Azure Networking – an overview
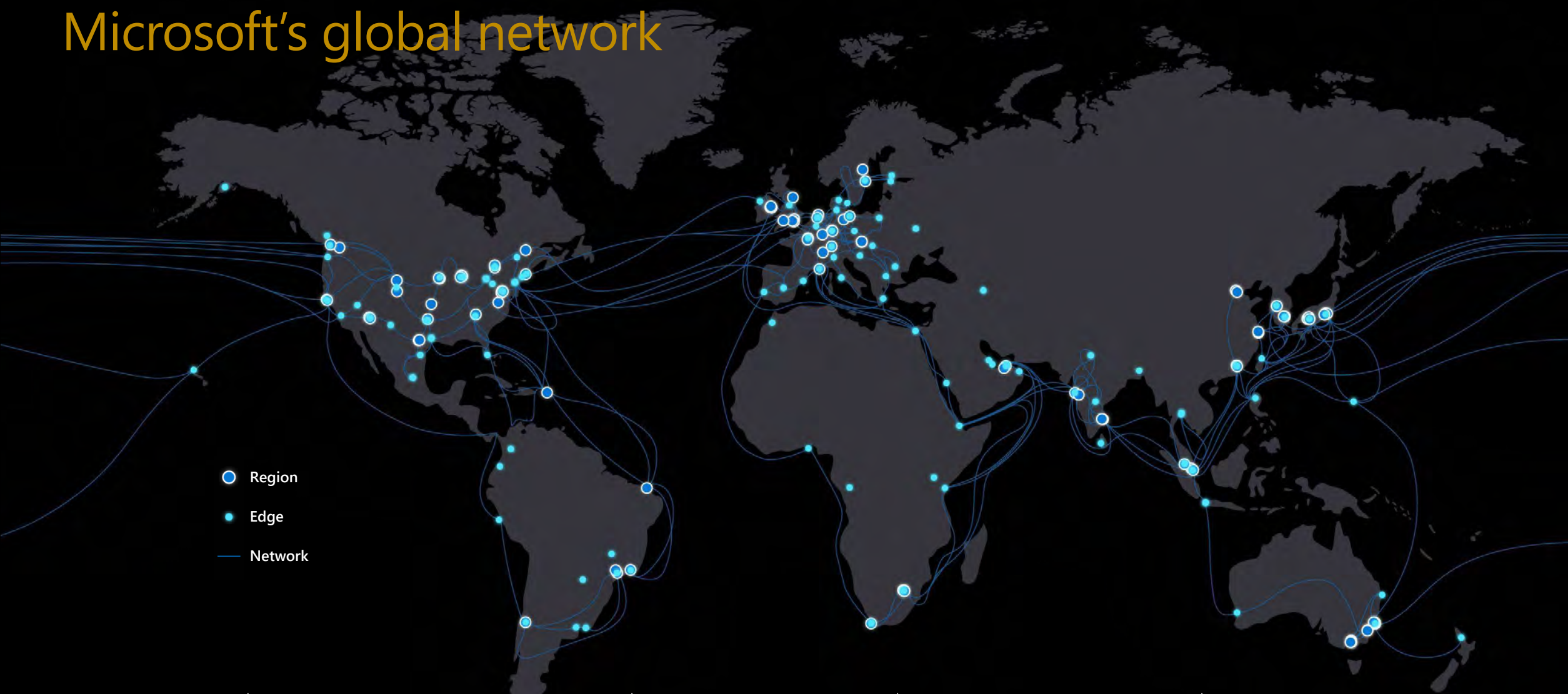
Markus Klein, Microsoft Deutschland GmbH
Cloud Solutions Architect Networking & Datacenter Migration

Datacenter design & connectivity

Microsoft

Microsoft's global network

Legend:
- Region
- Edge
- Network

64+ Azure regions | **165k+** miles of fiber + subsea cables | **170+** edge sites | **500+** network partners | **20k+** peering connections

Geos and regions

The world is divided into geographies

Defined by geo-political boundaries or country borders

Defines the data residency boundary for customer data

Europe	United States	France
Japan	Germany	Brazil	...

A region is defined by a bandwidth and latency envelope

< 2 ms network latency (round trip)

Customers see regions, not DCs

Different fault and flood zones, electrical grid, hurricane zone

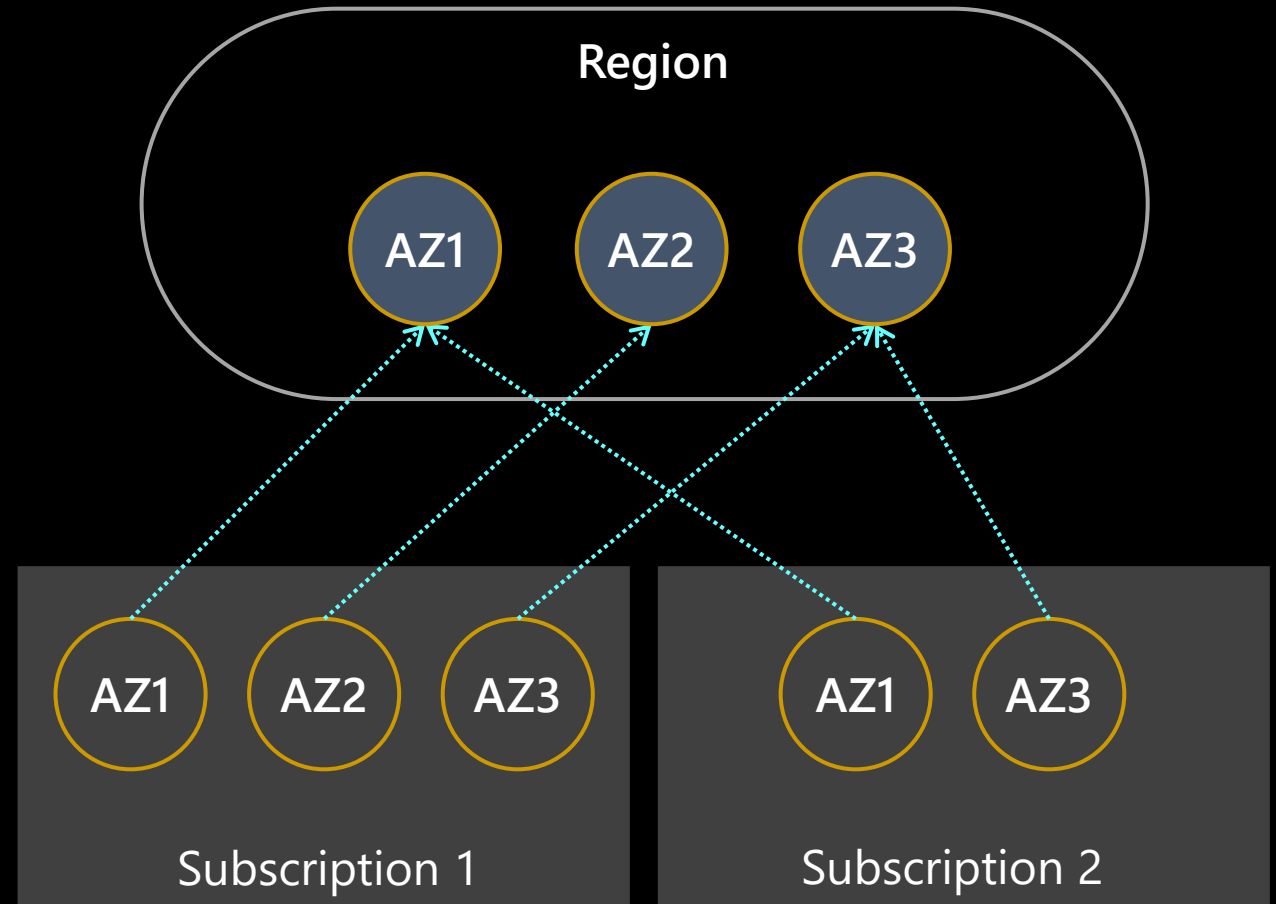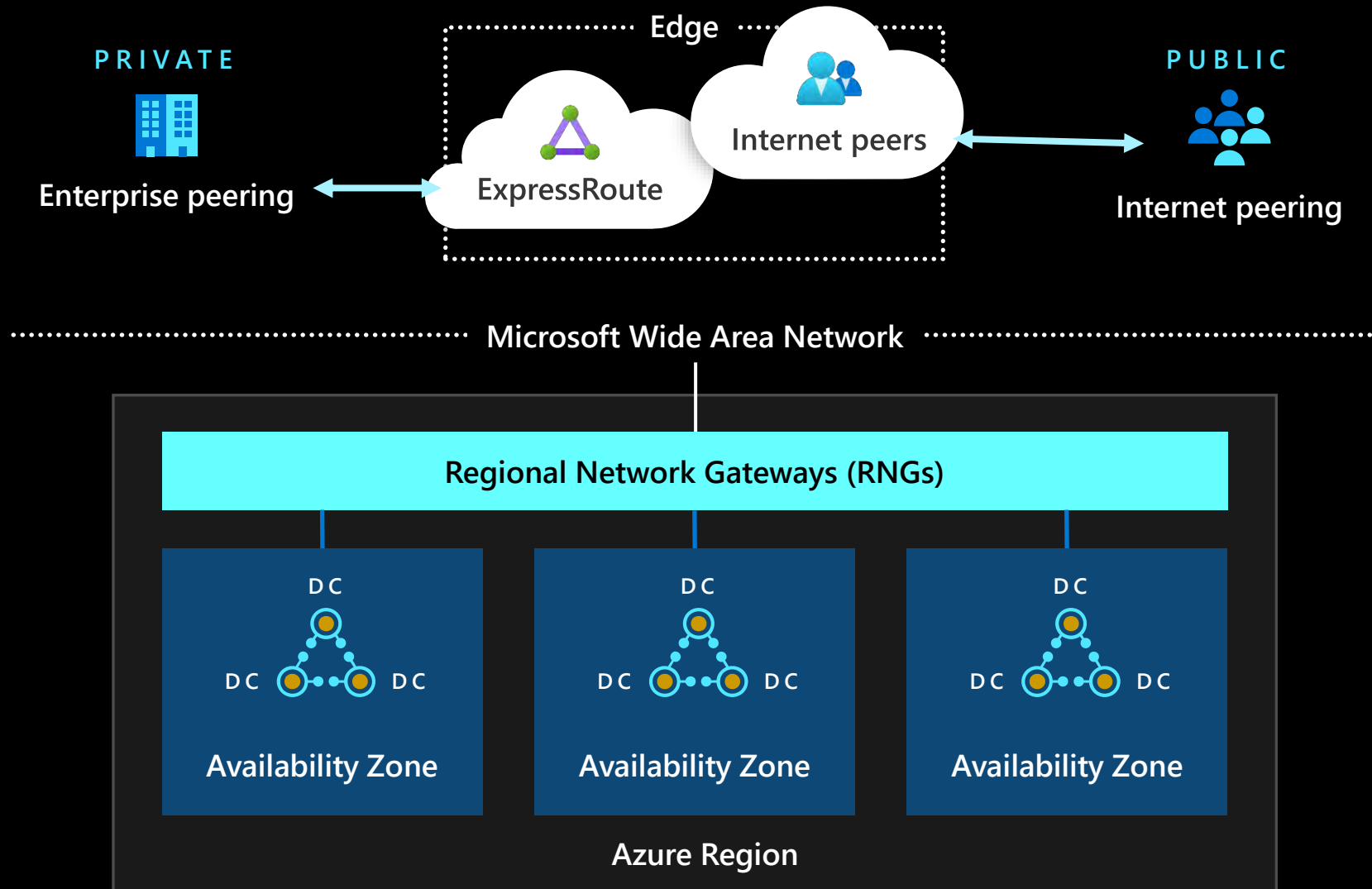| West Europe	East US	France Central
Brazil South	UK West	...

Region 1

100's of miles

Region 2

Availability Zones
Intra-region resilience

- ✓ Physically separate locations within an Azure region

- ✓ Made up of 1+ datacenters with independent power, cooling, networking, etc.

- ✓ Protection from datacenter failures

- ✓ Target: < 1 ms network latency

Region

AZ1 AZ2 AZ3

AZ1 AZ2 AZ3   AZ1 AZ3

Subscription 1   Subscription 2

Connecting Azure regions to the global network

PRIVATE

Enterprise peering

Edge

ExpressRoute

Internet peers

PUBLIC

Internet peering

Microsoft Wide Area Network

Regional Network Gateways (RNGs)

DC

DC   DC

Availability Zone

DC

DC   DC
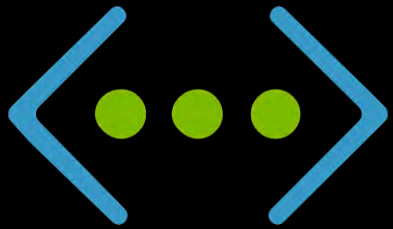
Availability Zone

DC

DC   DC

Availability Zone

Azure Region
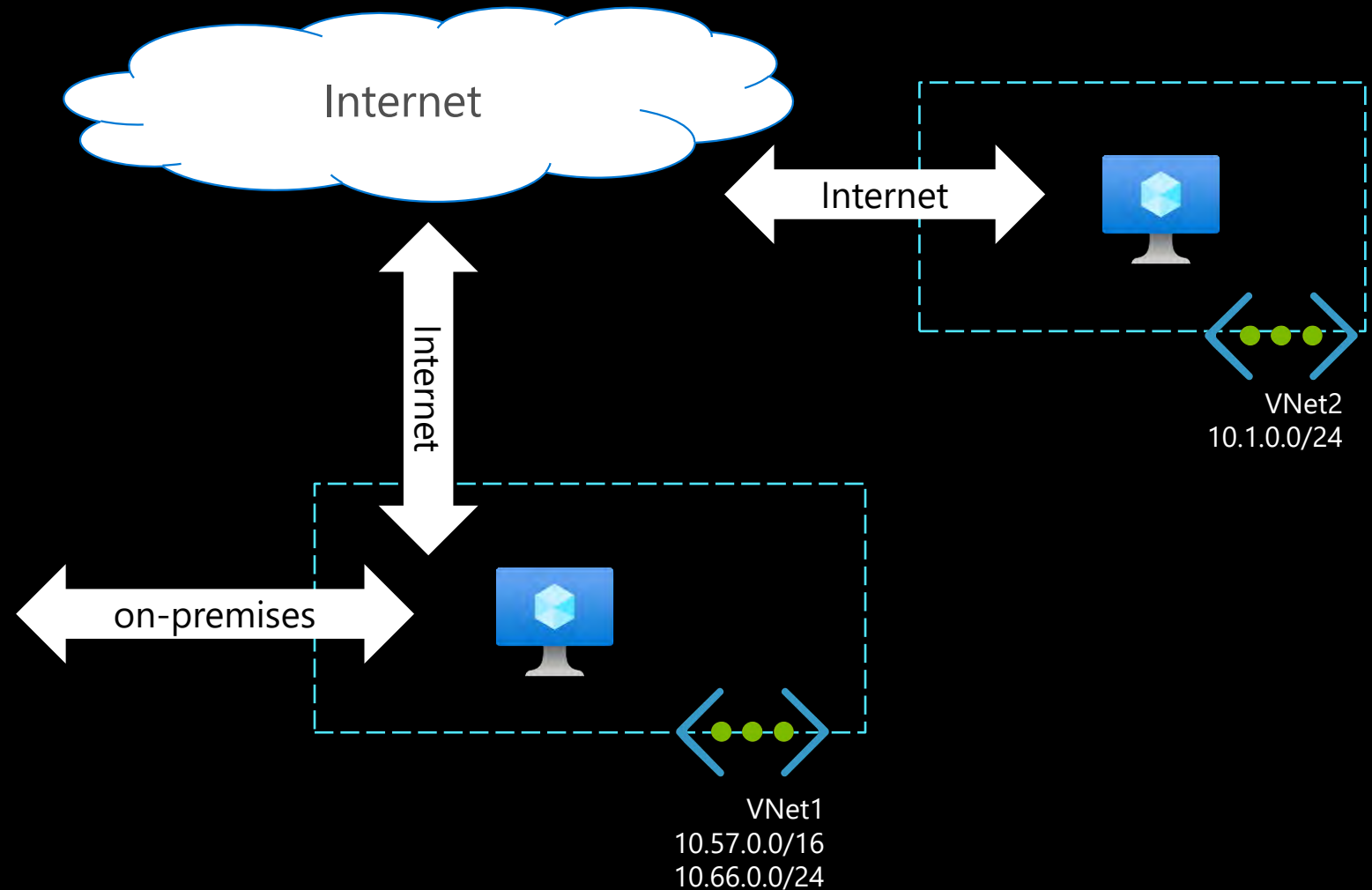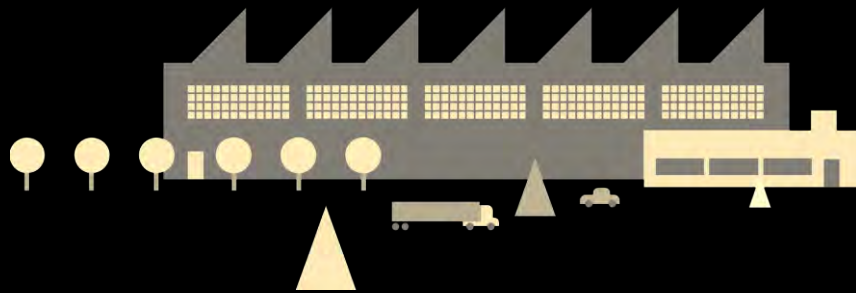
What is an Azure Virtual Network (VNet)?

A **private network in the cloud** with full control over IP addresses, DNS servers, security rules, and traffic flows
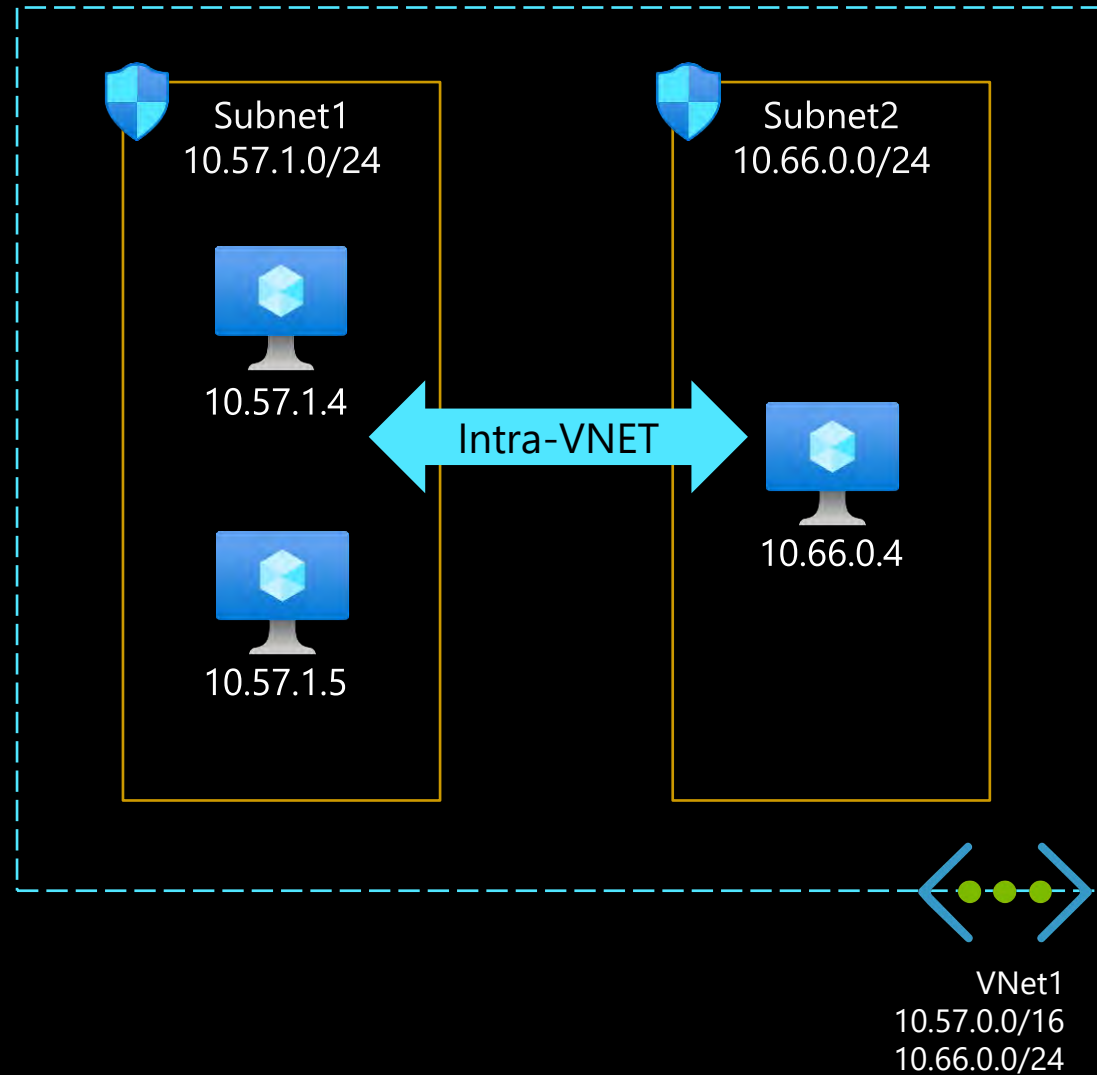
Virtual Networks

Your private network in the cloud

- ✓ **Isolation**
- ✓ **User-defined address space**
- ✓ **Connectivity**

Internet

Internet

Internet

on-premises

VNet2
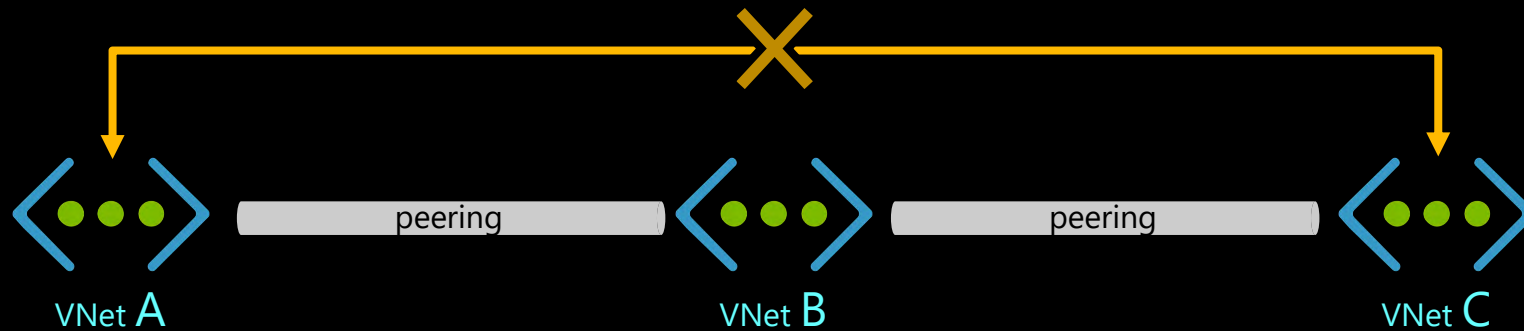10.1.0.0/24

VNet1
10.57.0.0/16
10.66.0.0/24

Subnets

Segmentation of VNets into one or more subnets

Virtual Network Peering
(VNet Peering)

✓ **Seamlessly connect two Azure virtual networks**

✓ **Uses the Microsoft backbone**

✓ **Across regions, subscriptions, tenants**

VNet A — peering — VNet B — peering — VNet C

Robust networking infrastructure services

(non-exhaustive)

Azure Bastion
Establish secure and
seamless RDP & SSH access

Azure Firewall
Protect your virtual network
resources

Load Balancer
Deliver high availability and
network performance to
your applications

Application Gateway/WAF
Build scalable and highly-
available web front ends
in Azure

DDoS Protection
Protect your Azure resources
from DDoS attacks

VPN Gateway
Establish secure,
cross-premise connectivity

Azure DNS
Host your DNS domain
in Azure

Content Delivery Network
Ensure secure, reliable
content delivery
with broad global reach

Traffic Manager
Route incoming traffic
for high performance
and availability

ExpressRoute
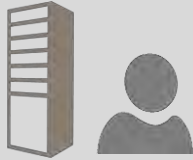Dedicated private network
fiber connections to Azure

Network Watcher
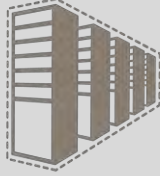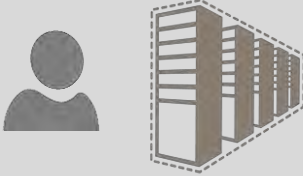Network performance
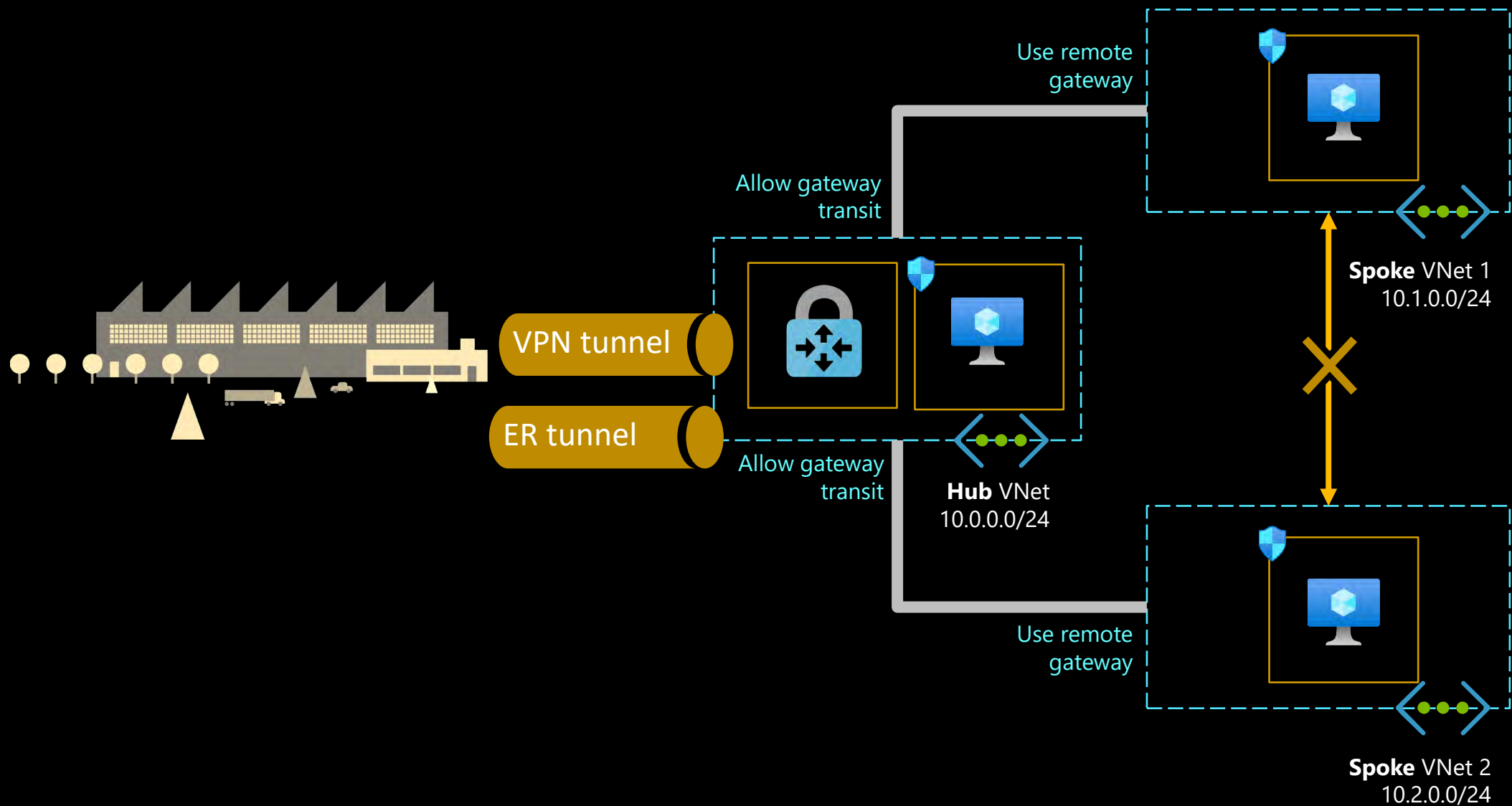monitoring and
diagnostics solution

Hybrid connectivity

Microsoft

Hybrid Networking Scenarios

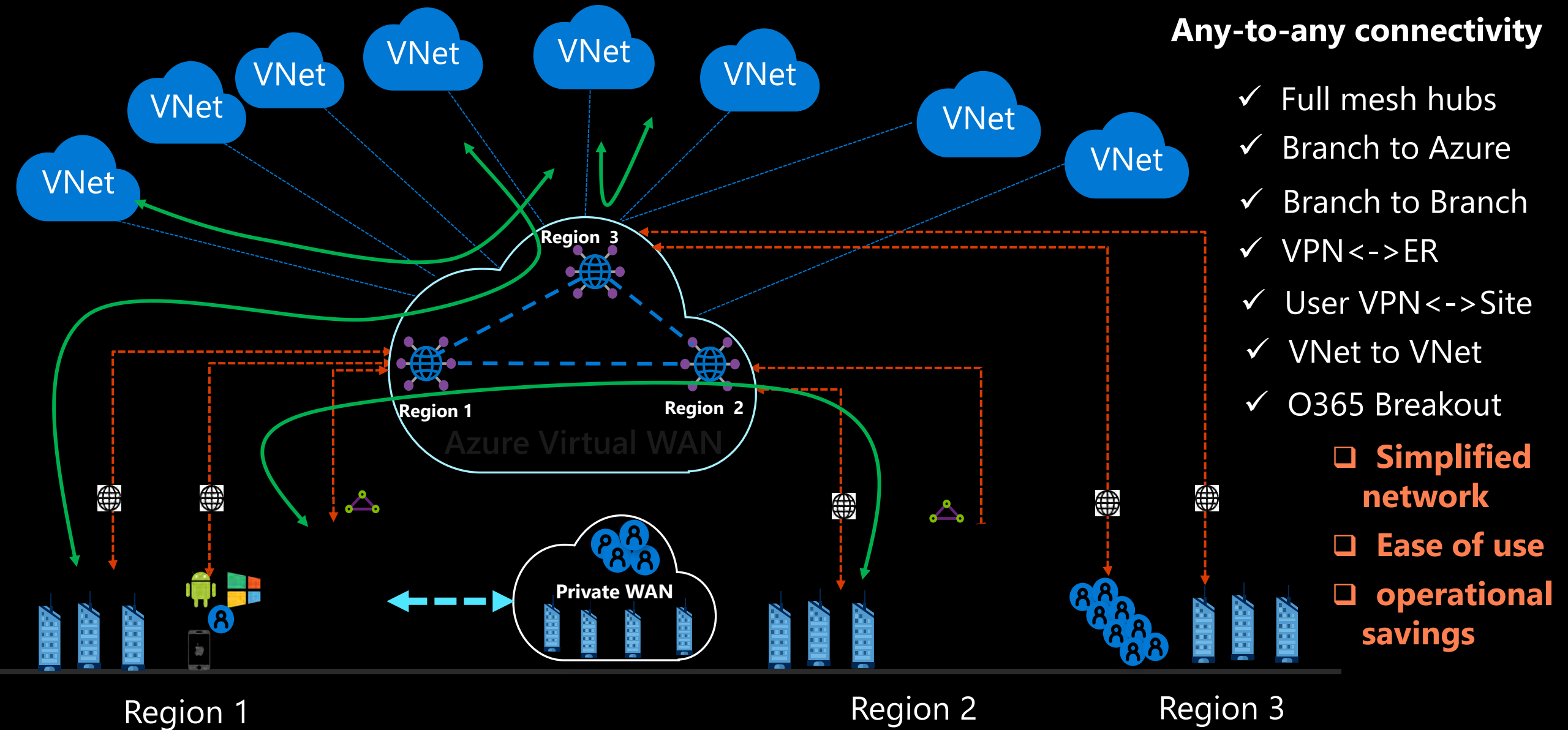| CLOUD		CUSTOMER	SEGMENT & WORKLOADS
	Secure point-to-site connectivity Virtual network (Point-to-Site)		• **Developers** • Small scale deployments • Connect from anywhere
	Secure site-to-site VPN connectivity Virtual network (Site-to-Site)		• **SMB & Enterprises** • Connect to Azure compute • IaaS and PaaS workloads
	Private site-to-site connectivity ExpressRoute		• **SMB & Enterprises** • Mission critical workloads • Backup/DR, media, HPC • Connect to all hardware
	Managed Hub for S2S, P2S or ER Gateways Virtual WAN		• **SMB & Enterprises** • Managed Hub by Microsoft • Large Scale VPN connections • Branch to Branch Routing

Hub & Spoke network

Use remote gateway

Allow gateway transit

Spoke VNet 1
10.1.0.0/24

VPN tunnel

ER tunnel

Allow gateway transit

Hub VNet
10.0.0.0/24

Use remote gateway

Spoke VNet 2
10.2.0.0/24

ExpressRoute
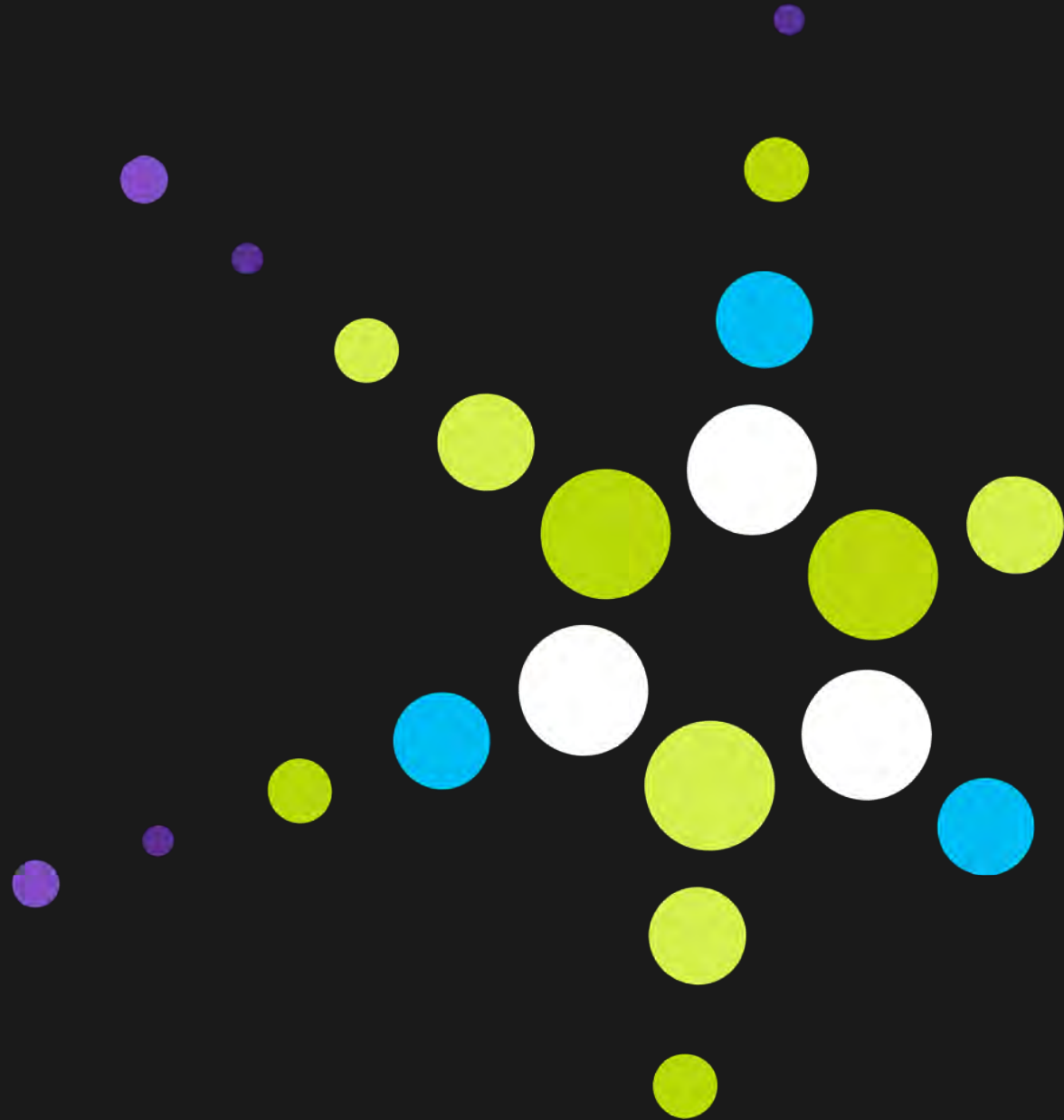
✔ Unified connectivity to Microsoft Cloud Services

✔ Predictable performance

✔ Enterprise-grade resiliency and with SLA for availability

✔ Large and growing ExpressRoute partner ecosystem

Company

Partner Edge

Primary Connection

Secondary Connection

ExpressRoute Circuit

Microsoft Edge

Public Peering for Office 365, Dynamics 365, Azure public services (public IPs)

Azure Private Peering for Virtual Networks

Global Transit Architecture with Azure Virtual WAN

Express Route live

Microsoft

Thank you.