

Solution overview

BECS VPN Solution

Contents

1 Overview.....	2
2 Automated VPN service provisioning.....	2
3 Network Plan and Build.....	3
4 Real-time network control and documentation.....	4
5 Integration to other OSS/BSS	4

1 Overview

BECS VPN solution is a network and service management software with the capability to fully automate end-to-end VPN service delivery in a multi-vendor environment. The solution meets the high technical requirements of a multiservice network on the business/provider edge, and at the same time reduces load on technical staff, thereby reducing cost. The solution simplifies and streamlines configuration of network elements, provisioning of services, management and documentation of the network. It targets carriers that:

- Need to **increase operational efficiency** of their business edge.
- Want to standardize VPN services into **pre-packaged and fully automated end-to-end services**, without losing the flexibility to create unique customer solutions.
- Value a **completely documented network** that is automatically updated and cleaned-up in real-time at each network or service change.

2 Automated VPN service provisioning

One of the key benefits of BECS is that it simplifies the work and reduces the risk of errors in the service provisioning process.

Automation of VPN services can be implemented in different steps and extent. In a basic scenario BECS takes care of service provisioning through configuration of the Provider Edge (PE) routers. As a part of the service provisioning process BECS also configures other affected network elements, such as Route Reflectors (RR) and adjacent PE nodes. In a more advanced scenario BECS also configures devices at the Customer Edge (CE), access and/or aggregation levels.

BECS can store the complete network infrastructure overview with elements, resources (IP address pools, VLAN pools, routing details) and services as objects in a hierarchical configuration tree. The configuration tree provides structured information of network and service.

A new VPN service is created using a GUI wizard where the technician assigns static parameters (for example QoS settings) to the service definition as well as dynamic parameters and rules for how the dynamic parameters are assigned (for example IP/VLAN/AS numbers).

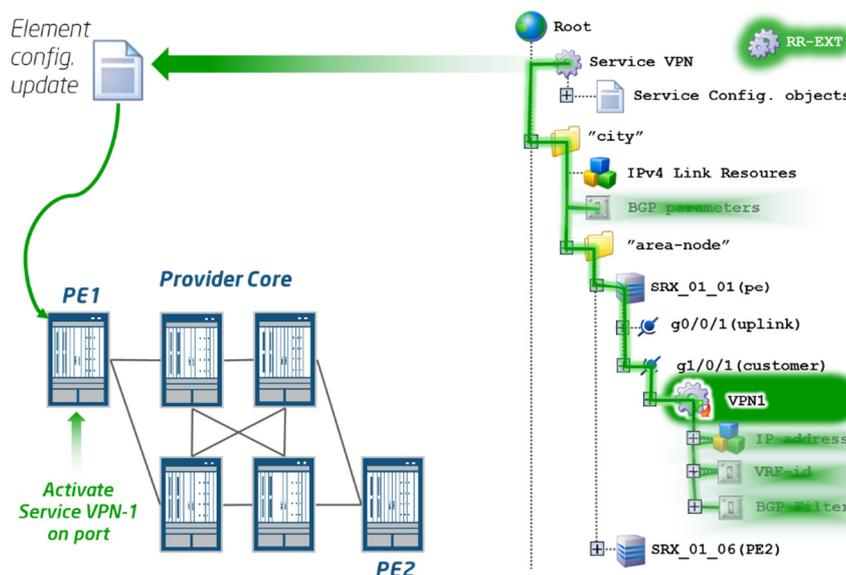
Typically BECS is integrated with a provisioning system enabling a simple and network technology and topology agnostic service activation. The same actions can be performed by the technicians directly in BECS GUI. It has a template based structure enabling very fast service activation and modification.

When a VPN service is activated, either the provisioning system or the BECS operator adds the service to the customer interfaces which are represented in the configuration tree. The service definition provides the static parameters and BECS traverses the configuration tree to collect the associated dynamic parameters, for example VPN name, VRF-id, IP address, AS number, or other routing parameters. BECS combines the static and dynamic parameters and calculates a complete configuration for each element that is affected by the service activation. Finally BECS translates the

element configurations to element specific commands and passes the difference of the old and new configurations to each affected network element.

In the case where a service is deactivated, BECS re-calculates the configuration again for each element that is affected of the de-activation. Resources like IP addresses, VLANs, VRF-ids that are no longer used are released and returned to the resource pools. BECS assures that the network and its elements always have the correct configuration and at the same time documented in real-time in BECS's database.

The diagram shows an example how a VPN is activated to a port in PE1. BECS traverses the configuration tree (illustrated to the right in the diagram) and collects the relevant configuration parameters for the VPN service and creates the configuration update.



2.1.1

BECS can also manage the CE level and the aggregation and access elements between PE and CE. A typical action can be to set VLANs through the service provisioning. BECS is able to take care of the complete service provisioning process and configure multiple elements upon one single service provisioning request.

3 Network Plan and Build

The Network Plan and Build process enables operators to define the network topology and element configuration in a structured way in advance and automatically deploy the result as the network elements are connected to network.

One part of the Network Plan and Build is that BECS provides zero-touch deployment and configuration for elements. In a VPN environment, this capability is usually most valuable for deploying CEs and potentially the aggregation and access elements.

The network engineer builds the network in BECS using pre-defined element- topology- and resource- templates. Element templates define vendor, chassis, models and line-card settings. Topology templates (L2, L3, aggregation, MPLS, and more) structure how elements are connected. Resource templates define how and what IP, VLAN, Routing, etc. are allocated for these topologies.

All templates can be adapted to the network owner's needs and the scripting function allows the network owner to create wizards for adding entire rings or POPs with full automation of configuration, including VLAN and IP address assignment.

The first step is that the engineer adds an element to BECS from the BECS GUI. When the element is connected to the network, BECS will catch a BOOTP request from the element and push the system configuration to the element. If the element needs new firmware, BECS will also trigger a firmware upgrade. If an element does not support BOOTP, the element needs to be pre-configured with IP configuration before the element is connected to the network.

4 Real-time network control and documentation

Documentation of the network is an integral part of BECS. Every element and its configuration as well as every service activation are documented in the system itself, and linked to the actual network in real-time.

BECS provides full documentation of all network elements under BECS control, dynamically updated in real-time for each element. When a BECS operator (or an external system) changes anything in the network or activates/deactivates a service, BECS will update the configuration for all affected elements. Version management enables roll-back to older configuration versions, for a single port on an element or the entire network. BECS instantly clean-up unused configuration for all affected elements and CPEs in the service delivery path and IP addresses, VLANs and other resources are released as soon as they aren't used anymore.

The clean-up of configuration is an appreciated BECS feature, since it solves a problem from which many organizations suffer today. Often the network and its configuration isn't properly documented and when a VPN connection is removed the staff does not always know if the resource is still in use so they choose to leave the configuration active. This leads to a situation where network resources are locked-up even though they are not in use, which prohibits efficient usage of the network resources. With BECS in control of the network configuration this will not happen. Configuration is always up to date and network resource usage stays efficient.

5 Integration to other OSS/BSS

BECS is designed for integration with northbound business support systems and other OSS functions. Every function in BECS is represented by an API-call published on the external API. The external API is a low level API based on SOAP/XML.

On top of the external API, a number of API Adapters publishes specialized high-level APIs. One example of such API adapter is SPAPI which provides simple (service, port) yet powerful calls for service provisioning and management. Each API adapters provide API-calls for a specific purpose that abstract long chain of BECS functions into single non-technical API-calls. This assures for efficient integration with a minimum of API calls between the northbound OSS/BSS application and BECS. It also removes the need for the northbound OSS/BSS application to keep any knowledge about BECS or the network technology or topology.

BECS integration layer contains a script engine that is used to add logic between BECS and external systems. Scripts can for example be used by an API adapter to execute a series of commands within one single call from an external system, or to interact with external systems.

It is possible to extend the API and the API adapters with new API-calls. This is particularly useful for integration with legacy systems that might have limited and very specific integration capabilities.

BECS also comes with an optional workflow engine that can define, schedule, control and track processes in and between systems and organizations. The built-in scripting capabilities can be used to automate parts of these processes which will minimize errors and speed up lead time between order and service delivery.