AWS Outposts and AWS Wavelength

An in-depth look at hybrid cloud use cases

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AWS

Extending the cloud for a truly consistent hybrid experience

On-premises, Metro centers and the 5G edge

AWS OUTPOSTS

Fully managed AWS infrastructure delivered to virtually any customer datacenter or on-premises location

AWS LOCAL ZONES

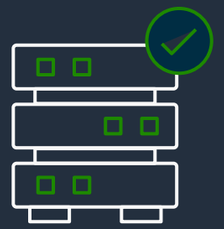
Places compute, storage, database, and select AWS services closer to where your end users are located

AWS WAVELENGTH

Embedded in 5G networks to extend AWS infrastructure, services, APIs, and tools

AWS Outposts:

Bringing AWS on-premises



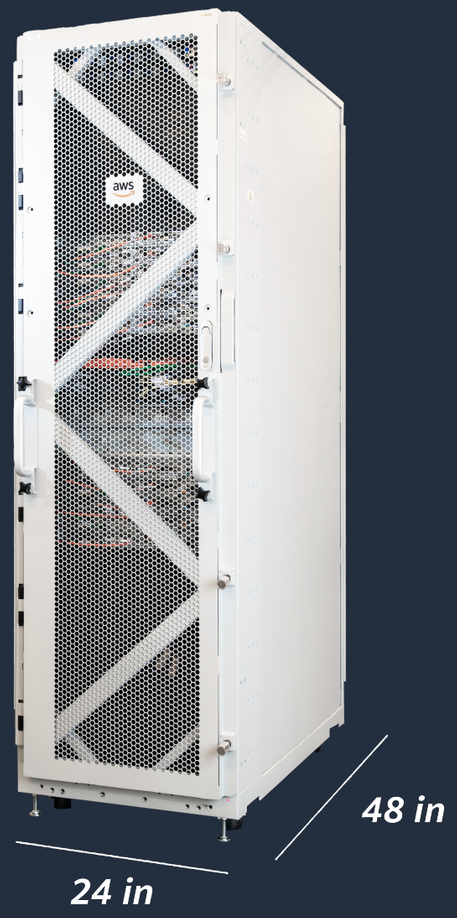
Same AWS-designed infrastructure as in AWS data centers (built on AWS Nitro System)

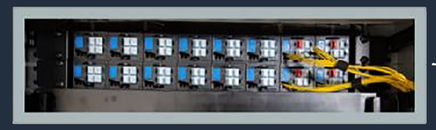
Fully managed, monitored, and operated by AWS as if in AWS Regions

Single pane of management in the cloud providing the same APIs and tools as in AWS Regions

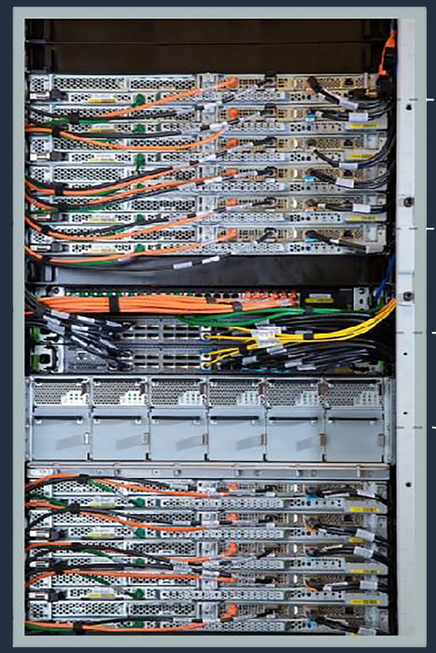
AWS Outposts:
The hardware

42U Rack





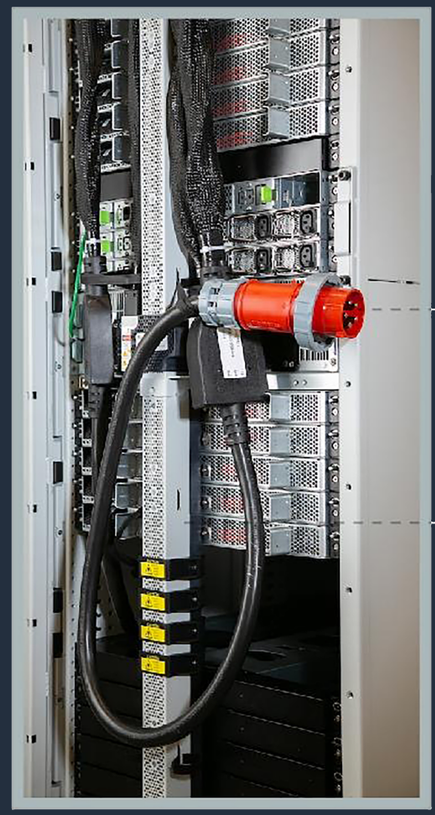
Patch Panels
1/10/40/100G Network
Fiber Uplink Options



Hosts

Network Switches

Power Shelf
Redundant Centralized
Power Conversion Unit



5kVA-15kVA
Power Supply
Redundant feeds supported

Bus Bar

AWS Outposts:
Use Cases

Low Latency

Rendering, inference, data processing

Application Modernization

Modernize enterprise applications running at the edge

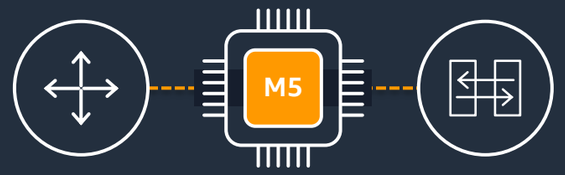
Data Residency

Regulatory, security, process requirements

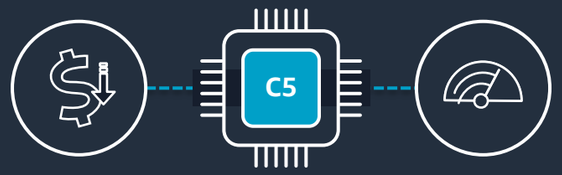
Local Data Processing

Local control systems, 5G/IOT

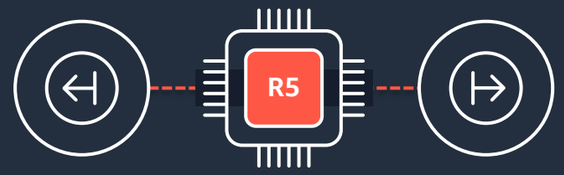
Build on the same Amazon EC2 instances and Amazon EBS volumes



For general-purpose applications

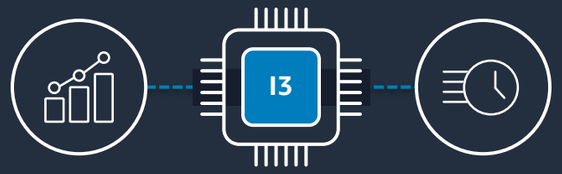


For compute-intensive applications (media transcoding, gaming servers, machine learning inference)



For memory-intensive applications (databases, in-memory caches, real-time data analytics)

For machine learning inference and graphics workstations



For I/O-intensive applications (NoSQL databases, in-memory or transactional databases, distributed file systems)

Local instance storage and EBS gp2 volumes for temporary and persistent storage

Run AWS services locally

› Compute and storage
Amazon EC2 instances and Amazon EBS volumes

› Networking
Amazon Virtual Private Cloud (Amazon VPC)
Amazon Application Load Balancer (Amazon ALB)

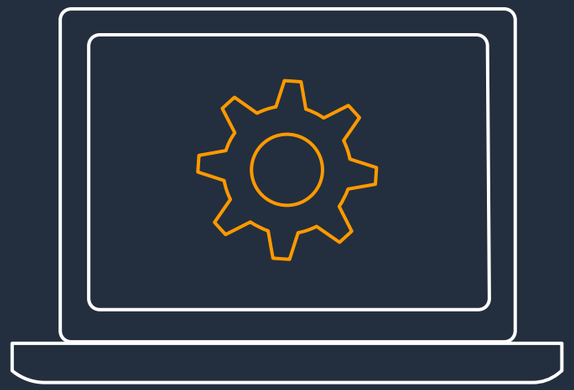
› Database and Cache
Amazon Relational Database Service (Amazon RDS)
Amazon Elasticache

› Containers
Amazon Elastic Container Service (Amazon ECS) and
Amazon Elastic Kubernetes Service (Amazon EKS)

› Data processing
Amazon Elastic Map Reduce (Amazon EMR)

› Local storage
Amazon S3

With the same AWS APIs and tools as in the AWS Region



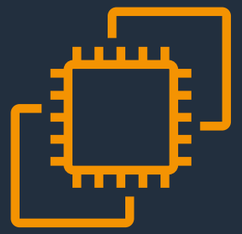
- Amazon EC2 Auto Scaling groups
- AWS CloudFormation
- Amazon CloudWatch
- AWS CloudTrail
- AWS Elastic Beanstalk
- AWS Cloud9

and more . . .

Amazon VPC Networking

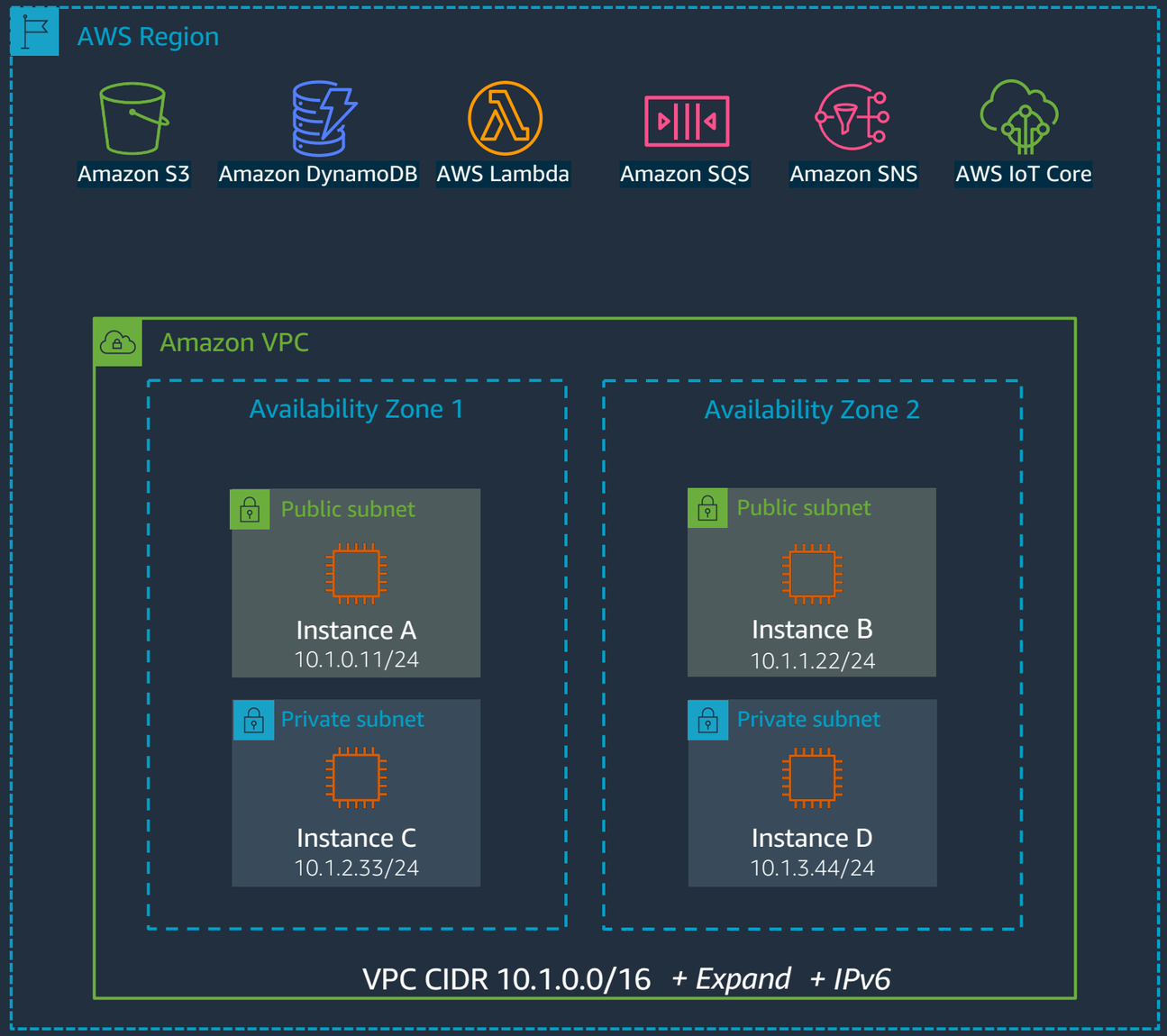
To understand AWS Outposts, we need to first understand Amazon VPC networking

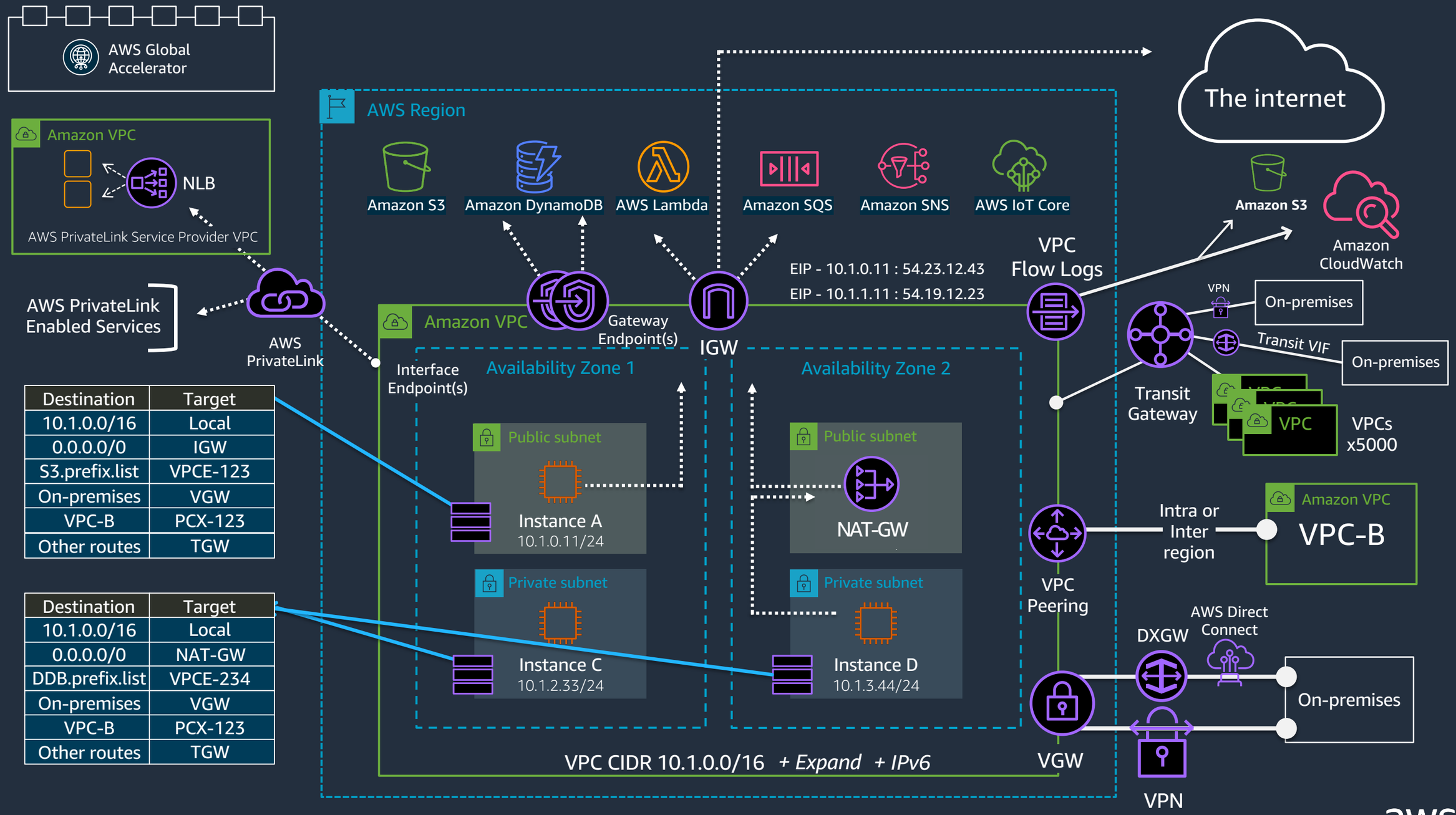
Amazon VPC networking



Amazon EC2

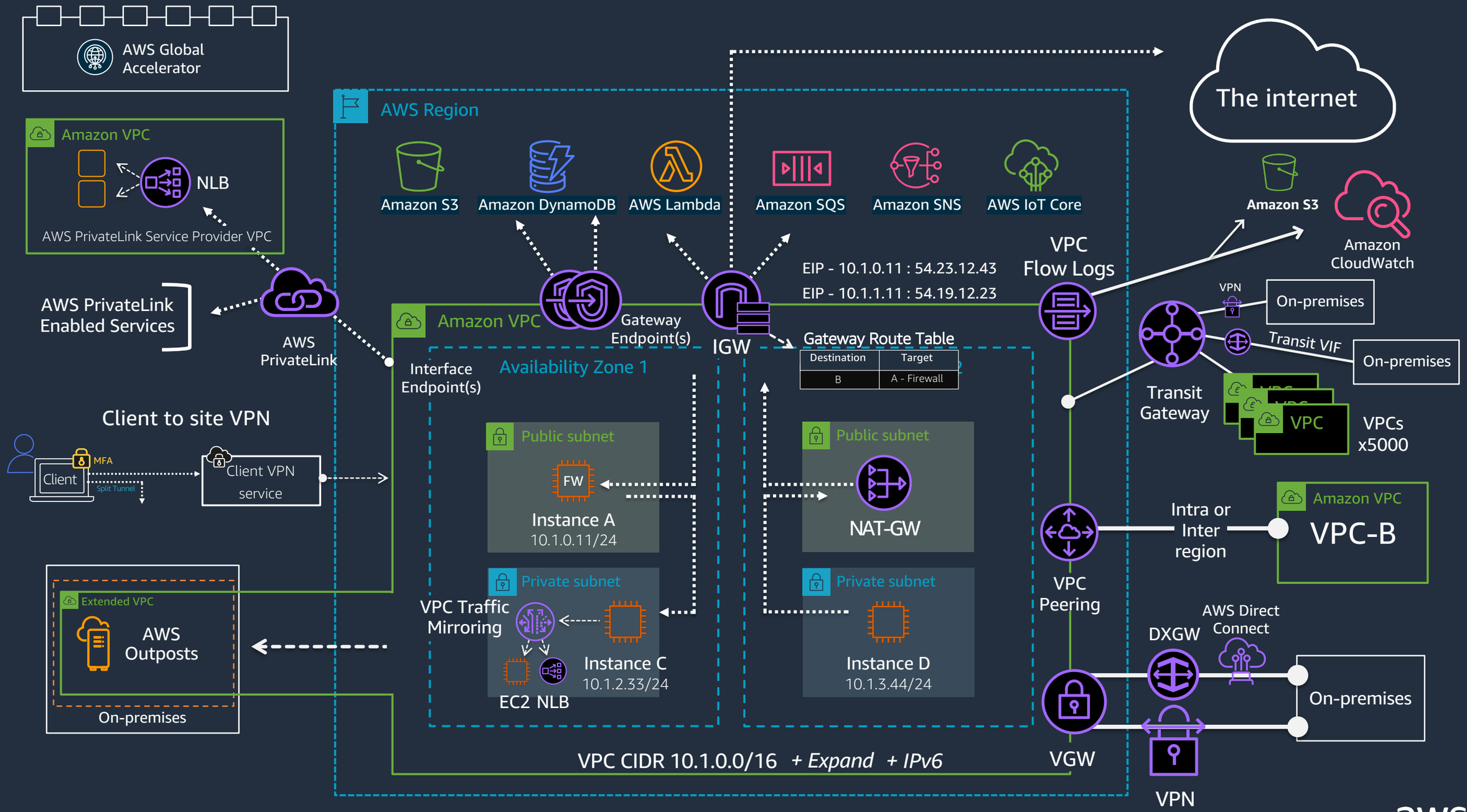
Amazon VPC





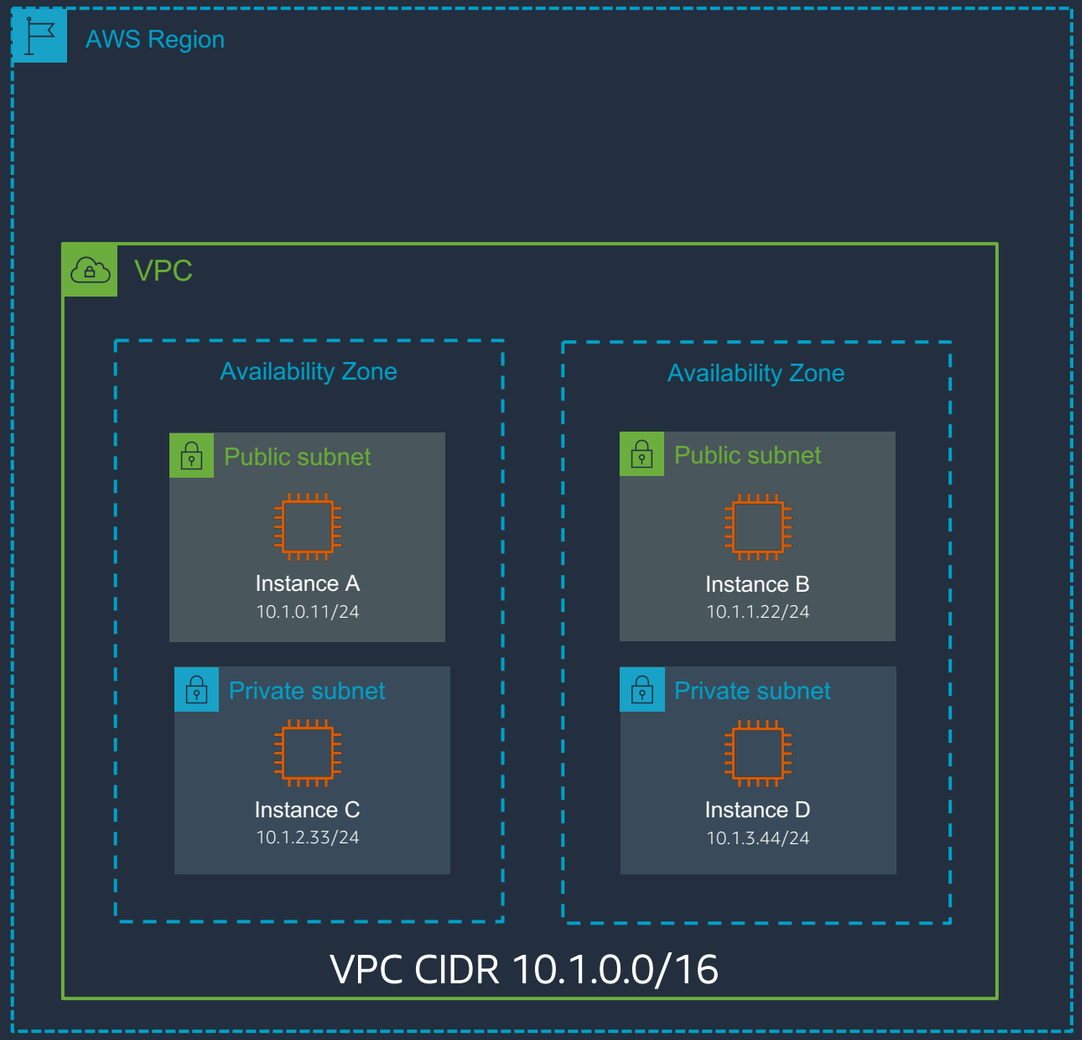
Destination	Target
10.1.0.0/16	Local
0.0.0.0/0	IGW
S3.prefix.list	VPCE-123
On-premises	VGW
VPC-B	PCX-123
Other routes	TGW

Destination	Target
10.1.0.0/16	Local
0.0.0.0/0	NAT-GW
DDB.prefix.list	VPCE-234
On-premises	VGW
VPC-B	PCX-123
Other routes	TGW

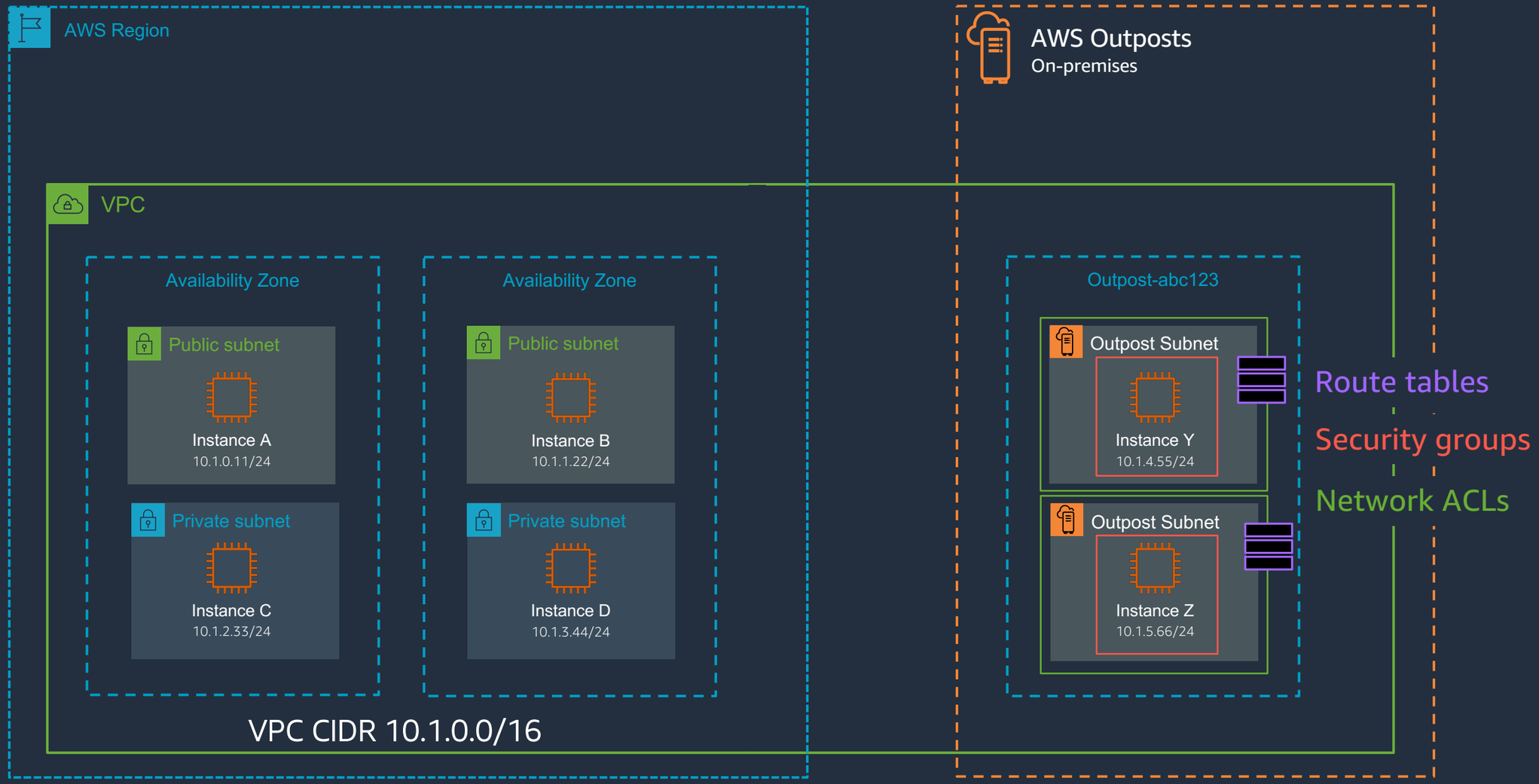


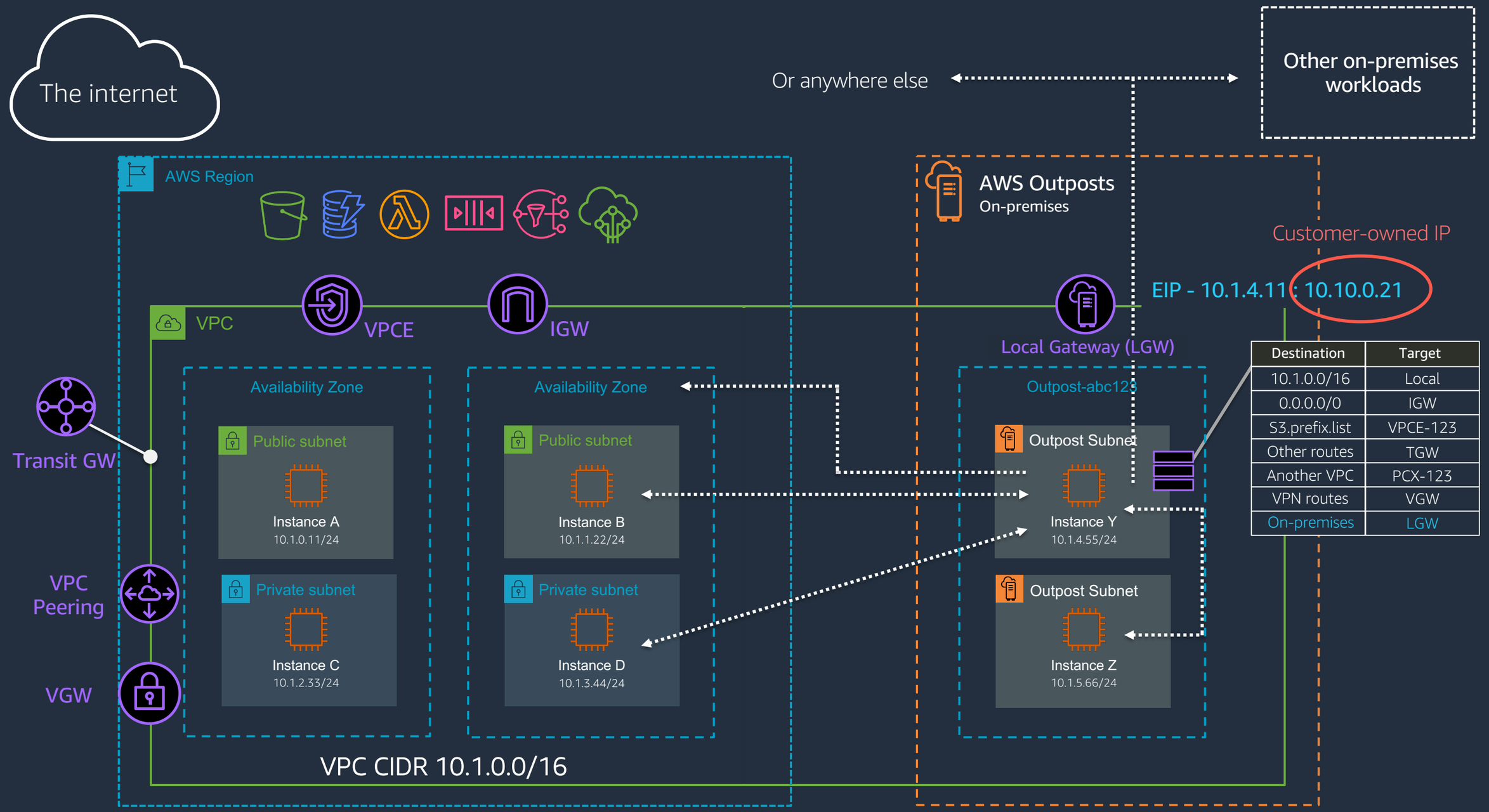
Amazon VPC Networking

Now, let’s dive into Amazon
VPC networking for AWS Outposts



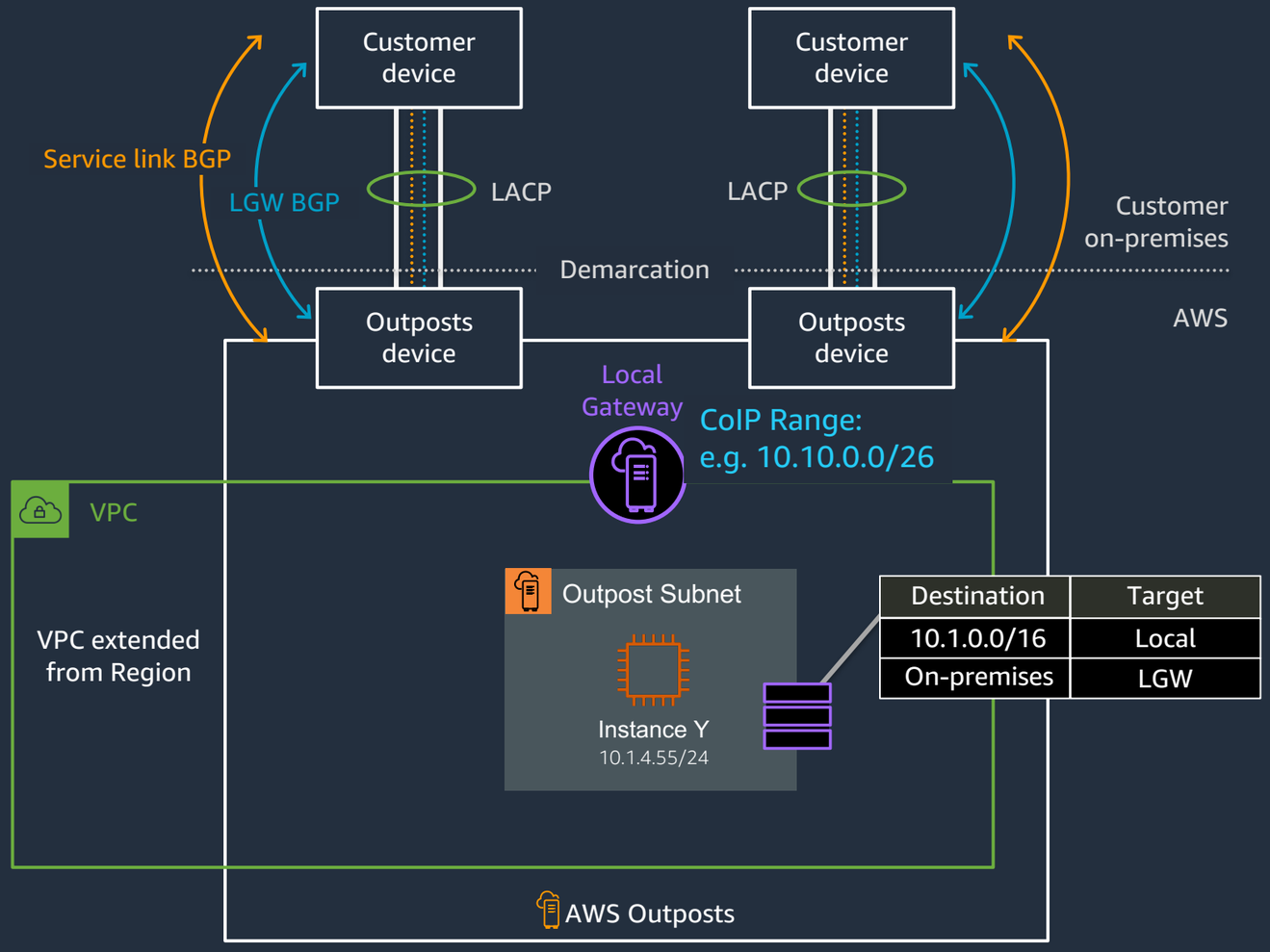
Access to the same networking constructs as the AWS Region





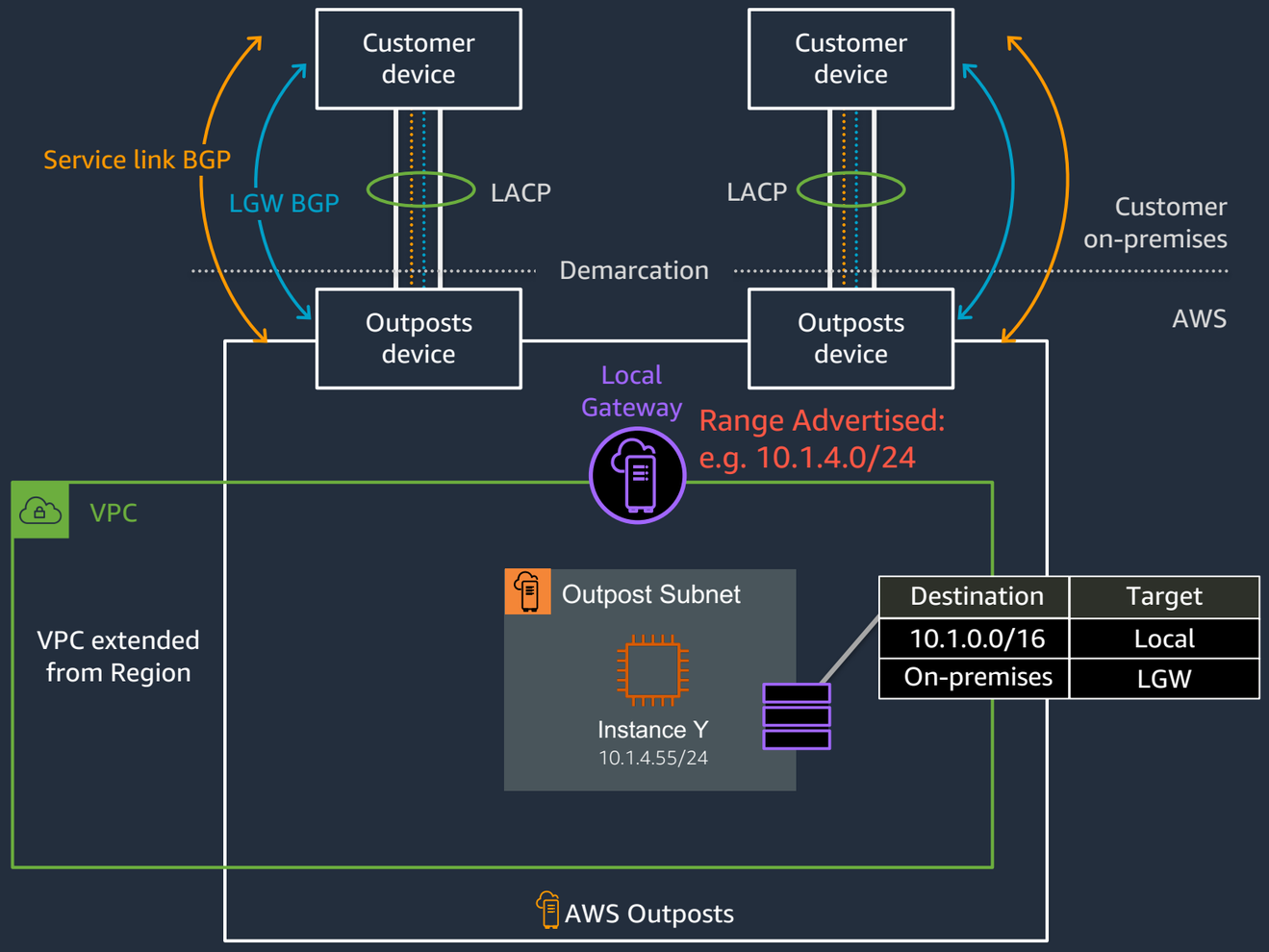
On-premises connectivity: Local Gateway (LGW)

- Multiple Outpost network devices per rack, providing physical redundancy
- Separation of service link and LGW traffic paths using Virtual LANs (VLANs)
- Multiple BGP sessions for service link and LGW
- Local Gateway (LGW) is a logical entity attached to your VPC
- Customer-owned IP addresses (CoIP) are advertised on LGW BGP sessions
- VPC configuration is distinctly separate from the physical configuration



On-premises connectivity: Local Gateway

› Coming soon! – Direct advertisement of the Outpost subnet range over the LGW BGP sessions, no CoIP required



Don’t forget to check out the Outposts reference architectures from our partners

Cisco:

https://bit.ly/37mtFvq

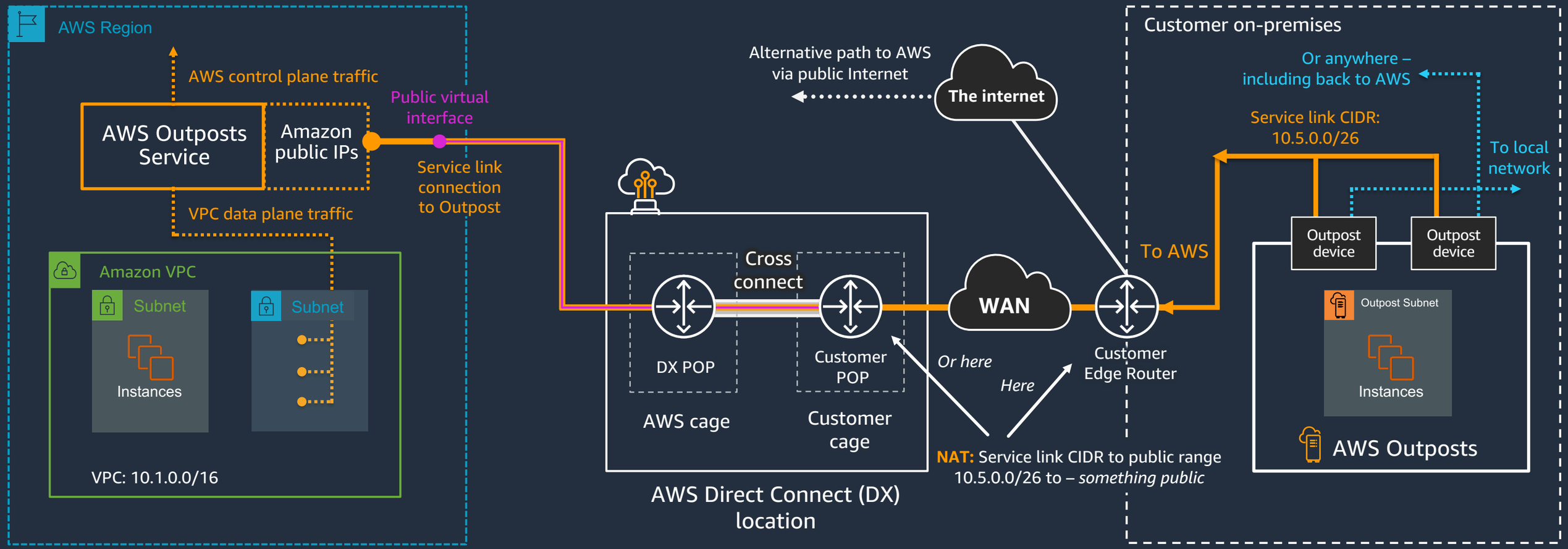
SCAN ME

Juniper:

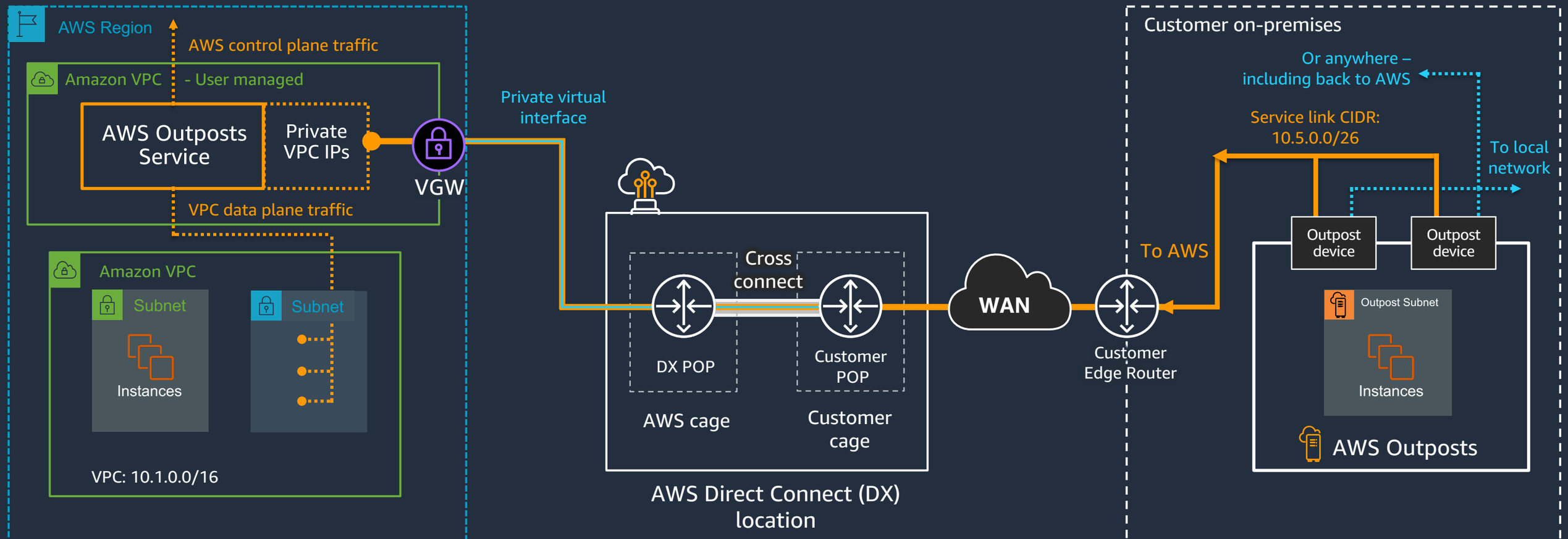
https://juni.pr/2MTkol7

SCAN ME

AWS Region connectivity: Service link

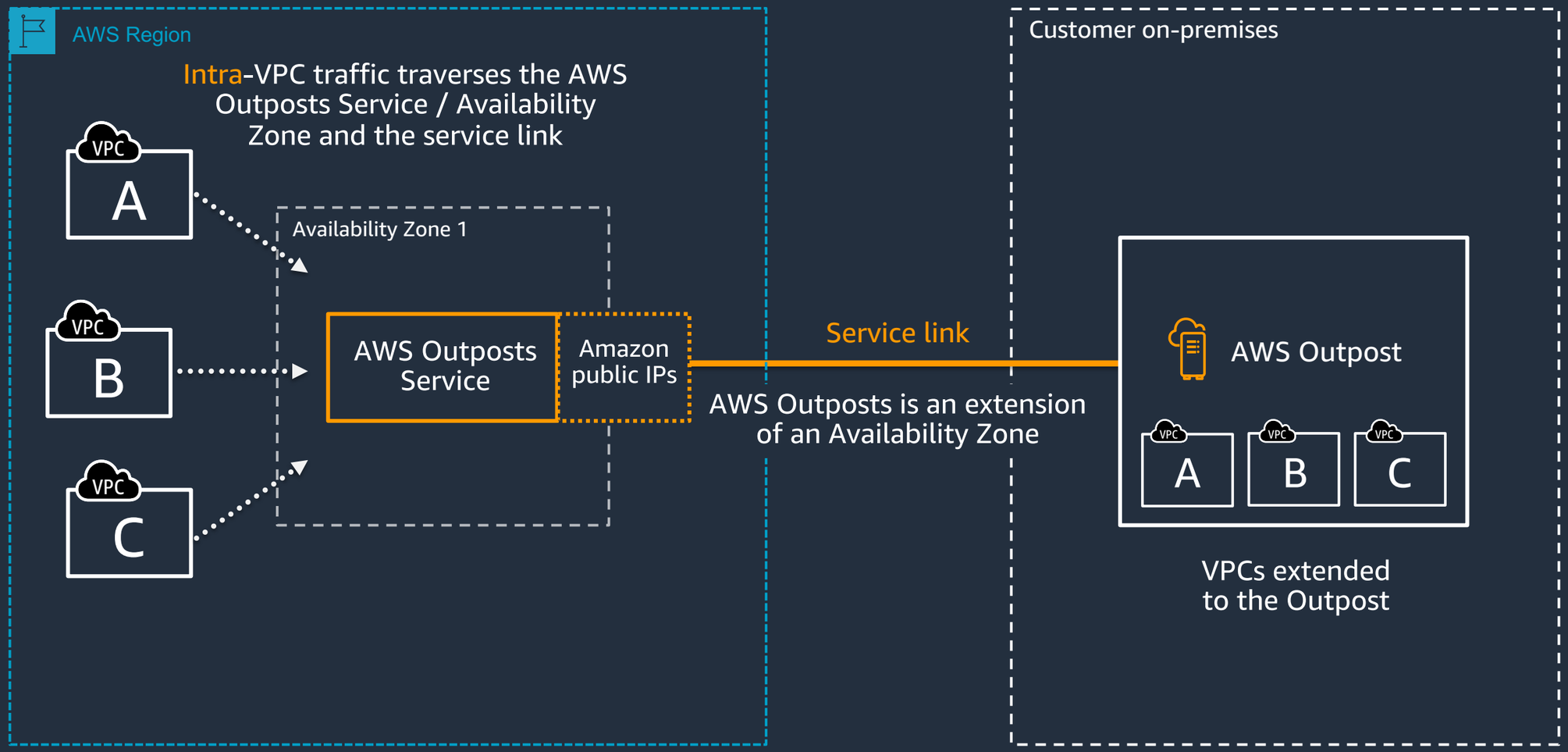


AWS Region connectivity: Service link

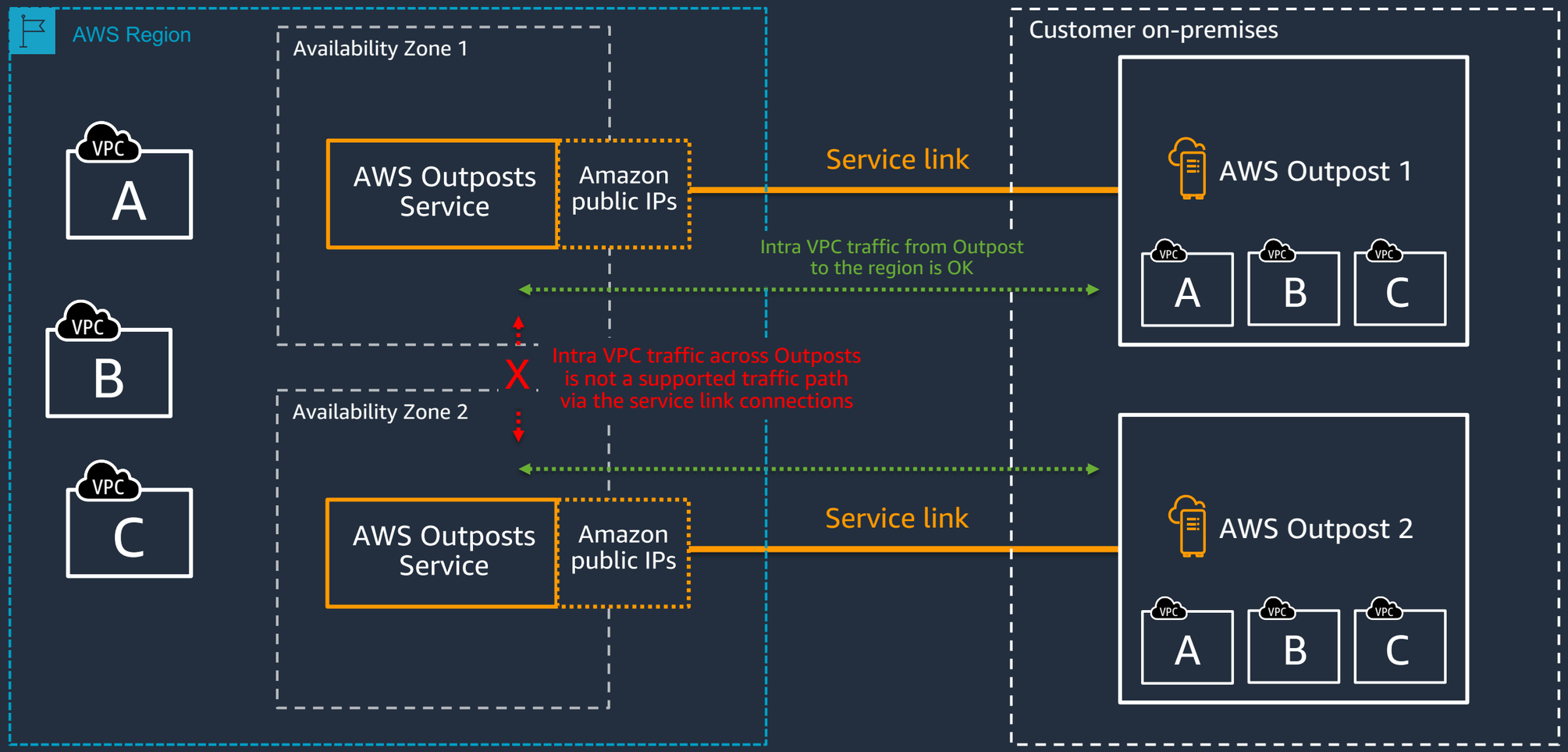


Private service link connectivity

VPCs and a single Outpost deployment



VPCs and a multi Outpost deployment



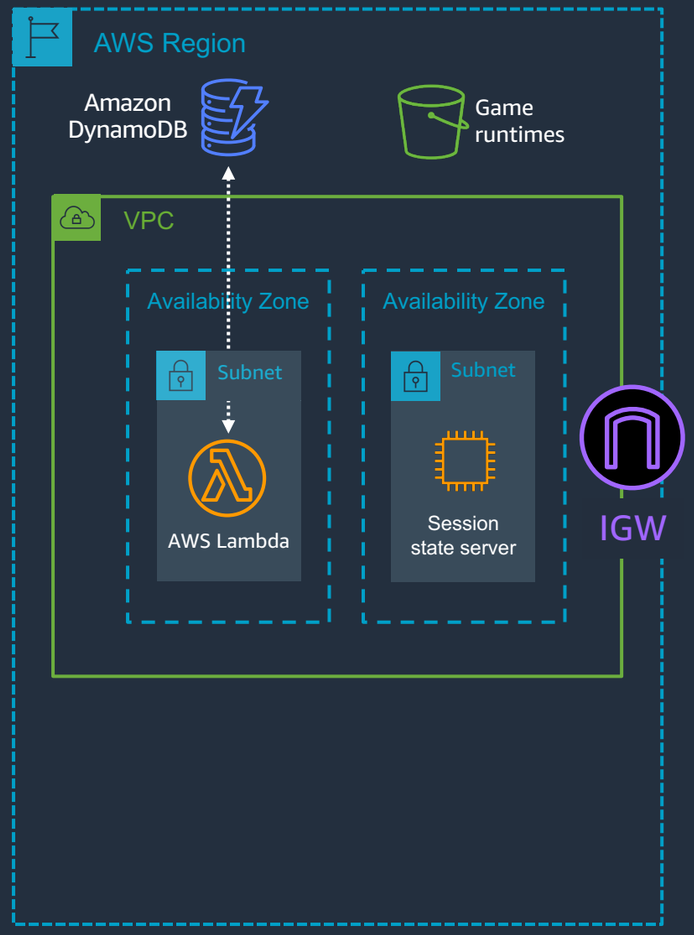
AWS Outposts Architectures

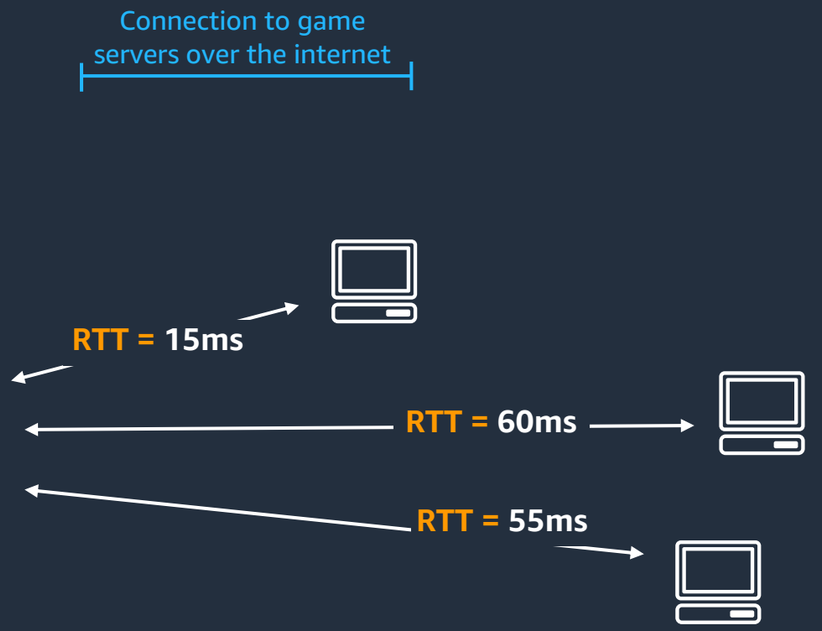
Rendering, inference, data processing? How about online games

Low Latency

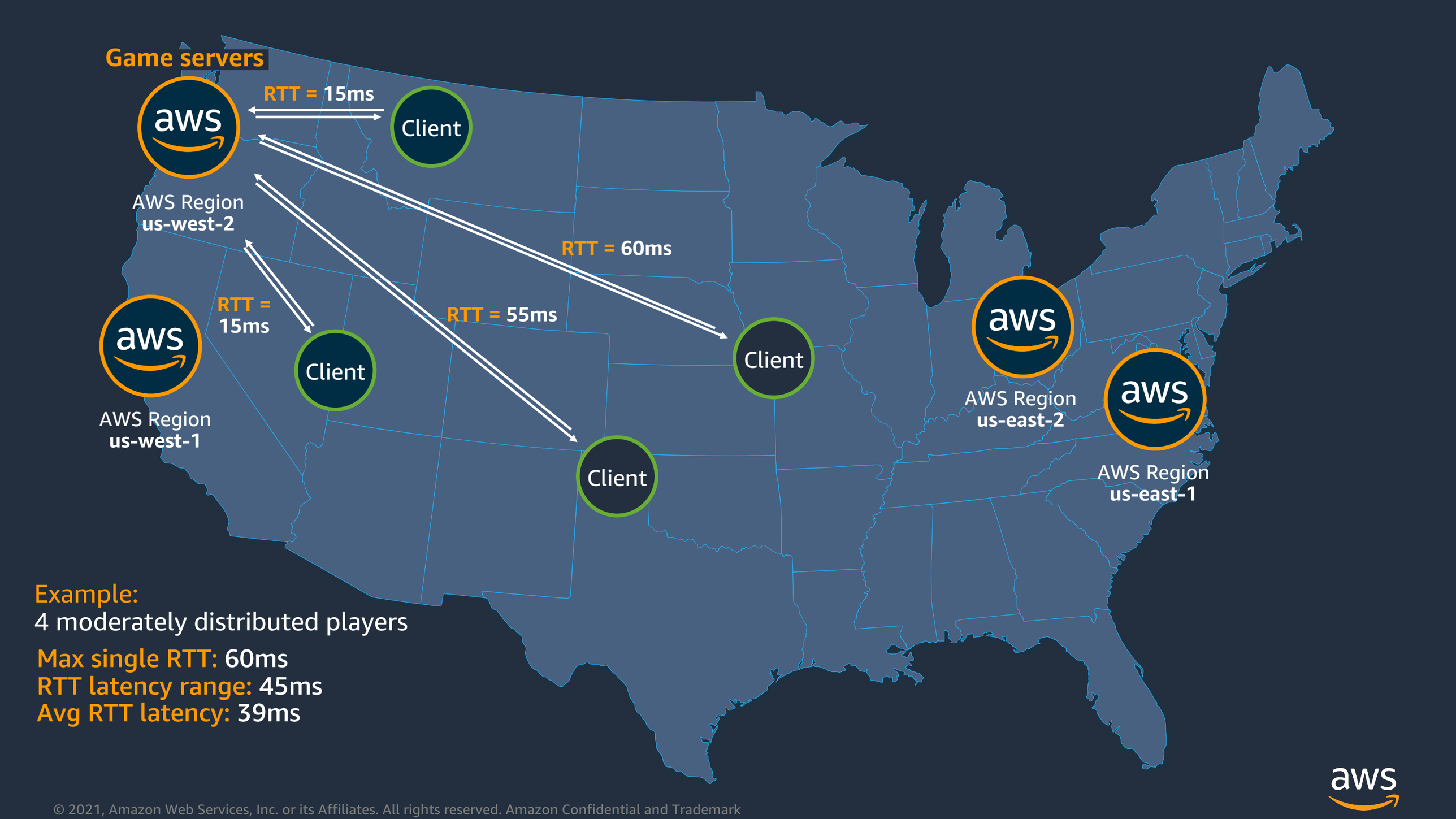
Rendering, inference, data processing

Using the AWS Region for low-latency online games



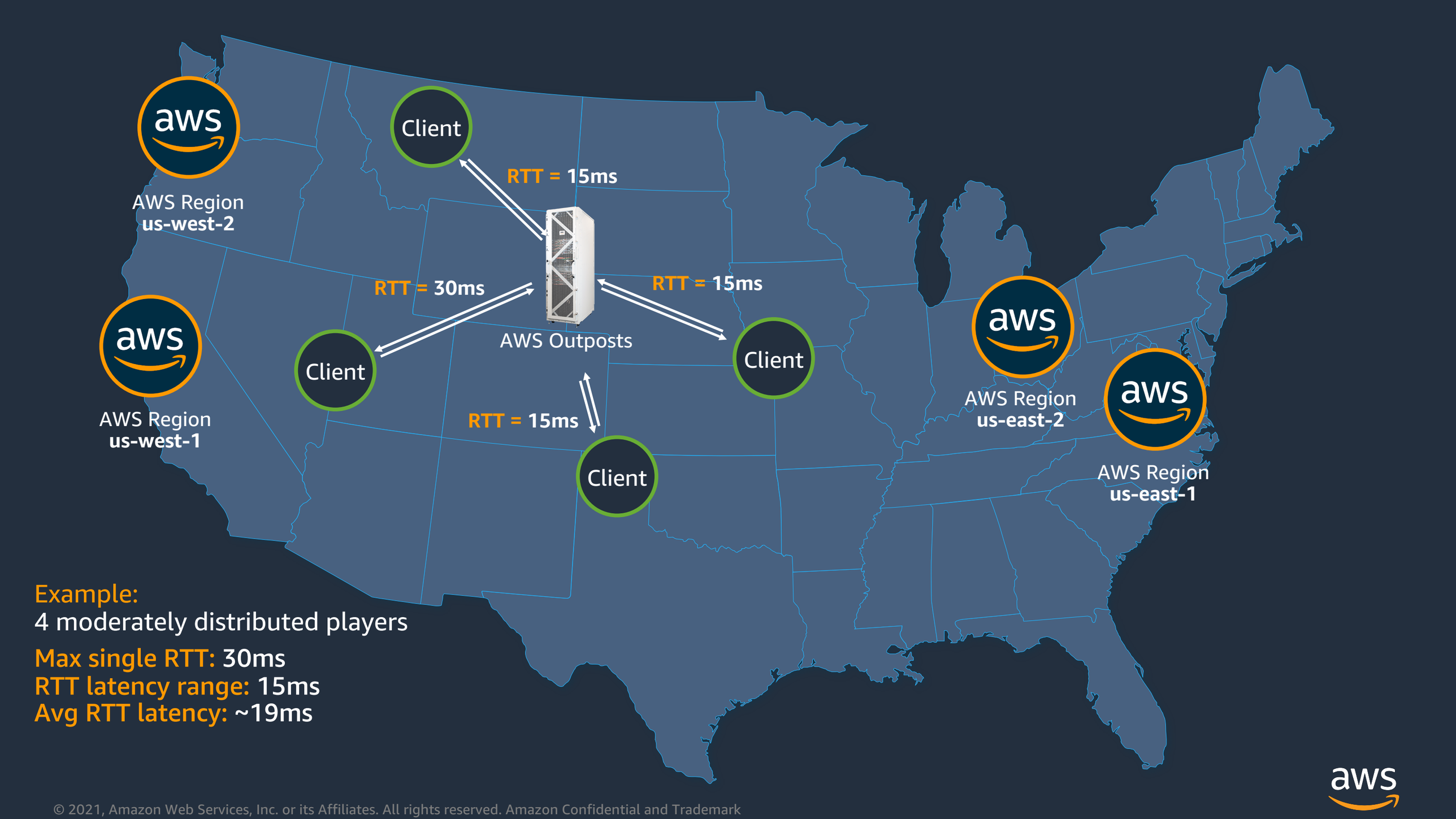


Due to the proximity of users to their closest region, an amount of variance in latency occurs

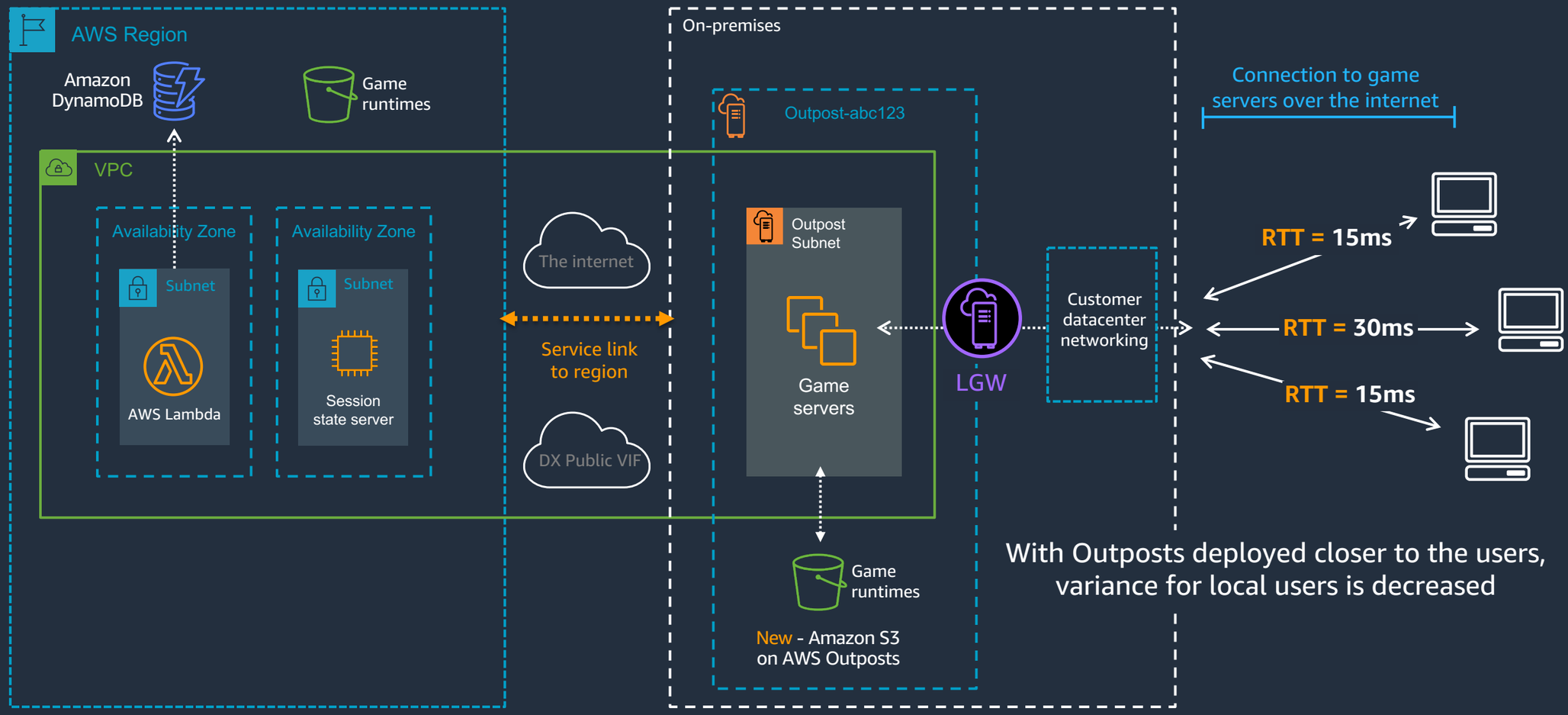


Example:
4 moderately distributed players

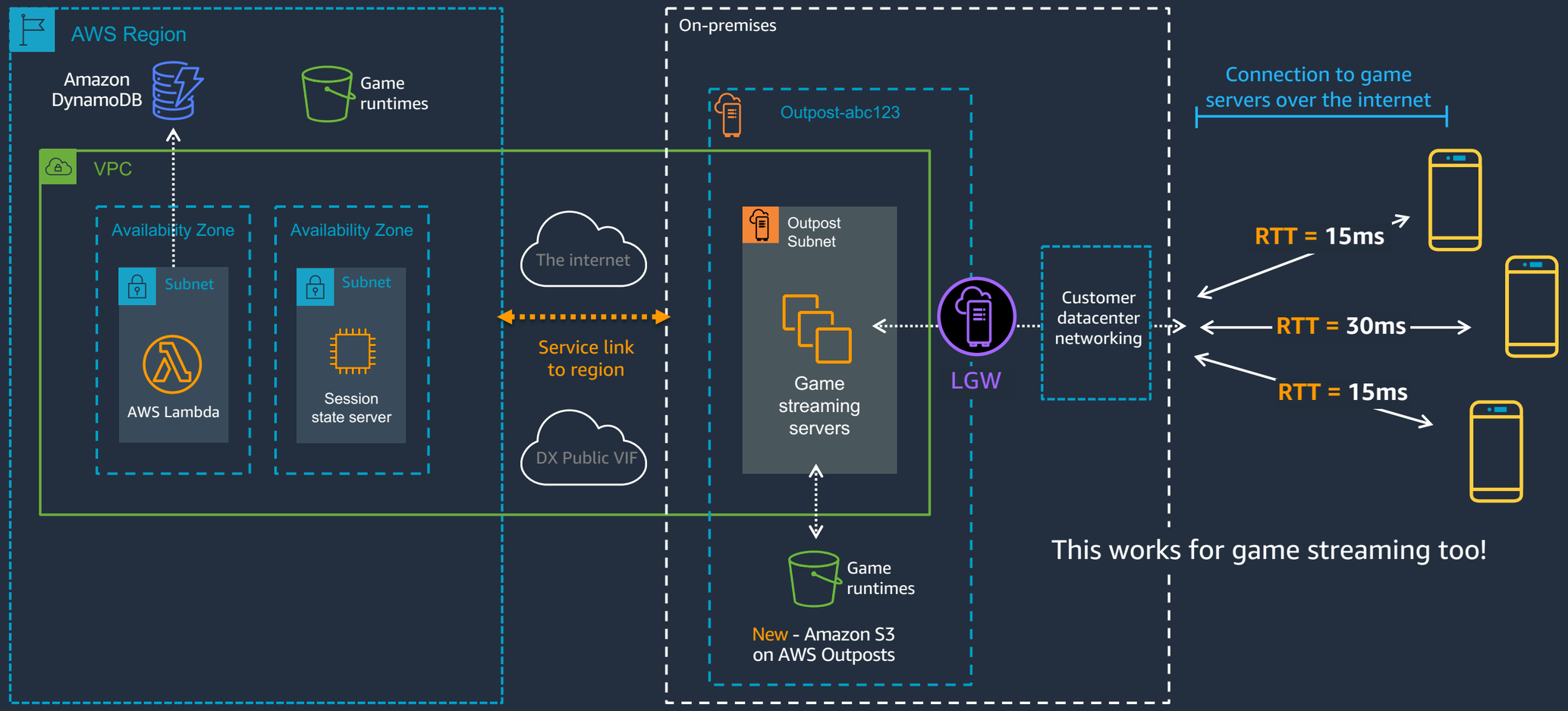
Max single RTT: 60ms
RTT latency range: 45ms
Avg RTT latency: 39ms



Using AWS Outposts for low-latency online games



Using AWS Outposts for low-latency online games



AWS Outposts:
Use Cases

Low Latency

Rendering, inference, data processing

Application Modernization

Modernize enterprise applications running at the edge

Application modernization tools

AWS CloudFormation

Application Load Balancer

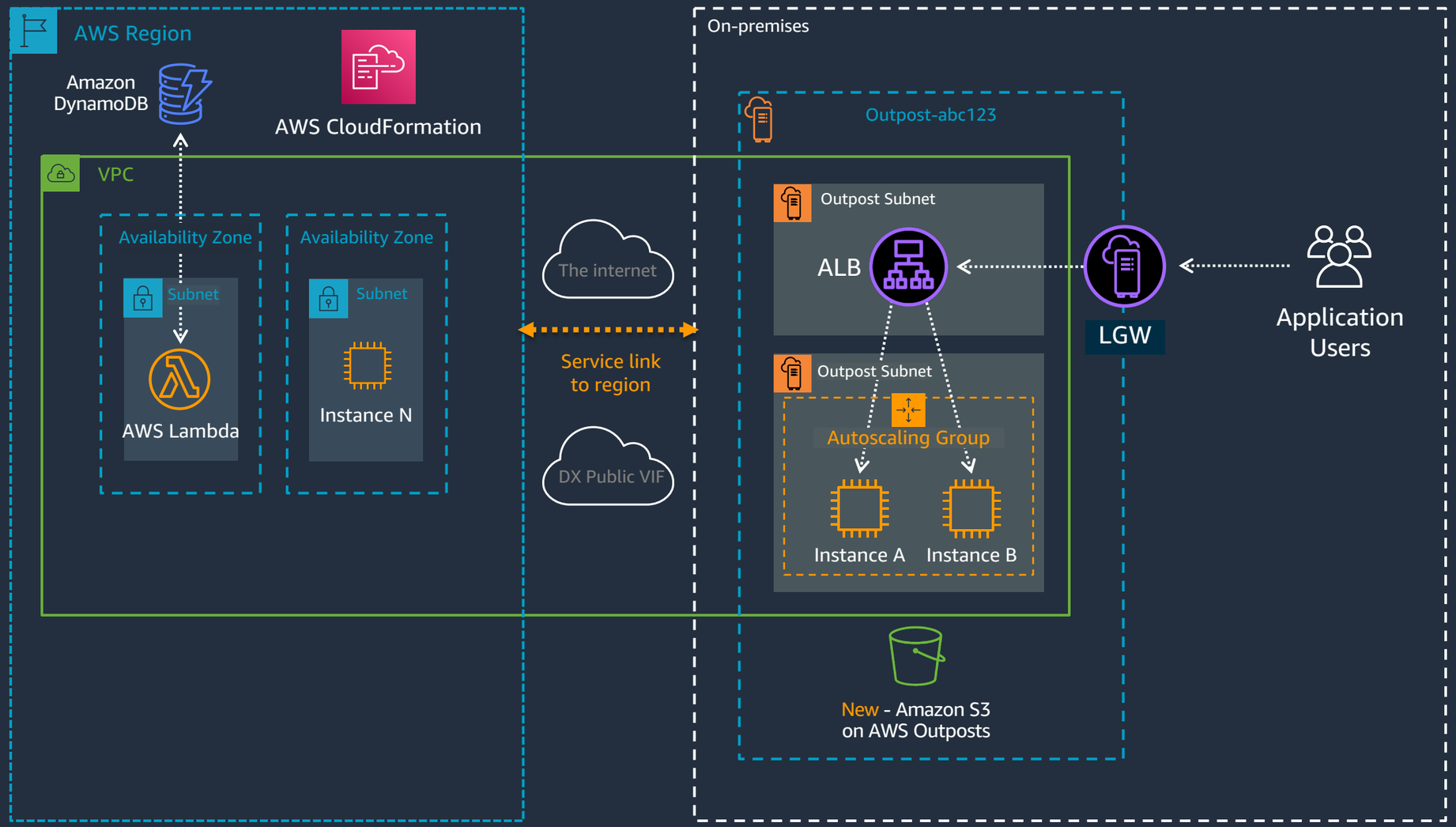
Amazon Simple Storage Service (S3)

Amazon VPC

Amazon EC2 Auto Scaling

And many more!

Using AWS Outposts for application modernization



AWS Outposts:
Use Cases

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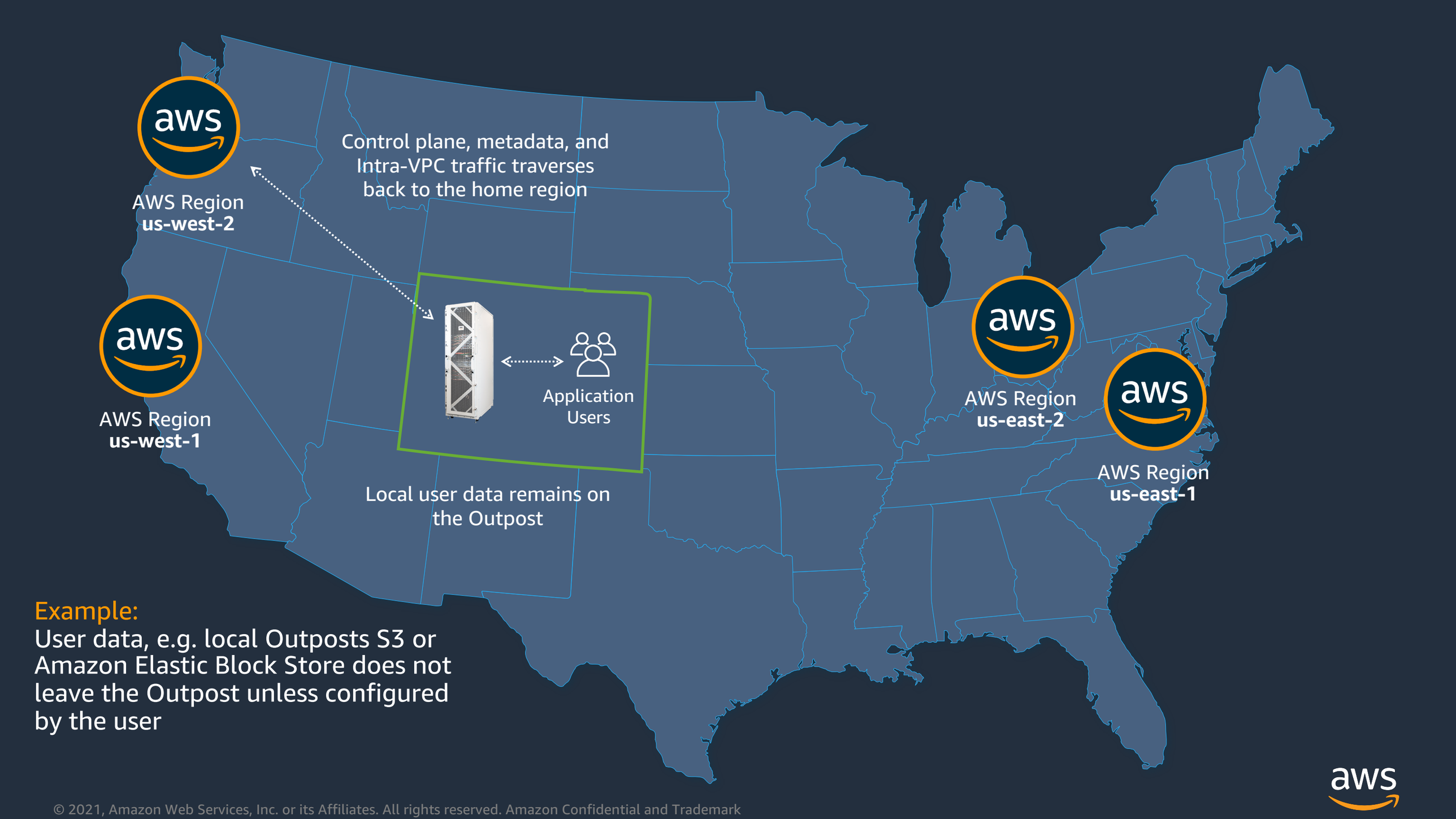
Application Modernization

Modernize enterprise applications running at the edge

Data Residency

Regulatory, security, process requirements



Example:
User data, e.g. local Outposts S3 or Amazon Elastic Block Store does not leave the Outpost unless configured by the user

AWS Outposts:
Use Cases

Low Latency

Rendering, inference, data processing

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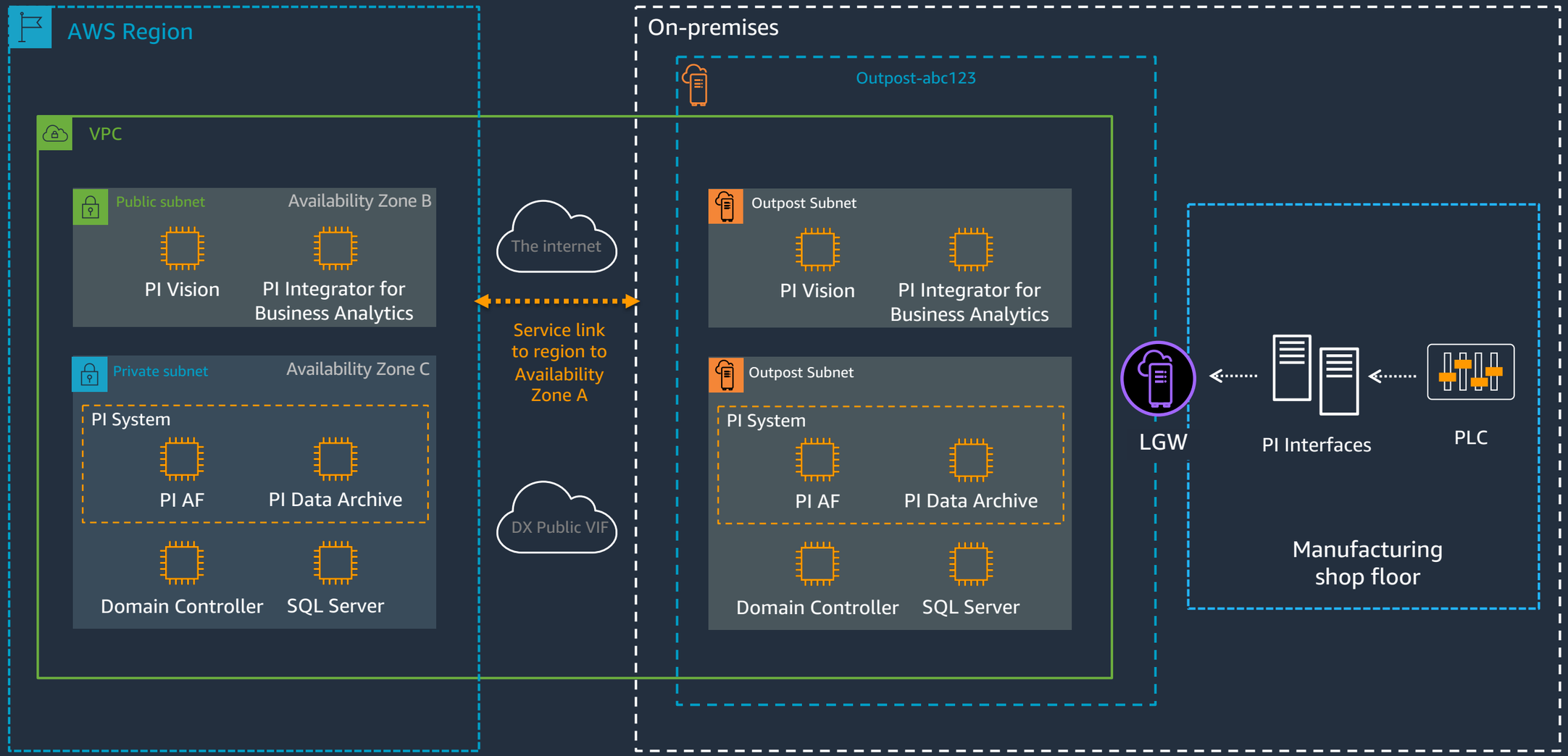
Local Data Processing

Local control systems, 5G/IOT

Using AWS Outposts for application modernization



AWS Outposts Architectures

Low Latency

Rendering, inference, data processing

Application Modernization

Modernize enterprise applications running at the edge

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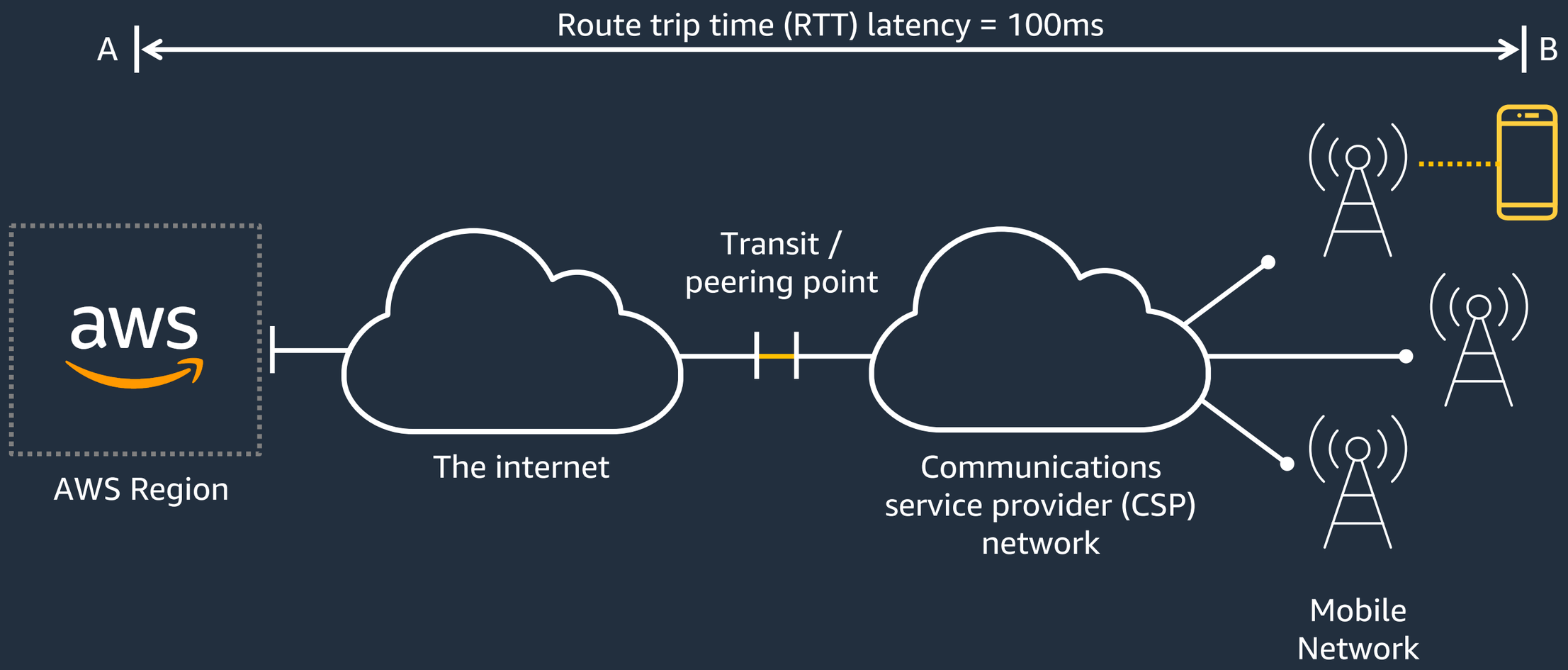
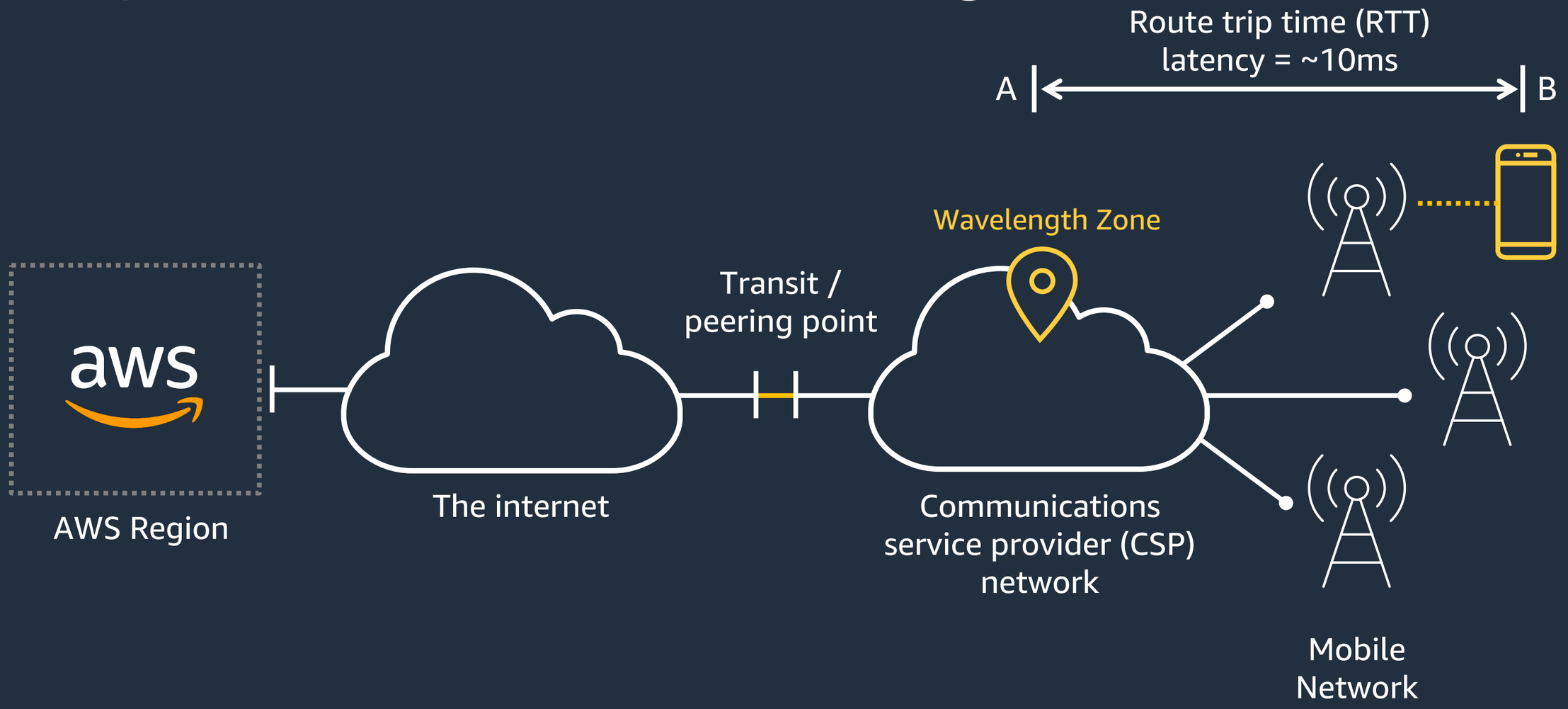
Local control systems, 5G/IOT

AWS Wavelength

The end-to-end network

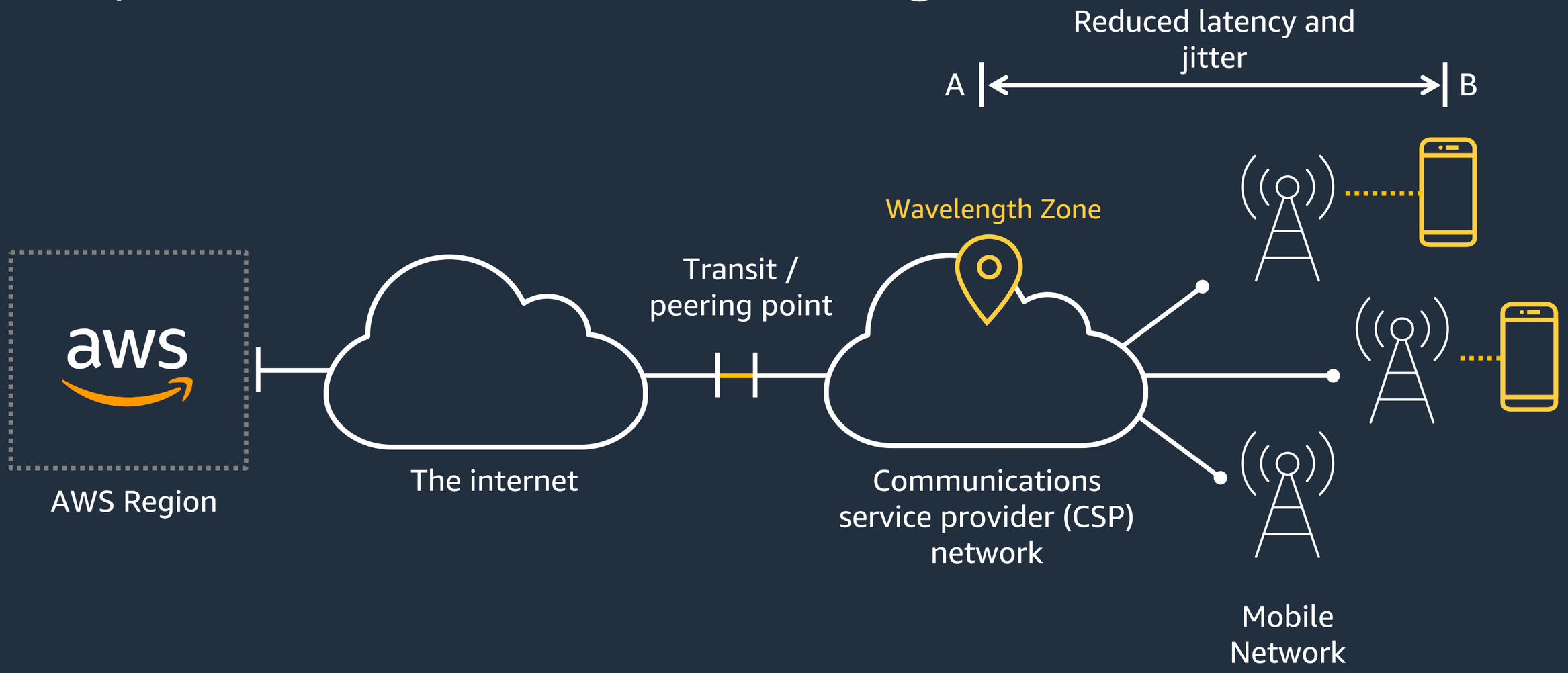


Compute at the 5G network edge



Note: p90 latency across user population across the US

Compute at the 5G network edge



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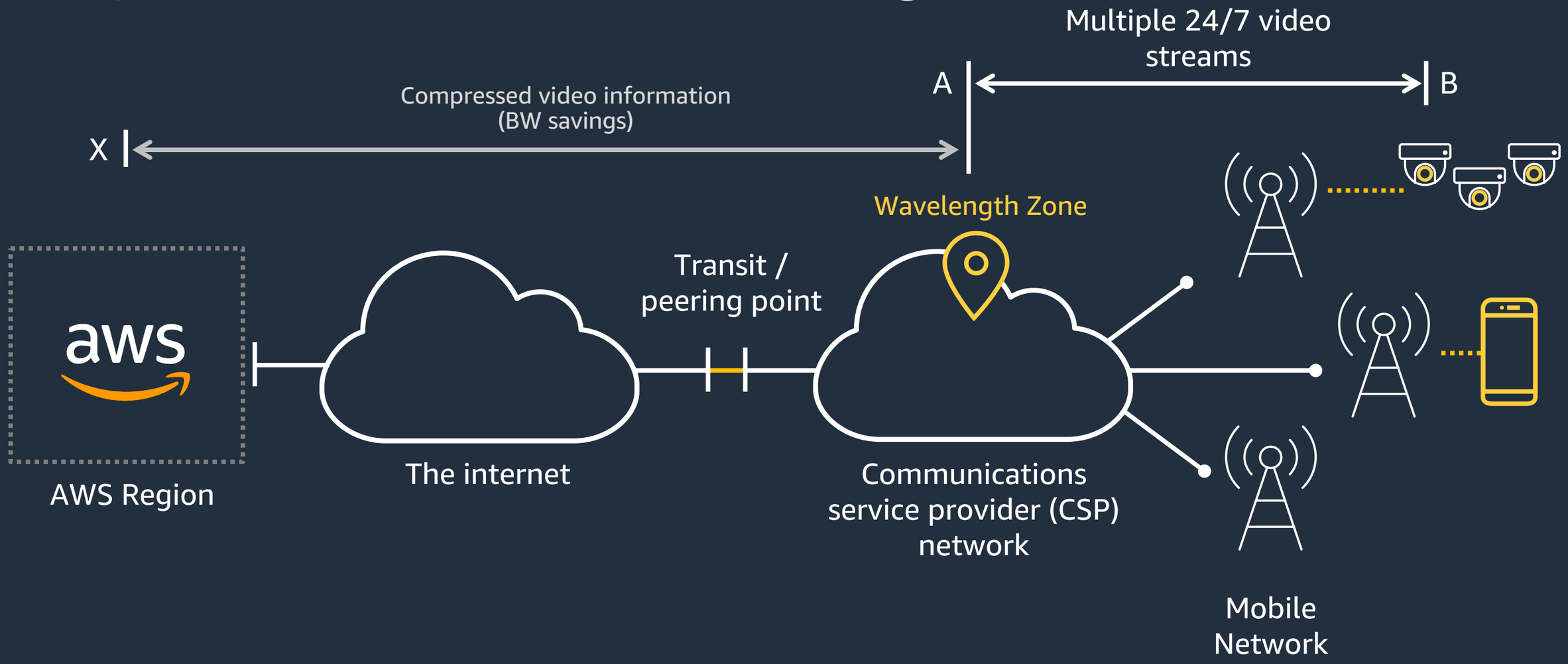
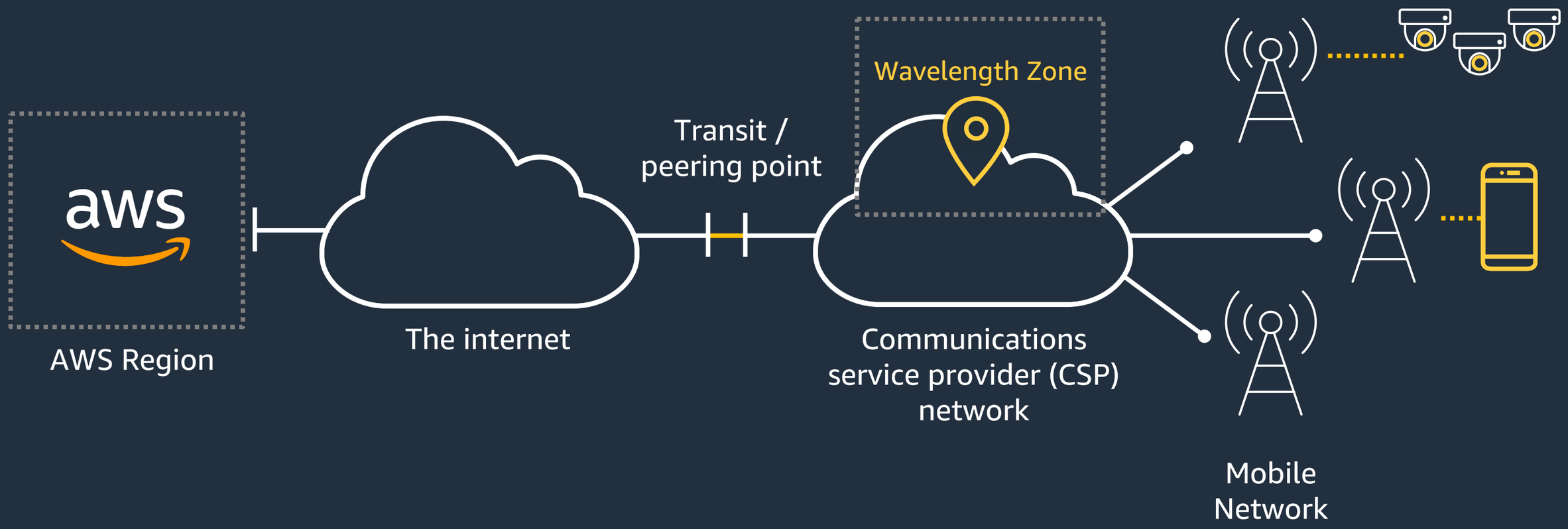


Wavelength zones

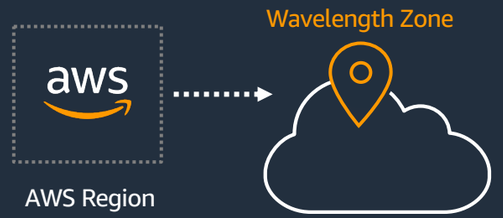
Wavelength zones



What is a Wavelength Zone

Same AWS-designed infrastructure as AWS data centers

Hosted in a site within a CSP partner network



Managed and monitored from an AWS region

Integrated into the CSP 5G Network

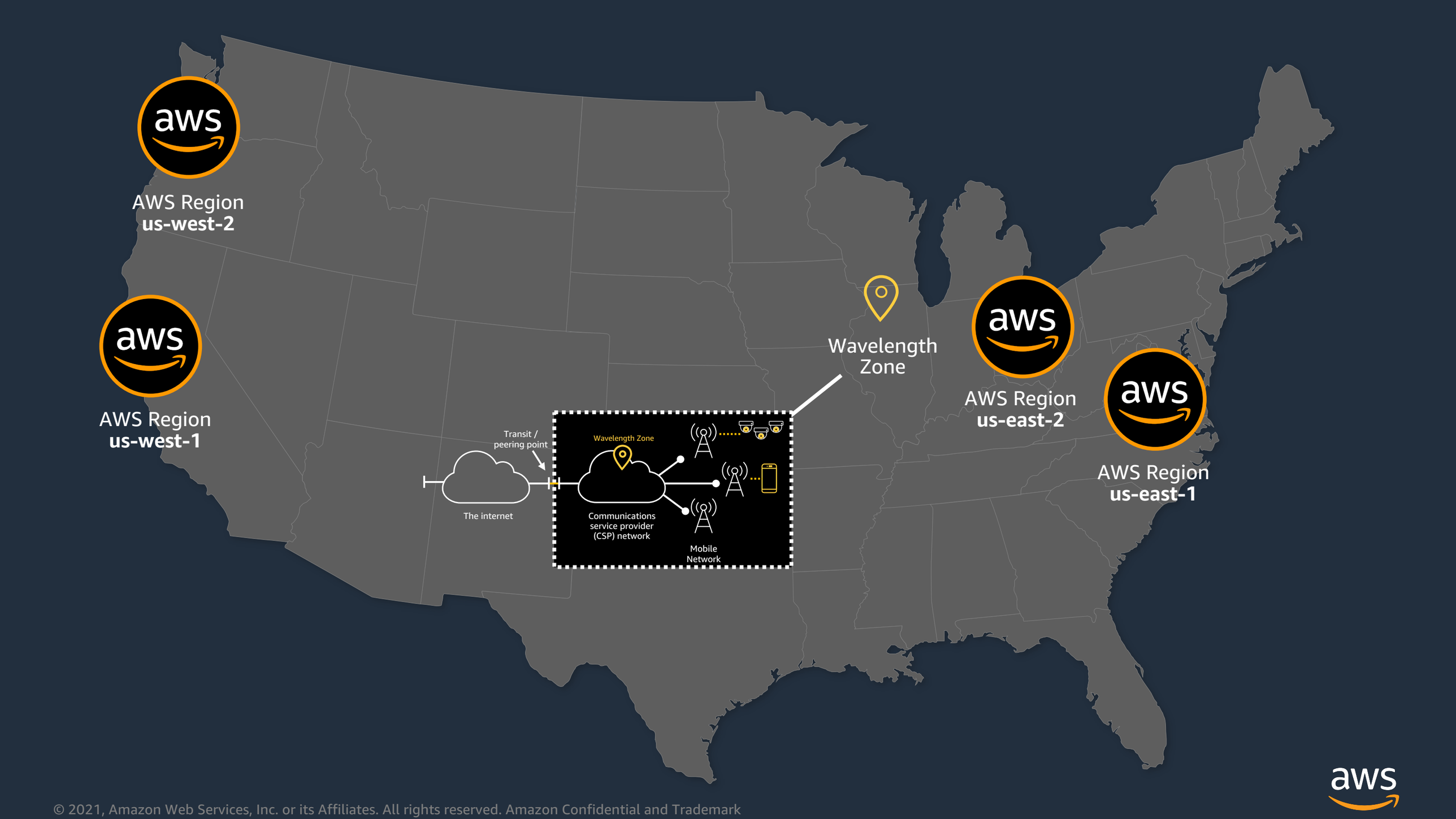
What is unique about a Wavelength Zone

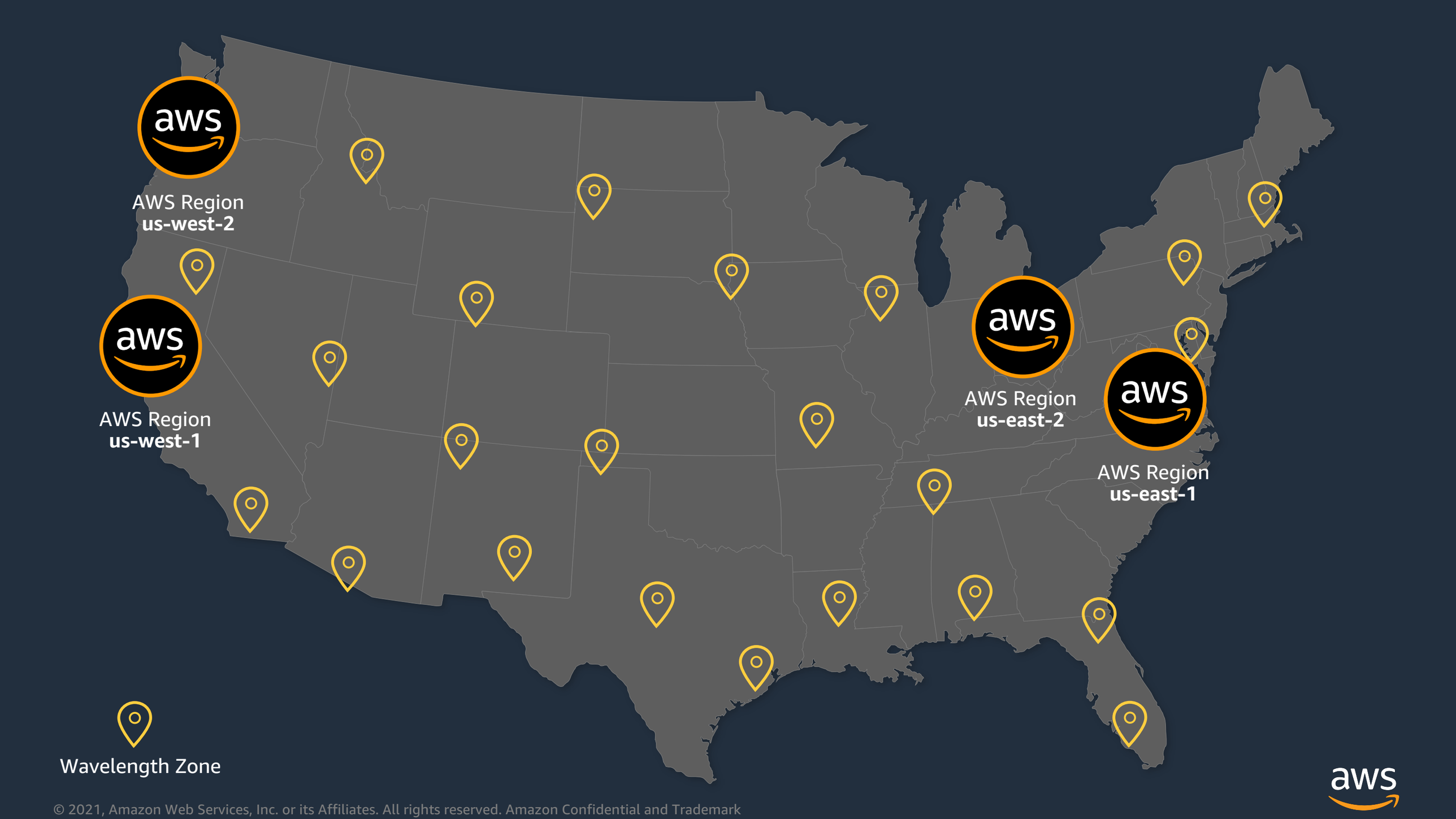
Single pane of management, across zones and AWS regions

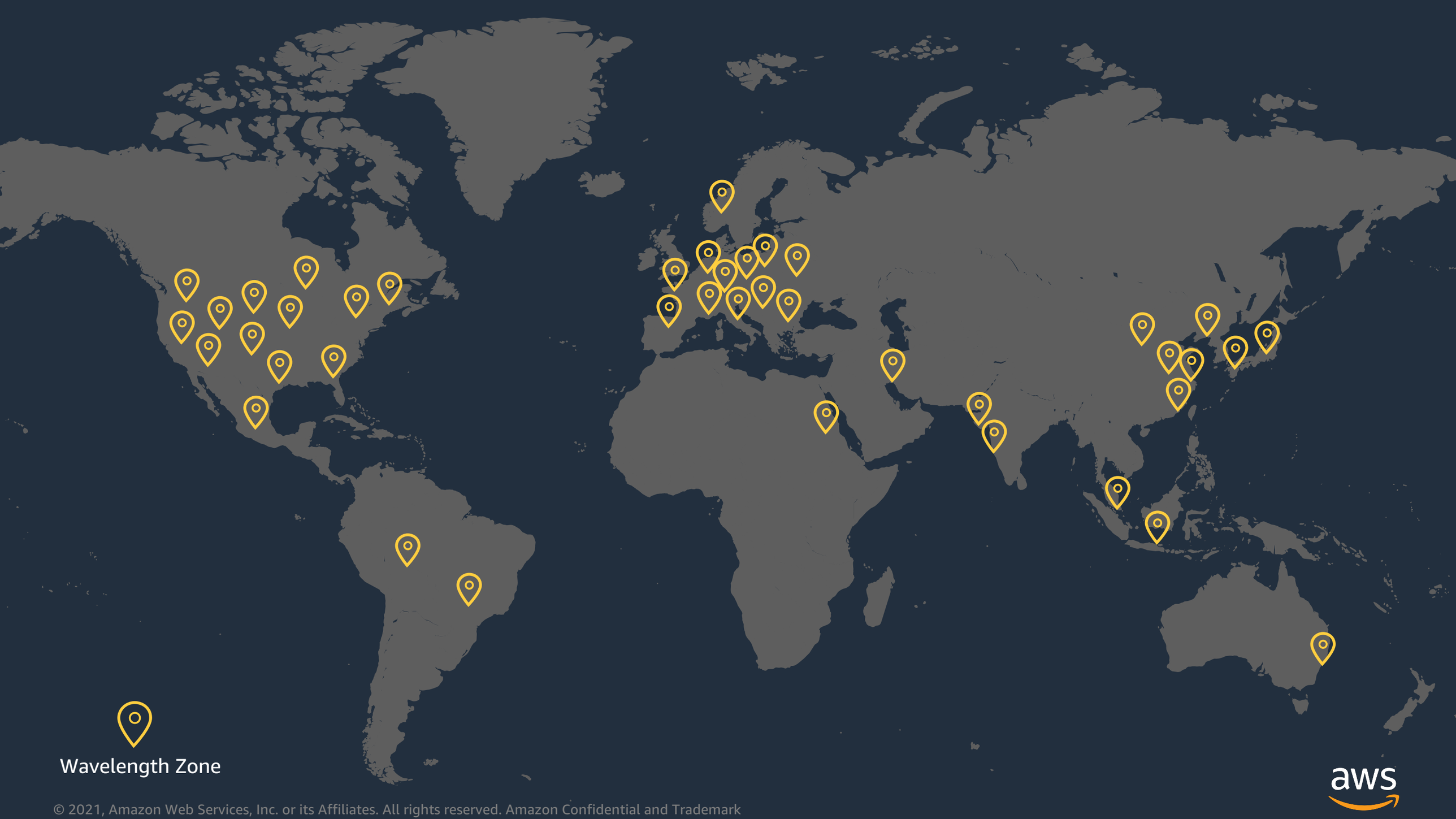
Same operational consistency (upgrades, patches, versions)

Same pace of innovation as in the AWS regions

Failover from Wavelength Zone to AWS region



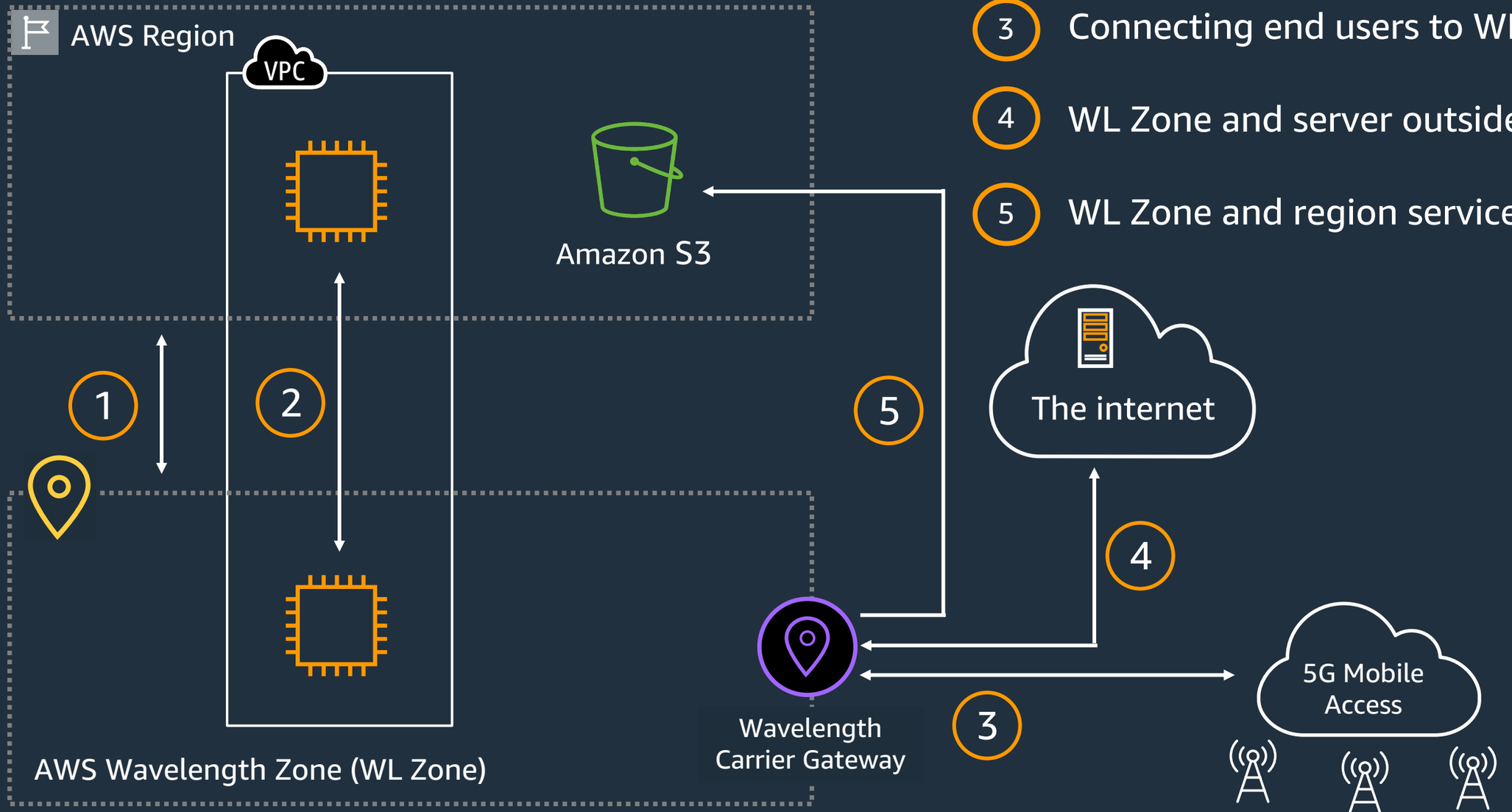




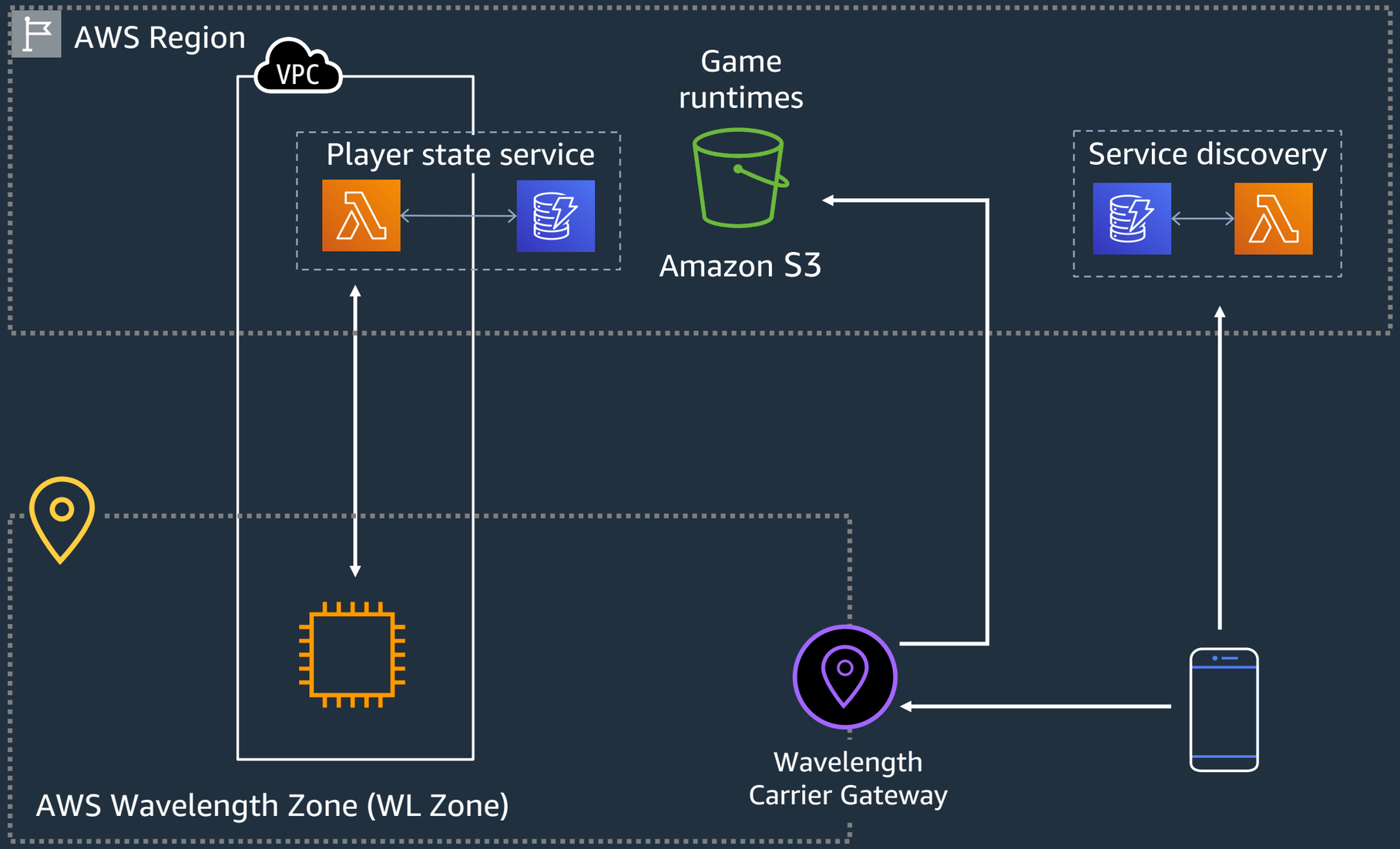
Using Wavelength Zones

Deploying applications

1. Control, management, and monitoring
2. VPC extension across Region and WL Zone
3. Connecting end users to WL Zone
4. WL Zone and server outside of AWS region
5. WL Zone and region service end points



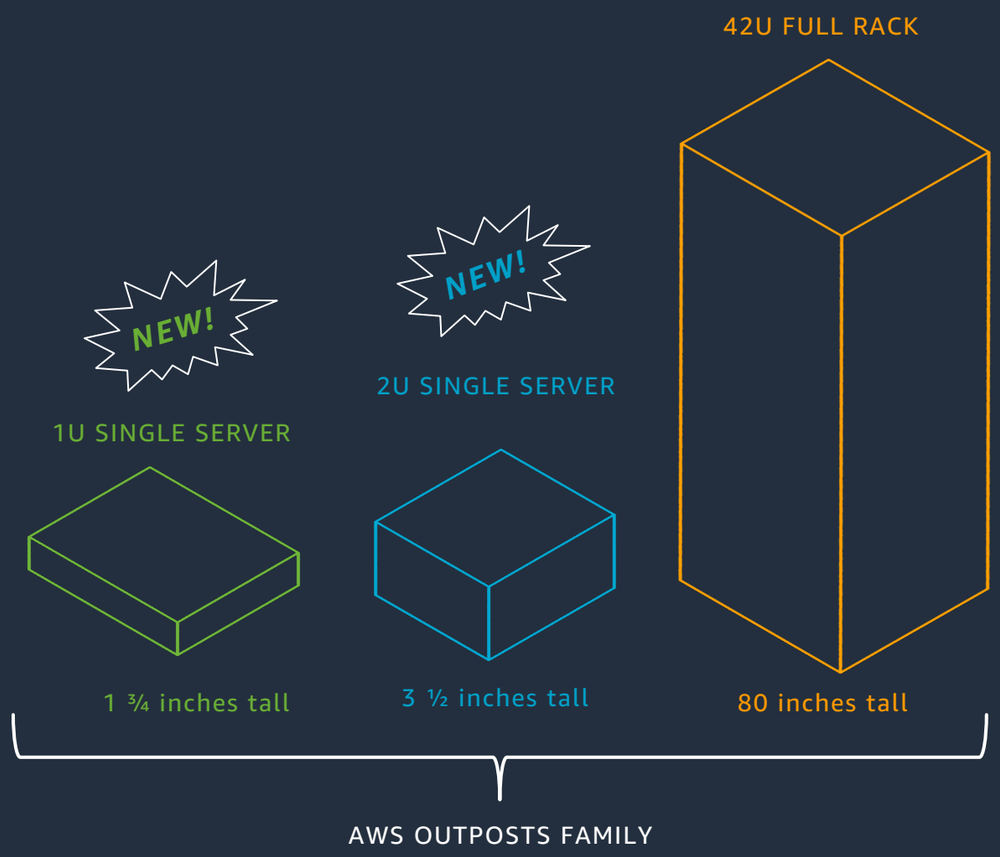
Deploying applications



Wrap up

Coming soon for AWS Outposts:

AWS Outposts in 2 new sizes



Offers the same AWS infrastructure, services, APIs, and tools on-premises, now with a smaller form factor

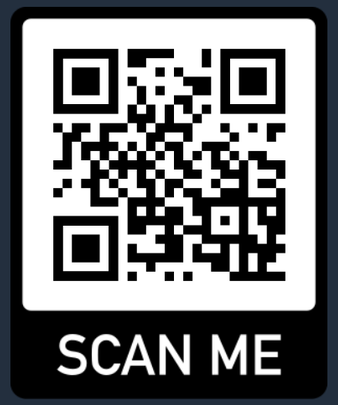
Choose between a 1U Outpost server with an AWS Graviton2 processor or a 2U Outposts server with an Intel processor

Run AWS services locally, including EC2, ECS, and EKS and edge services like AWS IoT Greengrass

Ideal for workloads that require low latency and local processing needs

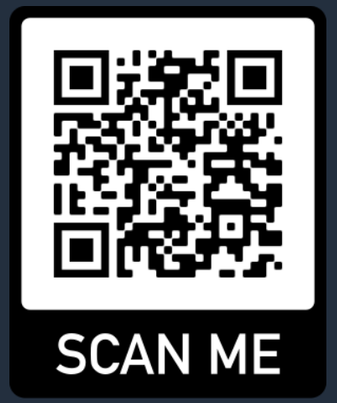
Simple device installation by either your own on-premises personnel or a preferred 3rd party vendor

Additional resources & next steps



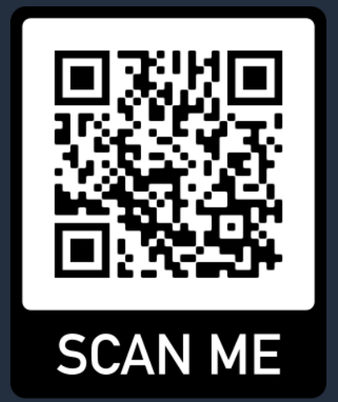
Reference Architecture

AWS Outposts Networking



Resources Page

Solution Briefs, E-Books, and more!



Reinvent Session

Cloud Where you Want it

reinvent Session

Bringing the AWS experience on premises

Thank you!

Matt Lehwess
Principal Developer Advocate
AWS
@mlehwess