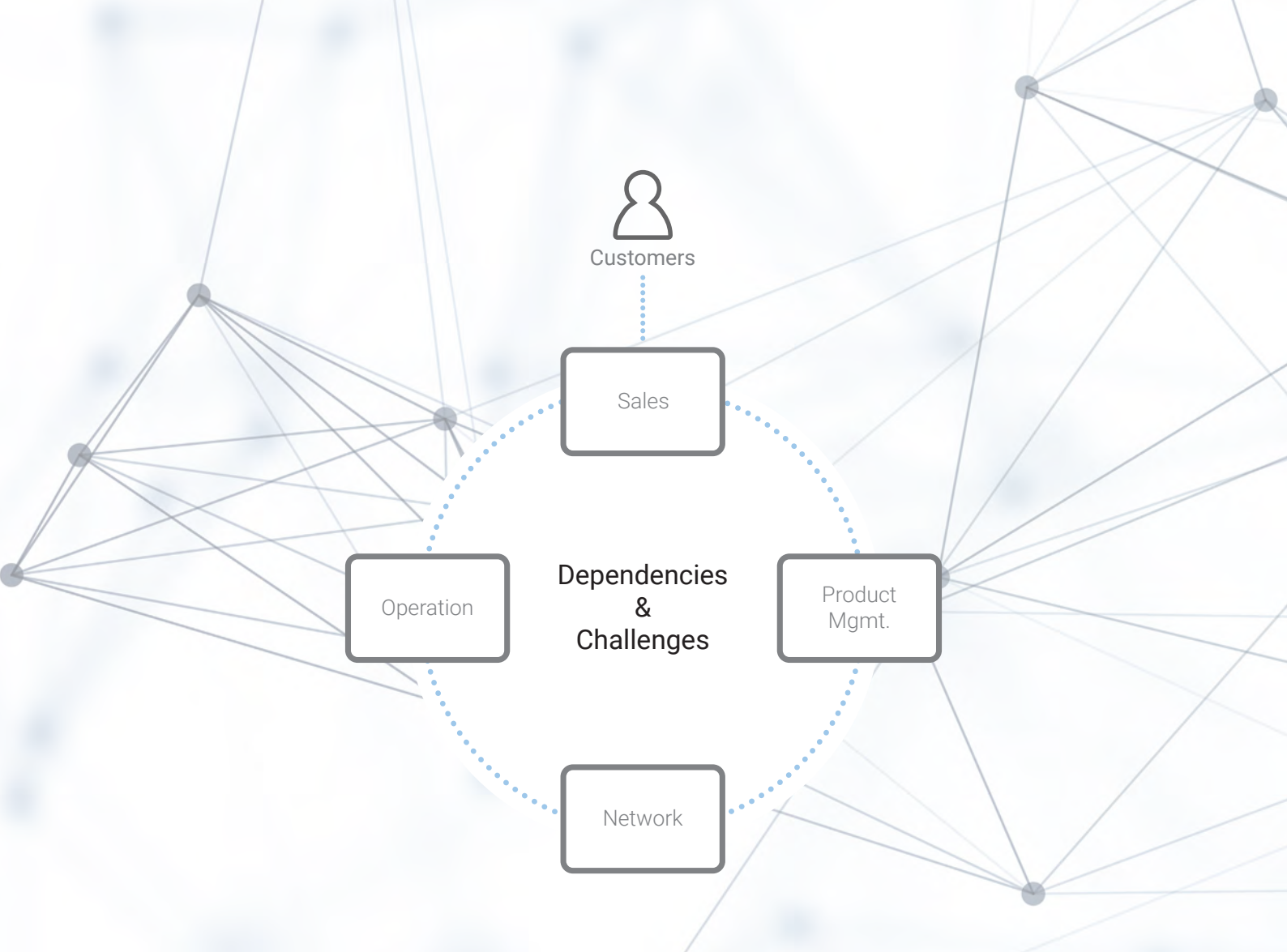
Based on our discussions with operators, we see a common pattern where manual network and service configuration lead to errors, long lead times, constant lack of resources and difficulties to launch new services across the network.

It all starts with the enthusiasm to provide all types of service customizations in order to "go above and beyond". Over time this becomes a handicap. The main problem is not the initial deployment but the lack of capability to maintain and document the network in the long run.

For example, all service changes are supposed to be addressed by operations, but their ability to know how the services are configured is limited, so a tech specialist needs to step in. Resolution of network problems is another bottle neck and is supposed to be addressed by helpdesk but due to limited network visibility tends to end up at higher tier technical staff as well.

Even Product Management have their challenges as the organizational responsibility of launching new services often lies in their department. However, they often lack tools and the required service consistency to provide services across the entire network.

In the following pages we will describe how the network automation provided by BECS not only assists the technical staff, but helps the whole organization to solve some of their main challenges.



Challenges

Time to Service (TTS)

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

Ease of Provisioning

Much of the provisioning is today done by system experts instead of Operation Service consistency: Manually configured services and individual style make it difficult to launch and maintain services.

Errors Elimination

There is no room for service interruptions due to erroneous configuration causing SLA violations and time consuming troubleshooting.

VNF Ready

NFV-based services are knocking on the door. An agile organization and automated network are mandatory.

Solution

Plan, Build and Deployment

Deploy a VPN network from core to CE from any vendor. Add new CE's with zero-touch configuration – No pre-staging required.

Service provisioning

Add, change or delete a VPN customer in your provisioning system. BECS will automatically update all involved network elements.

Benefits

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

BECS

BECS addresses the challenges mentioned on the previous pages and solves many other operational issues.

What is common for all operators using BECS is a high degree of organizational efficiency, few or zero configuration errors and capability to launch new services fast. Operations staff can add, change or delete services, even in more complex setups, such as redundant CE's, directly from the OSS/BSS system.

Helpdesk has full visibility of the network and can efficiently provide diagnostics and verify service status. That ensures fast response to customers and off-loads your technical experts.

How can Product Management provide a variety of services and customer adaptations to the sales organization?

Both VPN and value add services are technically defined in BECS. Via northbound API these services are represented as "Lego blocks". This means that Product Management can put together commercial packages consisting of one or more Lego blocks, in any order or combination, without involving network technicians to achieve customizations. Using BECS, you always have full documentation of all services and their associated configuration.

The service definitions in BECS (the Lego blocks in the API) are from a functional perspective hardware agnostic. From an integration perspective this means that you only specify what service to provision on a customer port.

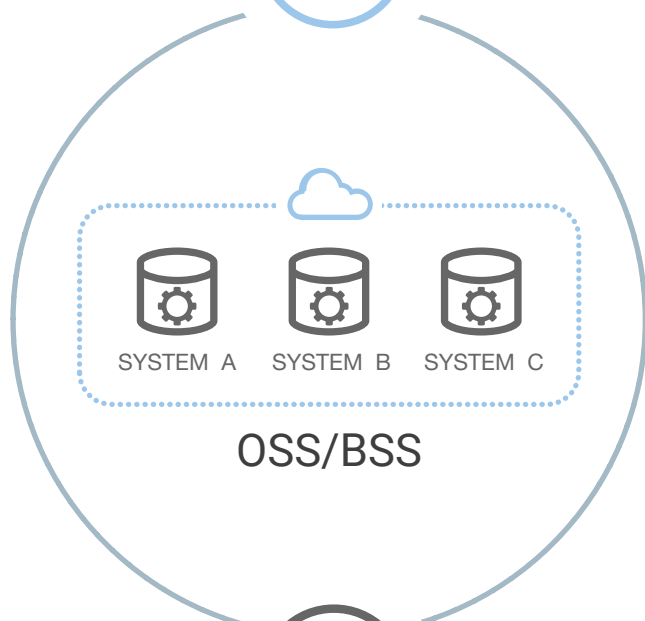
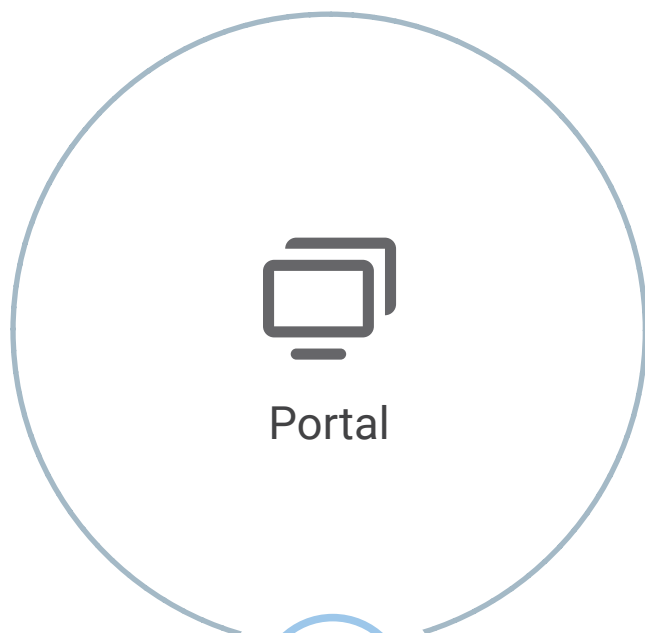
The complexity of figuring out what config to generate for different network elements is handled by BECS. This also allows your network department to deploy new hardware models without you having to adapt the integration between your CRM system and BECS.

The Business Case

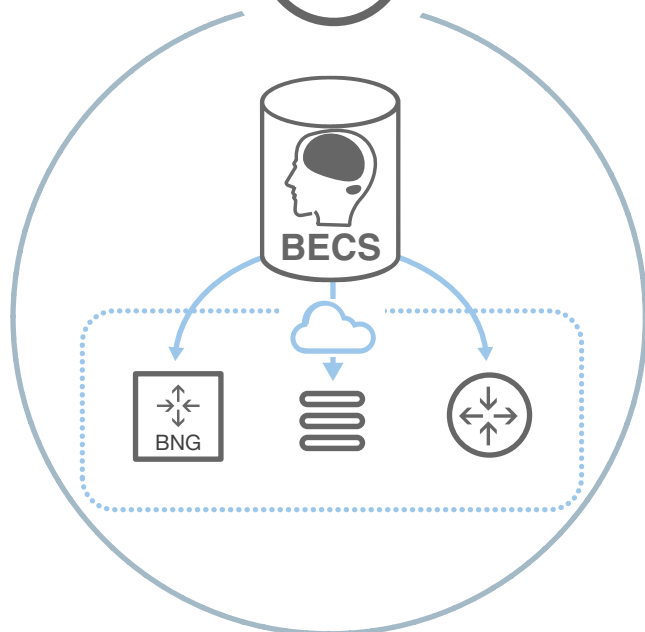
The result of these tangible benefits, such as fast provisioning flow, reduced number of errors and full service documentation are easy to turn into direct cost savings.

The lion's share of the staff is placed in Operation and Helpdesk. Our experience shows that the use of BECS can reduce the OpEx in these parts of the organization by up to 50%. Within other parts of the organization there is a high potential for OpEx savings. This is due to fact that with BECS you get faster delivery of services, less network configuration errors and a fully documented network.

But benefits are not only on the OpEx side: with the reduced time spent on day-to-day operations, the staff can focus on matters that really bring value to the company, such as programs to increase customer satisfaction, design new value add services and develop the network itself.



API



Customer

- Fewer errors, less complaints
- Instant services, customizations

Operation

- Network Abstraction - Hardware Independent Service Definitions
- Easy provisioning and visibility

Network

- Consistent Network Configuration
- Fast Network Configuration Changes
- End-to-end Service Logic
- Automated Resource Management
- Network Documentation

BECS Structure

The topology tree enables creation of complex logical relations between network elements and provides a detailed view down to 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, which elements are affected and how resources are allocated. Based on this BECS renders unique configuration for each element. Also, every change is just a change. This means that modifying and removing configuration is as easy as adding it. You have an always up-to-date and fully documented view of your network deployment.

The power of BECS allows you mix different hardware and network topologies, and manage the entire network from the Core to the CE level.

Element Managers

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

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, VPN IDs, AS numbers, routing parameters and more with the actual network topology.

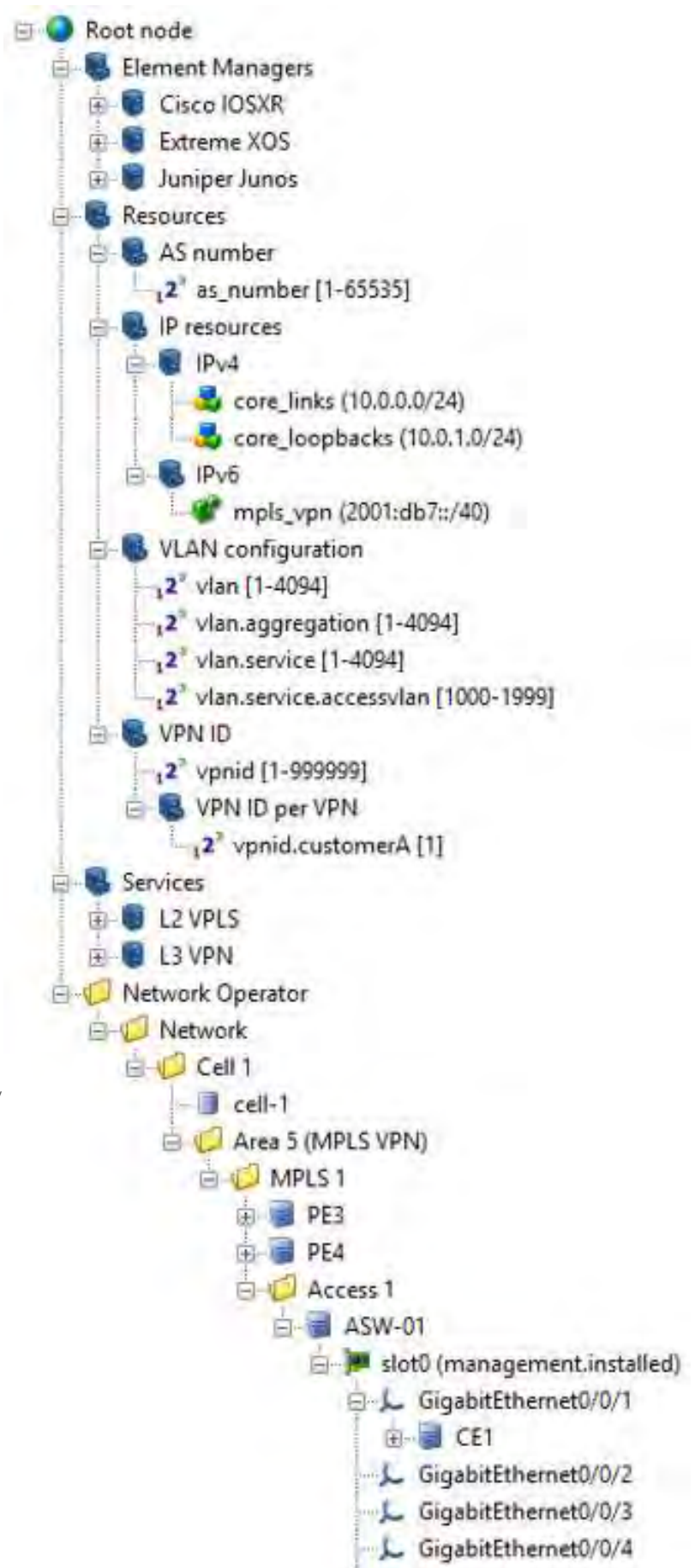
As the resource manager utilizes the tree structure, a value is always allocated from the correct resource pool. You can let BECS allocate the next available resource automatically, or choose a value yourself. BECS will make sure that resources are unique where they must be unique.

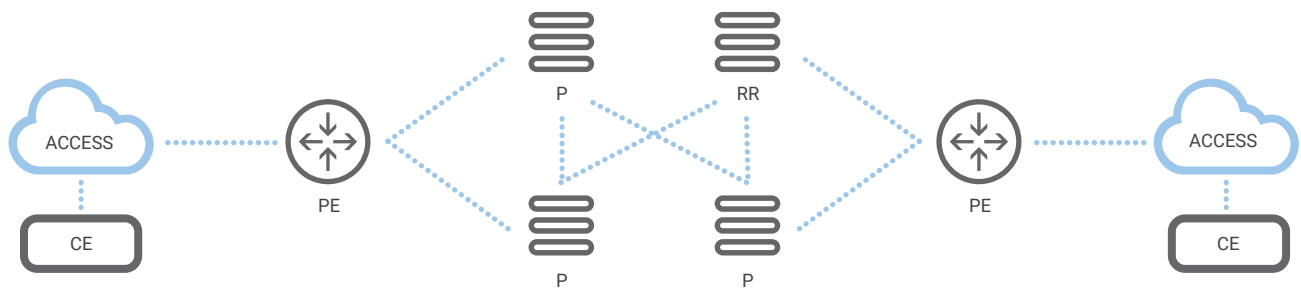
Services

BECS is delivered with a library of pre-defined VPN service logic for various service types and network topologies. However, it is important to note that the services can be adapted to fulfill your specific requirements. After all, the idea is that BECS supports your services and processes, not the other way around.

Network Elements

The topology tree enables creation of complex logical relations between network elements making sure that every provisioning triggers the correct configuration in the correct network elements using the correct resources. It also provides a detailed view down to physical and logical interface levels. This means you have full control of how every element is used and what resources you have at your disposal.





1. Hardware Library

- Library of routers, switches & CE
- Basic configuration templates
- Support for chassis/slot combinations etc.

2. Resources

- Build resource pools
- BECS automatically assigns resources

3. Build and Deploy: "Next - Next - Finish"

- Build a complete VPN network from core to CE
- Automatic element configuration (Zero-touch)

4. Maintenance

- Automated base and service configuration during HW replacement

Plan and Build Process

The Plan and Build tool lets you add or replace a network element with just a few clicks giving you a fully automated resource management of IP, MPLS, routing, VPNs and more.

Plan and Build

Zero-touch element configuration together with the network deployment functions sets up and configures most network elements, including CE devices, 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 topologies. This means that you can add or replace a network element with just a few clicks.

Resource Management

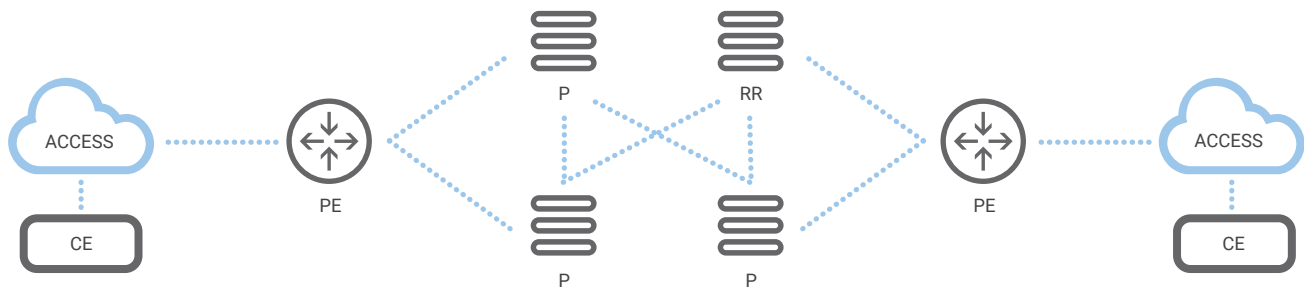
When adding network elements, BECS allocates necessary resources based on a predefined hierarchical resource structure. These resources include IP addresses, VLAN IDs, routing parameters, etc. When provisioning services, resources such as VPN IDs, AS numbers and route distinguishers are automatically allocated. The end result is a fully automated resource management of IP, MPLS, routing, VPNs, and more.

Use-Case - Customer Edge Deployment

Deploying Customer Edge manually is a time consuming and tedious process. The installation must be coordinated and CE's are often pre-staged to make sure the service can be delivered. It is important that the correct resources are used as the equipment will not come online otherwise. Due to this, an experienced engineer has to do the installation. Many times he has to be in contact with the operations team as well during the installation process, meaning that several people have to be coordinated in order to succeed with the delivery.

Using BECS, this process can be fully automated without any pre-staging. Most Customer Edge elements on the market support a BOOTP/ DHCP boot procedure where the equipment will ask for its configuration from the network. BECS will automatically detect the booting CE, allocate necessary resources, and create a unique configuration file that the CE will download using for example HTTP or TFTP.





1. API

- Flexible service provisioning API
- Easy provisioning - "Port & Service"
- Service diagnostics for Helpdesk
- Subscribe network actions

2. Resources

- Structure Your service resources
 - AS number
 - IPv4/v6
 - VLAN and
 - VPN-id's
- BECS automatically assigns resources

3. Provider Edge Automation

- Full configuration or
- Services configuration only
- Services automation (L2VPN, L3VPN, Internet etc.)

4. Customer Edge Automation

- Zero-touch configuration
- Sub-services, such as:
 - QoS, BW, Traffic classes
 - Redundancy options, NetFlow
 - DHCP Relay, DHCP Server, FW

Day-to-day Operations

Service Provisioning

Similar to how topologies and resources are structured in the plan & build process, technical services are created before they can be provisioned to customers. Services include the logic needed to configure VPNs end-to-end, resource pools from which to allocate IP addresses, VLAN's, etc., and the configuration templates needed to generated the correct configuration for all involved network elements.

BECS comes with a library of pre-defined VPN service logics for various service types and network topologies. It also contains configuration templates for a number of different hardware platforms. The standard logic and configuration templates can easily be modified to match the unique requirements of every network.

Use-Case

- Adding a new VPN End-Point

Adding a new VPN endpoint includes a number of tasks, which, if performed manually, take a long time and are error prone. A complex, but common, VPN service involves setting up a redundant CE solution, configuring VPN transport through the transit layer, and configuring the actual VPN on the PE's. Also, for all this tasks resources of different types must be allocated. Using BECS it is very easy and always error-free to add new endpoints.

No matter how complex the VPN service is, if there is logic to how it works, the entire process of adding a new endpoint can be automated. Through the northbound API of BECS the service provisioning is just a single operation where an external customer care system provides BECS with customer interface, VPN service name, and service attributes (such as VPN name). Also note that unprovisioning the service, or moving it from one interface in the network to another, is just as easy.

The VPN service includes the logic for which configuration to remove and which resources to return. This means that old configuration is never left behind and you will always have a network with correct configuration.

How to Get Started

It takes time and effort to automate a network. We're here to help you get started.



How can BECS Lower the Barrier to Get Started?

The beauty of automation is easy to agree upon, but the most frequent questions are:

- 1) **What effort does it take to implement BECS and**
- 2) **How to lower the threshold to start**

Most operators have a long history of legacy installations and non-standardized service configurations across the network. The magic tool that fetches all existing configuration, automatically cleans it from errors and standardizes services is unfortunately far from realistic. Yes, tools for fetching existing network element and basic configuration data is available, but that's the easy part. It's the services to end-customers that are the tricky part. For example, in case of a conflict between the data in the billing system and network configuration, the system can not decide what is the right choice. And how to decide if two manually configured services are actually the same service with individual variations or two intentionally individual services? The conclusion is that it takes time and effort to automate a network and is a reason that can cause operators to be reluctant to start.

Start in Your Own Pace

The low hanging fruit is to start with new customers only, meaning existing customers remain manually configured for later, gradual, migration, a scenario BECS fully supports. But there are also other ways to start:

- BECS can automate only part of the network, e.g., a geographical area or a specific network layer, such as PE's or CE's.
- BECS can also ignore parts of the element configuration to allow even more gradual process.

And you have full control: when BECS first connects to an element, it is typically in read-only mode. This means BECS clearly indicates what changes it would do if being in control of the element or interface. This way you can make sure that nothing unexpected or undesired happens during the migration process.

This give you the advantage of a smooth introduction to SDN and NFV enabled network with minimal impact of your organisation and time. The existing customers can be migrated when they ask for updates or renew their contracts.

BECS – Generic Features

System requirements

- RedHat or CentOS
- Bare-metal or virtual server

Scalability

- Max. 1,000 elements 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
- VPN ID
- AS numbers
- Any other scalar resource

BECS – VPN Specific Features

Infrastructure

- Build and deployment tool
- Element replacement and decommissioning tool
- Any topology
- Migration tools
- PE, aggregation, access and CE support

VPN service management

- Full end-to-end service logic for:
 - L2 Ptp/VPLS
 - L3 VPNs
 - Mobile backhaul
 - Redundant LSP topologies
 - Custom-built VPNs

Add-on services

- CE services, for example:
 - Firewall
 - DHCP server
 - Netflow

SDN/NFV

- OpenDaylight integration
- Open Source MANO integration
- OPNFV integration