AWSOME DAY

ONLINE CONFERENCE

Innovation with AWS

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Amazon Web Services

Internet of Things (IoT)

What is the Internet of Things (IoT)?

IoT is where a system of integrated devices, such as appliances, watches, or features in a car, can be connected to various applications.

These connections enable data to be transferred to and from devices in a bidirectional communication flow over a network.
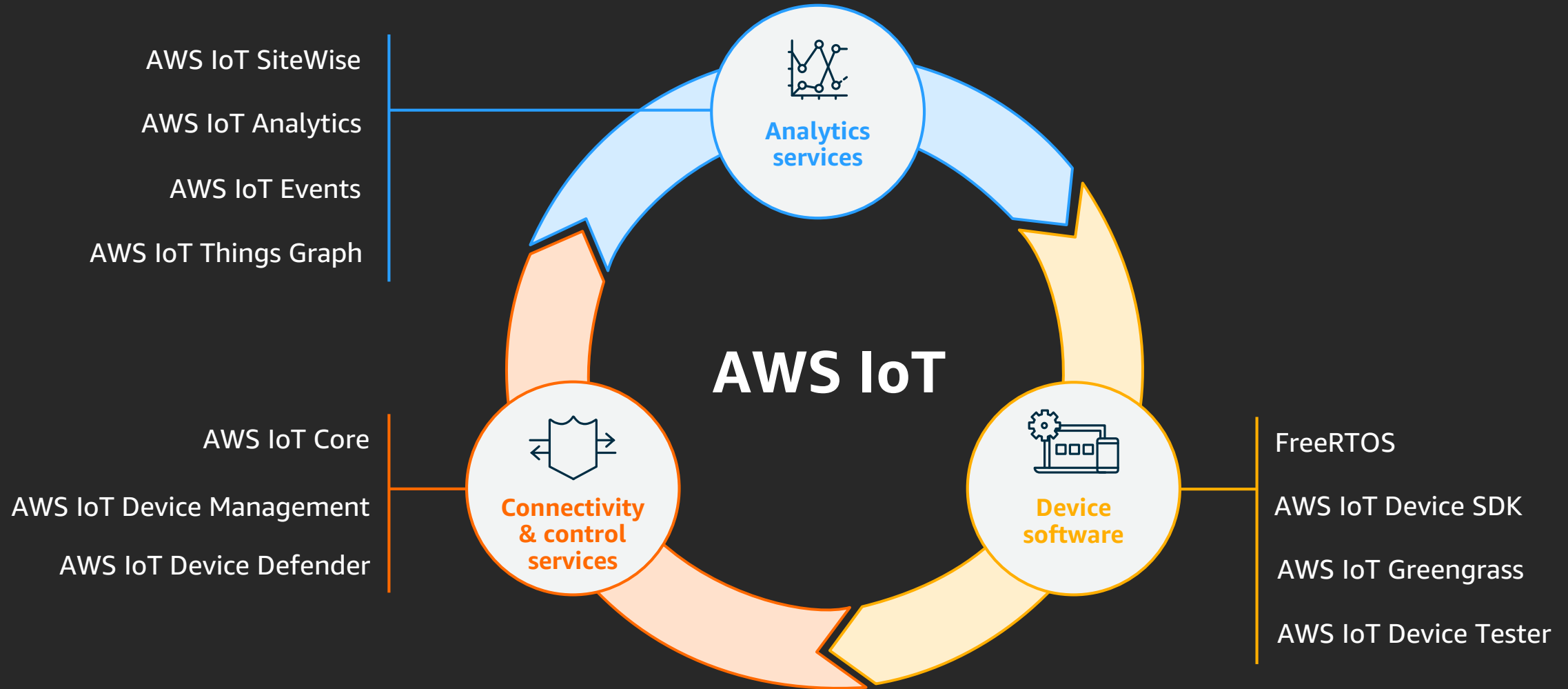
Challenges of managing "things"

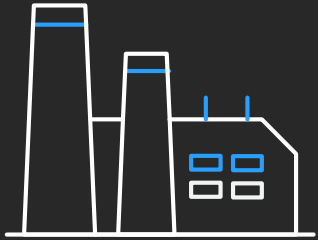The task of managing IoT devices poses a number of challenges

- Management and updates
  - Inconsistent or intermittent network connectivity
  - Devices are remote and may not be physically accessible
  - Large fleets of devices in production
- Analytics
  - Low compute power, low-spec on-device resources
 - Devices may emit large quantities of streaming data

AWS IoT services

AWS IoT SiteWise

AWS IoT Analytics

AWS IoT Events

AWS IoT Things Graph

Analytics services

AWS IoT

AWS IoT Core

AWS IoT Device Management

AWS IoT Device Defender

Connectivity & control services

Device software

FreeRTOS

AWS IoT Device SDK

AWS IoT Greengrass

AWS IoT Device Tester

What customers are doing with AWS IoT

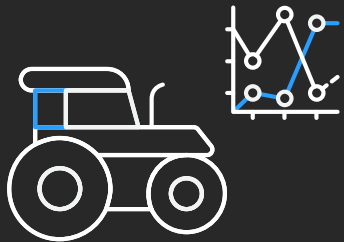Improve the performance and productivity of industrial processes
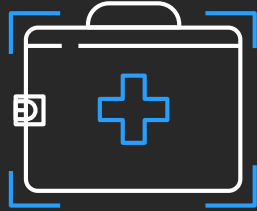
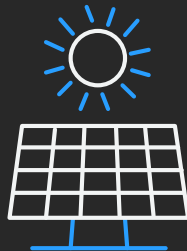Remotely monitor patient health & wellness applications

Track inventory levels and manage warehouse operations

Build smarter products & user experiences in homes, buildings, and cities

Grow healthier crops with greater efficiencies

Manage energy resources more efficiently

Transform transportation with connected and autonomous vehicles

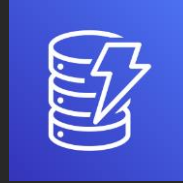Enhance safety in the home, the office, and the factory floor

aws | intel.

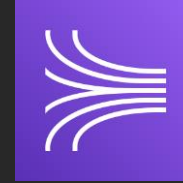# AWS IoT core: Rapid development

AWS IoT Core
Connect devices
to the cloud
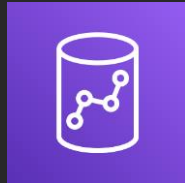
AWS Lambda
Run code in
response to events

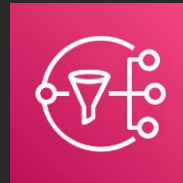**Amazon DynamoDB**
Predictable & scalable
NoSQL data store

Amazon Kinesis
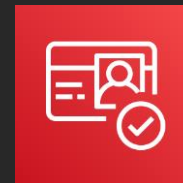Streaming
analytics

Amazon API Gateway
Build, deploy, and
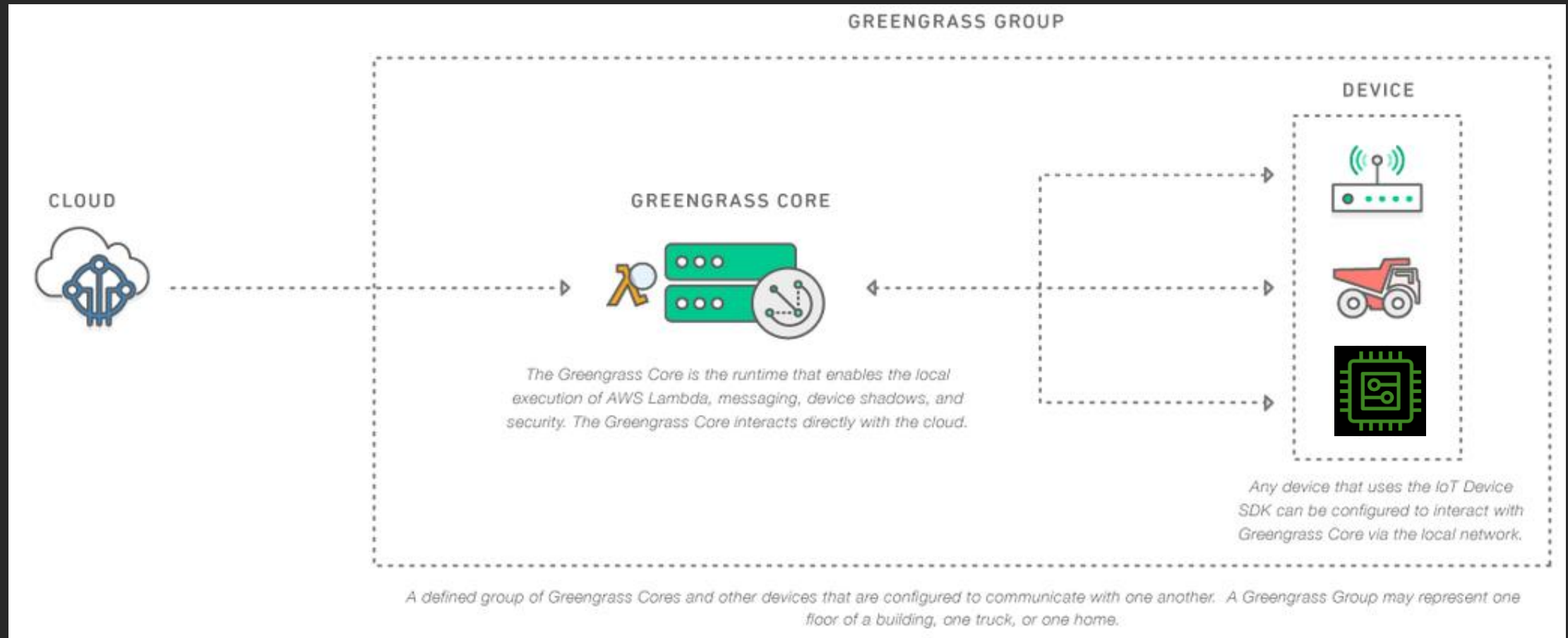manage APIs

Amazon Redshift
Petabyte-scale
data warehouse

Amazon SNS
Mobile push
and notifications

Amazon Cognito
User identity and data
synchronization

. . .and more

AWS IoT Greengrass

GREENGRASS GROUP

DEVICE

CLOUD

GREENGRASS CORE

The Greengrass Core is the runtime that enables the local execution of AWS Lambda, messaging, device shadows, and security. The Greengrass Core interacts directly with the cloud.

Any device that uses the IoT Device SDK can be configured to interact with Greengrass Core via the local network.

A defined group of Greengrass Cores and other devices that are configured to communicate with one another. A Greengrass Group may represent one floor of a building, one truck, or one home.

Problem

In the seed business, it's important to gain better and faster visibility into what's going on in fields during planting and harvest within breeding research and supply chain organizations.

Solution

AWS IoT helps Bayer Crop Science manage the collection, processing, and analysis of seed-growing data. Data analysts use the new data collection platform to access data on their mobile devices via dashboards. The solution captures multiple terabytes of data from seed transportation, planting, and growing in the company's research fields across the globe.

Impact

Using AWS IoT, Bayer Crop Science can provide seed data to analysts in just a few minutes instead of a few days. This also helps farmers gain better visibility into field conditions and provides a robust edge processing and analytics framework.

Machine learning

What is machine learning?
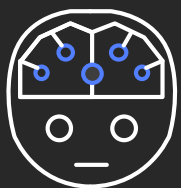
Artificial intelligence (AI)

Any technique that enables computers to mimic human intelligence using logic, if-then statements, and machine learning (including deep learning)

Machine learning (ML)

Subset of AI that uses machines to search for patterns in data to build logic models automatically

Deep learning

Subset of ML composed of deeply multi-layered neural networks that perform tasks like speech and image recognition

Amazon's machine learning innovation

Recommendations for you

- Your Orders
- Pet Supplies
- Beauty & Personal Care
- Tools & Home Improvement

4,000 products per minute sold on Amazon.com

1.6 million packages every day

Billions of Alexa interactions each week

First Prime Air delivery on **Dec. 7, 2016**

AWS AI and machine learning services

AI services

VISION			SPEECH		LANGUAGE		CHATBOTS	FORECASTING	RECOMMENDATIONS
Amazon Rekognition Image	Amazon Rekognition Video	Amazon Textract	Amazon Polly	Amazon Transcribe	Amazon Translate	Amazon Comprehend & Comprehend Medical	Amazon Lex	Amazon Forecast	Amazon Personalize

ML services

Amazon SageMaker	Ground Truth	Notebooks	Algorithms + Marketplace	Reinforcement learning	Training	Optimization	Deployment	Hosting

ML frameworks + infrastructure

FRAMEWORKS	INTERFACES	INFRASTRUCTURE									
TensorFlow MXNet PyTorch	GLUON Keras	EC2 P3 & P3dn	EC2 G4 EC2 C5	FPGAs	DL containers & AMIs	Amazon ECS	Amazon EKS	AWS IoT Greengrass	Amazon Elastic Inference	AWS Inferentia

Amazon SageMaker overview

Amazon SageMaker

Prepare →

SageMaker Ground Truth

NEW
SageMaker Data Wrangler

SageMaker Processing

NEW
SageMaker Feature Store

Build →

SageMaker Studio notebooks

Built-in and
bring-your-own algorithms

Local mode

SageMaker Autopilot

Train & tune →

One-click training

SageMaker Experiments

Automatic model tuning

SageMaker Debugger

Managed spot training

Deploy & manage →

One-click deployment

Kubernetes & Kubeflow
integration

Multi-model endpoints

Model Monitor

NEW
SageMaker Pipelines

SageMaker Studio
Integrated development environment (IDE) for ML

PROBLEM

3+ terabytes of data, 1,500+ hours of play time per week

Needed a solution for real-time stats

Lean team, no data science expertise

SOLUTION: NEXT GEN STATS

Engaged with Amazon ML Solutions Lab

Live data streamed to AWS from RFID tags on players and in game ball

Data processed in 100+ steps in under 1 second

ML models built on Amazon SageMaker make predictions in real time

IMPACT

Launched 20+ stats quickly with limited data science team

Sports announcers get interesting data points to engage fans

Amazon Rekognition

Object and scene detection

Photo-sharing applications can power smart searches and quickly find events or images, such as weddings, hiking, or sunsets

Facial analysis

Retail businesses can understand the demographics and sentiment of in-store customers

Face comparison

Hotels and hospitality businesses can provide personalized service for guests

Facial recognition

Provide secondary authentication for existing applications

Object and scene detection

Identify objects and scenes, and provide confidence scores

Use object and scene detection to add features that search, filter, and curate large image libraries

Woman

Pen

Notebook

Man

Utensils

Chair

Plant
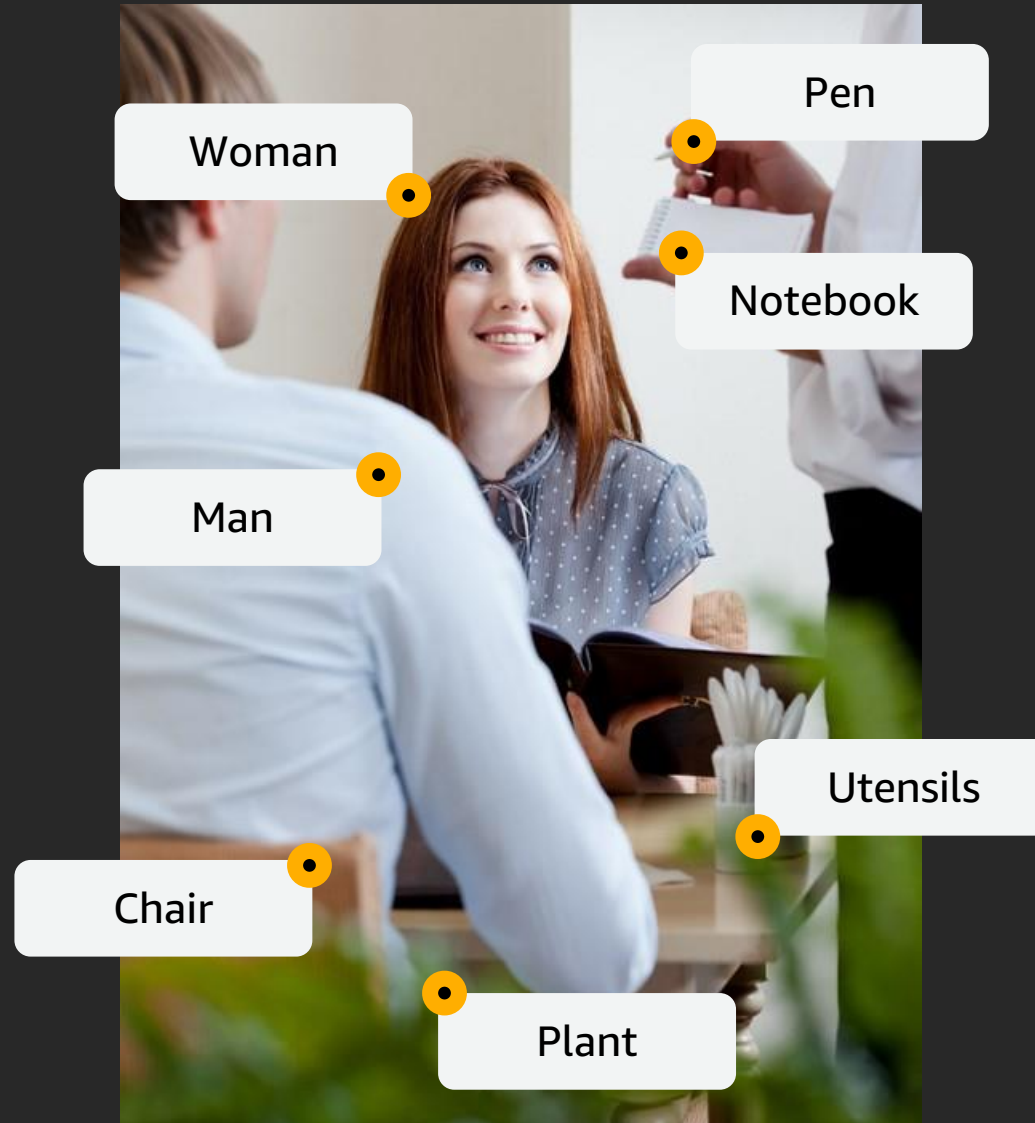
DetectLabels

Facial analysis

Analyze facial characteristics in multiple dimensions

DetectFaces

Demographic data
Age range: 29–45

Facial landmarks
EyeLeft, EyeRight, Nose,
RightPupil, LeftPupil,
MouthRight, LeftEyeBrowUp,
Bounding Box. . .

Image quality
Brightness: 23.6%
Sharpness: 99.9%

Happy 83.8

Emotion expressed
Happy: 83.8%
Surprised: 0.65%

General attributes
Smile: True 23.6%
EyesOpen: True 99.8%
Beard: True 99.5%
Mustache: True 99.9%

Facial pose
Pitch: 1.446
Roll: 5.725

Blockchain

What is blockchain?

Blockchain makes it possible to build applications where multiple parties can execute transactions **without the need for a trusted, central authority**.

Today, building a scalable blockchain network with existing technologies is complex to set up and hard to manage.

Each network member needs to

Manually provision hardware	Install software	Create & manage certificates for access control	Configure networking components
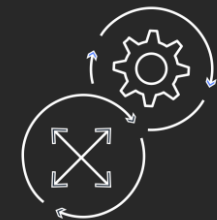
Example use cases

Shipping

**Supply chain
management**
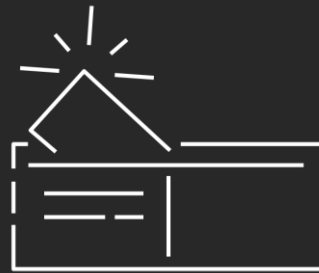
**Finance
and banking**
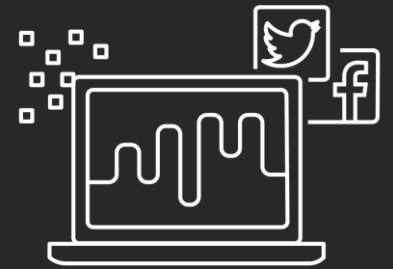
**Digital
advertising**

Blockchain qualities

Decentralized trust

Financial institutions
Peer-to-peer payments

Mortgage lenders
Process syndicated loans

Supply chain
Transact with suppliers
and distributors

Retail
Streamline customer rewards
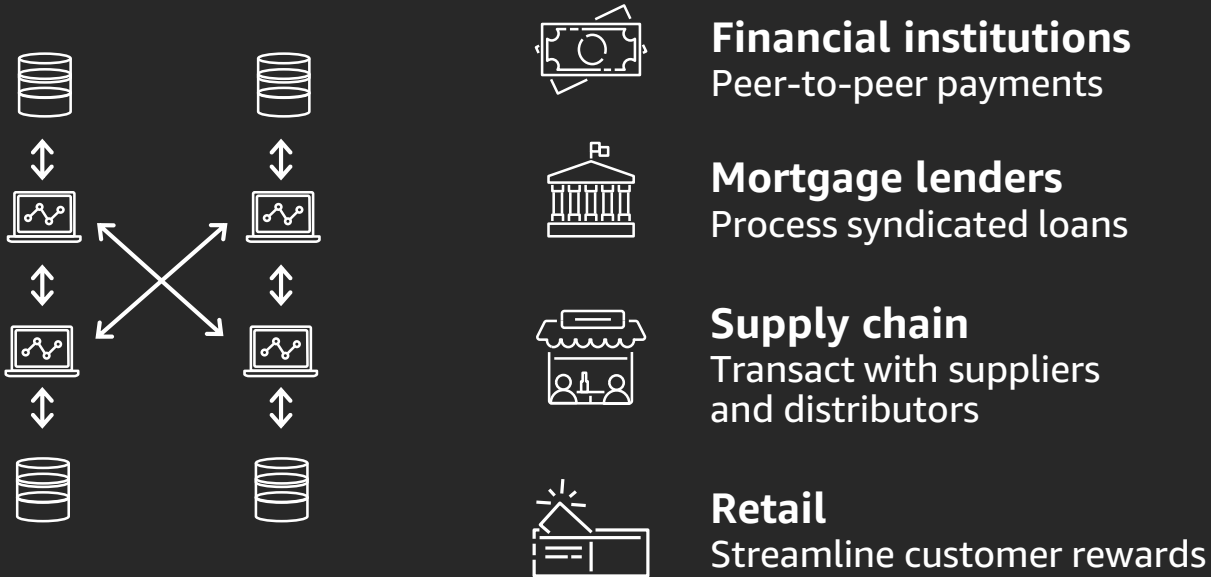
Benefits

Transparency

Immutability

Auditability

Permissionless

Permissioned

Consortium

AWS blockchain services

Amazon Managed Blockchain

Fully managed service that makes it easy to create and manage scalable blockchain networks using popular open-source frameworks

- Hyperledger Fabric
- Ethereum

Amazon Managed Blockchain features
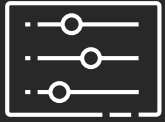
Fully managed
Create a blockchain network in minutes

Open-source variety
Support for two frameworks

Decentralized
Democratically govern the network
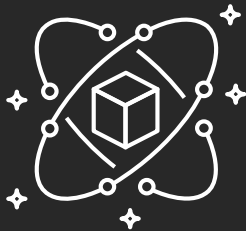
Reliable and scalable
Backed with Amazon QLDB technology

Low cost
Only pay for resources used

Integrated
Easily use with AWS services

Nestlé's chain of origin coffee cultivates supply chain transparency with Amazon Managed Blockchain

Challenge

Nestlé is the biggest procurer of coffee in the world, and it wanted to uncover transparency around its coffee bean supply chain beyond its brokers and buyers

Solution

Nestlé turned to Amazon Managed Blockchain to trace back through every step in its supply chain – from the farmer and grader to the roaster and packer

Benefits

- Nestlé can now grow one-on-one relationships with coffee farmers and roasting facilities

- Because the secure blockchain ledger is public, it provides greater accountability to everyone in the supply chain

Company: Nestlé
Country: Switzerland (CH)

Employees: 300,000+

Website: Nestle.com

About Nestlé
Nestlé is the world's largest food and beverage company. It is present in 190 countries around the world, and it has 308,000 employees. Nestlé is also the biggest procurer of coffee globally.

" Whether its how we ensure freshness, whether its making sure that the packaging being used is better for the planet, **it means that the value is going back to the farmers and the partners we're working with**. "

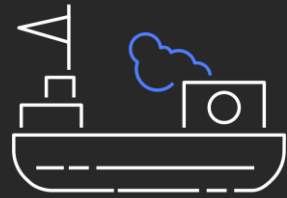**Armin Nehzat**, Digital Technology Manager, Nestlé

AWS Ground Station

Common satellite data cloud processing use cases

Weather forecasting and agriculture

Commercial fruit producers can monitor crop health and water levels to ensure efficient use of limited resources

Global shipping and anti-piracy

Leverage registries of ship placement, destination, and tracking to confirm accuracy of ship positioning, as well as be notified of any deviations from normal operations

Earth observation and fire safety

Use low-latency access to high-resolution heat mapped images of the earth to inform frontline fire commanders on safest, lowest heat entry points to fight fires
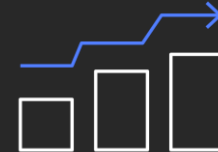
Retail forecasting

4.8 million satellite images from 44 major US retailers confirms numbers of cars in parking lots and yields an informational advantage to forecasting accuracy

Industry challenges
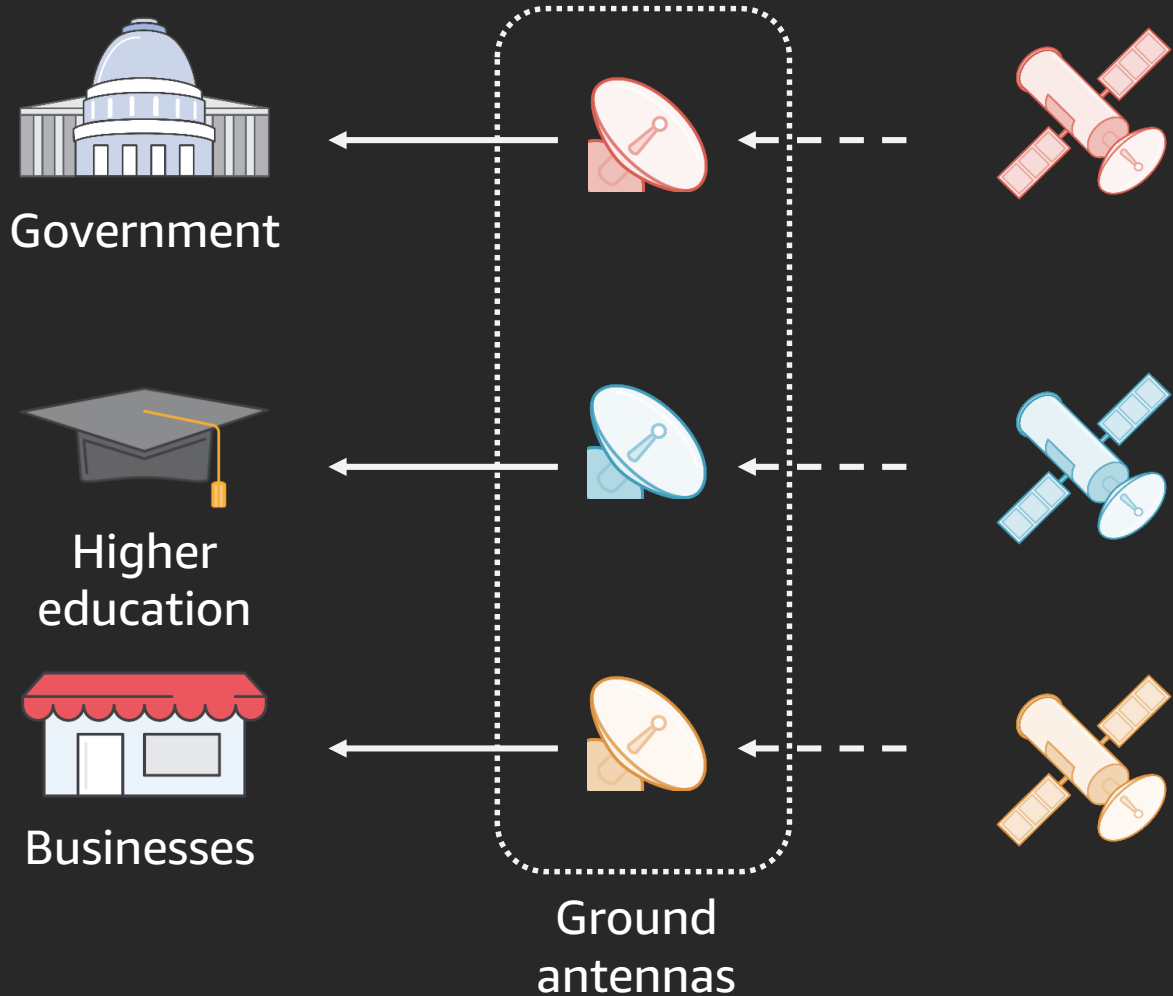
- Build, lease, or purchase unused bandwidth
- Are difficult to maintain
- Require high capital expenditure investment to scale
- Support opaque pricing
- Cause data access latency

AWS Ground Station: What is it?

AWS Ground Station is a fully managed service that lets you control satellite communications, process data, and scale operations without having to worry about building or managing your own ground station infrastructure

These facilities provide communications between the ground and the satellites in space

- Low-latency global fiber network

- Direct access to AWS services

- Fully managed service (no infrastructure commitments)

- Pay-as-you-go pricing

- No licensing requirements

- Scale satellite communications on demand when your business needs it
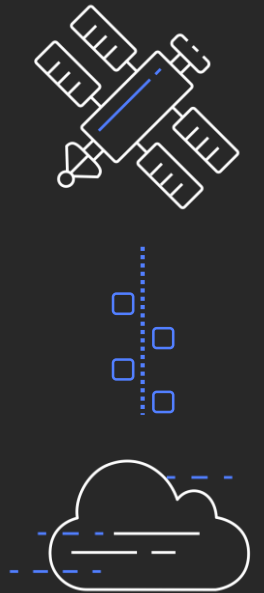
What AWS Ground Station offers

Government

Higher education

Businesses
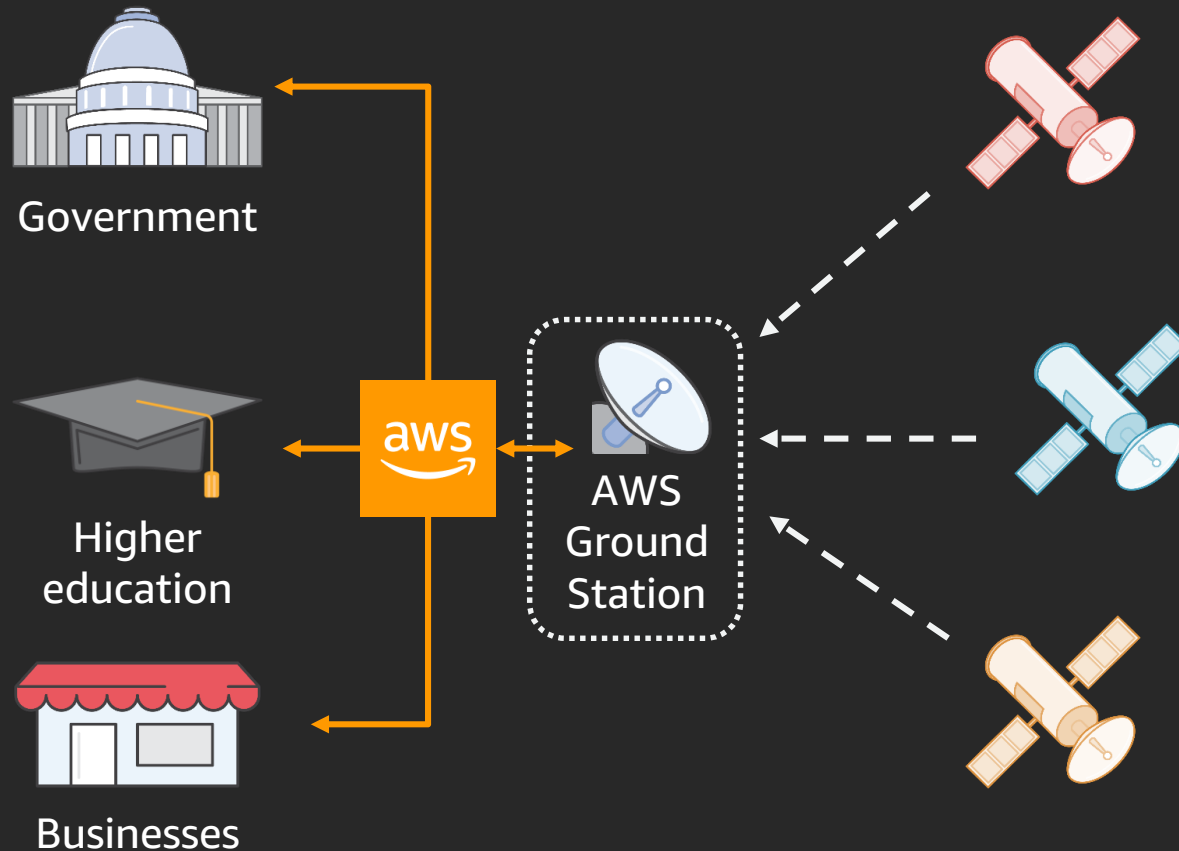
AWS Ground Station

- Satellite ground support with no infrastructure commitments
- Pay-by-minute pricing
- Self-service scheduling
- Colocated ground stations and AWS data centers providing direct access to AWS resources and services
- Backhaul of base band data to customer Region of choice included in pricing
- Near-real-time data delivery

AWS Wavelength

Mobile edge computing: Characteristics

- **Massive number of devices** such as sensors, video cameras, and IoT devices generating large volumes of data

- Processing of data needs to happen **close to data generation**

- In real time with **very low latency**
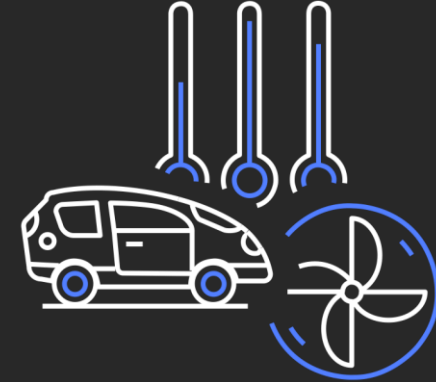
Total global mobile traffic expected to reach 131 EB (exabytes) per month by 2024*

aws | intel.

5G and mobile edge computing

Ultra-low-latency, high-bandwidth network slicing

5G

5G proliferation forecast for the next 4 years
- 1.8 billion mobile subscribers
- 175 million business subscribers worldwide

Demand and new requirements such as low latency, local processing at MEC solution

Mobile edge computing

New use cases

Cloud gaming, video streaming, AR/VR, IoT, video recognition, C-V2X, etc.
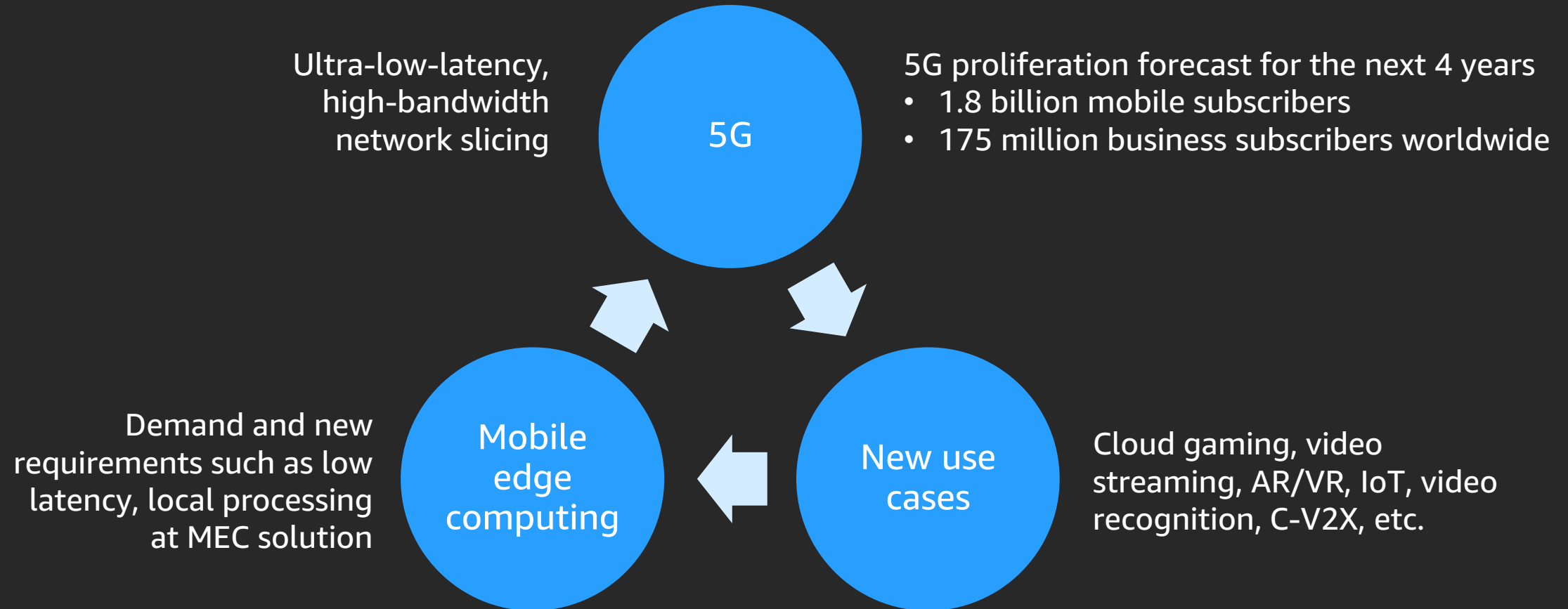
AWS Wavelength

AWS Wavelength

AWS Wavelength combines the high bandwidth and ultra-low latency of 5G networks with AWS compute and storage services to enable developers to innovate and build a whole new class of applications
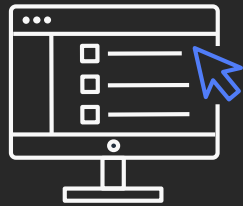
- AWS infrastructure and services in CSP 5G networks

- Ultra-low latency, local data processing

- Scalable capacity in CSP data center managed and supported by AWS

AWS Wavelength: Built for the mobile edge

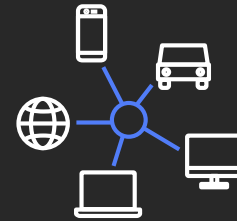## AWS SERVICES FROM INSIDE THE CSP MOBILE NETWORK

AWS compute and storage infrastructure embedded inside CSP mobile network

Single pane of management, across Wavelength Zone and AWS Regions

Access to services in the AWS Region

Develop applications once and deploy for use with 5G network globally

Failover from Wavelength Zone to AWS Region

AWS Wavelength use cases

Healthcare

AI/ML solution for processing and analyzing video, images, and data for real-time diagnosis

Connected vehicles (C-V2X)

Real-time monitoring of data from sensors for road safety, secure connectivity, in-car telematics, and autonomous driving

Smart factory

Accelerating the industrial edge with AI/ML, video recognition for software-defined manufacturing

LG uses AWS Wavelength for low-latency, high-throughput delivery of V2X data

"5G gives us that connectivity piece with high bandwidth and low latency, while **Wavelength is providing the necessary compute power at the edge to supplement the 5G technology**. So, it's about bringing security, privacy, connectivity, and compute together for the benefit of consumers and their safety."

Harsh Kupwade Patil,
Security Leader & Principal Research Engineer, LG Electronics

Thank you for attending AWSome Day Online Conference

We hope you found it interesting! A kind reminder to **complete the survey.**
Let us know what you thought of today's event and how we can improve the event experience for you in the future.

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Test your knowledge

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