Graphiant + Intel

Simplifying Complex Networks with Graphiant's Network Edge Service

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Chief of Product Strategy

Agenda

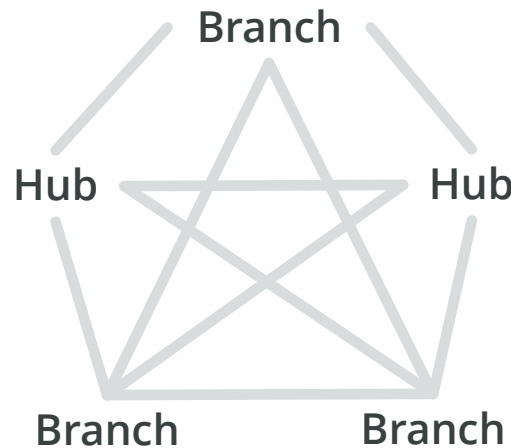# The Rise of Unpredictable Topologies

The expansion & elasticity of the network is an essential part of the digital transformation

Predictable
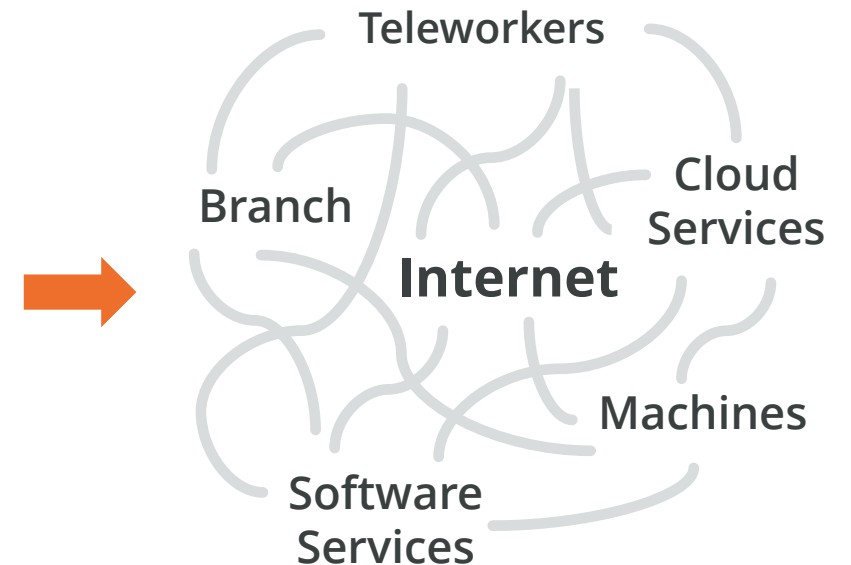
Unpredictable

Problem

Networks are no longer made up of fixed locations from data center, cloud, colos and edge compute

Branch

Hub

Hub

Branch

Branch

Teleworkers

Branch

Cloud Services

Internet

Machines

Software Services

What the **solution** needs to be

It must be a private network

- Enterprise Grade Reliability

- Privacy

- Security

It must be *as-a-Service*

- Agility

- Scalability

- Cost Effective

Graphiant Network Edge Service

A service that provides reliable delivery, simple control, and optimized throughput to your Edge applications and users.

Edge

Any-to-any connectivity with **guaranteed** delivery for apps & services

Cloud

Secure & **optimized** connectivity from any customer site to **any cloud environment**
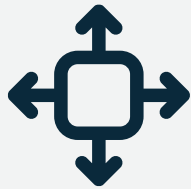
B2B

A ready-to-consume service that makes it easy to connect **partners & customers**
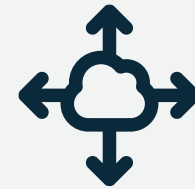
Service Edge

Hardware Edge

Baremetal, Devices from Intel, Lanner, Dell, HPE

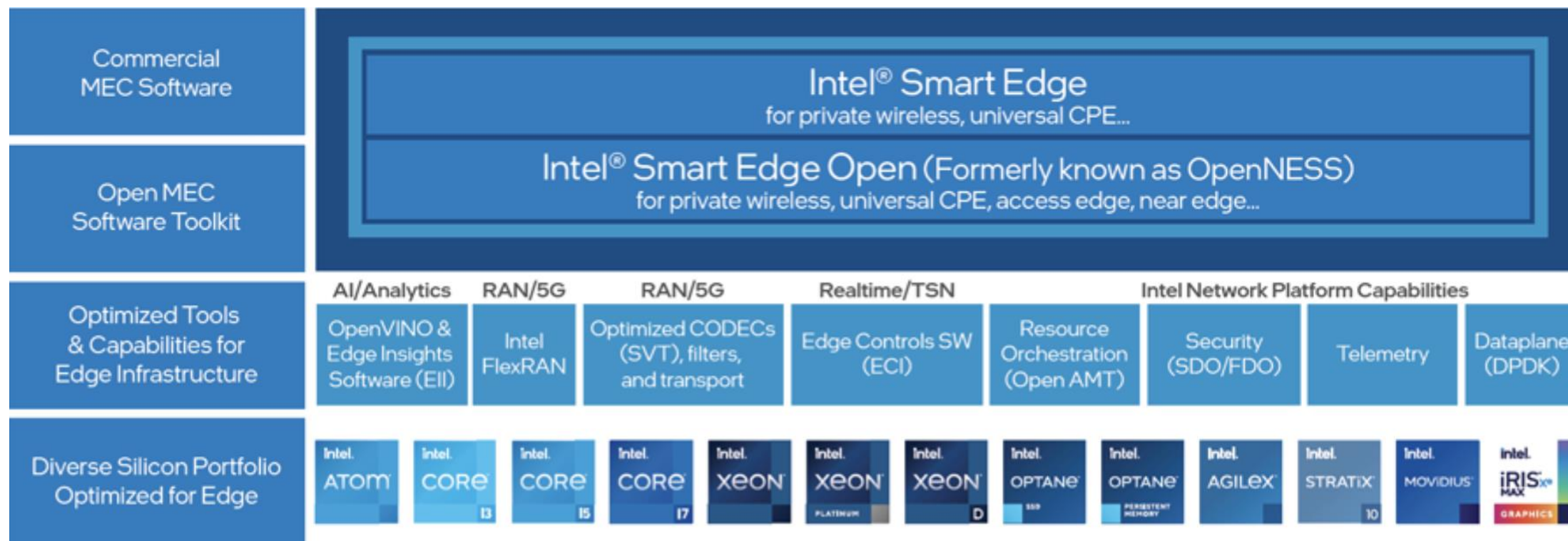### Intel Smart Edge

An Edge compute ecosystem platform

Cloud Edge

Virtual machines, AMI, VHD, OVA

Intel & Graphiant

Commercial MEC Software	Intel® Smart Edge for private wireless, universal CPE...						
Open MEC Software Toolkit	Intel® Smart Edge Open (Formerly known as OpenNESS) for private wireless, universal CPE, access edge, near edge...						

	AI/Analytics	RAN/5G	RAN/5G	Realtime/TSN	Intel Network Platform Capabilities		
Optimized Tools & Capabilities for Edge Infrastructure	OpenVINO & Edge Insights Software (EII)	Intel FlexRAN	Optimized CODECs (SVT), filters, and transport	Edge Controls SW (ECI)	Resource Orchestration (Open AMT)	Security (SDO/FDO)	Telemetry / Dataplane (DPDK)

Diverse Silicon Portfolio Optimized for Edge

intel. ATOM · intel. CORE i3 · intel. CORE i5 · intel. CORE i7 · intel. XEON · intel. XEON PLATINUM · intel. XEON D · intel. OPTANE SSD · intel. OPTANE PERSISTENT MEMORY · intel. AGILEX · intel. STRATIX 10 · intel. MOVIDIUS · intel. IRIS X MAX GRAPHICS
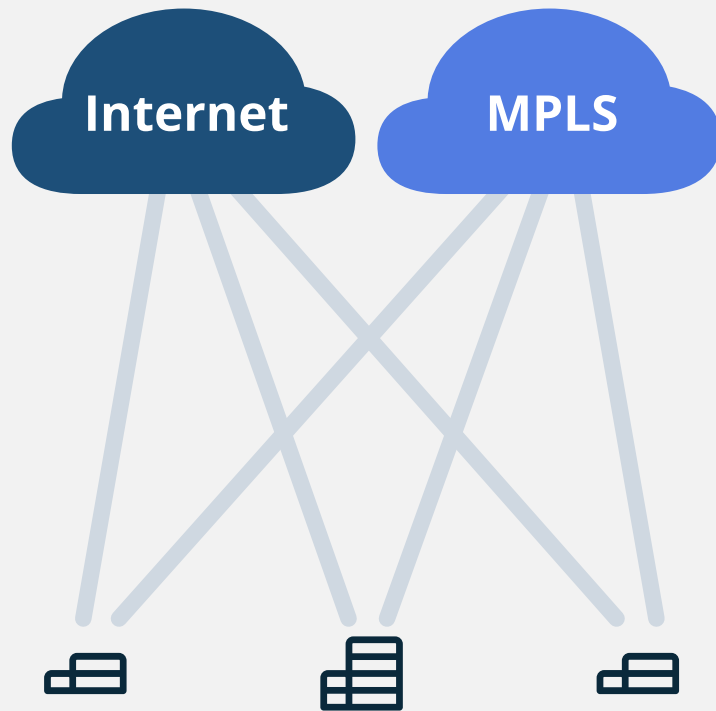
Intel® Multi-Edge Computing (MEC) technologies: Intel® Smart Edge and Intel® Smart Edge Open.

Evolving SDWAN in to NaaS

SDWAN

Graphiant NaaS

Internet

MPLS

Graphiant Stateless Core
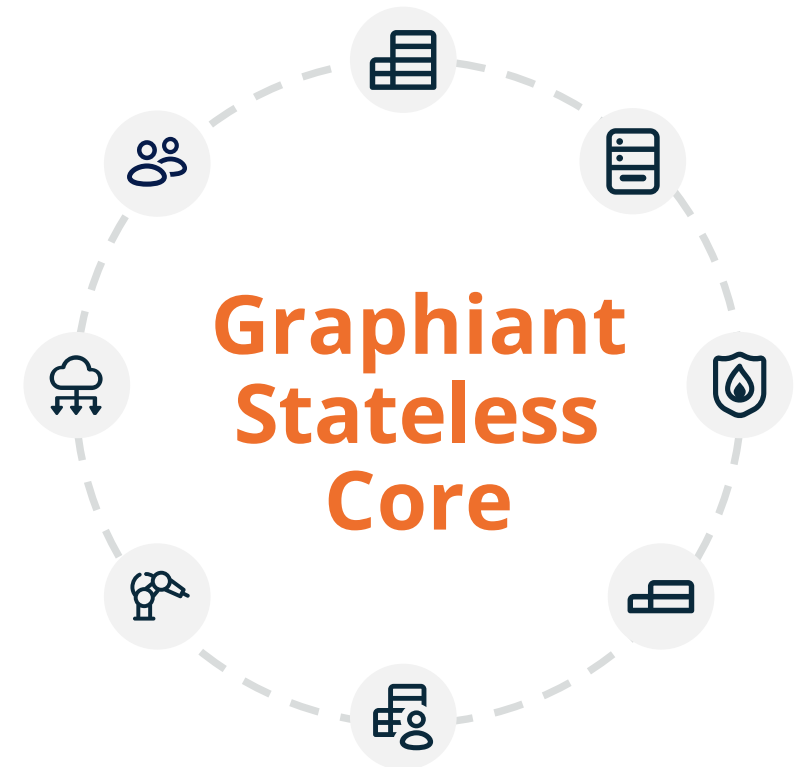
Graphiant Architecture

SDN Principles for the **Graphiant** Solution

Control & Data Plane Separation

Offload the Core of any control plane state to achieve maximum scale and performance
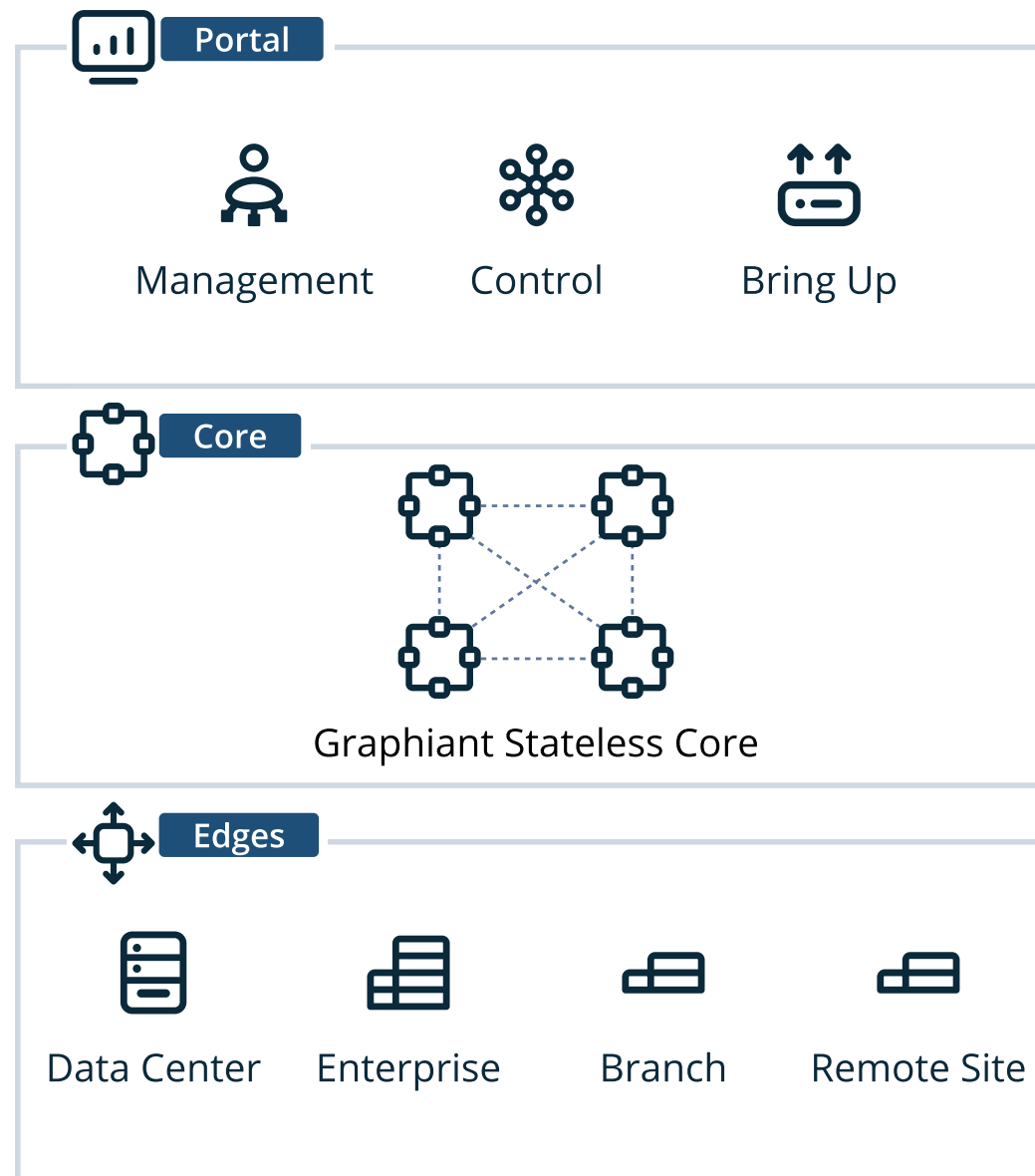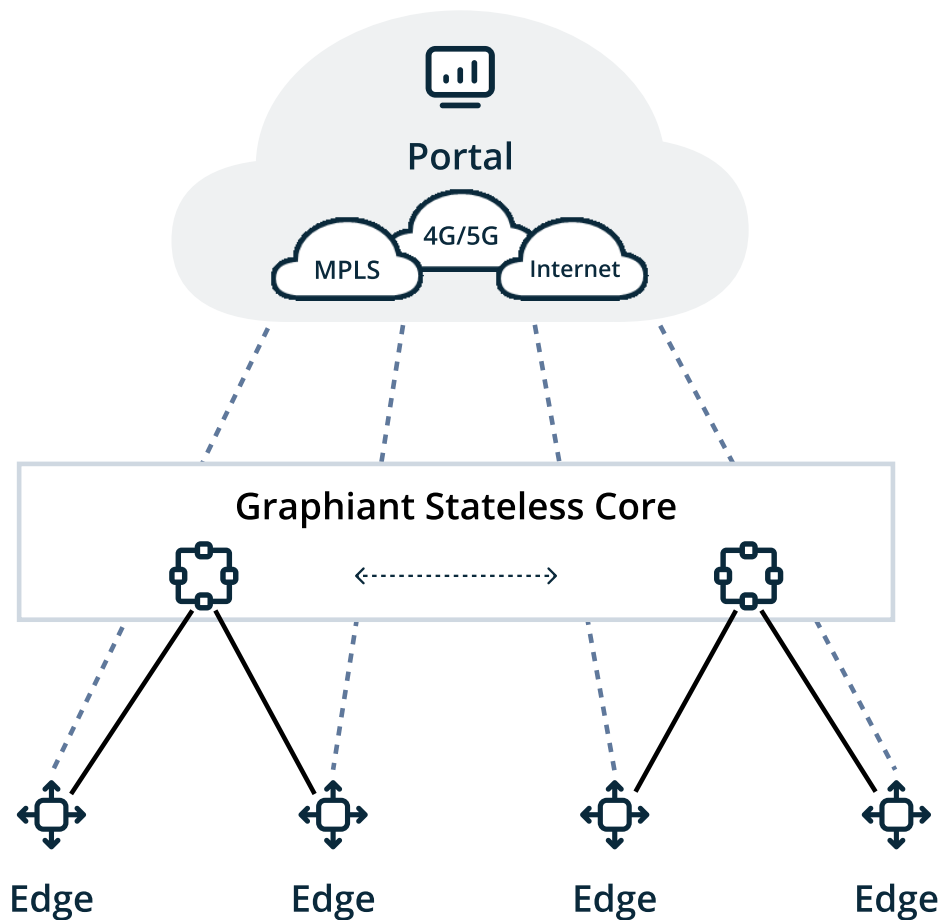
Privacy & Security

Ensure end-to-end encryption and strictly prohibit decryption outside of customer Edge

Cost Effective

Minimize the number of virtual machines needed to power drawn by appliances for achieving high bandwidth throughput

Graphiant Service

Portal

4G/5G
MPLS
Internet

Graphiant Stateless Core

Edge   Edge   Edge   Edge

Portal

Management   Control   Bring Up

Core

Graphiant Stateless Core

Edges

Data Center   Enterprise   Branch   Remote Site

Control Plane

Graphiant Cloud

- Multi-tenant cloud delivered portal
- Main control plane processing engine
- Runs Graphiant's network protocols
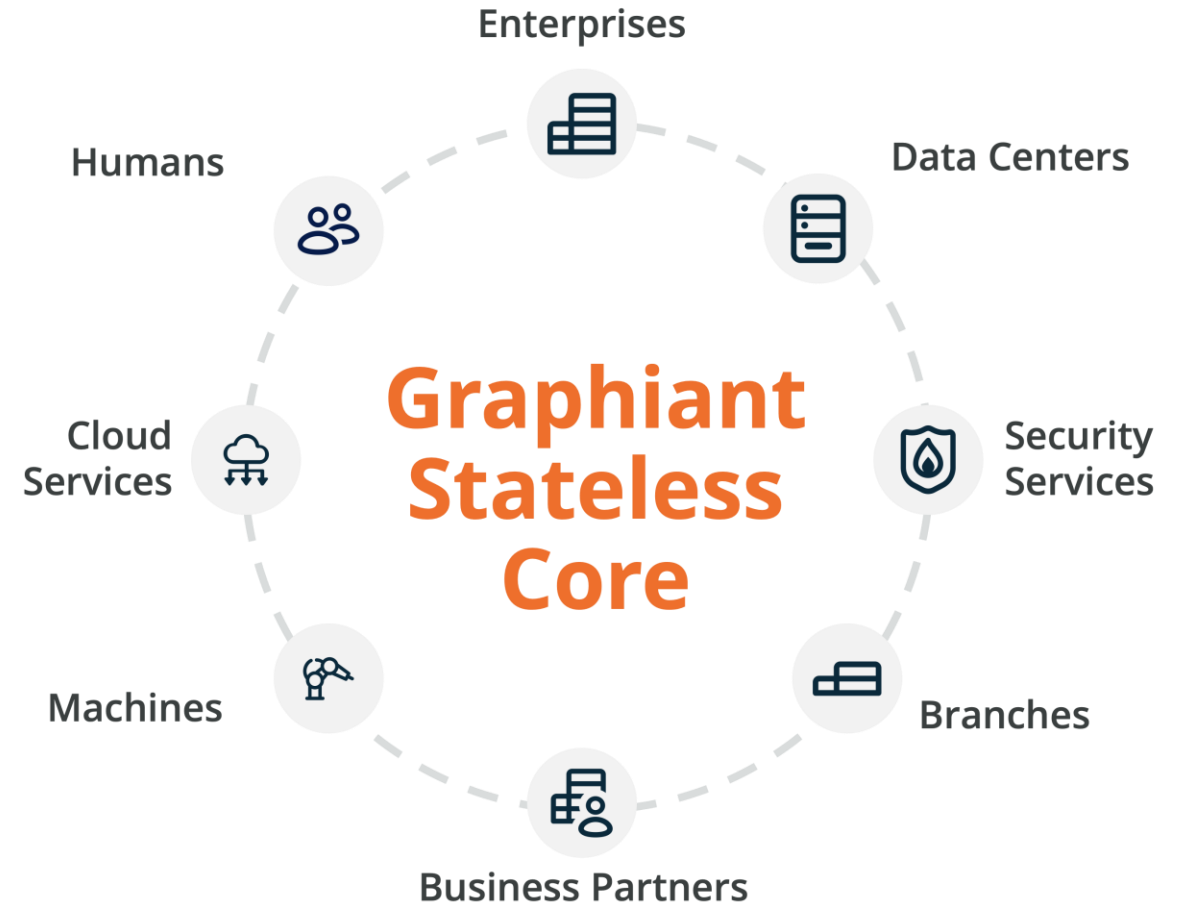- User interface for management of devices and policies
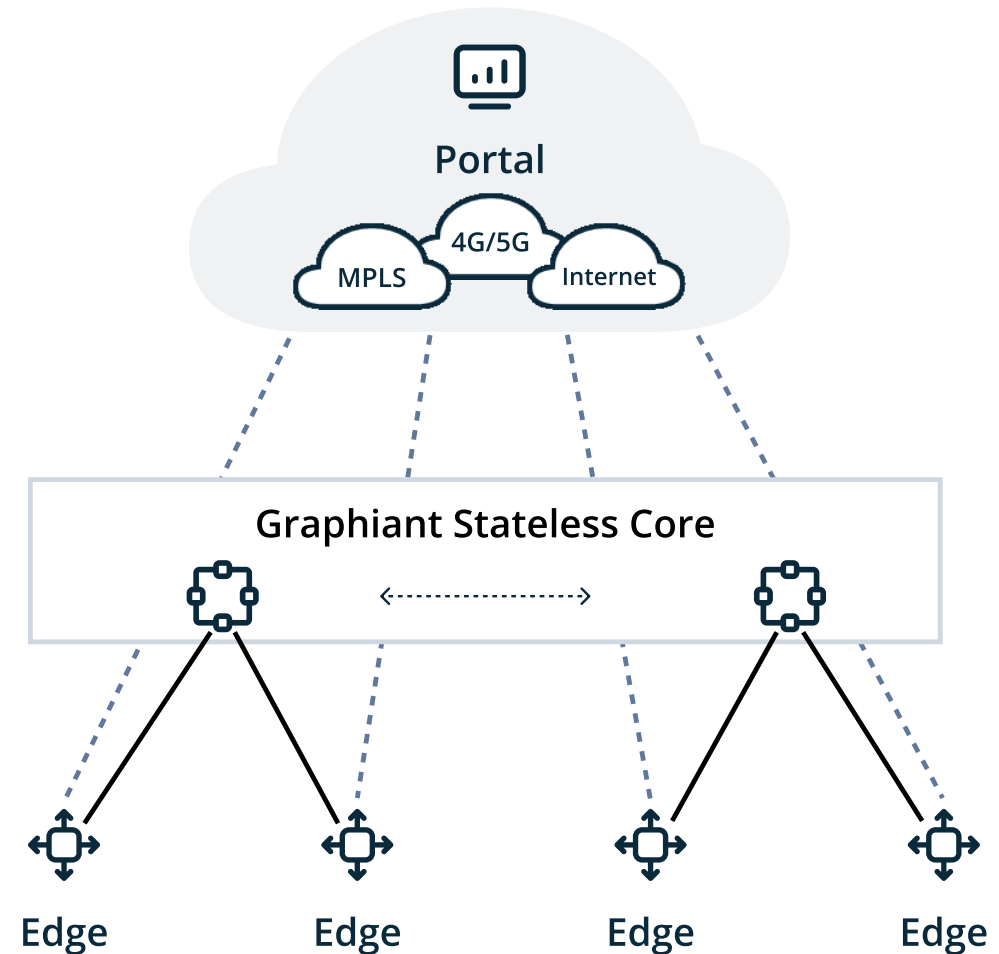
The Stateless Core

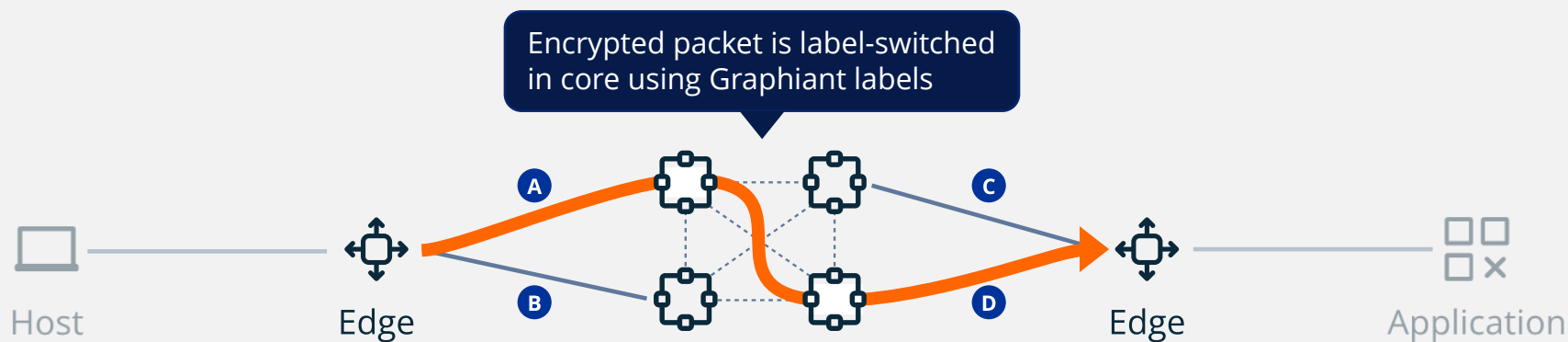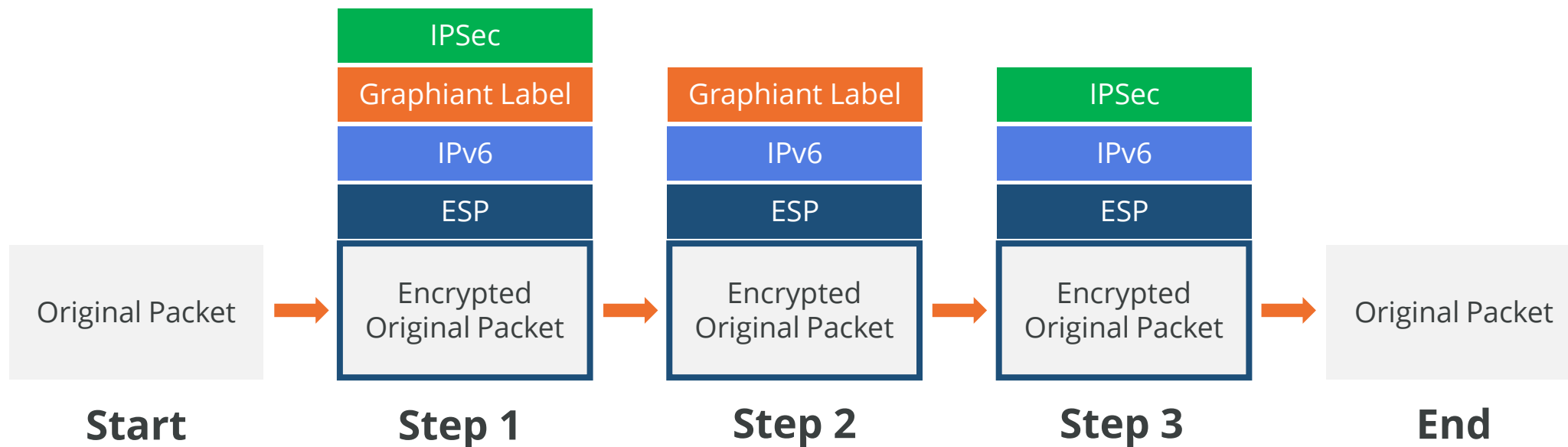**Facilitates connectivity to Edges and services across the network**

Unique Core Architecture

- New metadata protocol
- Natively multi-tenant core delivered as a service
- Stateless transit for end-to-end privacy
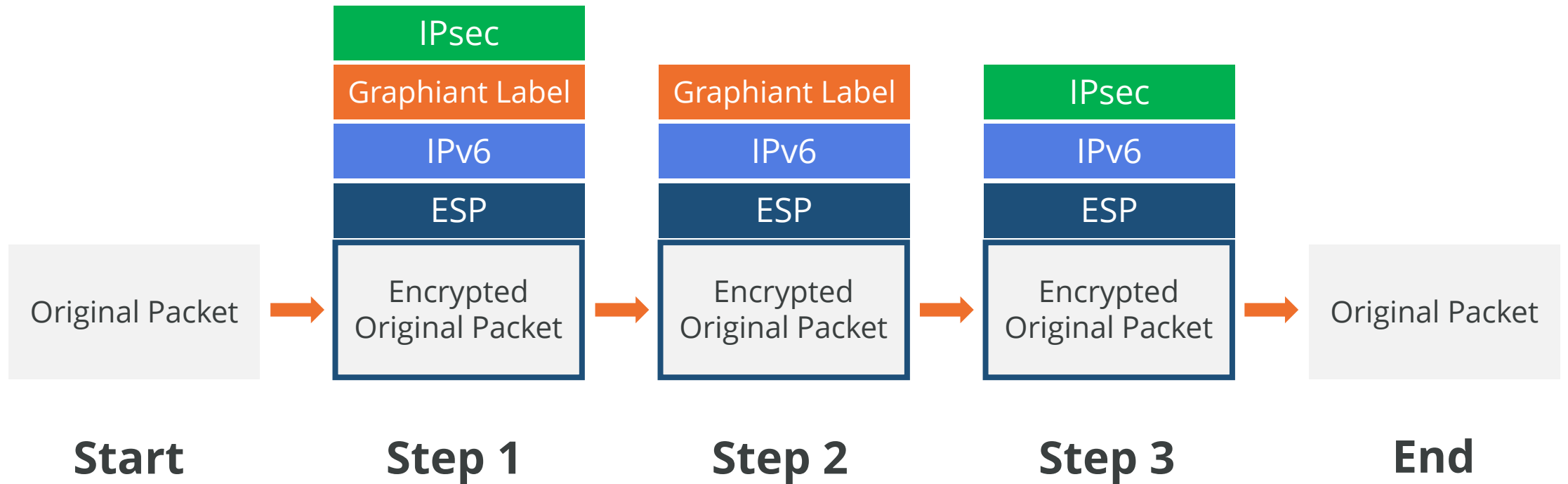- Programmable pathing & SLAs for customers to interact via policy and metadata

Enterprises

Data Centers

Humans

Security Services

Cloud Services

Graphiant Stateless Core

Branches

Machines

Business Partners

Metadata Based Forwarding

	IPSec			
	Graphiant Label	Graphiant Label	IPSec	
	IPv6	IPv6	IPv6	
	ESP	ESP	ESP	
Original Packet	Encrypted Original Packet	Encrypted Original Packet	Encrypted Original Packet	Original Packet
Start	**Step 1**	**Step 2**	**Step 3**	**End**

Encrypted packet is label-switched in core using Graphiant labels

A
B
C
D

Host   Edge   Graphiant Stateless Core   Edge   Application

Encapsulation at Each Step

Start

Step 1

Step 2

Step 3

End

Step 1: Edge to Core

Host **10.1.1.1** sends traffic to server **10.2.2.2**

Host

Edge

Graphiant Stateless Core

Edge

Application
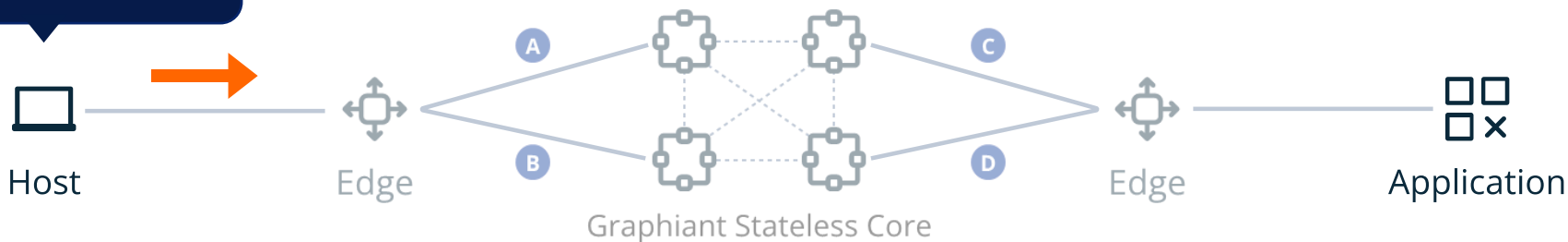
Edge uses IPsec integrity protection to access the Graphiant Core

Edge encapsulates the packet in IPv6 + Graphiant label

| Data | SA=10.1.1.1 | DA=10.2.2.2 | ESP | IPv6 | Graphiant Label | IPsec |
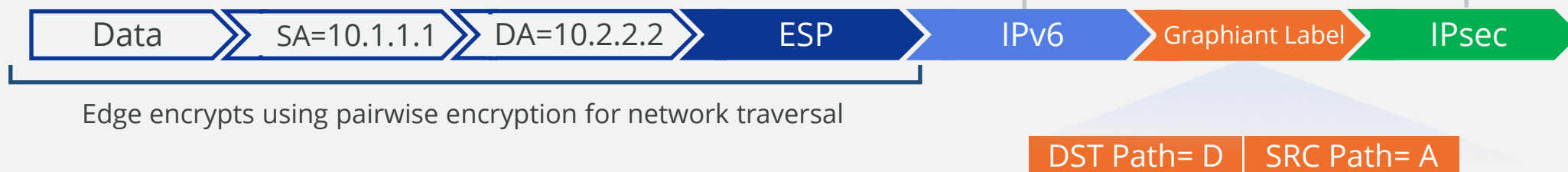
Edge encrypts using pairwise encryption for network traversal

DST Path= D │ SRC Path= A

Step 2: Ingress Core to Egress Core

Encrypted packet is label-switched in core using Graphiant labels

A

B

C

D

Host

Edge

Graphiant Stateless Core

Edge

Application
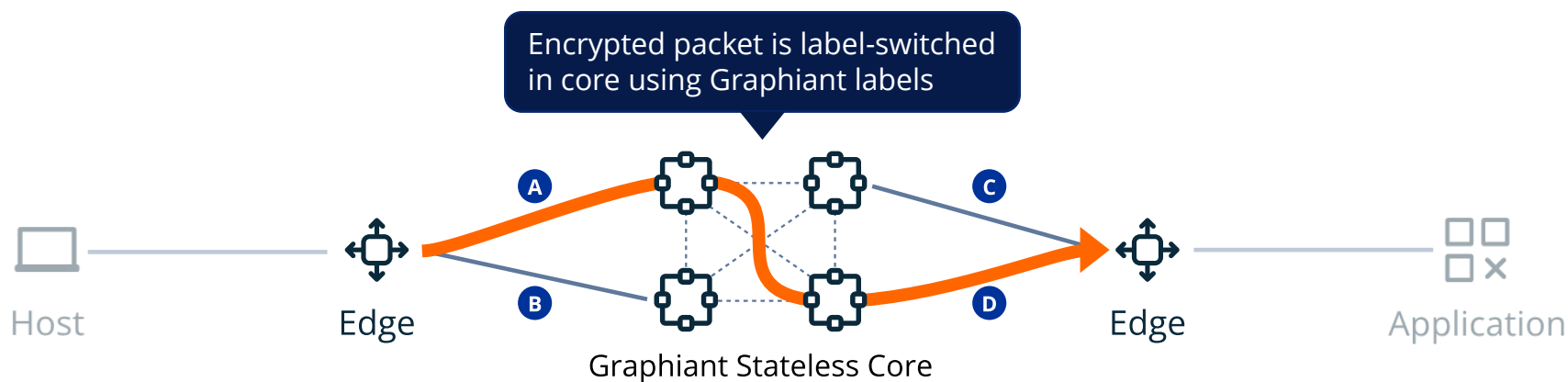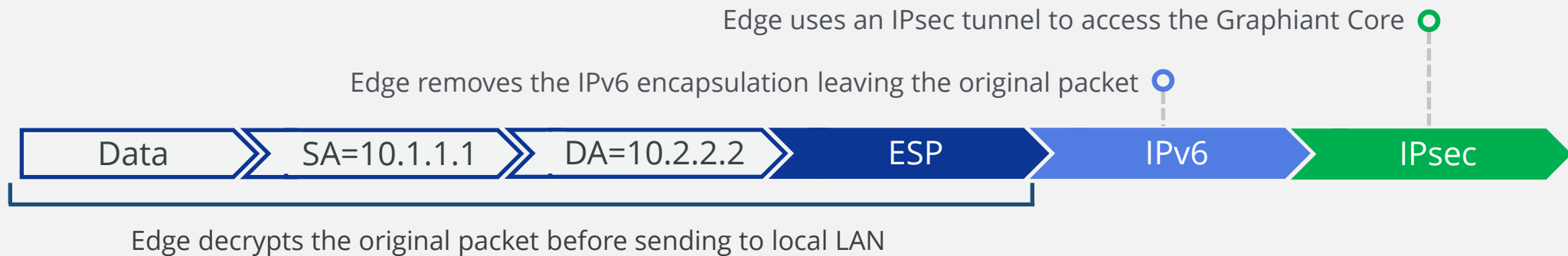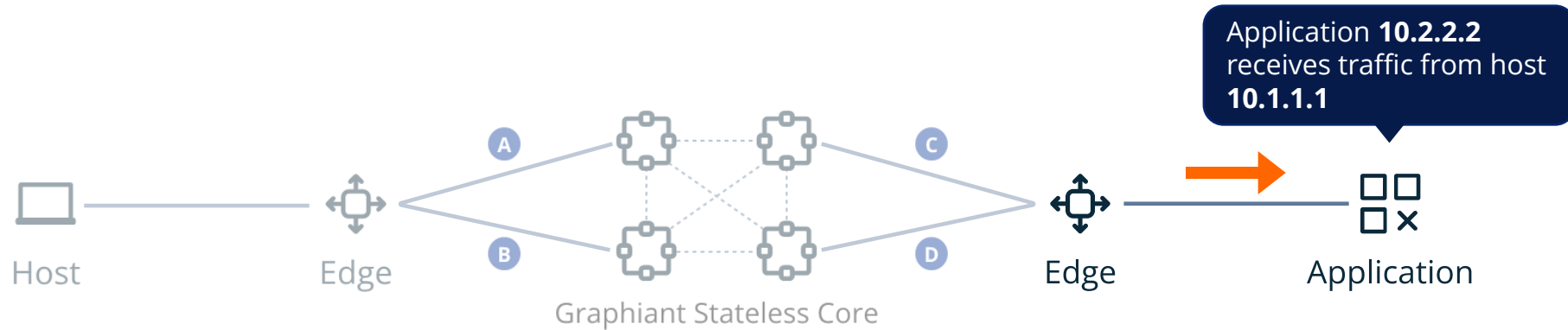
Once the packet enters the core the Graphiant Labels are used and removed to direct the packet to the correct egress core node
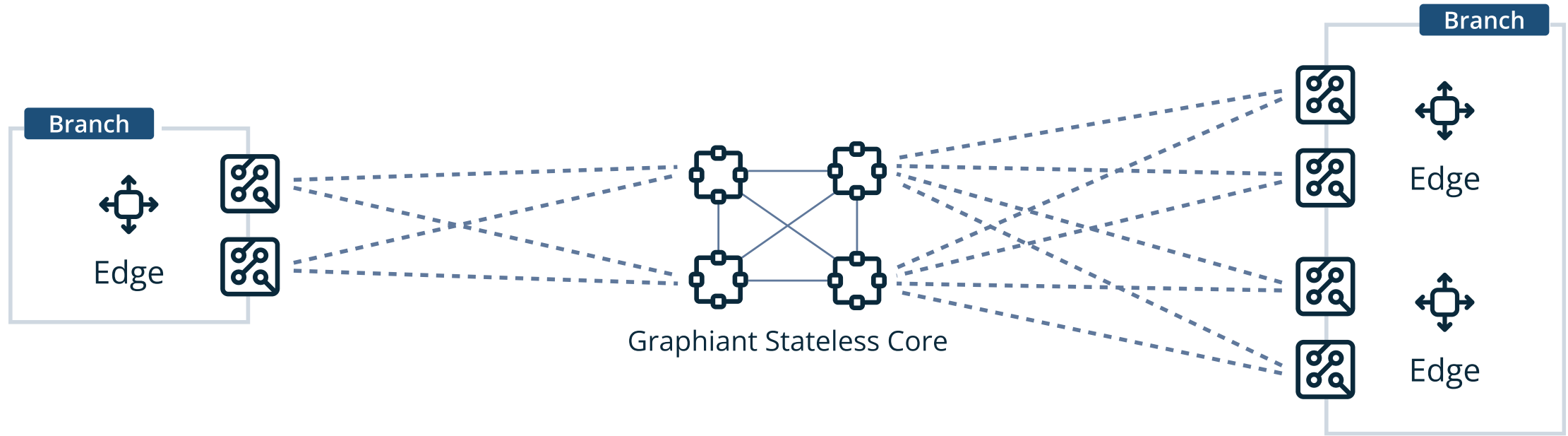
| Data | SA=10.1.1.1 | DA=10.2.2.2 | ESP | IPv6 | Graphiant Label |

| DST Path= D | SRC Path= A |

Step 3: Egress Core to Edge

Host

Edge

Graphiant Stateless Core

Edge

Application

Application **10.2.2.2** receives traffic from host **10.1.1.1**

Edge uses an IPsec tunnel to access the Graphiant Core

Edge removes the IPv6 encapsulation leaving the original packet

| Data | SA=10.1.1.1 | DA=10.2.2.2 | ESP | IPv6 | IPsec |

Edge decrypts the original packet before sending to local LAN

Branch Redundancy

Branch

Edge

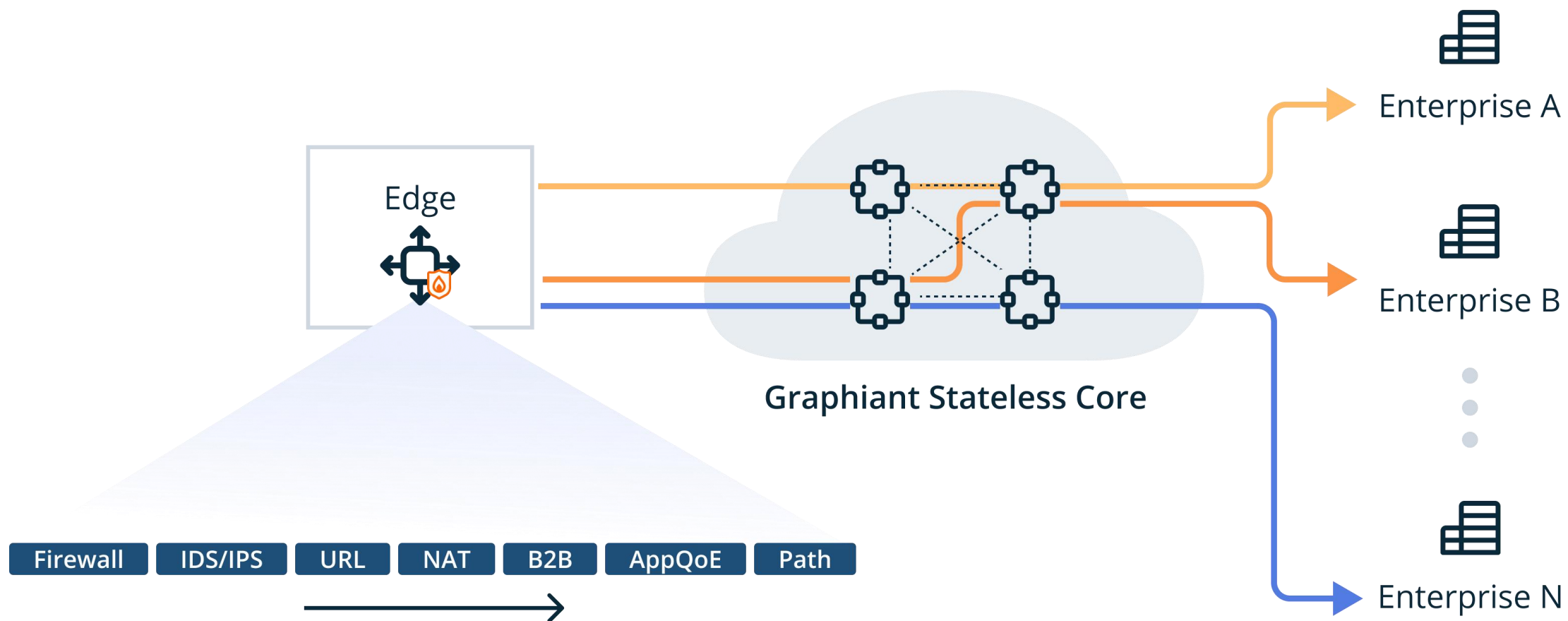Graphiant Stateless Core

Branch

Edge

Edge

Single Edge

Dual Uplink
Redundant paths to 2 unique core sites

Dual Edge

Dual Uplink
Redundant paths to 2 unique core sites.
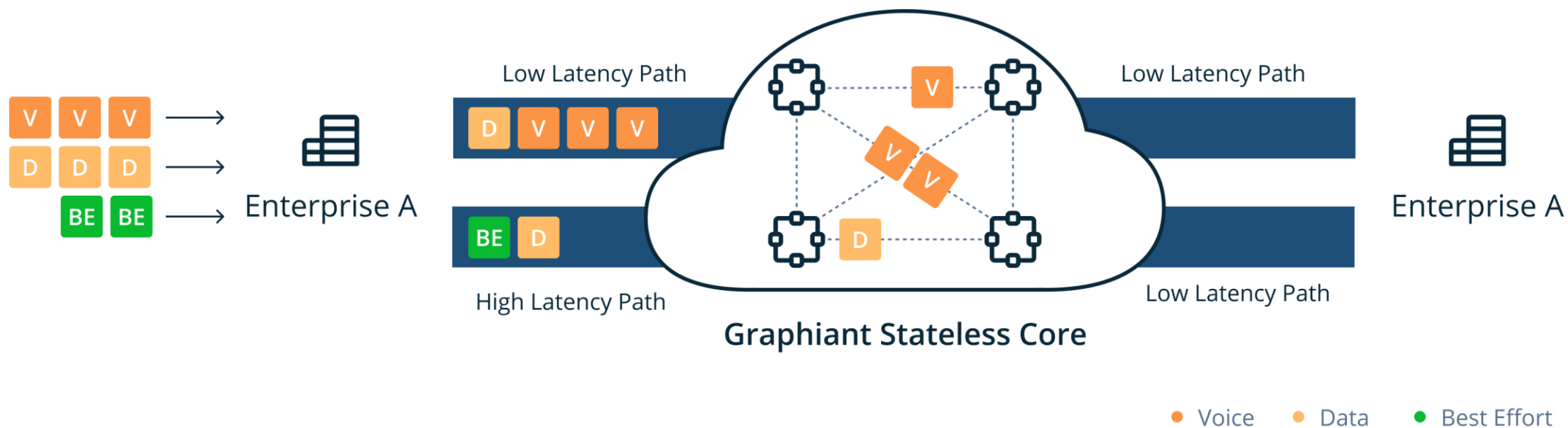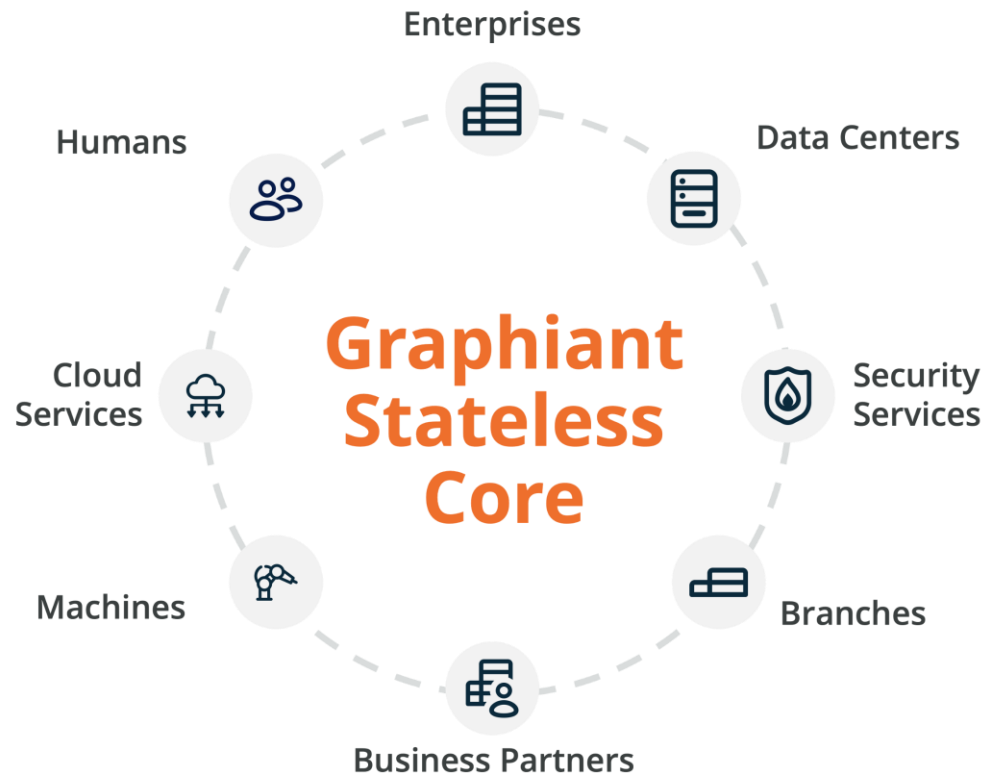First-hop LAN via VRRP or IGP/BGP

User Policy Controls

Edge

Graphiant Stateless Core

Enterprise A

Enterprise B

Enterprise N

| Firewall | IDS/IPS | URL | NAT | B2B | AppQoE | Path |

Metadata Labels for Policy & SLA

Low Latency Path

Enterprise A

High Latency Path

Graphiant Stateless Core

Low Latency Path

Enterprise A

Low Latency Path

- Voice   - Data   - Best Effort

Solution Use Cases

Network Edge

A next-gen solution with the performance to **replace** MPLS + SDWAN

Enterprises

Humans

Data Centers

Cloud Services

Graphiant Stateless Core

Security Services

Machines

Branches

Business Partners

Problem

Networks connect the edge, multiple clouds, customers, & partners together but existing solutions don't support today's digital transformation

With Graphiant

Simple provisioning in minutes, cost-effective, enterprise-grade privacy and secure connectivity to meet business needs
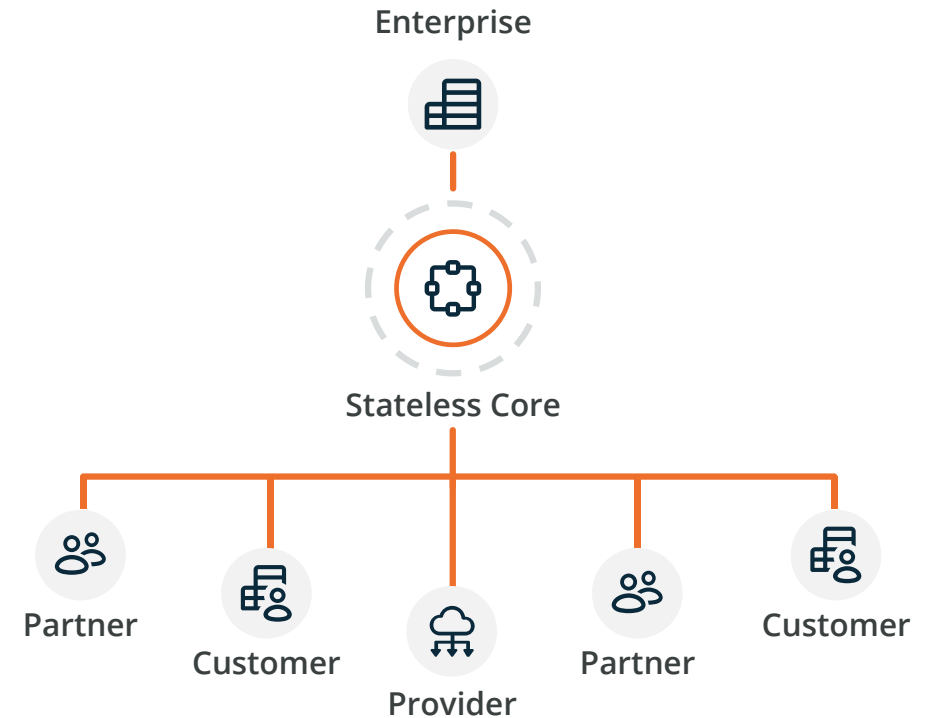
B2B Connectivity

Rapidly deploy enterprise-grade business-to-business connectivity that is fast, reliable & secure

Problem

Businesses increasingly need to connect with customers and partners, but current solutions are *broken*

- Expensive to maintain
- Complex operations
- Requires static DMZs

Enterprise

Stateless Core

Partner

Customer
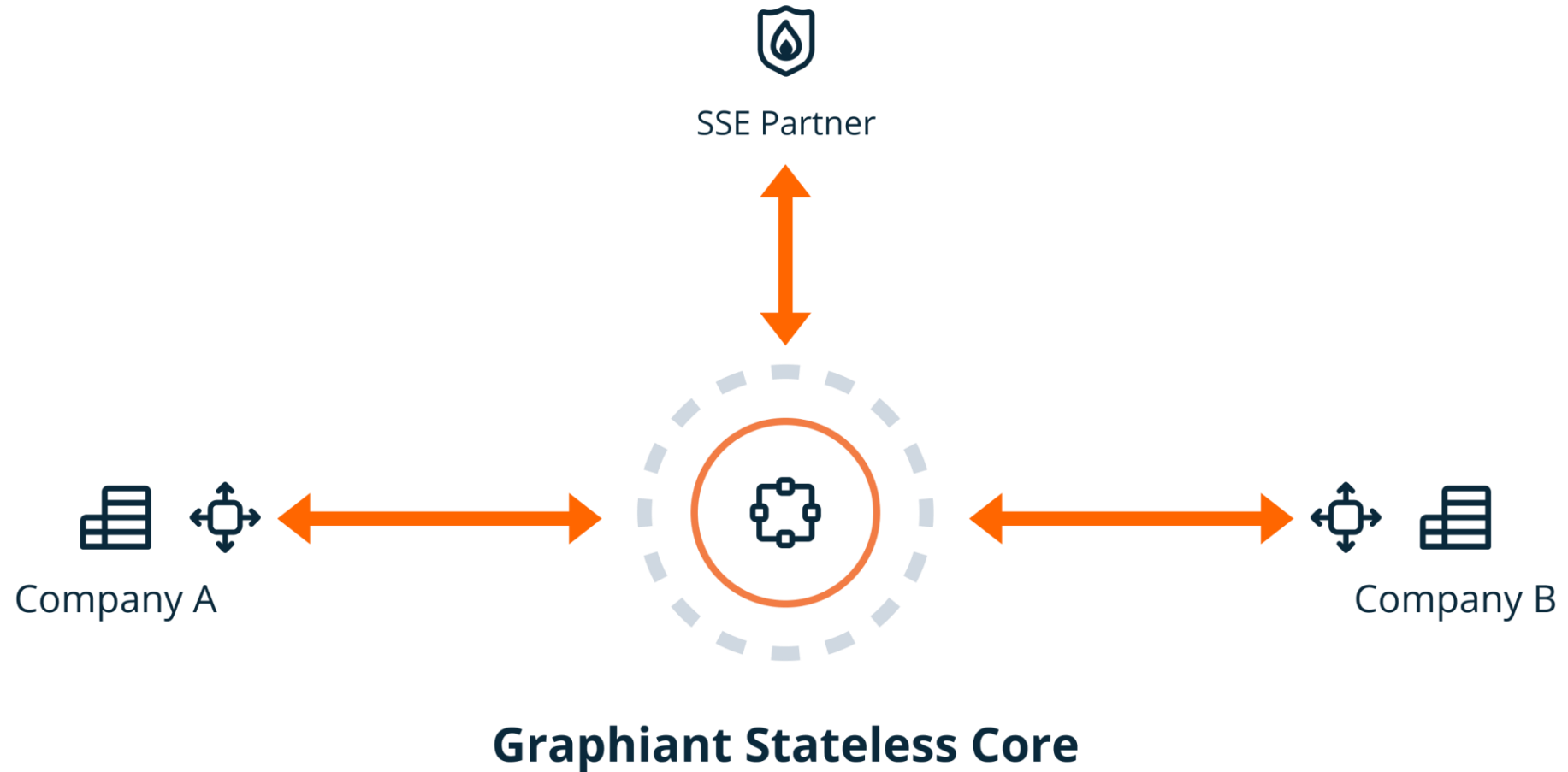
Provider

Partner

Customer

With Graphiant

Connect your enterprise to customers + partners using the Graphiant service. Use simple business policy to enable connections & decrease time to market
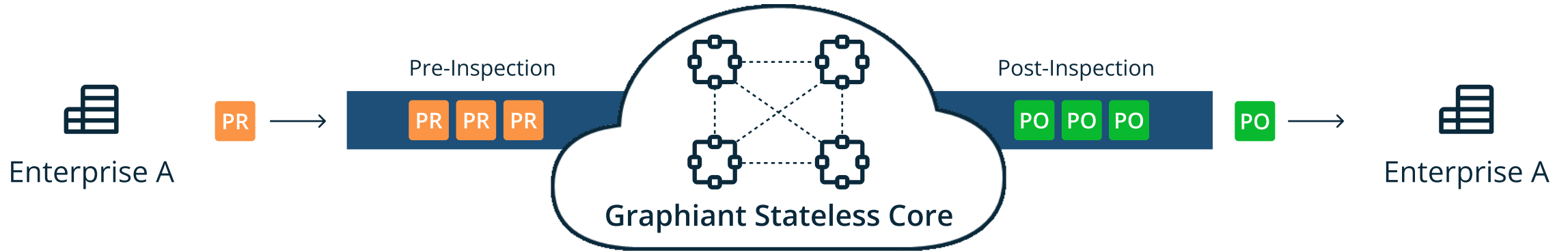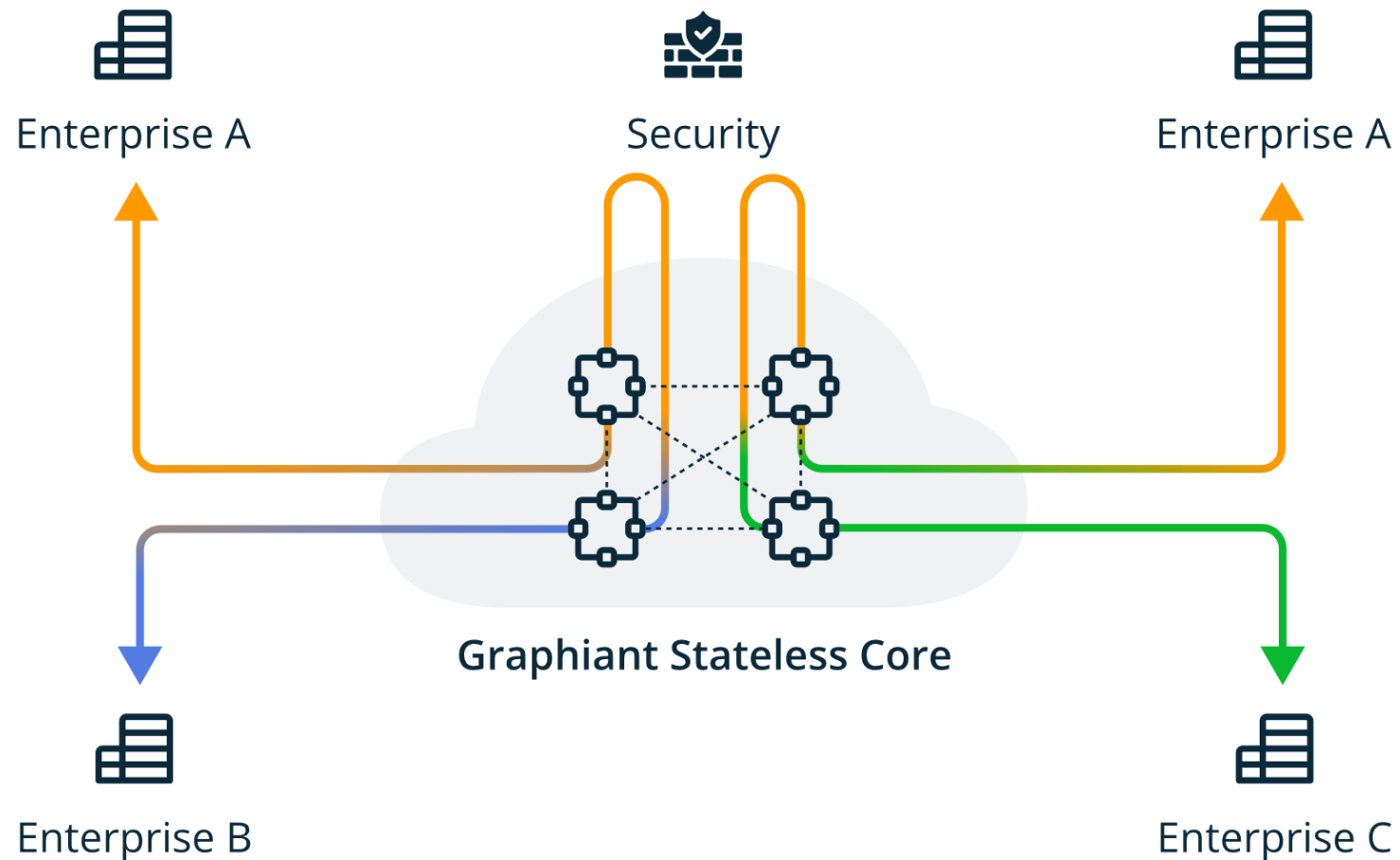
B2B with Graphiant & SSE

SSE Partner

Company A

Company B

Graphiant Stateless Core

SLA Driven Access to SSE

Enterprise A → PR → Pre-Inspection [PR PR PR] → **Graphiant Stateless Core** → Post-Inspection [PO PO PO] → PO → Enterprise A

● Pre-Inspection   ● Post- Inspection

Programmable B2B Security

Enterprise A

Security

Enterprise A

Graphiant Stateless Core

Enterprise B

Enterprise C

Edge Compute Use Case

The Smart Edge Vision

The industry 4.0 revolution focuses on the transformative nature of data

- Intel's Smart Edge enables a world where any endpoint can generate, process and use data to make localized efficient decisions

- Graphiant sees this as the next emerging ecosystem that will require simple, as-a-service connectivity tied to bandwidth consumed
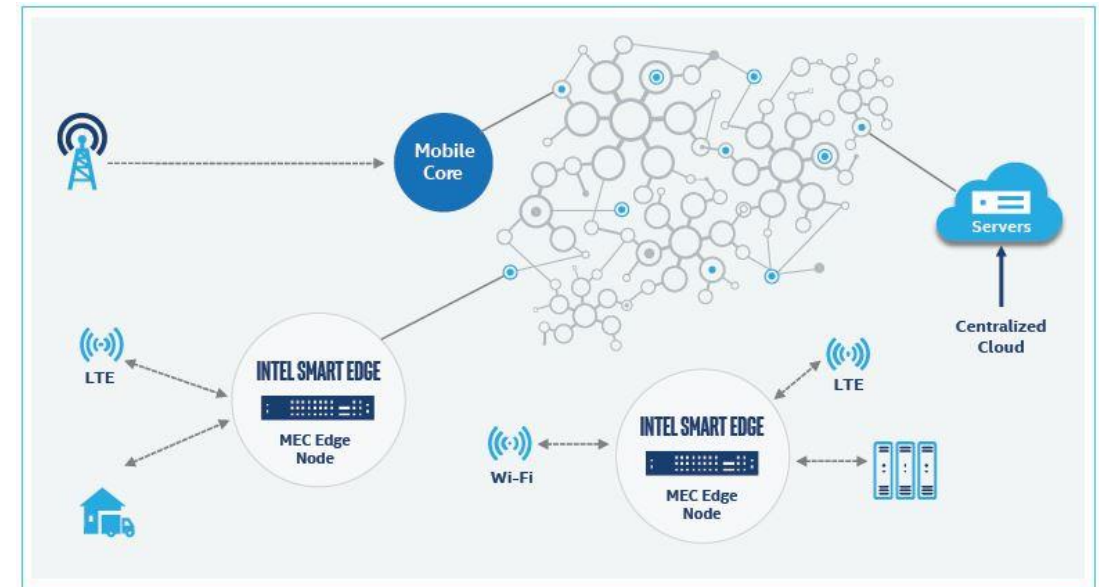
Manufacturing

- Creating new footprints in existing manufacturing sites to use localized compute to process data across different lines

- Enabling private access to lines to accelerate business partners to access data from their specific devices & provide new services

Edge Compute Use Cases

The wave of transformation is seen in two major areas

Healthcare

- Leveraging new techniques to enhance healthcare, like new video recording capabilities in operating theatres

- Exchange of data like mRNA research & genetic profiles between healthcare entities and pharmaceutical companies

The Future of Edge Computing

The Edge Compute Future

The Next 2 Years

- Lots of interesting use-cases

- Non-standard approaches

- Heightened need for consistent architecture

The Larger Future

- Standard on-demand consumption models

- Well established ecosystem for range of use-cases

- Simplified connectivity for all modes

Thank You

graphiant

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