Point of View

# Peering under the hood

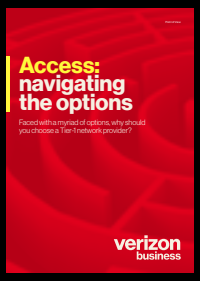
An introduction to network peering and how it can affect application performance.

verizon business

Many businesses now depend on public cloud services for mission-critical operations—both software as a service (SaaS) applications like SAP and their own apps hosted on services like Microsoft Azure or AWS. Therefore, the ability of your network to access cloud services securely and reliably is essential.

As I explained in my earlier paper (Navigating the options for enterprise access), the internet is made up of thousands of individual networks that are interconnected to provide reach. At its core are the 15 Tier-1 network operators that provide the global backbone. These operators agree to exchange traffic with each other free of charge. This concept is critical to the internet and all the private networks that operate over it functioning. The places where traffic is exchanged are called peering points. As well as peering with other network operators, network providers often peer with cloud service providers.

Verizon is a Tier-1 operator and peers with most of the major hyperscalers and SaaS providers in multiple locations around the world—our minimum peering requirement is four geographically-diverse points. In this document, we'll show how we can give you greater visibility of how peering performance is affecting your network, and consequently, application performance. As the interactive map below shows, we have both public and private peering points spread across the world.




## Navigating the options for enterprise access

This other paper from this series gives insight into how the choice of provider can have a huge impact in terms of performance and outcomes for your business. This is especially important for latency-sensitive applications, such as many AI use cases.

15-minute read

Verizon operates one of the most expansive, high-performance networks in existence.

**500+**
Peering points.

**1M+**
miles of fibre.

**20+**
Peering points with leading cloud providers.

**9**
Network (NOCs) and security operations centers (SOCs).

## Verizon peering locations around the world

### Americas

Brazil: San Paolo
Canada: Calgary, Montreal x 2, Toronto x 2, Vancouver.
Mexico: Mexico City, Monterrey.
U.S.: Ashburn x 3, Atlanta x 4, Austin x 2, Baltimore, Boston x 4, Buffalo x 3, Charlotte, Chicago x 4, Cleveland, Dallas x 3, Denver x 2, Detroit, Hartford, Hilliard, Hillsboro, Honolulu, Houston x 2, Indianapolis, Irving, Jacksonville x 2, Kansas City, Kennersville, LA x 3, Las Vegas, Memphis, Miami x 2, Minneapolis x 2, New Orleans, New York x 5, Newark x 2, North Royalton, Orlando, Palo Alto, Philadlephia x 3, Phoenix, Piscataway, Pittsburgh x 2, Raleigh, Rialto, Richmond x 2, Sacremento, Salt Lake City, San Antonio, San Diego, San Francisco x 2, San Jose x 4, Santa Clara, Seattle x 4, St Louis x 2, Tampa, Torrance, Vienna x 2, Washington, Waynesville.

### EMEA

Austria: Vienna x 2.
Belgium: Brussels.
Czechia: Prague.
France: Paris x 2.
Germany: Frankfurt.
Greece: Athens.
Ireland: Dublin.
Italy: Milan.
Netherlands: Amsterdam.
Finland: Helsinki,
Norway: Oslo.
Portugal: Lisbon.
Spain: Madrid.
Sweden: Stockholm.
Switzerland: Zurich.
London,

### Asia-Pacific

Australia: Sydney.
Hong Kong: Hong Kong.
Japan: Tokyo x 2.
New Zealand: Auckland.
Singapore: Singapore x 2.
South Korea: Seoul.
Taiwan: Taipei

## The need for agility

It has become a cliché to say that change is the norm. But, like many clichés, it has become one because it's true. There are many events, internal and external, that mean that businesses and IT teams must remain agile, including:

**Political changes**

- Relationships between countries can change leading to changes in trading conditions, including tariffs, shifting demand.
- Attitudes can change—such as globalisation falling from favour and protectionism and trade barriers increasing, leading to shifting demand and process changes.

**Economic changes**

- Demand can rise and fall quickly when new opportunities are seized and the competitive landscape changes.
- New markets can open up and the relative of importance of existing regions change with shifts in consumer taste and political and economic policies.

**Internal changes**

- Mergers and acquisitions mean data and systems need to be integrated with existing systems .
- Divestments mean data needs to be isolated.
- Sites are opened, expanded and some times closed.

**Technological changes**

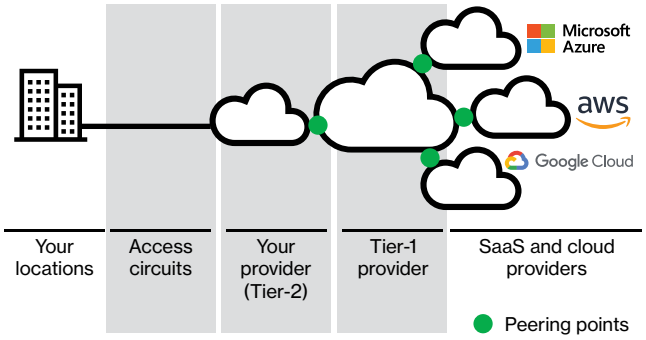
- New projects are started and others come to an end.
- New technologies and applications need to be deployed.
- Applications are updated, refactored and increasingly moved between cloud operators.

**Legal changes**

- Regulatory changes can force organisations to change operational structures and business processes.

To maintain the performance, stability and security of your existing and future applications, your business will need visibility of the performance of these peering points and whether your network provider has direct access or is dependent on other network operators to reach them.

When procuring a new network, it's important to consider the peering arrangements that exist between the potential providers and the relevant hyperscalers and SaaS providers—not just the ones that you use today, but also the ones you may want to use in the future. Most Tier-1 network providers will claim they have direct access to the operators, however the questions you need answering are to which of these cloud operator sites are they connected and what they can share with you on the performance of the access to these individual locations, where your processing takes place.




The recent trend towards using microservices and containers to accelerate application development and make applications more scalable means that applications are now often spread across multiple locations and even different cloud providers. Indeed, increasingly developers want to move workloads and data around to get the best value and performance.

This makes the performance and manageability of the network even more important. It must be able to support moving large amounts of data quickly and flexible enough to adapt virtually instantly as the application architecture—where data is stored and where processing is being done—is changed. It's important that your network provider gives you visibility of the reliability and speed of its peering with each cloud operator.

## The importance of visibility

Historically, when a network was procured and installed over a period of time and the only changes were potential increases in bandwidth or implementation of new sites. The network design was largely static, with only minor changes.

Today, and even more so in the future, businesses require a network provider that can give them visibility of the performance of the network for specific cloud/hosting providers, or SaaS providers. This information empowers them to make immediate changes to the network if specific applications are not performing in the right way.

Verizon can give you detailed data specific to the performance of your applications in your business.

Network providers in lower tiers are usually reliant on peering with a Tier-1 operator, such as Verizon to reach the hyperscalers and therefore lack visibility of detailed performance information—they can see up to the peering point, but not between the peering point and the hyperscaler.

Resolving these issues may involve changing settings to mirror applications in additional locations to improve performance in specific territories. In extreme circumstances, it may necessitate a discussion between your network provider and the IaaS/SaaS provider to strengthen their peering. This is more likely if your network operator is a smaller, Tier-2 or Tier-3 operator. Tier-1 operators, like Verizon, are likely to have extensive relationships with all the major hyperscalers and data centre companies you may consider using.


**Supercharge your AI**

This other paper from this series discusses the role of the network in successfully deploying AI and other latency-sensitive applications to enable real-time decision making and responsive experiences.

15-minute read

# Verizon's approach to peering

As a leading provider of public internet transit services, Verizon has built out one of the world's largest high-performance, high-reliability internet backbones. To improve performance and deliver our customers' data as efficiently as possible, we interconnect with many leading operators (which equates to hundreds of regional and national networks) in more than 32 countries. These extensive peering relationships enable us to provide unparalleled reach, including direct connectivity to more than 65 countries worldwide. They are also critical to our ability to provide reliability and exceptional end-to-end performance.

## Not all peering is the same

Verizon has extremely high standards for resiliency and performance. To maintain these, we set high standards for our peering relationships. Our minimum standard for a peering partnership is four geographically diverse interconnection points. This helps mitigate issues to avoid outages and maintain application performance.

To help avoid congestion at peering points, we proactively augment capacity to maintain throughput to other Tier-1 network operators, public cloud providers, SaaS providers and OEM providers.

As a Tier-1 operator, we can give customers specific information on performance to each individual site across their network. This enables granular understanding of application performance and where there may be bottlenecks. A representation of this type of data is shown below. Detailed information like this can be of great value in helping to maintain application performance.

| City | Report | Destination | Jun-24 | Jul-24 | Aug-24 | Sep-24 | Oct-24 |
|---|---|---|---|---|---|---|---|
| Buenos Aires | AWS | US-EAST-1-BUE-1 | 1.2 | 1.2 | 1.1 | 1.2 | 1.3 |
| Melbourne | AWS | AP-SOUTHEAST-4 | 23.5 | 23.4 | 24.2 | 23.8 | 23.8 |
| Sydney | AWS | AP-SOUTHEAST-2 | 2 | 2 | 2 | 1.9 | 2 |
| Sao Paulo | AWS | SA-EAST-1 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |

| City | Report | Destination | Jun-24 | Jul-24 | Aug-24 | Sep-24 | Oct-24 |
|---|---|---|---|---|---|---|---|
| Melbourne | Zscaler | Melbourne | 24 | 23.3 | 23.2 | 24 | 24.2 |
| Sydney | Zscaler | Sydney | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Vienna | Zscaler | Vienna | 13.1 | 13.4 | 12.9 | 12.9 | 13.5 |
| Diegem | Zscaler | Brussels | 7.5 | 7.3 | 6.9 | 6.9 | 7.5 |

| City | Report | Destination | Jun-24 | Jul-24 | Aug-24 | Sep-24 | Oct-24 |
|---|---|---|---|---|---|---|---|
| Braddon | Azure | Australia Central | 9.7 | 9.7 | 9.8 | 9.7 | 9.5 |
| Melbourne | Azure | Australia Southeast | 26.1 | 25 | 25.4 | 24.6 | 26.3 |
| Sydney | Azure | Australia East | 1.9 | 1.9 | 2.2 | 2.3 | 2.3 |
| Vienna | Azure | Austria East | 24.4 | 24.8 | 24.5 | 24.5 | 24.7 |
| Sao Paulo | Azure | Brazil South | 3 | 3 | 3 | 3 | 3.1 |
| Sao Paulo | Azure | Brazil Southeast | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |
| Montreal | Azure | Canada East | 37.6 | 37.5 | 37.6 | 37.6 | 38 |
| Toronto | Azure | Canada Central | 29.2 | 29.3 | 29.3 | 26.9 | 28.3 |
| Santiago | Azure | Chile Central | | 98.1 | 97.2 | 97.1 | 97.6 |
| Helsinki | Azure | Finland Central | 50.3 | 50.3 | 50.2 | 50.3 | 50.3 |
| Pantin | Azure | France Central | 1.5 | 1.5 | 1.6 | 1.6 | 1.7 |
| Pantin | Azure | France Sud | 11.9 | 11.6 | 11.7 | 11.7 | 11.7 |
| Frankfurt | Azure | Germany West Cen | 2.1 | 2.2 | 2 | 2.1 | 2.1 |
| Hong Kong | Azure | East Asia | 2.8 | 2.8 | 3.1 | 3.1 | 3.1 |
| Milan | Zscaler | Milan | 1 | 0.9 | 1 | 1.1 | 1 |

Whereas in the past, companies may have reviewed hosting providers on say an annual basis, mainly to manage costs and value for money, IT teams now need frequently updated granular data like this to make intelligent decisions to maintain performance. As these applications become more important, the more often performance needs to be reviewed. This is one of the reasons why we've invested in making our network more virtualised and automated. In the future, we foresee much of this work being automated. Tools are emerging that will enable companies to set rules and then use artificial intelligence (AI)-based models to analyse the data and make decisions in near-real-time.

| RTD to | Times/day |
|---|---|
| Google DNS Multicast DNS | 3 x |
| Nearest AWS cloud datacentre | 4 x |
| Cloudflare DNS Multicast IP | 3 x |
| Nearest Azure cloud datacentre | 4 x |
| Nearest Zscaler node | 4 x |
| Nearest Google Cloud Platform datacentre | 4 x |
| Nearest Oracle cloud datacentre | 4 x |

We've already deployed systems that enable customers to integrate their systems with Verizon systems directly—enabling changes to be made with no human intervention. The field of AIOps is still pretty new, but it's likely to grow quickly as it promises to increase business agility, reduce downtime and reduce the burden of repetitive tasks on IT and network professionals. Making the most of AIOps depends upon gathering lots of data, this needs to be timely and granular. This is likely to be much more difficult if you're relying on Tier-2 and Tier-3 network providers that don't have direct access to the peering points with the cloud operators.

## Let's talk

From IoT to real-time analytics and AI, Verizon can help you stay at the forefront of using technology to monitor, manage and improve operations. If you still have questions after reading this paper, get in touch with us at: verizon.com/business/en-gb/contact-us

# The Network Procurement series

This paper is one of a series exploring the growing demands on enterprise networks and important questions companies should ask during the procurement process to help ensure that the solution they chose are truly enterprise-grade and will meet their current and needs.

## Something big is coming

Data | IoT | AI

This paper explores some of the key drivers behind the explosive growth in the volume of data enterprises are gathering and what that means for network planning.
verizon.com/business/resources/articles/iot-genai-data-explosion.pdf

## Access: navigating the options

Performance

There are many decisions to make when buying networking. Understanding the three tiers of the internet is critical to thoroughly evaluating the options. This paper explains what they mean for network performance and security.
verizon.com/business/resources/articles/tier-1-isp-enterprise-connectivity.pdf

## Network peering

Cloud | Performance | Reliability

Peering is fundamental to network performance and consequently enterprise applications, particularly ones based in the cloud. Despite this, it's rarely discussed during procurement. Read this short paper and put that right.
verizon.com/business/resources/articles/network-peering.pdf

## Are you in the dark about performance?

Data | Performance | Managability

Read this paper to learn how the decision to split the procurement of physical (underlay) and logical (overlay) networks can affect network performance, visibility and managability.
verizon.com/business/resources/articles/overlay-underlay-network-procurement.pdf

## Better together

Security | Performance | Managability

Cyberthreats continue to grow in volume and sophistication. This short paper offers six reasons to consider greater integration between cybersecurity and networking to improve protection while reducing workload and cost.
verizon.com/business/resources/articles/unified-network-security-services.pdf

## Supercharge your AI applications

AI | Performance

Artificial intelligence (AI) promises to be the most disruptive technology since the internet became mainstream around 30 years ago. This paper explains why network performance is critical to the performance of many AI applications and realising the anticipated benefits.
verizon.com/business/resources/articles/network-infrastructure-ai-platforms.pdf

verizon business