

## Network Function Virtualization

The **TOWARDEX® Network Function Virtualization (NFV)** product is a hosted solution (“NFV as a Service”) that allows you to quickly deploy your WAN architecture for small to medium traffic applications, without having to install a physical bare metal router. Leveraging leading software-based virtual routers and our IP network architecture offering lowest latencies in the market, your WAN router is hosted at the fastest performing network available for virtualizing any network functions — all you need is a cross-connect and a LAN switch to plug into your hosted virtual WAN router.

### Network Virtualization is Here.

Rent a virtualized router at our fastest performing IP network.

Boston’s startup business community continues to demand creativity and agility to fuel their business growth and accelerate their time to market. Businesses are increasingly looking to virtualize their data center infrastructures as a means to lower cost, increase flexibility and save time. **By the virtue of placing everything on the cloud, the next logical step is to also virtualize your organization’s wide area network functions.**

In most enterprise networks, WAN segments have the lowest traffic requirements in contrast to their campus and data center network deployments. For example, while it is typical for a campus or data center deployment to be running at 10G/40G or 100 Gig capacities, WAN connections on the other hand are typically sitting at only 1Gig or even less. For many small and medium-sized enterprises, WAN traffic requirements are even lower, typically less than 500 Mbps.

Because of low traffic requirements at the WAN segment, it does not always make sense to purchase physical routers and colocate them in a carrier hotel, when such architecture could become fully virtualized. Virtualization platforms today are fast enough to handle small to medium traffic applications typical of most enterprise WAN deployments.

### Product Overview and Benefits

The TOWARDEX® NFV service consists of a software router hosted in our compute data centers. It runs on our cloud architecture consisting of Cisco Unified Computing System (Cisco UCS) and Dell PowerEdge servers designed for high availability and scalability.

The NFV provides a single-tenant rented router in a virtual form-factor that delivers comprehensive WAN gateway functions for IP transit, site-to-site VPN and virtualized cross-connects to other carriers of your choice. By renting your WAN gateway in the cloud, you can lower your total cost of ownership and speed your time to market.

TOWARDEX® NFV service is available with your choice of **Cisco Cloud Services Router (CSR) 1000V**, **Juniper vMX**, **Ubuntu Linux** or **FreeBSD** for software router images. Customers can employ the rented virtual router for either virtualizing their WAN gateway functions at a data center, building an overlay network for VPNs, creating a lab network, or to run additional BGP route-reflectors for redundancy in their own network.

### Scenarios

The following is how you could use the TOWARDEX® NFV service in the cloud to virtualize your WAN functions:

- **Virtualized Carrier Hotel Headend (for up to 500 Mbps traffic):** The TOWARDEX® NFV offers you the ability to pull cross-connects from participating network providers and handle up to 500 Mbps of traffic without having to incur high costs of colocation. Cross-connects to participating network providers are available at significantly discounted prices. Connectivity to your virtualized router can be arranged through a participating dark fiber or Ethernet last mile (E-Line) provider.
- **Secure VPN gateway:** Through NFV Service, you can deploy secure route-based IPSec VPNs (DMVPN, GETVPN and FlexVPN) and SSL VPN access, enabling you to securely connect distributed sites to your cloud and campus environment. Because our Non-Stop Network® extensively peers with last mile providers and outperforms every other provider in achieving the lowest latencies, virtualizing your VPN gateway through our NFV Service makes the most ideal choice for performance.
- **Managed head-end (for up to 500 Mbps traffic):** Through our Enterprise Network Services (ENS), you can virtualize your WAN topology and rely on our expert engineers to help you make network design decisions. For customers requiring more than 500 Mbps traffic, physical colocation services are also available in conjunction with your virtualized network environment.

### Ordering Information<sup>2</sup>

| Model Number    | Description  |
|-----------------|--|
| NFV-BDL-50M-CO  | 50 Mbps NFV Hosted Router Bundle:<br>(1) Hosted Virtual Router instance – 50 Mbps Backplane<br>(1) 50 Mbps Premium Non-Stop Network® IP Transit<br>(1) 50 Mbps Amazon DirectConnect or (1) E-LAN/E-Line cross-connect to participating provider<br>(1) Cisco compatible 1000 BaseLX SFP for physical connection into customer LAN switch     |
| NFV-BDL-100M-CO | 100 Mbps NFV Hosted Router Bundle:<br>(1) Hosted Virtual Router instance – 100 Mbps Backplane<br>(1) 100 Mbps Premium Non-Stop Network® IP Transit<br>(1) 100 Mbps Amazon DirectConnect or (1) E-LAN/E-Line cross-connect to participating provider<br>(1) Cisco compatible 1000 BaseLX SFP for physical connection into customer LAN switch |
| NFV-BDL-500M-JU | 500 Mbps NFV Hosted Router Bundle:<br>(1) Hosted Virtual Router instance – 1 Gbps Backplane<br>(1) 500 Mbps Premium Non-Stop Network® IP Transit<br>(1) 100 Mbps Amazon DirectConnect or (1) E-LAN/E-Line cross-connect to participating provider<br>(1) Cisco compatible 1000 BaseLX SFP for physical connection into customer LAN switch   |
| NFV-BASE-100M   | 100 Mbps build-to-order NFV Hosted Router instance:<br>(sold separately) Choice of Juniper vMX, Cisco CSR1000V or free open-source operating system<br>(1) 100 Mbps Value Blend IP Transit<br>(1) E-LAN/E-Line cross-connect to participating provider; Amazon DirectConnect sold separately.  |

Figure 1. NFV Service positioned as a virtual carrier hotel router

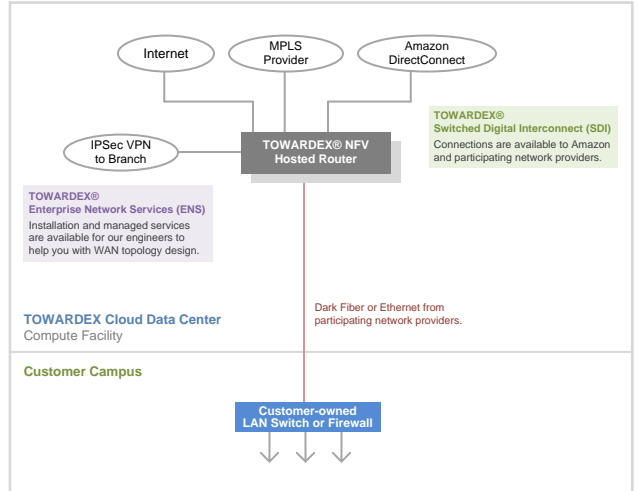
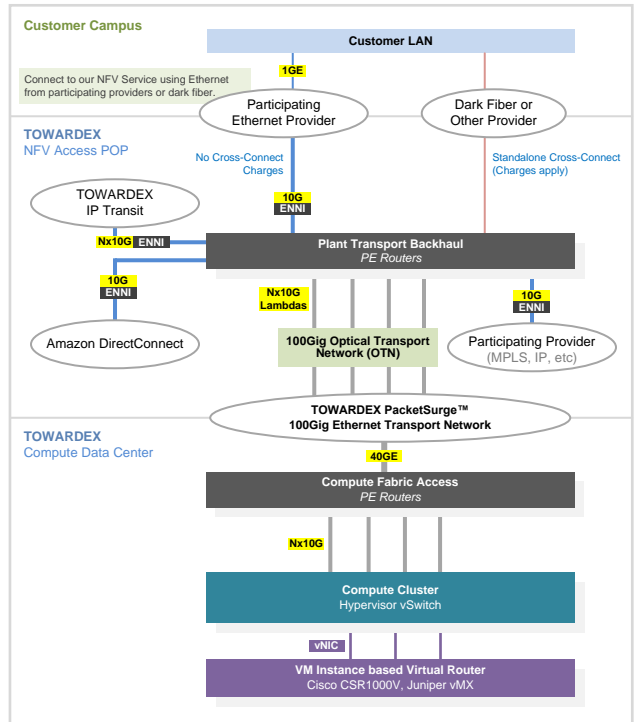


Figure 2. NFV Service Physical Topology

The TOWARDEX® NFV Service is delivered on a robust physical architecture designed to provide high availability and rapid scalability for upper layer virtualized routers in the stack. Using Carrier Ethernet technologies, our NFV Service provides nonblocking, high throughput capacity for up to 500 Mbps traffic per virtual router.



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<sup>2</sup> Contact your account representative for à la carte pricing on services, such as additional cross-connects and managed services. Additional cross-connect charges may apply to terminate incoming Ethernet or dark fiber connection from customer campus.