Virtual Network Functions Bring Cost-Effective Agility to Network Infrastructure Deployments

In today’s digital world, business agility means IT agility. That’s why companies have invested heavily in cloud computing and server virtualization. Unfortunately, it won’t matter how fast you can spin up new applications if required changes to your network infrastructure takes weeks or even months.

In traditional networks, specific functions require specialized hardware, typically proprietary, usually from different vendors. Routers, firewalls, WAN accelerators — each demand unique and costly skill sets to configure and manage. When changes are required, they need to be made manually, box-by-box, often across geographies, which is time-consuming and prone to human error.

But what if you could deploy any combination of these functions on one general-purpose piece of hardware? And you could configure and manage them via software, in a streamlined and centralized manner? That’s the idea behind Network Function Virtualization (NFV) technology.

NFV removes a major barrier to business agility by virtualizing key network functions so they can be deployed quickly in software running on industry-standard, high-volume servers. By deploying software-based virtual appliances known as Virtual Network Functions (VNFs), instead of hardware, you minimize the time, labor, and cost associated with buying, installing, configuring, and maintaining separate, physical and proprietary network equipment.
Discover the Real Benefits of Going Virtual
Enabled by NFV and backed by AT&T network cloud platform, AT&T FlexWare solutions will take you to the next wave of networking and help you transform how you manage your network infrastructure by delivering speed, flexibility, simplicity, and a lower total cost of ownership.

AT&T-certified VNFs, known as AT&T FlexWare Applications, run on industry-standard x86 servers that we call the AT&T FlexWare Devices. You can run up to 4 FlexWare Applications on a single medium device and up to 2 FlexWare Applications on a single small device, mix and match applications based on capabilities you need at each location, and logically connect applications together via service chaining and orchestration. This not only simplifies and streamlines deployment and management of your network, but can lower capital expenses, reduce power and cooling requirements, and increase operational efficiency.

Best-in-Class Vendor Ecosystem
AT&T FlexWare Applications are designed to integrate seamlessly with your current network infrastructure. To give you all the choice and flexibility you need, we continue to expand our FlexWare Application offerings and partner ecosystem. AT&T currently supports virtual routers, virtual security, and virtual WAN acceleration from the following best-in-class vendors.

AT&T FlexWare Benefits
- Faster application deployments – hours not weeks; days not months
- Reduced number of hardware appliances to buy and manage
- Ability to mix and match applications, features, and management options based on changing business need
- Streamlined network operations and management
- Simplified vendor management
- Reduced need for proprietary solution skill sets
- Decreased break-fix downtime
- Lower total cost of ownership

Management Benefits
- Single point of contact (24x7x365)
- Configuration
- Proactive fault management
- Hardware/software fault monitoring
- Fault recognition
- Trouble isolation
- Problem resolution
- Issue tracking
- Interface with maintenance vendors
- Maintenance
- Equipment repair/replacement
- Break/Fix SLA – 24x7x4
- SLA Reporting-Business Center
- Change management

To learn more about AT&T FlexWare, visit www.att.com/FlexWare or have us contact you.
Activate New Routers in Days and Make Changes in Minutes

Virtual routers from Cisco and Juniper
You can choose virtualized router network applications from either Cisco or Juniper, with options based on your unique feature and cost requirements. As an AT&T managed option, our highly experienced professionals will automatically configure your virtual routers on your FlexWare Device to match your company’s policies. You can choose from a standard set of templates or build your own, including AT&T-provided configuration, monitoring, fault management, maintenance, reporting, billing, and changes.

Today, the virtual router applications work with AT&T VPN service. The following AT&T- and/or customer-managed architectures are supported:

- Virtual router
- Virtual router with customer-managed virtual security
- Virtual router with AT&T-managed virtual WANx
- Virtual router with customer-managed virtual WANx
- Virtual router with customer-managed virtual security and AT&T-managed virtual WANx
- Virtual router with customer-managed virtual security and customer-managed virtual WANx

Deploy Virtual Security and WANx Applications to Protect and Optimize Your Network

Virtual security from Fortinet
Virtual security is a software instance of the Fortigate Unified Threat Management (UTM) platform from Fortinet, an industry-leading security provider. This virtual security application handles all the capabilities of hardware-based firewalls, without all the cost – including traffic inspection, malware protection, web browsing control, and application-specific security. At this time, the Fortinet virtual security is customer-managed only. It can also be deployed as a stand-alone FlexWare Application on a FlexWare Device cascaded behind an existing traditional router.

Cisco CSR and Juniper vSRX Router applications
Key Features
- IP Versions (IPv4, IPv6, IPv4 & IPv6)
- Static Routing
- Routing Policy
- RIP, OSPF, IS-IS, EIGRP* and BGP Routing Protocols
- Class of Service (COS) options
- Network Address Translation (NAT)
- Multicast
- Dynamic Host Configuration Protocol (DHCP) Server and Relay
- Proxy Address Resolution Protocol (ARP)
- VLAN Selection on LAN Interfaces
- Access Control Lists (ACLs)
- Logging, Reporting and Monitoring
- Licensing – AT&T

*EIGRP Cisco only feature

vRouter System Requirements

<table>
<thead>
<tr>
<th>vRouter Configuration</th>
<th>vCPU</th>
<th>RAM (GB)</th>
<th>Storage (GB)</th>
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Virtual Security System Requirements

<table>
<thead>
<tr>
<th>FortiGate Software Version</th>
<th>vCPU</th>
<th>RAM (GB)</th>
<th>Storage (GB)</th>
<th>Virtual Domains</th>
<th>Throughput (Mbps)</th>
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Virtual WANx from Riverbed
The virtual WANx is a software-based WAN Accelerator from Riverbed that, depending upon the options you choose, has all the capabilities of Riverbed's hardware appliance. All traffic is inspected by the virtual WANx so granular policies can be written based on your specific needs.

The virtual WANx can be AT&T or customer-managed. Premium Services includes:
- Caching/Compression
- TCP Optimization
- Layer 7 Optimization
- SSL Optimization

AT&T-managed service customers can opt for the Basic Service, which includes:
- Caching/Compression
- TCP Optimization
- Caching/Compression
- Layer 7 Optimization

Riverbed Virtual WANx System Requirements

<table>
<thead>
<tr>
<th>vRouter Configuration</th>
<th>vCPU</th>
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<th>Data Storage (GB)</th>
<th>Throughput (Mbps)</th>
<th>Max Connections</th>
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*VCX 1555, VCX5055 and VCX 7055 will be supported at a later time.

For more information contact an AT&T Representative or visit www.att.com/FlexWare

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