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CMP312

Architecting 5G apps for ultra-low latency on AWS Wavelength

Saravanan Shanmugam

Senior Solutions Architect, AWS Wavelength

AWS

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Agenda

Overview of AWS Wavelength services

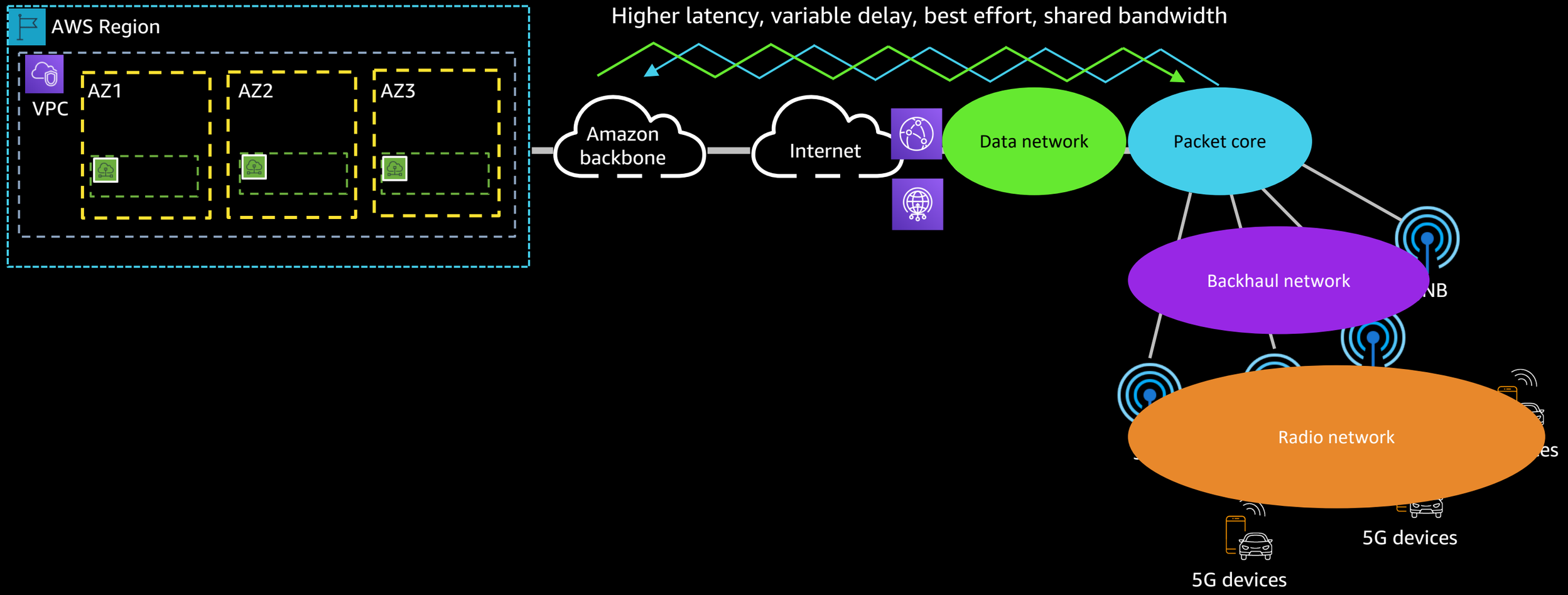
Designing application architecture for edge

AWS Wavelength use cases

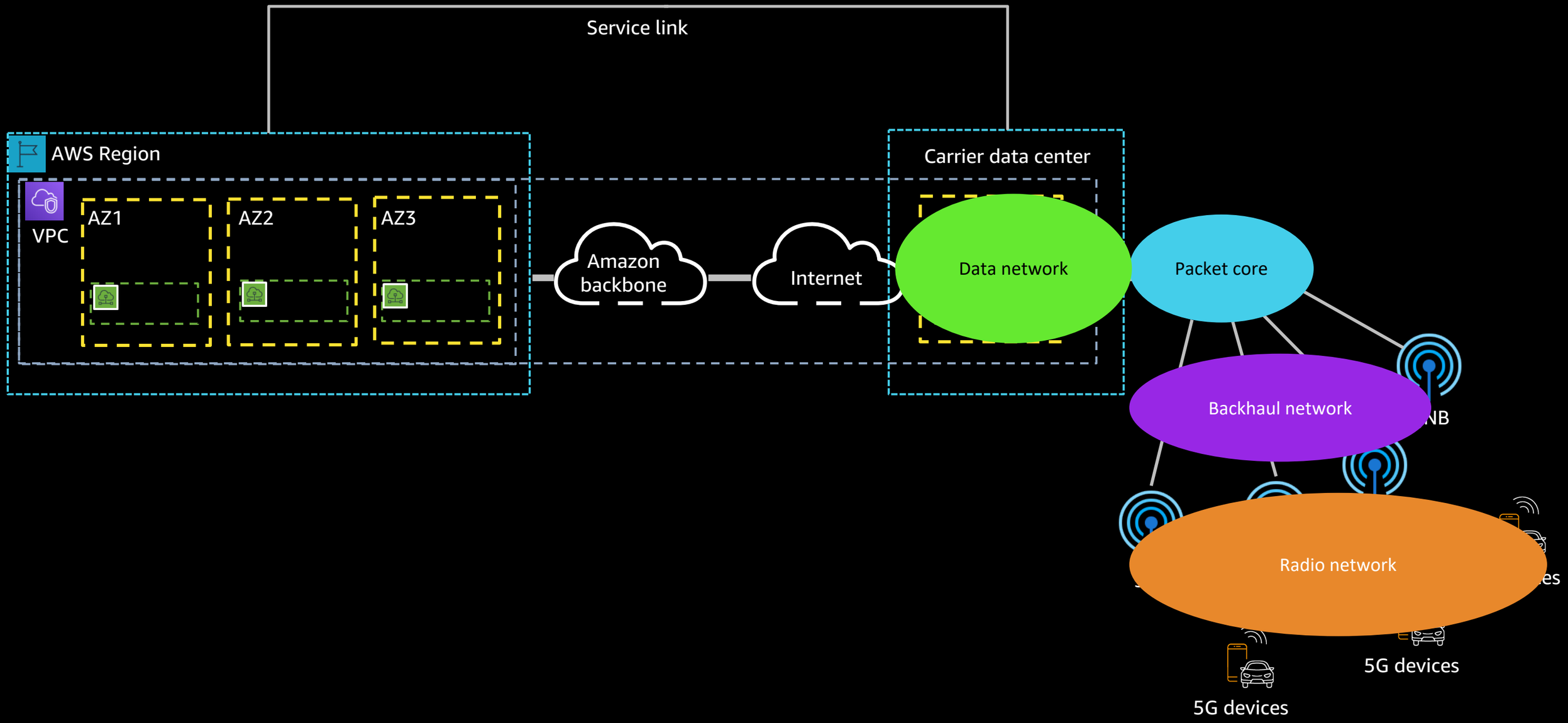


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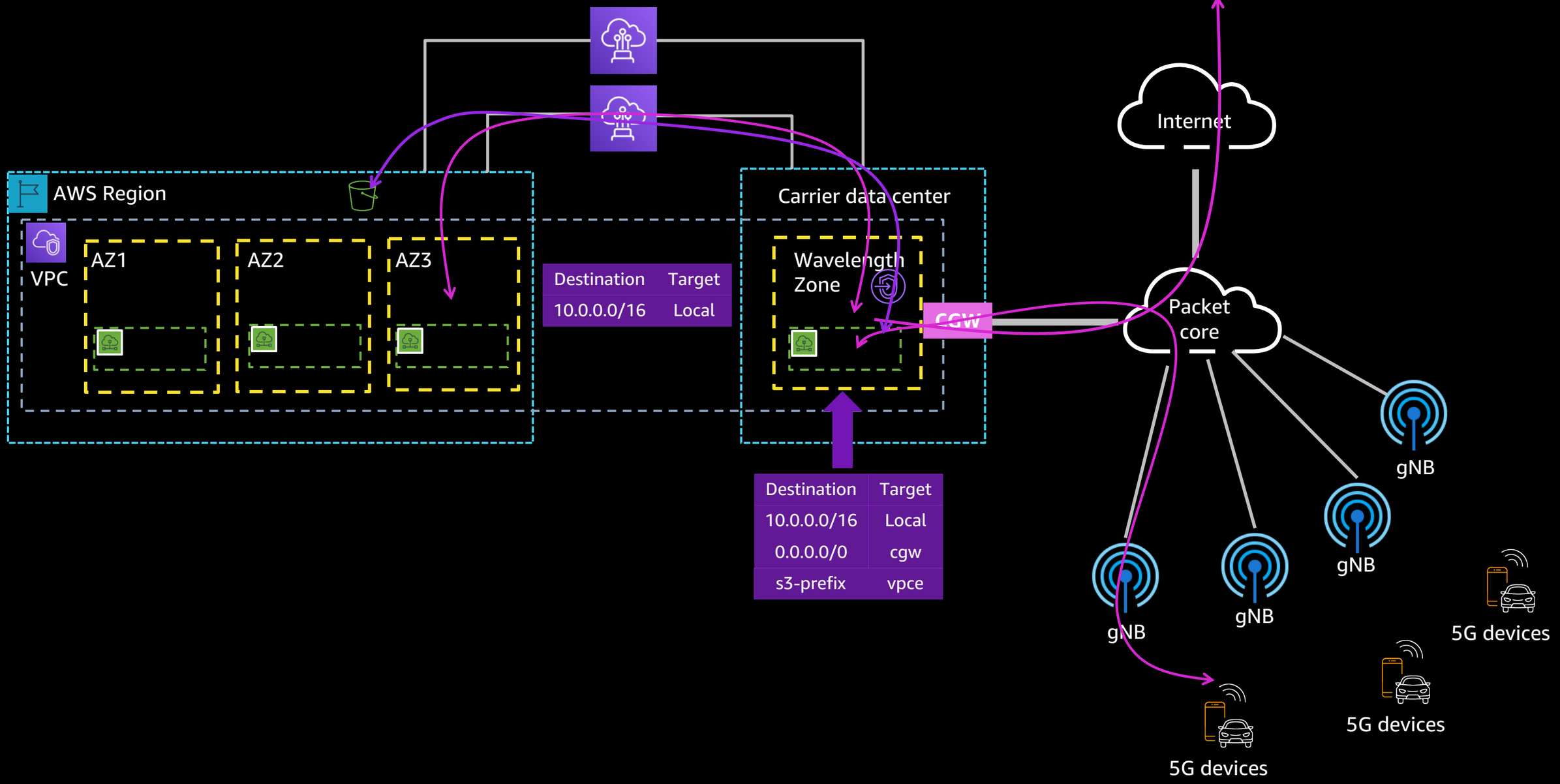
End-to-end view of AWS Region and carrier mobile network



Where AWS Wavelength blends in



Putting it all together



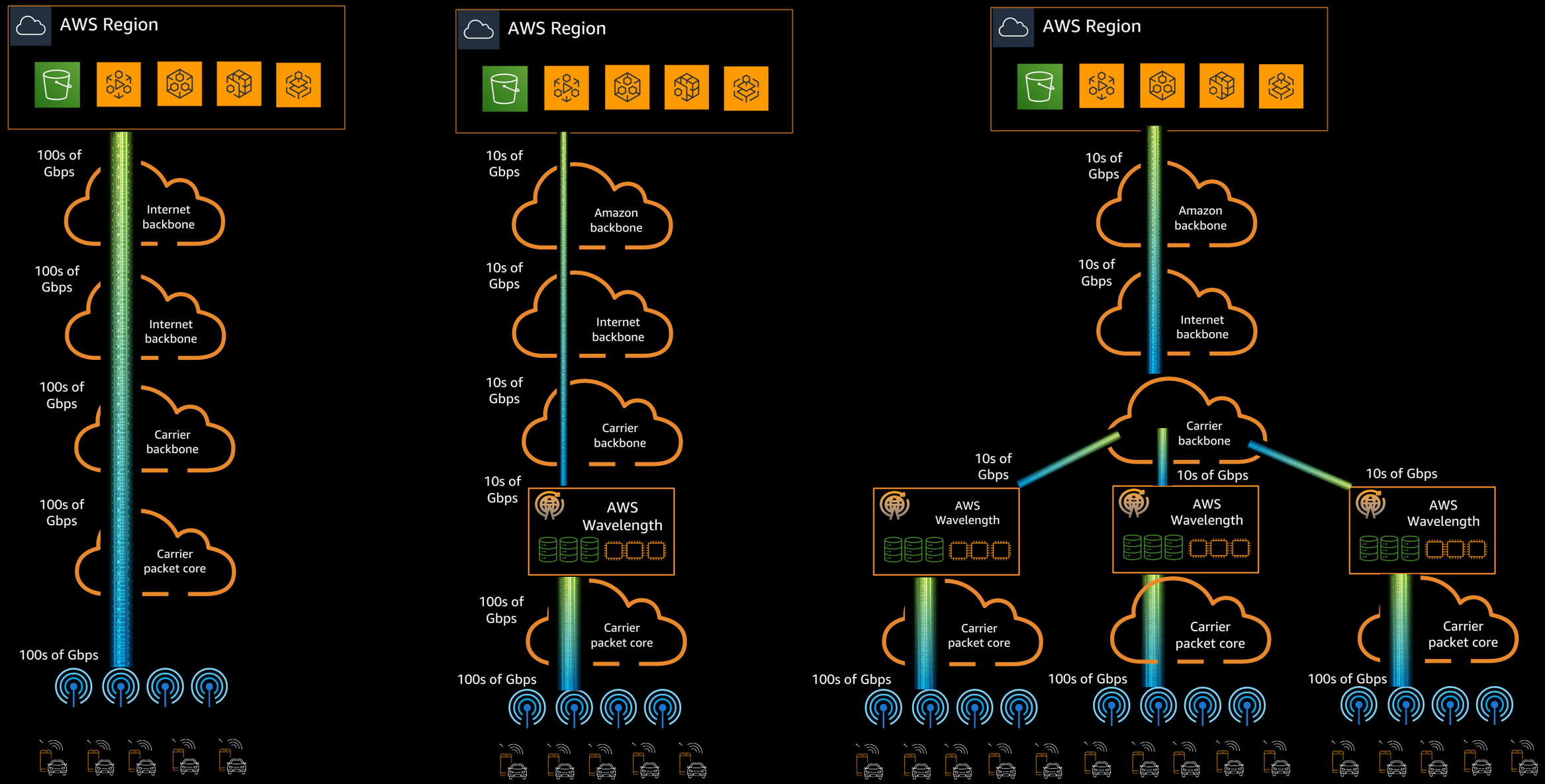
AWS Wavelength reference architecture



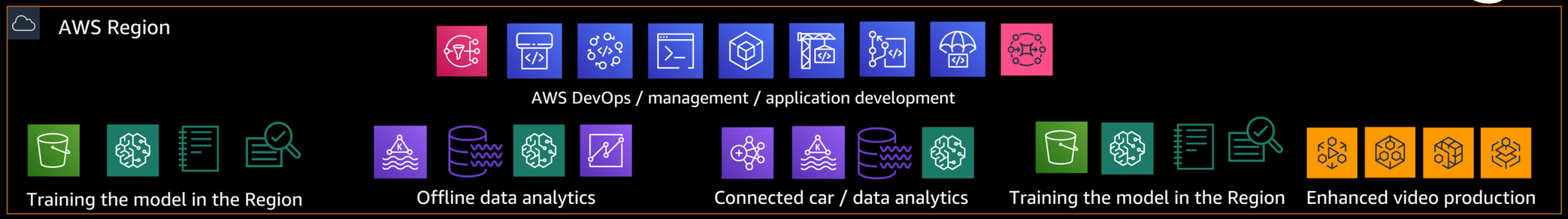
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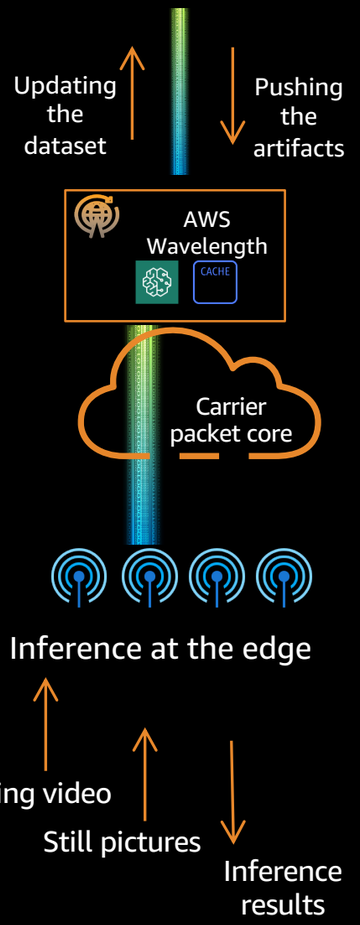
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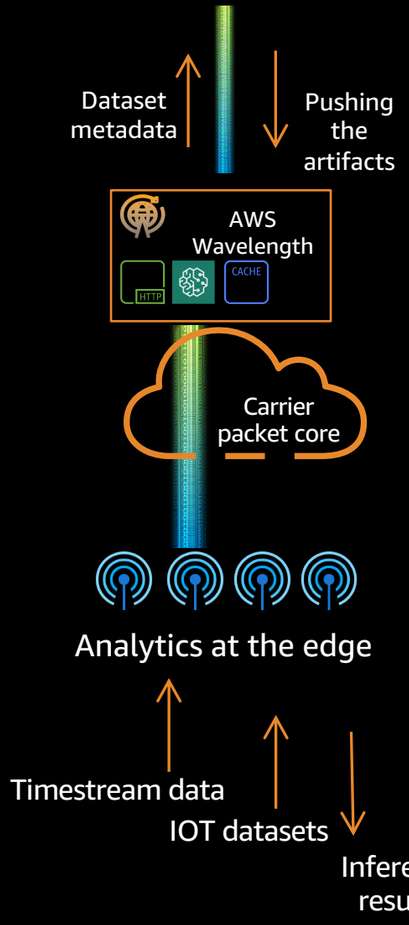
Reference architecture for AWS Wavelength

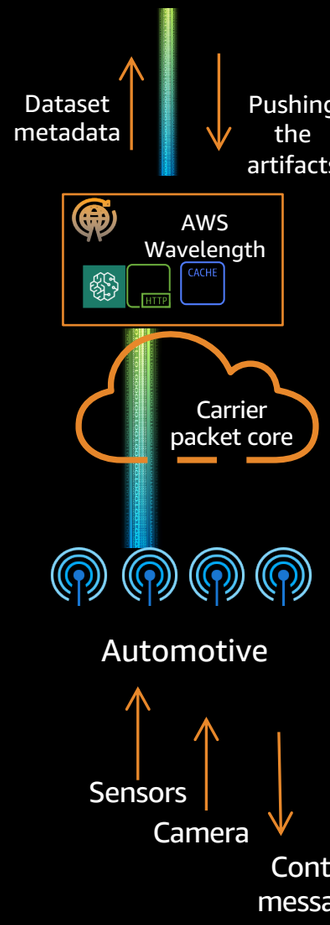


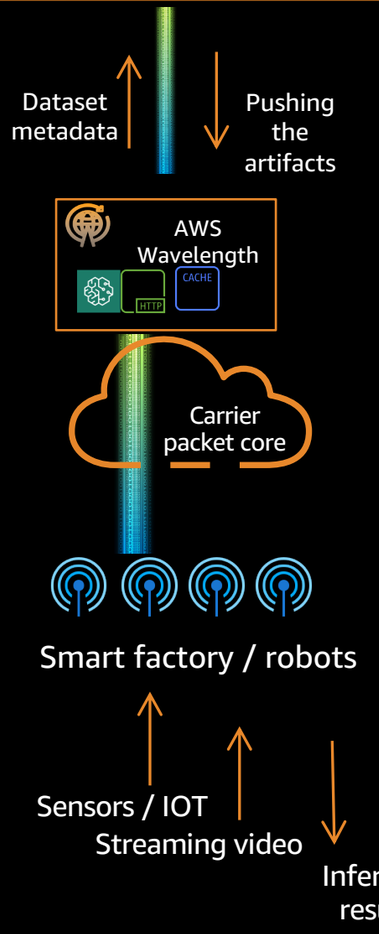
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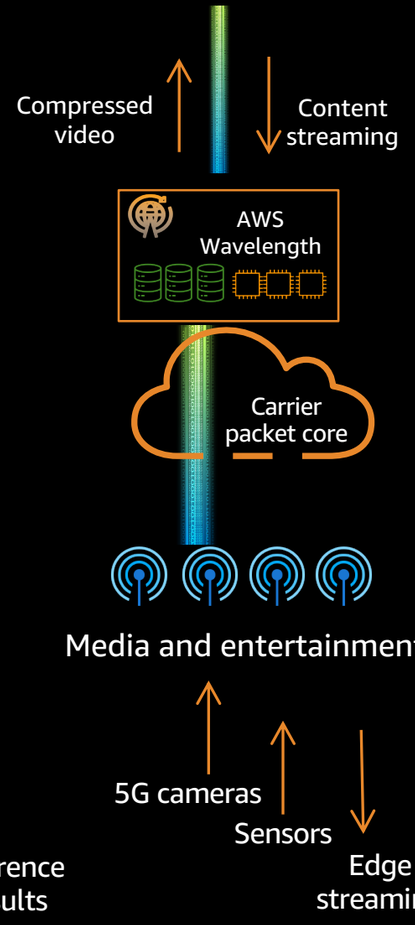












AWS Wavelength use cases



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Virtual reality implementation

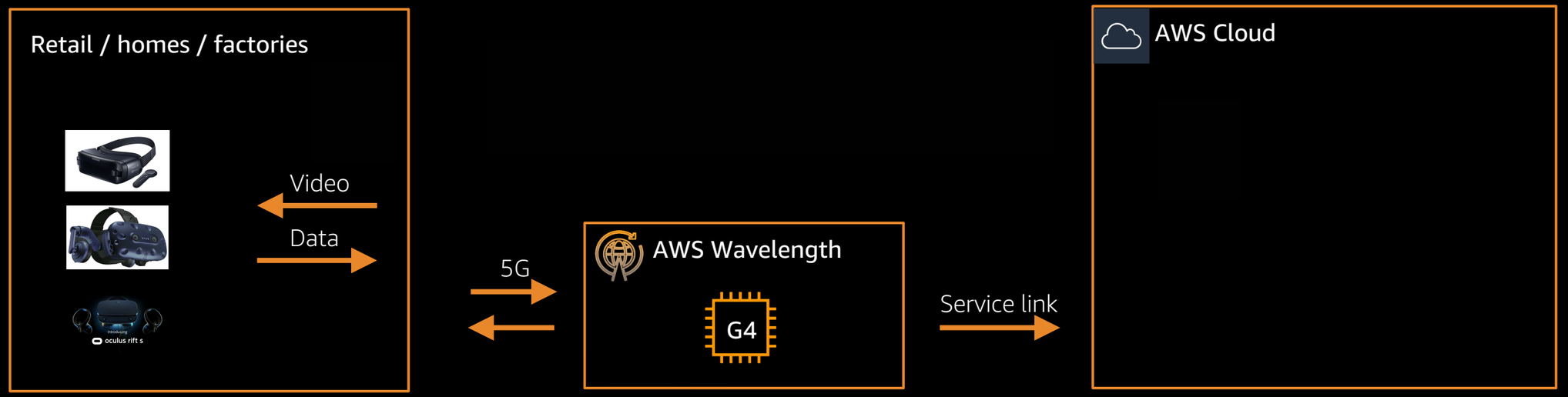


Latency – Ultra-low latency (<20 ms)

Network quality of service (QoS) – Consistent bandwidth with QoS is required

Device connectivity – Tethered device (GPUs); Android devices (Vive, GearVR, Oculus Quest)

Use cases – VR gaming, enterprise VR apps, safety, collaboration, and remote quality control



Virtual reality implementation – Remote engineer

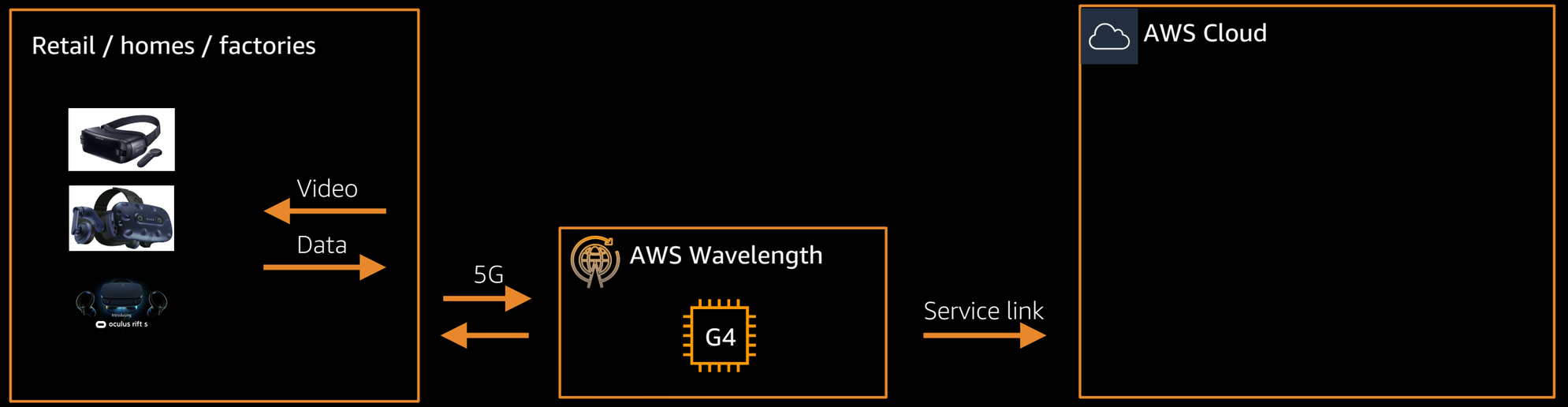


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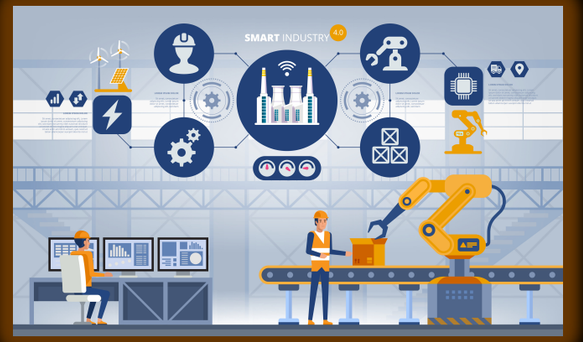
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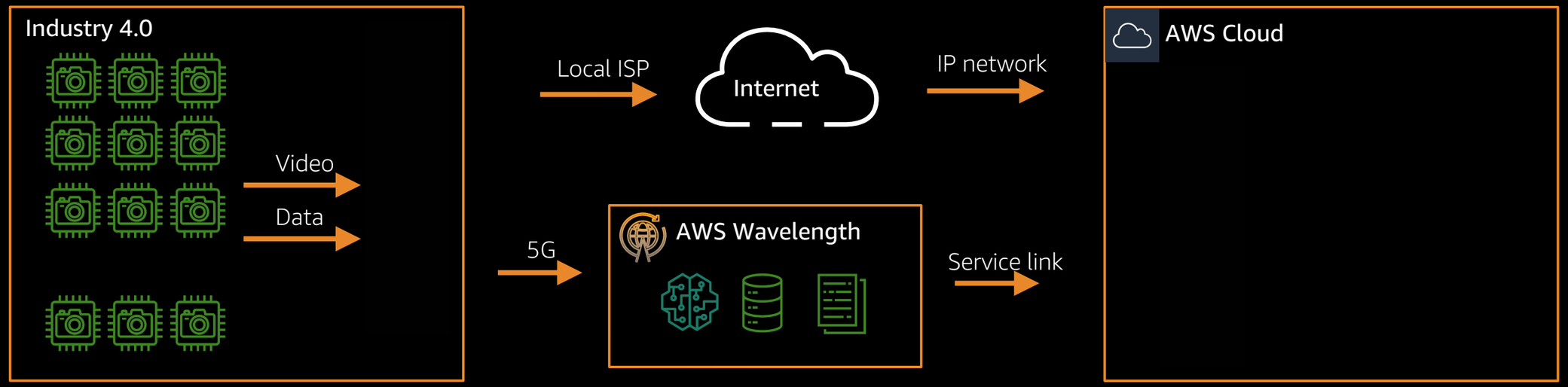
Machine learning (CV) at the edge – Industry 4.0



Low latency – Real-time consumers with ultra-low-latency application

Devices – Hundreds of cameras and sensors on the factory floor

Infrastructure – On-site along with cloud resources



Machine learning (CV) at the edge – Retail



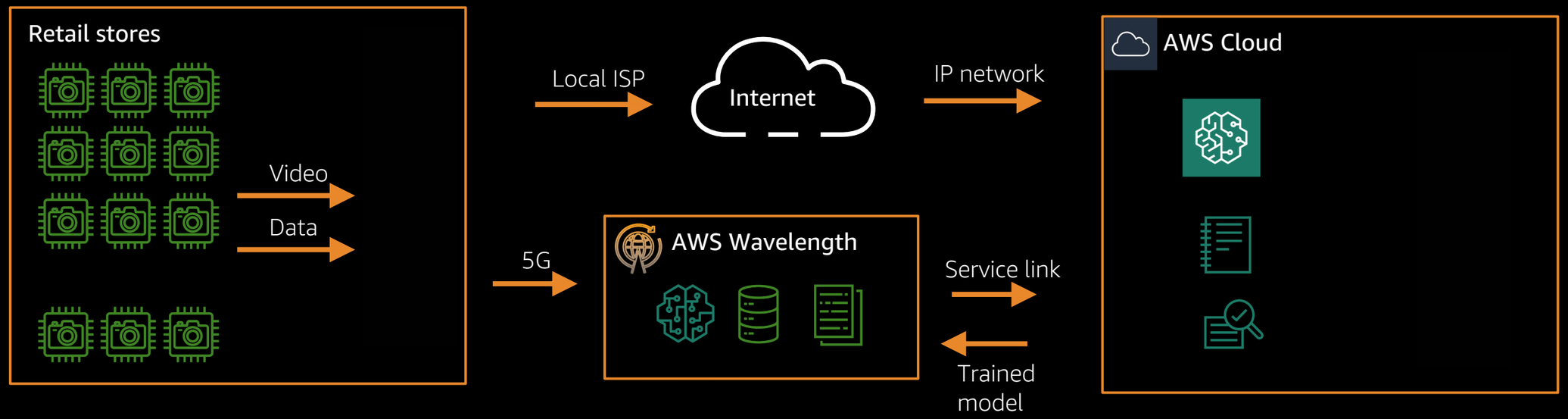
Low latency – Real-time consumers (125 ms)

Mid latency – Tracking humans (2.5–10 s)

Ad-hoc / higher latency – 10 minutes to seek and replay (archival, etc.)

Devices – Hundreds of cameras (rack, shelf, and tracking cameras)

Infrastructure – On-site along with cloud resources



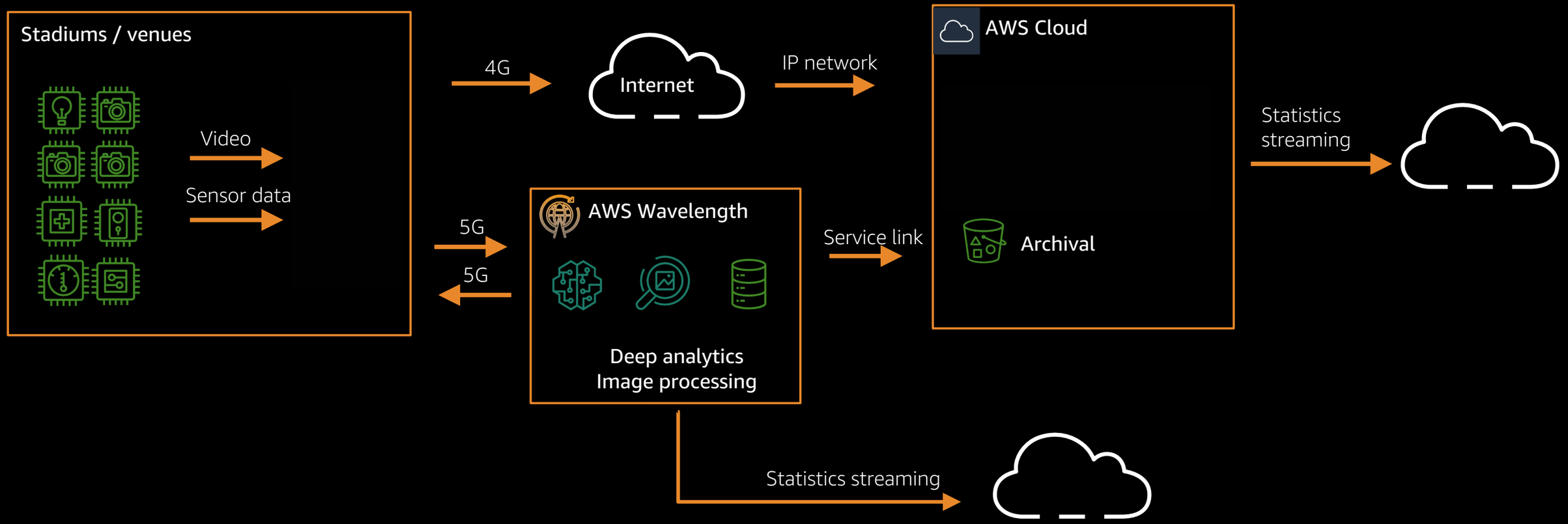
Data analytics at the edge



Use case – Real-time tracking of players, speed, and direction of ball

Platform – Layered over live streams; inference consumed by game statistics

Devices – Cameras and sensors across stadium, players, and equipment



Healthcare industry

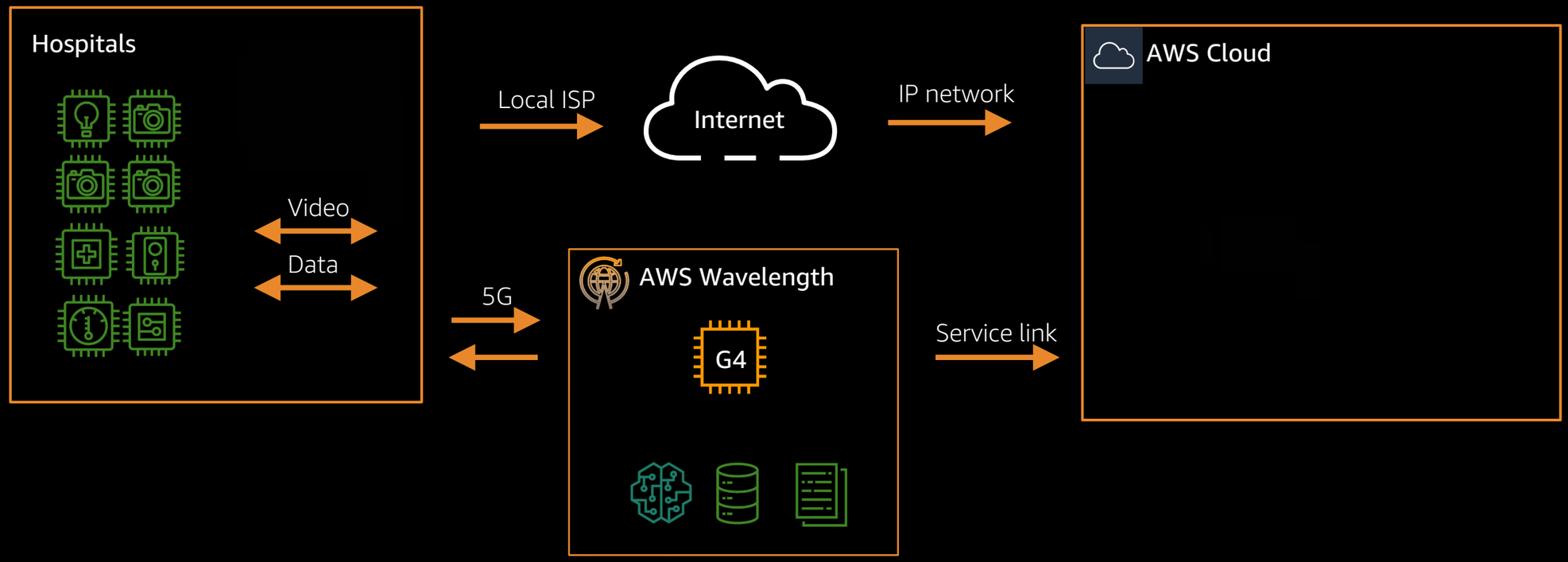


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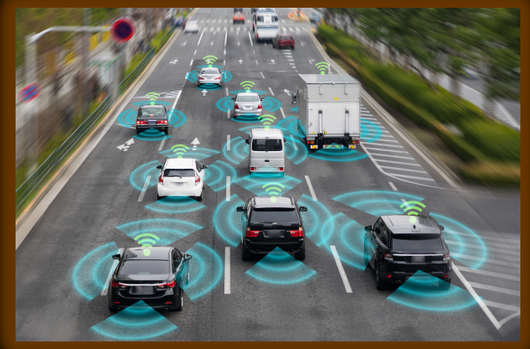
Device connectivity – Medical devices, cameras, and sensors

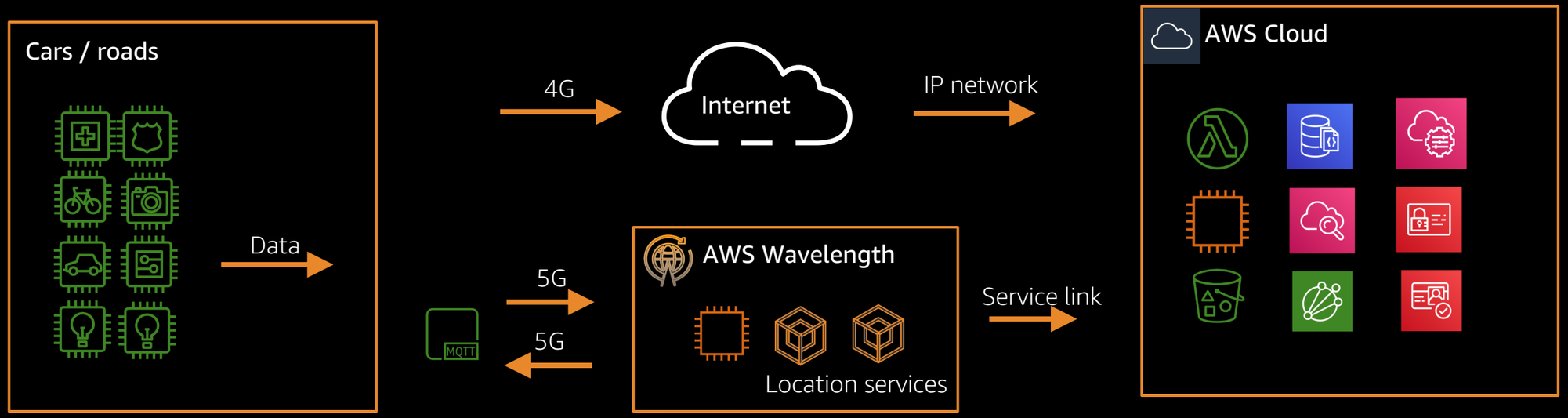
Use cases – Real-time image analysis and inference to improve healthcare



ADAS and C-V2X use cases

Use case – Connected cars, autonomous driving, road safety, etc.
Devices – Automobiles and road infrastructures
Latency – Ultra-low latency required for enhanced features (e.g., teleoperation)





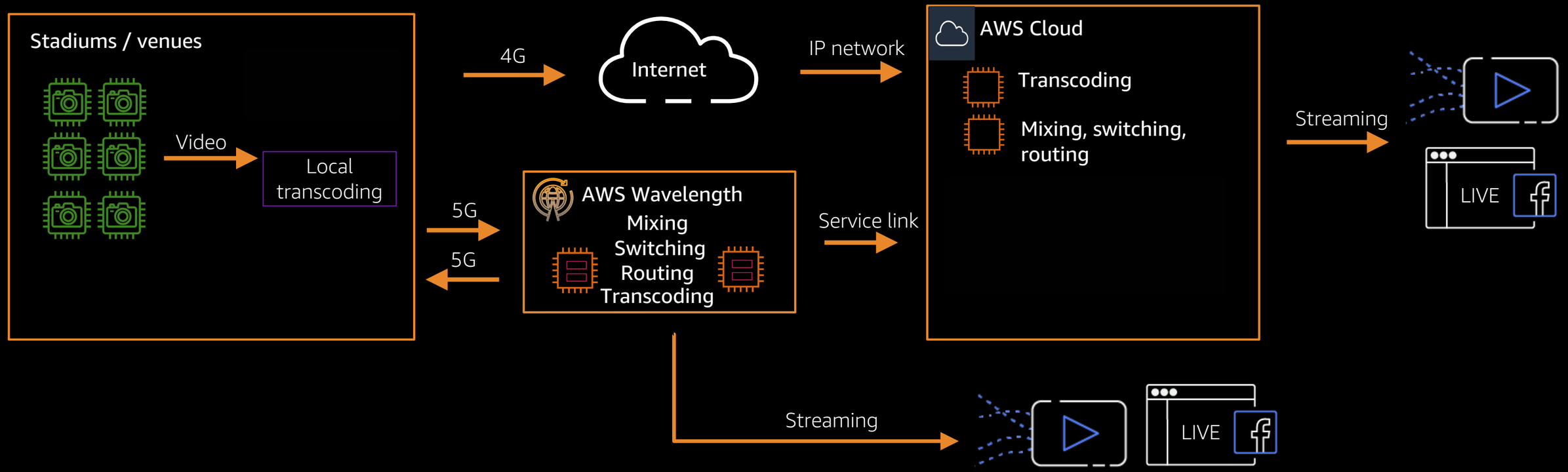
Virtual production – Cloud switcher



Use case – Broadcast sports events, music festivals, and live corporate events

Platform – Any platform to any audience, anywhere in the world

Devices – 5G cameras, 5G prototype devices, mobile 5G devices



5G / IP-based video distribution

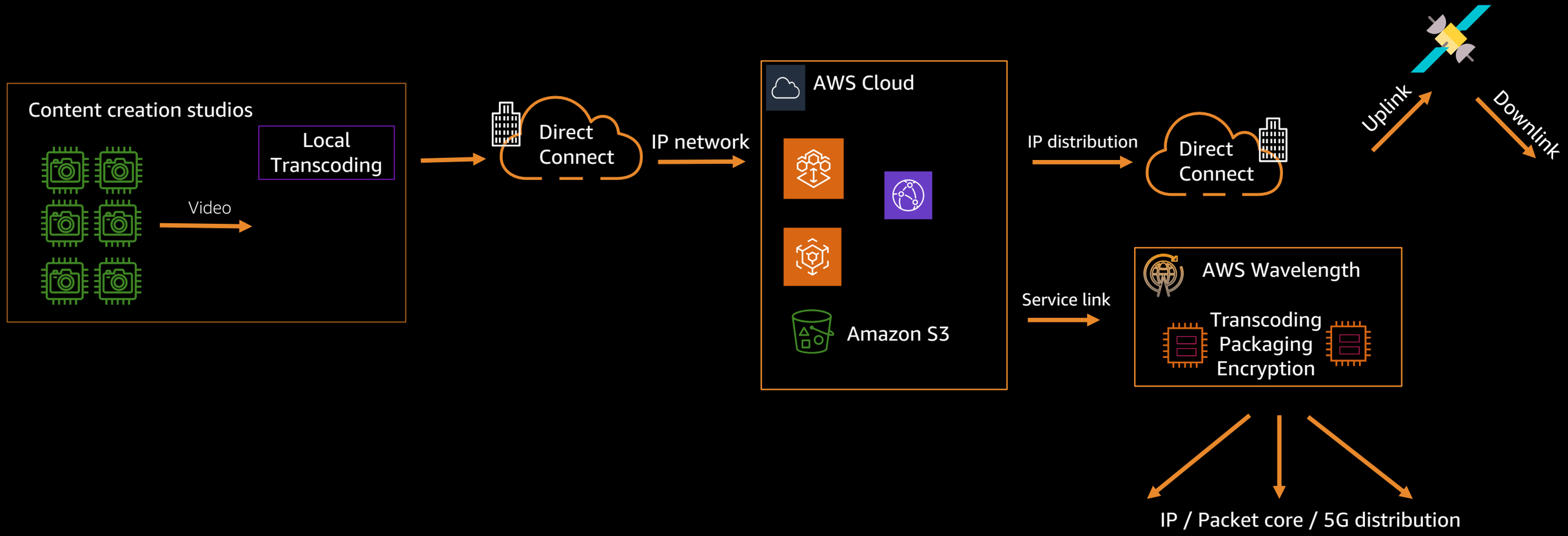


Use case – Broadcast sports events, music festivals, traditional broadcast

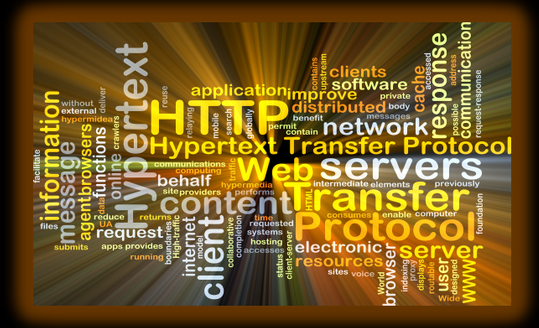
Platform – Distribution of broadcast quality content to consumers

Devices – Cameras with 5G, legacy transmission units, adaptability to 5G radio

Requirements – Consistent downstream connectivity with several Gbps throughput



Caching from the edge

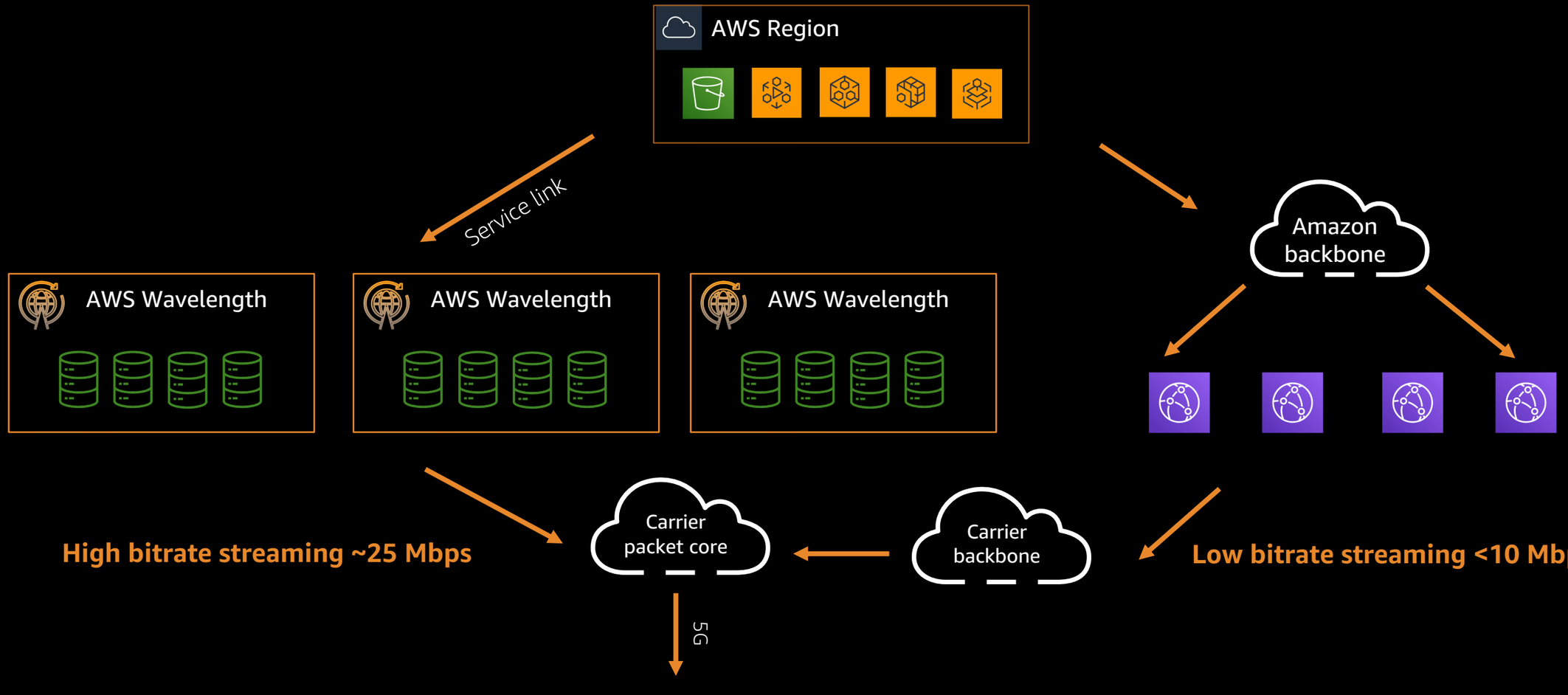


Low latency – Live streaming ultra-low-latency infrastructure from glass to glass

Ad hoc / higher latency – First byte latency and closeness to live point

Devices – 8k/4K/UHD streaming over the cloud to any device with hyperlocal caches

Infrastructure – Distribution of caches between traditional CDN and Wavelength Zones



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