packetfabric

Network as a Service (NaaS)

An Operator's Guide

Introduction

Networks are critical to every Information Technology (IT) application today, whether it's a private enterprise application, a consumer application, or a cloud application. With the expansion into the cloud, wide-area networks (WANs) have become even more important, connecting data and applications across a variety of clouds and partner networks. At the same time, applications are becoming more reliant on connectivity to access real-time data. This has put increasing demand on networks to become agile, resilient, and automated.

The legacy model of WAN requires building a private data network or purchasing access from a service provider with a series of complex manual steps through both the business process as well as the technology infrastructure process. This is no longer compatible with today's modern applications, which require a streamlined and automated process driven by digital technology rather than pieces of papers and plugs.

Fortunately, there is a solution.

The modern Network as-a-service (NaaS) model is emerging, based on cloud-based software technologies, APIs, software-defined networking, and real-time provisioning. These new approaches and technology can streamline and speed up connectivity – reducing the time to deploy new services from months to hours, or in some cases, simply minutes. Just as consumer technology such as digital commerce and smartphones have enabled consumers to order goods and services on demand digitally, the NaaS model empowers businesses, enterprises, and organizations to get what they want, when they want it, minimizing the red tape and bureaucracy of the traditional service provider.

> In this NaaS Operator's Guide, we explore how these modern technologies can drive automation and agile configuration of a global virtual WAN – and why you need NaaS now.

01

Networking Frustrations in the Modern Age

Think of the last time you ordered a network – I bet there were a lot of frustrations. The networking industry is riddled with barriers and gatekeepers, almost none of them necessary. Most of these barriers are created by the business dynamics of the industry itself – ripe, as they say, for disruption.

Think about how you order a smartphone – you can simply order a phone online, receive it an overnight package, and then turn it on to have it automatically provisioned and connected by software. Or you can go to a service providers' storefront and do the same, usually in under an hour. There are far fewer manual steps than there were, say, even five years ago.

Why is it so hard to do this with an enterprise WAN? It's larger scale and more complicated technology for sure. But enterprise network connectivity is now entering a similar state of evolution, driven by software-based control. Software is eating the world, and software will soon enable far easier and faster provisioning of both local enterprise networks and WANs.

Networking Challenges

WAN Networking Challenges | NaaS Networking Solutions

Gatekeepers are slow to respond to requests and don't always provide direct information about services.
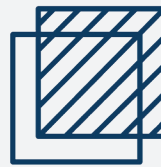
Self-Service
Transparent discovery and self-service provisioning.

Lock-in may leave you trapped in a long-term contract or proprietary technology.

Open
Interoperable equipment and APIs.

Technology complexity requires you to staff, train, and hire specialized experts to build a network.

Automation
Software-based management and automation.

Bureaucracy requires you to wait – possibly months – for complex contracts or approvals for activation.

Fast
Eliminate the middleman with a self-service model.

Waiting is the Hardest Part:

Frustrating Obstacles and Gatekeepers

It's likely that when provisioning a WAN, you have to wait. Or as Tom Petty said, "The waiting is the hardest part." This wait is not always due to the lack of services or even technology. Often, it may be due to the structure in the business process. Many legacy service providers require manual steps and human interaction to complete the process – some of which may not even be available. The network is there – it just needs software to provision it.

On the service provider side, challenges could range from service discovery to definition or simply lacking the manpower to process orders and contracts. Other frustrations can emerge. You may find out that the specifications of the service don't meet your needs, or that you will have to wait a long time and/or sign a long-term contract. Or perhaps there is complicated arrangement between a vendor and a service provider that requires you to buy new equipment, and that equipment may require yet another process or long wait time.

Do these scenarios seem familiar? Let's recap all the things that can go wrong in the legacy telecommunications services world.

1 Service Discovery Gatekeepers

Many service providers keep their services hidden under lock-and-key in a proprietary database. It may take them time to get back to you – or locate the service you are looking for. This may be because they own or lease the circuits themselves and need to investigate availability. Or it could be simply that you can't reach somebody on the phone. **But the bottom line is that it's hard to know if you don't have the capability to browse and discover services in real time.**

2 Propriety Technology and Lock-in

Both the service provider and the technology vendor are incentivized to lock you in, whether that's through contracts or proprietary technology. The advantage for them is simple – they want to retain you as a customer as long as possible. The advantage for the customer isn't clear. In fact, locking you up into long term contracts and inflexible technology platforms can be a major business liability.

You want freedom.

3 Specialized Technology Expertise

The main reason that businesses need to go through a service provider or an integrator to acquire a WAN services is that the technology and configuration is complex. This can also be a barrier to expanding the network. You may not have the right staff or expertise in house to manage the equipment used in the network expansion or reconfiguration. **If you need a specialized team to manage the network, either internally or externally, this is a barrier to the growth and success of your organization.**

4 The Paper Chase

Is there anything more frustrating than waiting for a paper contract? Most modern services are point-and-click, but the communications industry appears stuck on call-and-wait. **Modern service providers need digital business processes enabled by technology.**

> ❝ *Is there anything more frustrating than waiting for a paper contract? Most modern services are point-and-click, but the communications industry appears stuck on call-and-wait.* ❞
>
> *- PacketFabric Customer*

Solving the Roadblocks
with a Smart Roadmap

Now that we've identified the roadblocks and role of the gatekeeper, you are probably asking for solutions. They exist.

1 Eliminate the Gatekeepers –
Transparent Discovery and Self-Service Provisioning

It's time to eliminate gatekeepers. Wouldn't it be nice to browse, plan, and provision services yourself at a self-service portal? It's possible that the barrier is not the lack of access to a physical connection or network, but the lack of access to customer service. With the emergence of a new generation of alternative carriers Internet Carrier Exchanges (IXCs), Internet Service Providers (ISPs), and cloud providers, there may be somebody out there who can get you connected to the network faster. The key is for these next-generation service provider tools such as Web portals and self-service software to let you explore the potential services that are available – without a gatekeeper.

2 Use Open Equipment and Services

The cloud revolution has been fueled by an explosion of open software, hardware, and services. Where the legacy models are based on "closed," the cloud model is based on "open." More open customer premises equipment (CPE) is emerging to help customer avoid getting locked into one vendor or service. In addition, software-based network provisioning, such as that delivered by software-defined networking (SDN), is based on the premise that standard off-the-shelf OTT hardware can help you connect to a network. Although not all networks are moving to more open CPE, it's possible that you might be able to use open or existing equipment to connect to a cloud network, which is more open to flexible connection options. Or maybe, it's possible to eliminate the technology choice altogether – and use whatever you have.

3 Reducing Requirements for Network Expertise and Specialization

Cloud infrastructure and networks are based on the premise that by enabling software based provision and management, you can abstract away much of the complexity of the underlying infrastructure. Abstraction is a key concept that is easily conceptualized on the Web – often when you are browsing or ordering a specific service, complex calculations or database lookups are happening beneath the surface – but you don't have to know anything about them. All you know is that you are looking for something, and the machine is finding it for you. That is the key to the cloud and why NaaS is an exciting new model for delivering services.

4 Eliminating Paper and Middlemen

Is there anything more frustrating than waiting for a paper contract? Most modern services are point-and-click, but the communications industry appears stuck on call-and-wait. Modern service providers need digital business processes enabled by technology.

Futuriom spoke to several professional network managers to find out the key goals and need for NaaS. Several of them reinforced the point that they don't have time to wait months for networks to be provisioned.

> *I can't wait three months for services. Just to press buttons and go anywhere you want, it's compelling. I wish carriers were more like that.*
>
> *- PacketFabric Customer*

02

DIY, Managed Service, or NaaS:

How to Choose and Why It's an Easy Decision to Make

WANs are a critical component to the business infrastructure. They keep applications running, employees and partners communicating, and the business moving. But they also represent a significant cost – both a capital outlay and an operations perspective.

It's a classic business dilemma. Do you build it yourself or do you outsource? The network is no different. There are myriad details and complexities in running an enterprise WAN, ranging from equipment selection to security operations, troubleshooting, and monitoring.

But the world is changing. Cloud providers are building out huge networks and extending them closer to customers using Internet Connection points and colocation facilities. It's become easier than ever to tap into a large cloud network close to your facility and use virtualization techniques to build a scalable global WAN – often at a fraction of the price and much faster than building it yourself.

Let's take a look at the pros and cons of DIY vs. NaaS builds.

Do It Yourself (DIY)

In a do it yourself (DIY) model of networking, the IT, networking, and security teams cooperate to build a corporate WAN. This includes acquisition of relevant networking equipment and software, purchase of leased lines and Internet lines from service providers, and other networking devices and hardware such as security firewalls or load balancers.

Once up and running, all of these components must be managed and monitored, adding significant operational expense. For example, an organization needs to keep people on staff who are certified and trained in a wide range of equipment and software, including networking gear, security software and hardware, and service-provider interfaces. Monitoring and troubleshooting becomes a regular role that must be staffed appropriately.

☑ Pros:

Total control over the network and technology. Easily customizable.

☒ Cons:

Costs can escalate, especially operational costs. Networking vendors and service providers will try to lock-in end users to long-term supply contracts, resulting in less agility.

Managed Service

In a managed service, the organization buys a pre-packaged service and maintenance offering from a service provider. This can remove operational expense – at a cost. The managed service provider is usually a traditional service provider or Internet Service Provider (ISP) that provides its own monitoring, troubleshooting, and security tools and management. However, there may also be a premium built into the service, with the managed network services (MNS) provider selling connections at a high cost.

☑ Pros:

Alleviates the dependency on internal staffing and networking management. Can leverage a service provider's operational expertise.

☒ Cons:

Can be costly to operate. Long-term contracts are inflexible, and it may be difficult to switch providers for both last-mile and core network as the MNS is incentivized to keep you on their expensive networks.

NaaS

In a NaaS model, the organization may opt to build some local network services infrastructure in-house, but leverage the many cloud or NaaS options available. The organization may still have to manage its own local network and last mile connectivity, but it is no longer managing the WAN once connected to a local point-of-presence. That advantage of the NaaS model is speed, agility, and often cost -- WAN connections can typically be changed using point-and-click software implementations in the cloud, and changed based on growth and development conditions.

☑ **Pros:**

Alleviates the dependency on internal staffing and networking management. Flexible provisioning and service offerings.

☒ **Cons:**

Company does not "own" the network. May not be available everywhere.

Increasingly, it makes sense that more organizations will look at the NaaS approach. The reason is that many public cloud providers and co-location facilities are incentivized to provide cheaper access to bandwidth are in fact subsidizing that bandwidth as they fight for customer mindshare. And it's simply the right choice for right now.

In addition, innovations in enterprise networking tools such as software-defined wide area networking (SD-WAN) and multi-cloud networking software will make it increasingly easy to connect from the last mile to cloud networks. Internet transit connections in the core of the network – also known as the "middle mile" – have become much more efficient over time, providing cheap bandwidth with less of a performance penalty. Cloud providers can purchase dark fiber or large capacity at wholesale prices.

Streamlining Your WAN

Imagine an organization that has SD-WAN capabilities at the edge and connections to local POPs for NaaS and cloud services. This provides an affordable, global, and agile network at the fingertips of the network manager.

This will come in handy for extending enterprise networks to cloud POPs using transit gateways, which can help an enterprise leverage the cloud provider's networking infrastructure to build a global network. PacketFabric provides such functionality with instant software-provisioned network access to major cloud POPs. One network manager we spoke to at a Fortune 500 technology company – who asked not to be named – said the capability to extend the WAN using fast, software provisioned tools was revolutionary.

"There are just so many different use cases. PacketFabric has a nice interface and API for extending SD-WAN to a cloud POP. We can build up a circuit and get the BGP connectivity within a half an hour. It used to be two weeks. We do this on a daily basis. Bringing up more Google circuits every day – doing stuff in other Google Cloud Platform (GCP) regions. That is big."

One of the keys for this customer and others is being able to provision a dedicated connection on the fly. Using new SDN approaches such as VLAN, it's possible to create a dedicated networking connection – for example 100 Gbit/sec – when and where you want it.

> **" Bringing up more Google circuits every day — doing stuff to other Google Cloud Platform (GCP) regions. That is big. "**
>
> *- PacketFabric Customer*

03

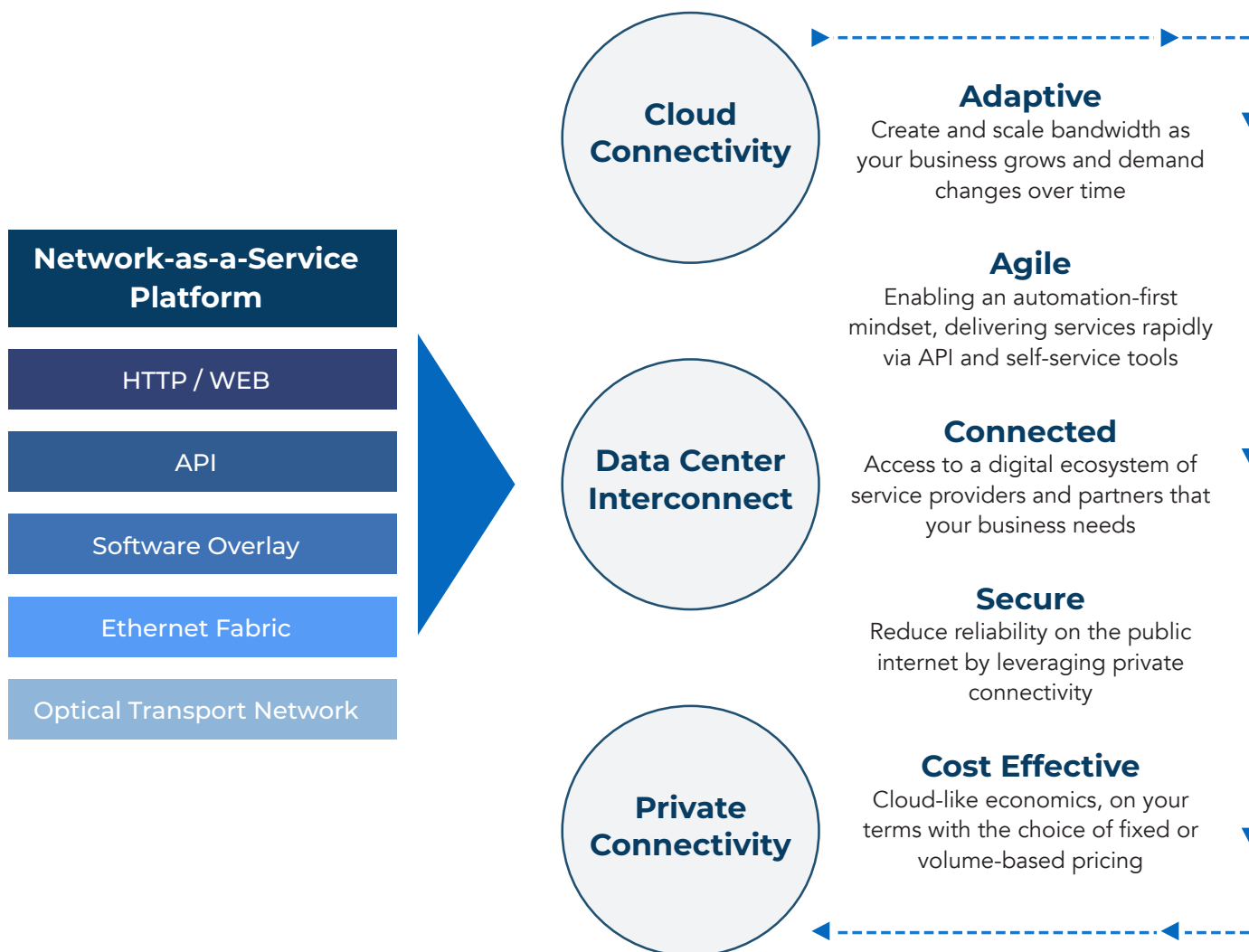# Key Elements of a Multi-cloud NaaS Solution

If you look at the evolution of the software as-a-service (SaaS) model in the enterprise, it was driven by the ease of use self-serve nature of ordering and connecting to new services in the cloud, as well as economies of scale. Similar trends applied to the Infrastructure as-a-service (IaaS) market, in which the major public cloud providers build major infrastructure of their own, which they then rent out to customers, potentially lowering the cost of the infrastructure itself.

The NaaS market is no different. Why build a network yourself when a larger provider can do it at a lower cost and then offer you access? The challenge in the past has been in ordering, managing, and provisioning services.

But using software-based provisioning, customers can quickly access networking infrastructure that is offered by a variety of networking specialists including IXCs, ISPs, cloud providers, and traditional service providers. As the diagram on the next page shows, a self-provisioned NaaS can be used to instantly create a global WAN using a variety of resources, including public cloud networks, private security services, dedicated Internet connectivity, IXCs, and traditional service providers.

A Modern Approach

Network-as-a-Service Platform

HTTP / WEB

API

Software Overlay

Ethernet Fabric

Optical Transport Network

Cloud Connectivity

Data Center Interconnect

Private Connectivity

Adaptive
Create and scale bandwidth as your business grows and demand changes over time

Agile
Enabling an automation-first mindset, delivering services rapidly via API and self-service tools

Connected
Access to a digital ecosystem of service providers and partners that your business needs

Secure
Reduce reliability on the public internet by leveraging private connectivity

Cost Effective
Cloud-like economics, on your terms with the choice of fixed or volume-based pricing

Traditional operators still control the bulk of the "last mile" – broadband Internet into buildings and/or homes. But the core Internet and cloud infrastructure has opened up markedly. Data colocation providers have built out thousands of hosting POPs. Internet Exchange players connect into these facilities have built high capacity fiber connections between them. And the public cloud players have also built out tens of billions of dollars of infrastructure, including fiber links and interconnection points, that can be leveraged by the enterprise.

Instant Access to Global Infrastructure

The key to connecting to this infrastructure is straightforward: customers need better access to the infrastructure via automated software orchestration and provisioning – through a Web portal. The customer interface in the past has been the point of friction for network services, as customers wait for gatekeepers at service providers to provision and control access. With modern SDN techniques, there is no reason why service provisioning can't be handled over directly over to customers – just as customers control their own ordering over the consumer Web.
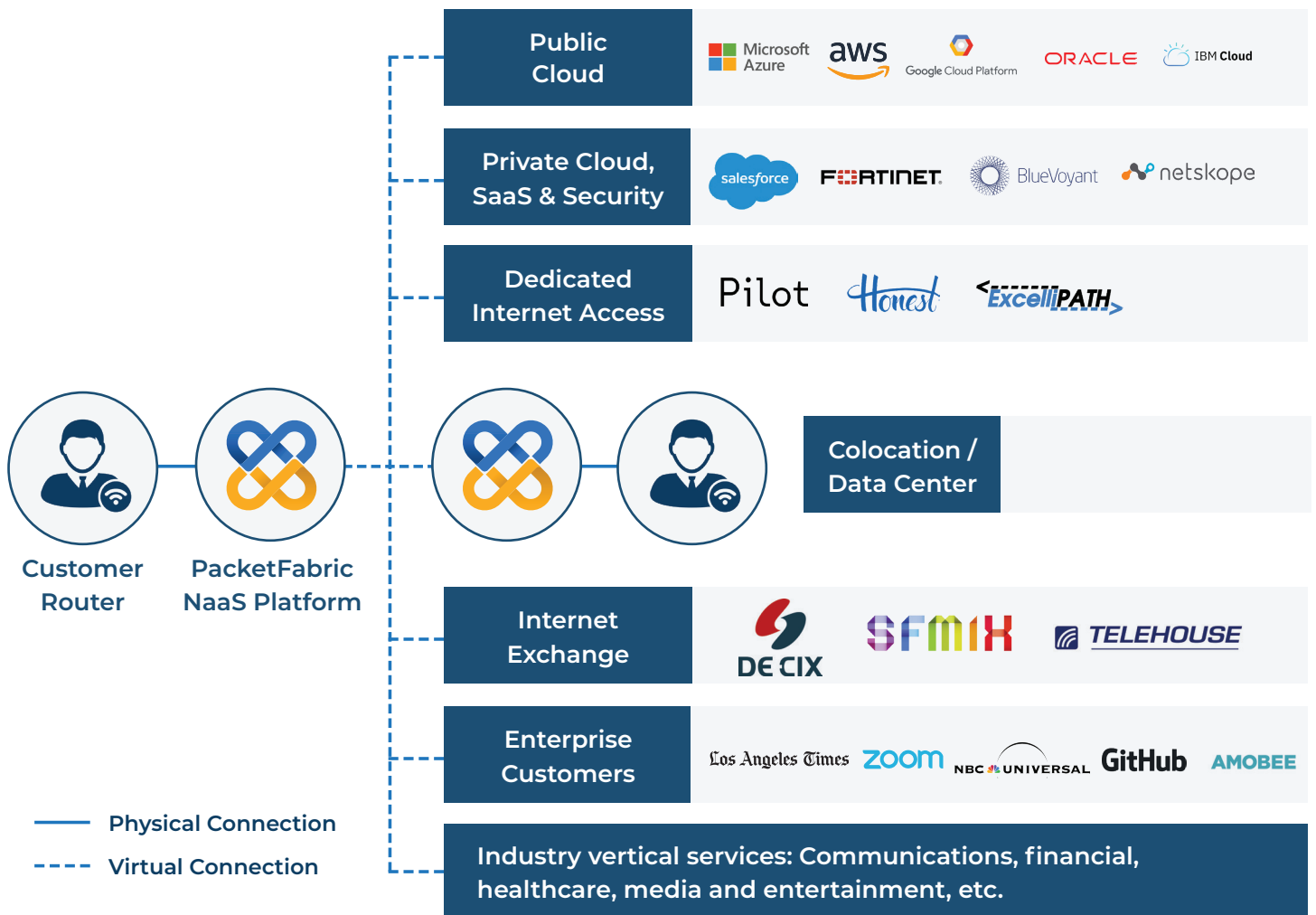
Several technology trends over the past few years have made this possible:

- Hardware and software APIs have made it easy to build multi-platform provisioning Web portals.

- Public cloud API gateways enable real-time provisioning of cloud bandwidth and services

- Standardized services such as carrier ethernet have become more ubiquitous

> *The key to connecting to this infrastructure is straightforward: Customers need better access to the infrastructure via automated software orchestration and provisioning — through a web portal.*

Instant Access to Global Infrastructure

How it Works:

Customer Router — **PacketFabric NaaS Platform**

—— Physical Connection

- - - Virtual Connection

Public Cloud
Microsoft Azure | aws | Google Cloud Platform | ORACLE | IBM Cloud

Private Cloud, SaaS & Security
salesforce | FÜRTINET | BlueVoyant | netskope

Dedicated Internet Access
Pilot | Honest | ExcelliPATH

Colocation / Data Center

Internet Exchange
DE CIX | SFMIX | TELEHOUSE

Enterprise Customers
Los Angeles Times | ZOOM | NBC UNIVERSAL | GitHub | AMOBEE

Industry vertical services: Communications, financial, healthcare, media and entertainment, etc.

Key Use Cases

The explosion of cloud applications has put new demands on the WAN. The Web-provisioned NaaS can solve many immediate challenges in enterprise data connectivity, cloud connectivity, and hybrid cloud connectivity.

Below are some examples of the emerging use cases of the on-demand NaaS.

1 Activating Data Center Interconnect

Customers can use self-service tools to order direct connections between data centers in geographically diverse POPs. This can include building redundant, highperformance fiber connections with the click of a button using a software interface – provisioned in minutes or hours rather than days or months.

2 Providing Network Support for Distributed Applications

Some applications built in the cloud may be highly distributed and complex, requiring connectivity to many endpoints, data centers, and public cloud services. A NaaS can be used to connect distributed infrastructure in colocation facilities across geographic regions and metropolitan areas, cost effectively and with instant scalability.

3 Building Hybrid Cloud

Customers may want to establish private connectivity between IT infrastructure hosted in a multi-tenant data center or applications and databases hosted in the public cloud. This requires setting up private circuits between co-located enterprise data centers and the cloud services. Using a NaaS with footprints in the POPs of the cloud services, connections can often be built on demand using a cloud-based NaaS.

4 Providing Private Connectivity and Internet

Cloud-based NaaS can be used to connect to the services and partners using a dynamic, virtualized network. The system can use API and self-service management to manage services. They can be used to increase the reliability of private connectivity. For example, this could be used to connect to IXCs to improve performance and gain more control of the path over private Internet transit.

Conclusion

Planning NaaS - A Call to Action

With the expansion of distributed cloud applications, the capability to manage dynamic NaaS infrastructure with customer-driven, software-based provisioning will become more important. Organizations can't roll out modern cloud-based applications without a network that can scale and adapt to their realtime needs.

In order to plan for network operations in the multi-cloud and hybrid cloud world, it's important to ask some key questions about NaaS operations going forward:

- Will the network be multi-cloud, hybrid cloud, or connected to distributed cloud applications?

- What provisioning times and dynamic network capabilities will be needed in the network environment going forward?

- Is the organization implementing SD-WAN, Network Functions Virtualization (NFV), or other virtualized networking services they may demand dynamic bandwidth?

- Has your service provider and/or cloud operators detailed network expansion and cloud connectivity plans for the future?
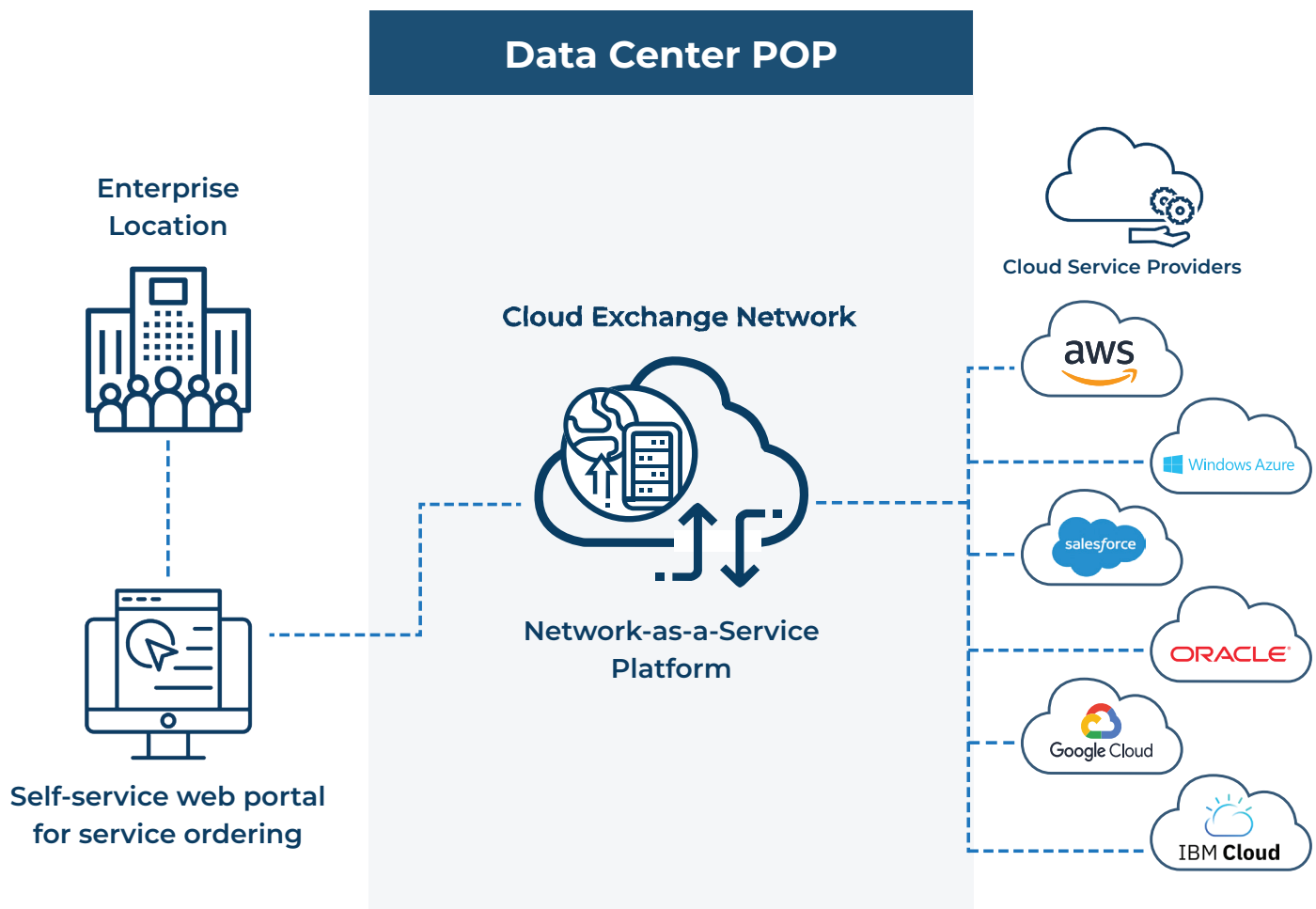
As multi-cloud and hybrid cloud operations expand, it's important that organizations have an action plan to build networking infrastructure that can support the next wave of IT. Cloud-based distributed applications are going to tax the network more than ever before, and IT and network managers need to be ready with a resilient, scalable network that can respond according to demand.

By using software-managed NaaS, enterprises and organizations can build direct connectivity to any cloud service on demand, using existing POPs. This is a powerful model, enabling network managers to build virtual networks that leverage existing cloud network resources without deploying new hardware. We call this a Cloud Exchange Network, a diagram of which can be seen on the next page.

NaaS:
Cloud Exchange Network

Data Center POP

Enterprise Location

Cloud Exchange Network

Network-as-a-Service Platform

Self-service web portal for service ordering

Cloud Service Providers

aws

Windows Azure

salesforce

ORACLE

Google Cloud

IBM Cloud

The Cloud Exchange Network is the model of the future, whereby network connectivity can be managed on demand to meet customer needs, using software. This enables the end users to manage a variety of networking platforms and connections, leveraging vast public cloud POPs and resources from a single screen.

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To Join the NaaS Revolution Contact:

Sales@PacketFabric.com

About the Author: R. Scott Raynovich

R. Scott Raynovich is the Founder and Chief Analyst of independent technology research firm Futuriom, where he directs and supervises technology coverage. He has been a technology writer, analyst, and publisher for two decades. In the past he was the Editor in Chief of Light Reading, where he worked as a partner for eight years. He helped develop the research brand Heavy Reading, where he wrote and edited the first reports, and he was also the Founder of the Rayno Report, which was sold to SDxcentral.com, where he became VP of Research. He has won several industry awards, including an Editor & Publisher award for Best Business Blog. His analysis has been featured by prominent media outlets including NPR, Bloomberg, CNBC, The Wall Street Journal, and the San Jose Mercury News.

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