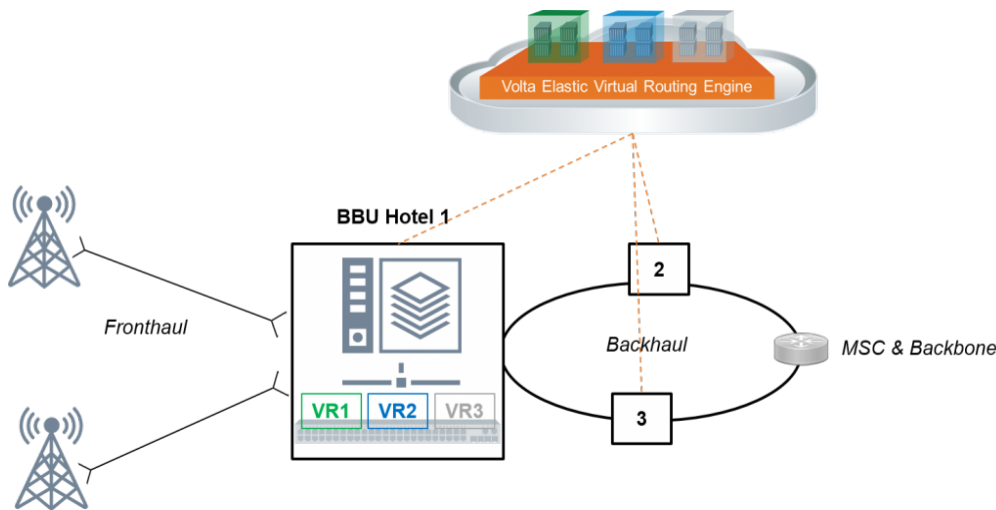


Mobile Backhaul Evolution

Mobile backhaul is both a critical infrastructure element for wireless service providers and a key source of revenue for fiber and infrastructure providers. It is poised for major changes as small cell sites with disaggregated base stations become the norm. C-RAN and 5G will require a different network topology. Base station disaggregation moves Baseband Units (BBUs) to “BBU hotels” where they will run as software as Virtual Network Functions (VNF) before connecting to the backhaul side to reach the backbone and MSC.

Virtual routers will be key to handling multiple functions in this architecture while providing for segmentation of applications and/or customers. Legacy routers are both expensive and limited in how they can be virtualized. Legacy vendors have responded to customer pressure to disaggregate their software from their proprietary hardware. Innovations like DPDK allow the routing software to run as VNFs on x86 based servers. However, the cost for an x86 server capable of running just one instance of the software with two 10GE NICs can run several thousand dollars which effectively increases the price per port. As routers must deliver more services over more ports with larger configurations, many more instances of the routing software along with server hardware will be required, creating a bottle neck in service delivery. Providers need a way to lower the per port cost of the data plane and scale out the control plane.



Virtual routers on white box switches connects VNFs at the edge.

The port cost can be addressed by using white box switches. For the price of one server with two 10 GE NICs, a white box switch will have 48 10 GE ports as well as higher speed uplinks. This is ideal for aggregating multiple *fronthaul* connections from the BBU VNFs, connecting to both the CO network and the *backhaul* network. By providing cloud-native networking software running on a public or private cloud infrastructure, Volta enables network operators to virtualize and scale out the control plane using the most cost-effective means of adding processing and memory. Each virtual router runs the bulk of the control plane in the cloud so processing can

scale cost effectively. This approach has a separate instance of the routing protocols for each virtual router, enhancing scalability, reliability and customization of each virtual router. Volta supports up to 255 separate virtual routers on a single 1U white box switch. In this multi-tenant scenario, each virtual router is a separate set of processes in the cloud as its own administrative domain that is configured to meet a given customer's exact requirements. It significantly simplifies service creation and provisioning by having a separate configuration file for every customer. This all leads to faster service delivery, as well reducing the errors in the process. Volta's networking service library is delivered as Python library, or as YANG (RFC 6020) data model, that simplifies integration into network operator OSS and BSS.