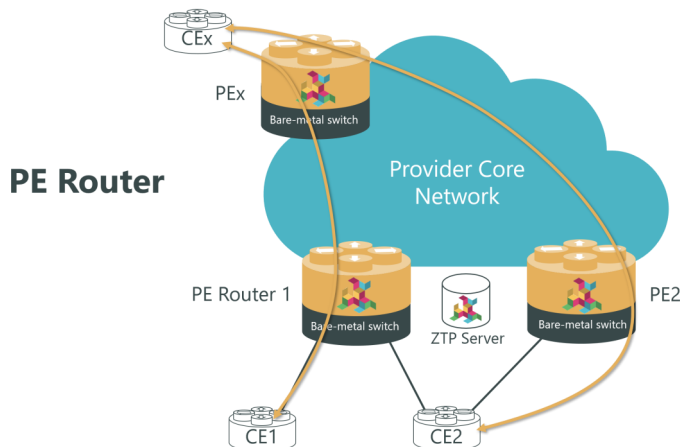


## Data Sheet

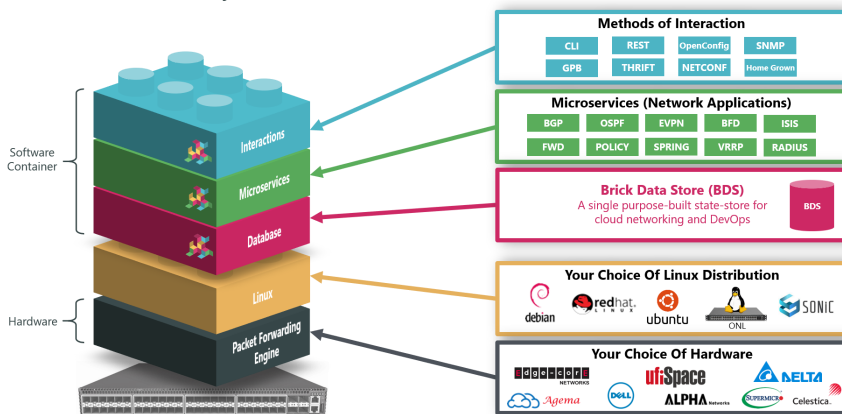
# Disaggregated PE Router

Over recent years, 'cloud-native' service providers have developed ways to build and run huge IT systems with a high degree of automation, to reduce operational overheads and deliver levels of service agility way beyond traditional carrier infrastructure. RtBrick's disaggregated PE Router brings these same benefits to carrier access networks, by using agile methodologies and the same battle-hardened DevOps cloud automation tools that have been adopted by the world's biggest cloud providers.



## Architecture

The RtBrick PE Router is delivered using RtBrick Full Stack software, which takes advantage of the latest merchant silicon running on powerful bare-metal switches to give you high-performance at a fraction of the cost of conventional monolithic router systems.



The RtBrick PE Router is delivered as a Linux container and packaged for bare-metal switches within an Open Network Linux (ONL) installation for a seamless experience out-of-the-box. ONL handles peripherals such as LEDs, temperature sensors, and other platform management tasks. The entire networking stack, including the forwarding elements, is implemented in userspace as containerized processes.

The platform provides an in-memory database custom-built to meet networking scale and performance requirements and also provides primitives needed to build network applications. Application instances can themselves be scaled out to meet performance requirements.

## Benefits

RtBrick's disaggregated PE Router delivers some significant benefits compared to traditional monolithic systems:

- **Greater agility** – you can add new services in minutes rather than weeks
- **Reduced risk** – no more vendor lock-in and a simpler automated operating environment
- **Cloud cost-levels** – leverage low-cost merchant silicon and automate your operations like an 'Internet-native'

### Agility

ZTP (Zero-Touch-Provisioning) ensures that each switch is booted, provisioned and operational without requiring manual intervention. This means that you can add capacity, or roll-out new service features, in a matter of minutes instead of days or weeks.

Agile software methodologies mean that features are rapidly prototyped and implemented, reducing the time-to-market for new services.

### Reduced risk

RtBrick's PE Router software allows you to pick and mix between the latest silicon and the best available software. It is also compiled for your specific use-case, using only the features you need. With an order of magnitude fewer lines of code, and a single state database rather than hundreds, the whole system is less complex, less prone to bugs and has much faster restart times.

### Cloud cost-levels

Now you can take advantage of the low cost-points of merchant silicon on your choice of bare-metal switches, significantly reducing your capex bill. And opex costs can be reduced by automating your operations, using ZTP and the same Web2.0 operational tools that the 'cloud-natives' use to run their infrastructure.



## Deployment Options

The PE Router can be provided on a single low-cost bare-metal switch, typically in a 1RU or 2RU format.

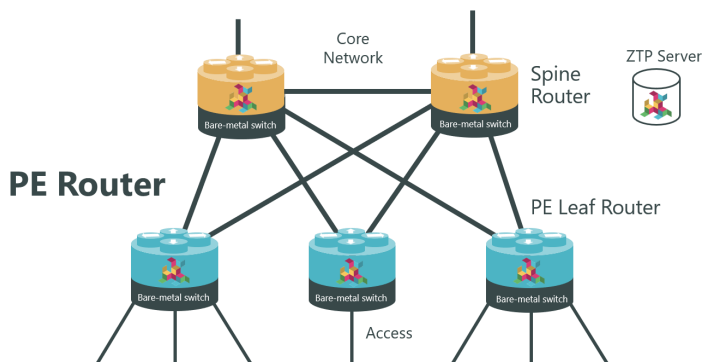
*Typical bare-metal switch*



For very high-scale applications, the PE Router capacity can be provided in a scale-out architecture called the Point-Of-Deployment (PoD). A large-scale PoD consists of PE Leaf aggregated by a layer of Spines in an auto-provisioned CLOS topology.

The PE Leaf Routers handle service termination and the Spines provide aggregation and connectivity to the core of the provider network. The leaves can be scaled out horizontally to increase the number of connections supported on the PoD, providing a pay-as-you-grow architecture.

*Large-scale PE Router architecture*

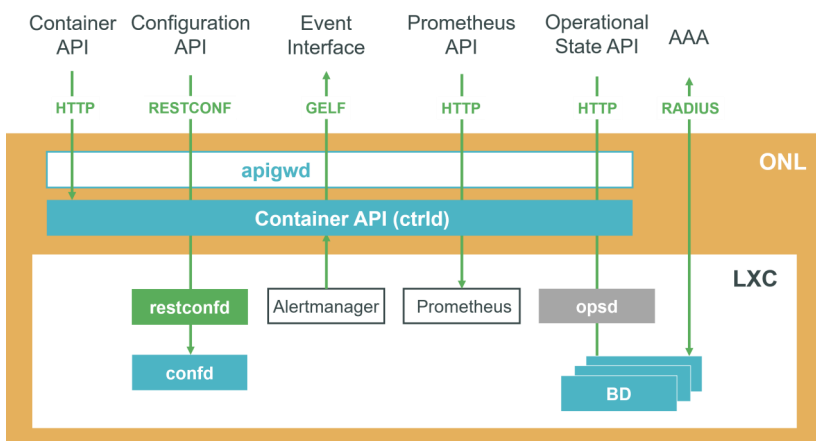


## Service Migration

Your RtBrick PE Router can also act as a service cross-connect, routing each customer connection to the appropriate network infrastructure and extending the life of your legacy platforms. You can re-use your existing infrastructure to continue to provide lower volume legacy services, and optimize the rest of the network for the bulk of your traffic - providing large volumes of high bandwidth services at a lower cost-point with a web-scale operating environment.

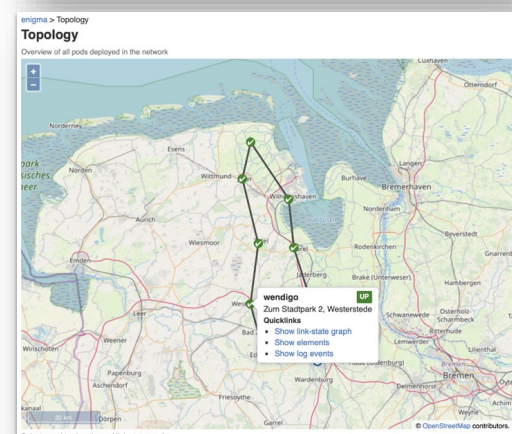
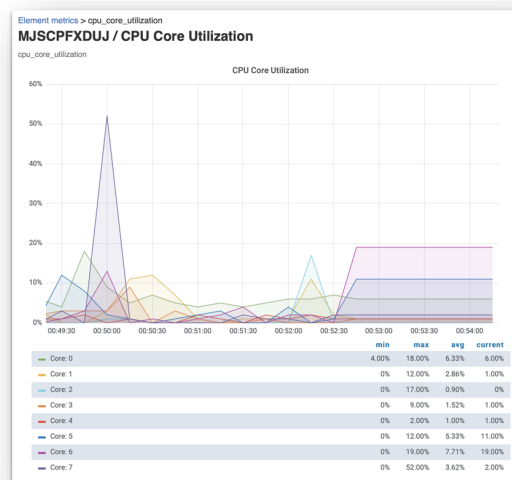
## Management and Operations

RtBrick's Management API has been designed to simplify the integration with your existing OSS and BSS systems. It reduces the amount of time and effort required to make your disaggregated network operational, and it leverages widely-adopted industry tools and programming languages. RtBrick's API is 'consumer-driven' - which means you can use the formats and languages of your choice, rather than have them imposed on you by a vendor. This allows you to build a client in Python, Go or Java, for example, as you prefer. And the APIs are all edited in Swagger, which is also a widely understood tool used by developers.



As an alternative to integrating directly into your own OSS system, you can use the RtBrick Management Suite (RBMS), which is an 'off-the-shelf' client that we have built using our own Management API. It is available to you as open-source software. It can be used as a standalone system for software management, ZTP (Zero-Touch-Provisioning) and switch inventory. Or you

*RtBrick Management System example screenshots*



## RtBrick PE Router Features

The following list may include some roadmap features—please check with us for the latest details.

Feature	Description
Base OS	<ul style="list-style-type: none"><li>• RBFS Linux container based on <b>Ubuntu 18.04 LTS</b></li></ul>
Supported Hardware	<ul style="list-style-type: none"><li>• <b>Delta</b>: AGCVA48S</li><li>• <b>Edgecore</b>: AS7946-30XB</li><li>• <b>UfiSpace</b>: S9500-22XST, S9600-32X, S9600-72XC, S9510-28DC</li><li>• Containerized deployment on x86 servers with DPDK interfaces</li></ul>
L3 Protocols*	<ul style="list-style-type: none"><li>• <b>BGP</b> - RFC 1771, 2385, 2545, 2918, 3107, 4271, 4364, 4456, 4486, 4659, 4760, 4798, 4893, 5065, 5492, 5549, 6513, 6608, 6793, 7313, 7911, 8092, draft-walton-bgp-hostname-capability-02, draft-kumar-idr-link-local-nexthop-02, draft-ietf-idr-bgp-prefix-sid-27</li><li>• <b>OSPF</b> - RFC 2328, 3137, 3509, 4136, 4576, 4577, 5185, 5250, draft-ietf-ospf-segment-routing-extensions-24</li><li>• <b>ISIS</b> - RFC 1195, 3277, 3787, 5301, 5302, 5303, 5304, 5306, 5308, 6130, 7775, 7794, ietf-isis-segment-routing-09</li></ul>
User Interface	<ul style="list-style-type: none"><li>• CLI</li><li>• RBFS REST API</li><li>• RBMS</li></ul>
RBMS RtBrick Management System	<ul style="list-style-type: none"><li>• Image Lifecycle Management</li><li>• ZTP</li><li>• Monitoring</li><li>• Log &amp; Event Management</li><li>• REST API</li></ul>

\*RFC and draft compliance partial except as specified