AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

IOT313

Enhancing telecommunications CPE data collection & analytics with AWS

Gavin Adams
Principal Solutions Architect, IoT
Amazon Web Services

J. Lowry Snow
Principal Business Development, IoT
Amazon Web Services

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Agenda

Overview: Data collection and transformation

Section 1: Liberating CPE telemetry with AWS

Section 2: Reference architectures and data collector deployment

Demo: Bulk data collection with AWS

Summary

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Overview: Data collection and transformation

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John Boyd

- Major in the US Air Force
- Flight instructor at Nellis AFB
- Wrote the manual on air-to-air combat
- Influenced design of the F-16, F-17, and F-18 fighter aircraft
- Considered one of the world’s great military strategists



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Energy-Maneuverability Theory

$$P_s = V\left(\frac{T - D}{W}\right)$$

Ps = Specific excess power

V = Speed

T = Thrust

D = Drag

W = Weight

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F-100 Super Sabre sensor data

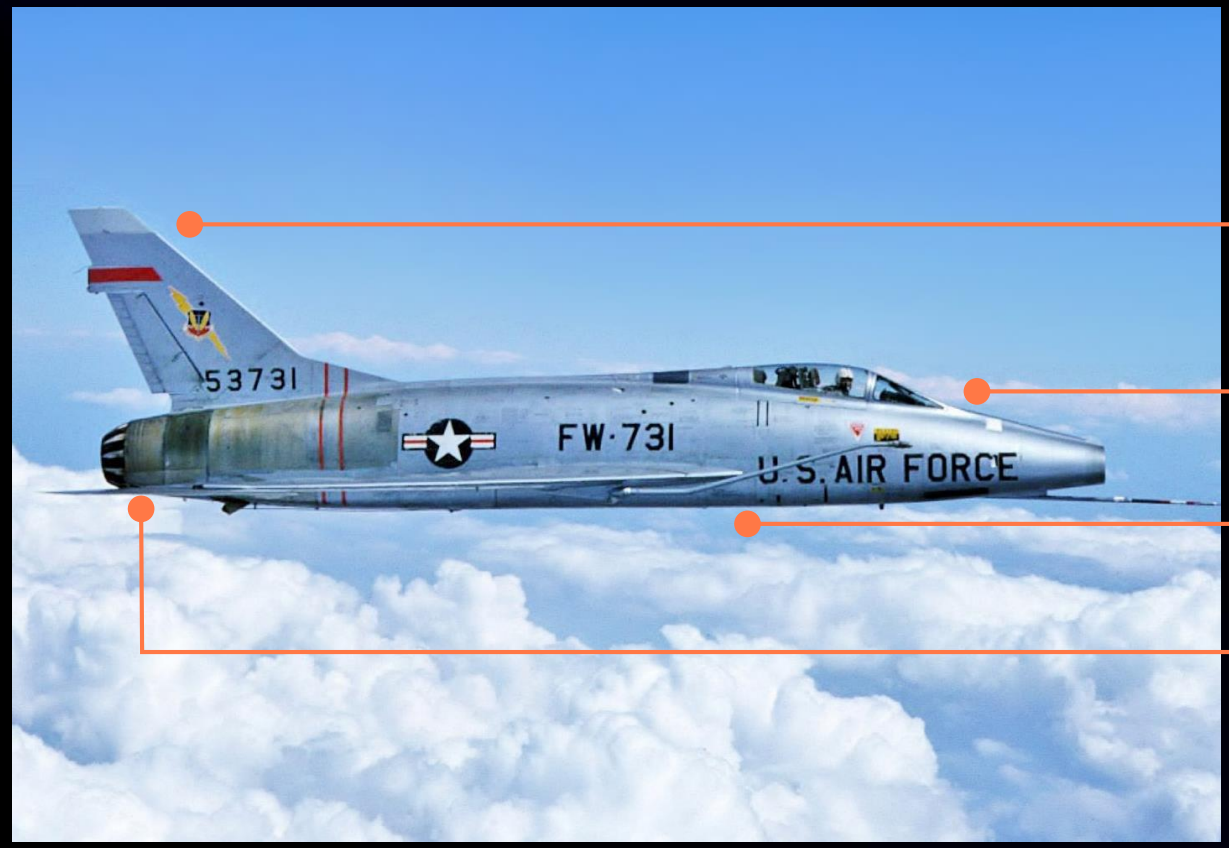
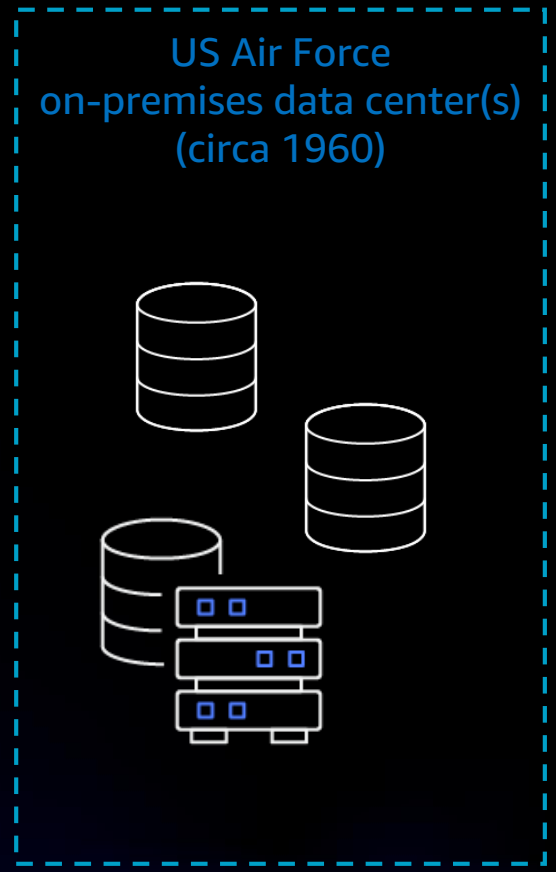


Photo by U.S. Air Force / CC BY-SA 4.0



Operational sensors

Pressure sensors

Position sensors

Engine sensors

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Formula for product transformation

$$P_s = V\left(\frac{T - D}{W}\right)$$

+



=

McDonnell Douglas F/A-18 Hornet



General Dynamics F-16 Fighting Falcon



Vision:

Energy-Maneuverability Theory

Data:

Aircraft sensor data
(and computers)

Product Transformation:

USAF Lightweight Fighter Program

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Data revolution in aviation

- New gen – 30x data collection
- New Airbus A350
  - 250K sensors on board
  - Collecting terabytes of data
- Airlines saving $5-6 billion annually
- New business models and innovations



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Telecom data and AI/ML

*Investment in **AI for telecommunications** is projected to reach **$36B by 2027**, a growth rate of 48% (CAGR)*



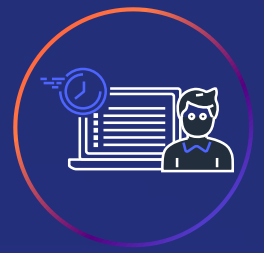
Source: Tractica, Artificial Intelligence for Telecommunications Applications (2019).



Network monitoring and optimization



Predictive analytics and diagnostics



Improved customer care experiences



Fraud detection and cybersecurity

AI/ML-driven solution areas

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Data is the new oil



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Data as the foundation for innovation



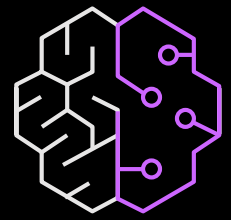
Data as an organizational asset

No longer locked in silos or the property of individual departments



Data is democratized

Available easily and securely for anyone who needs it



Data is put to work

Discover intelligent and actionable insights with analytics and AI/ML

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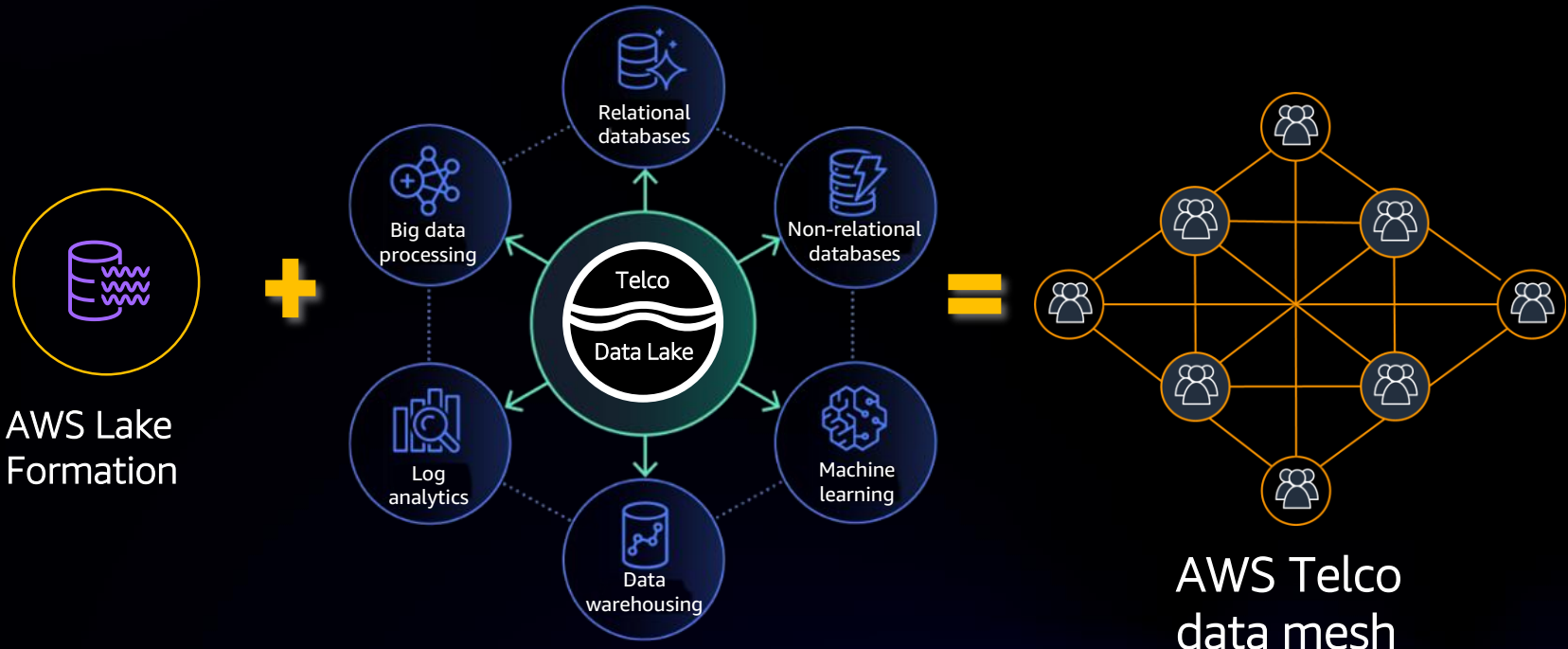
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Liberating telecom data with Telco data mesh

Data silos

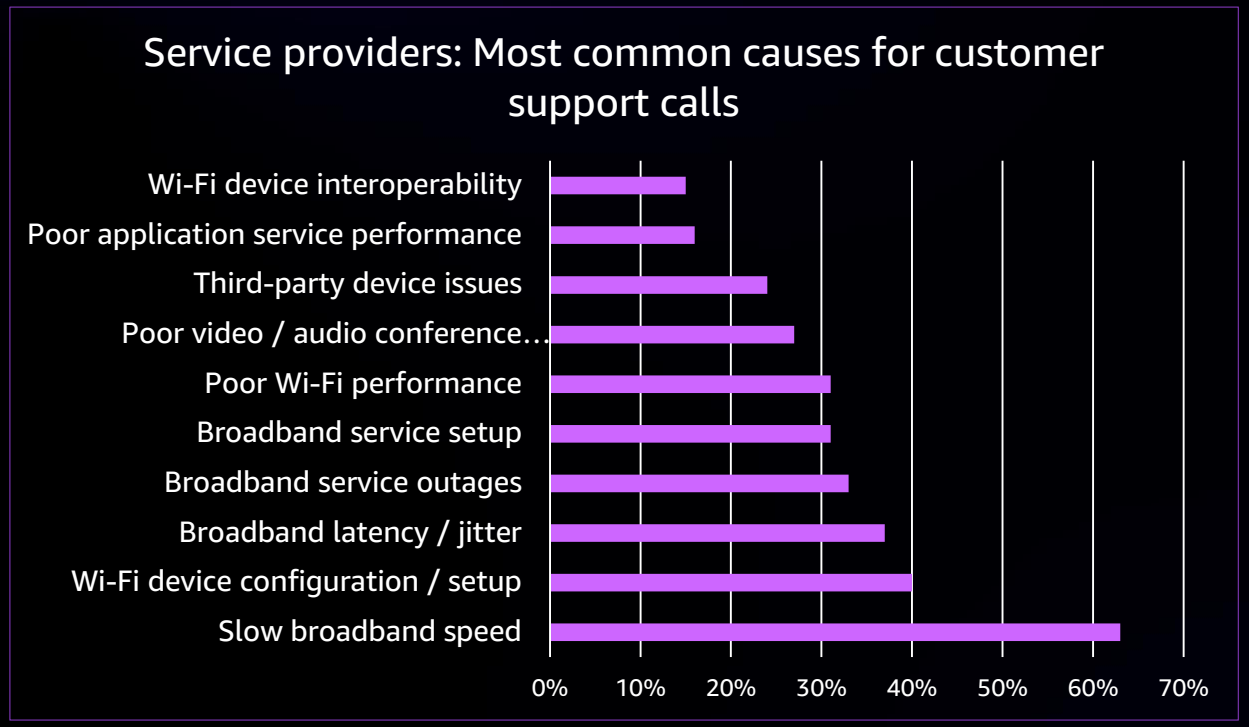


Telco data mesh is a data platform enabling Communications Service Providers to ingest, catalog, transform, query, and generate insights from data at petabyte scale – built and optimized specifically for Telcos



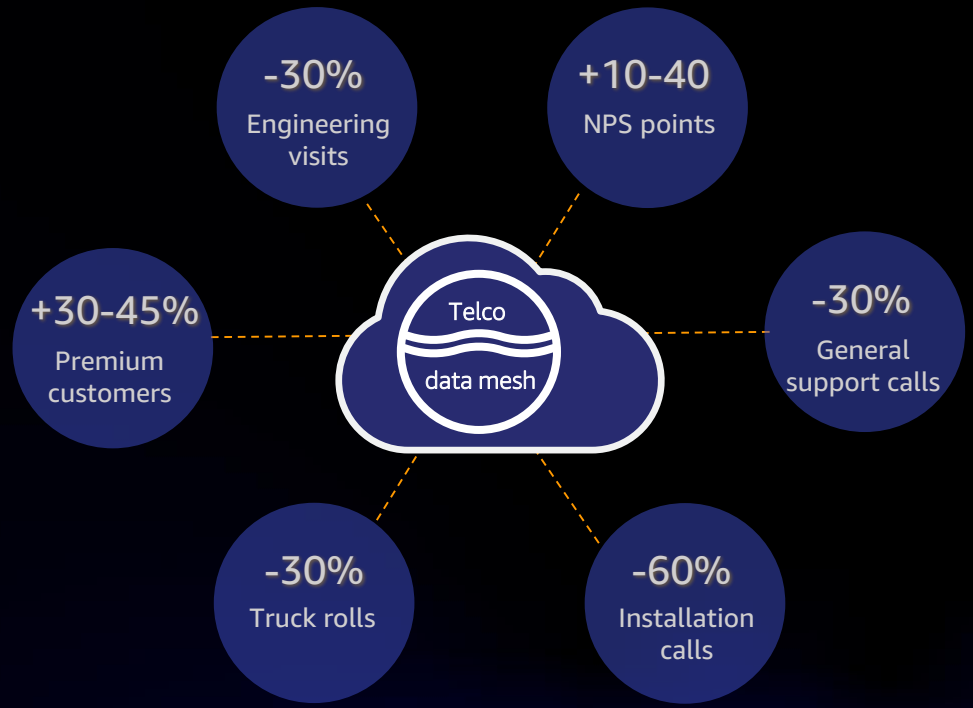
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Reducing OpEx with CPE telemetry



Source: OMDIA, "The Future Telco-Connected Home" whitepaper (2021).

OpEx reduction with investments in data collection and AI/ML

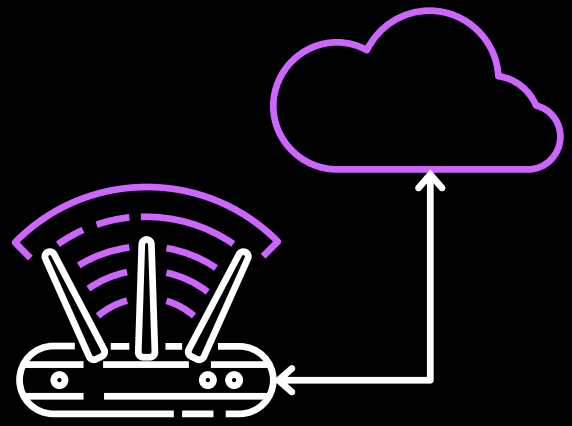


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Section 1: Liberating CPE telemetry with AWS

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Broadband Freedom with AWS



Broadband Freedom: An initiative that helps CSPs **modernize and add innovations** to CPE management systems by securely and cost-effectively integrating new and next-generation CPE fleets with AWS

AWS methodology for integrating CPE management systems with AWS for improved data collection and analytics, enhanced CPE management, and next-gen CPE with cloud-hosted apps and AI/ML

AWS ProServe broadband offering with workshop, architecture blueprints, starter code, and TR-69/369 integrations

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CPE fleet integration journey



Improved data collection and analytics



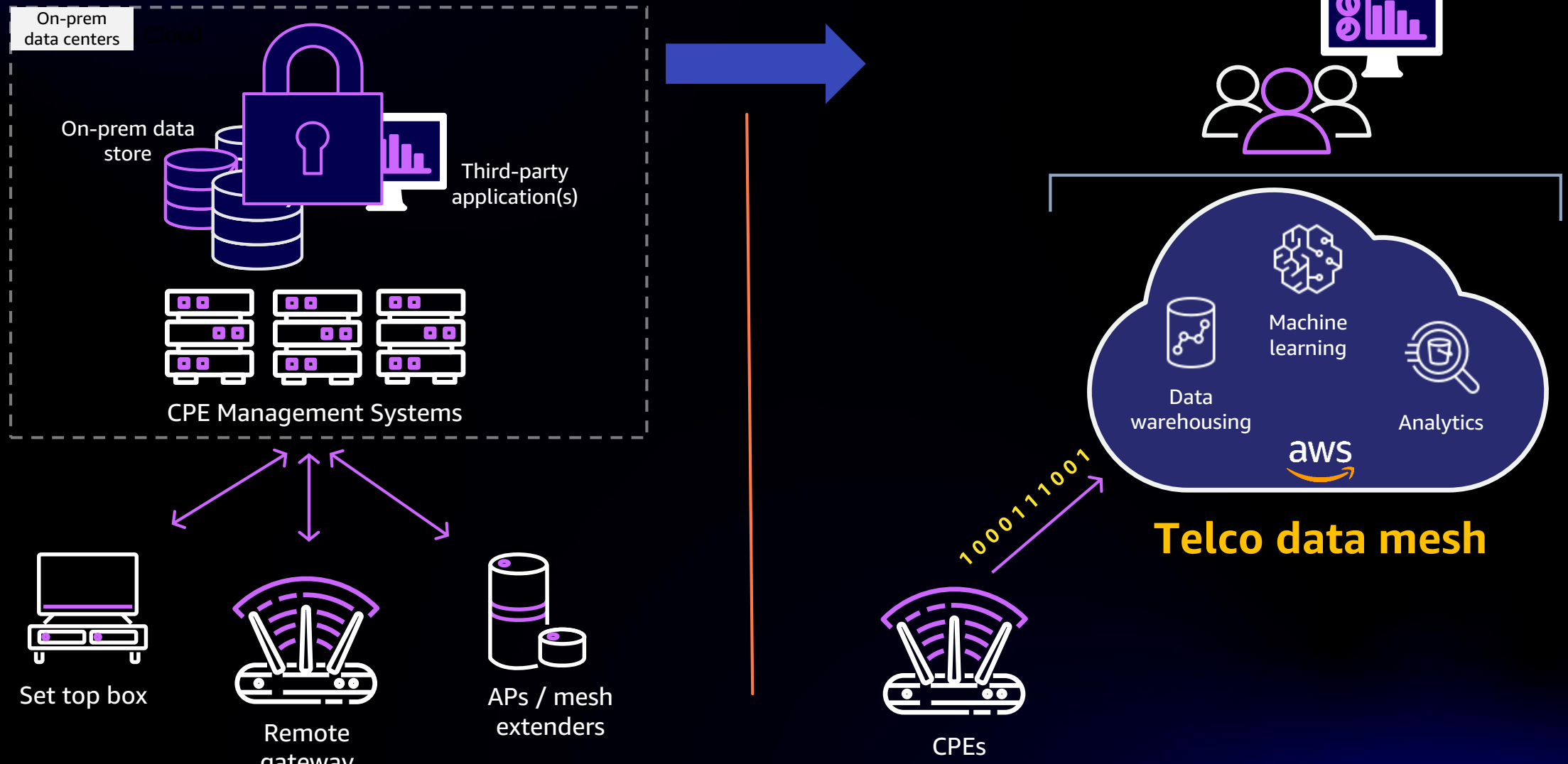
Enhanced CPE management with cloud services



Cloud-hosted applications and AI/ML integrations

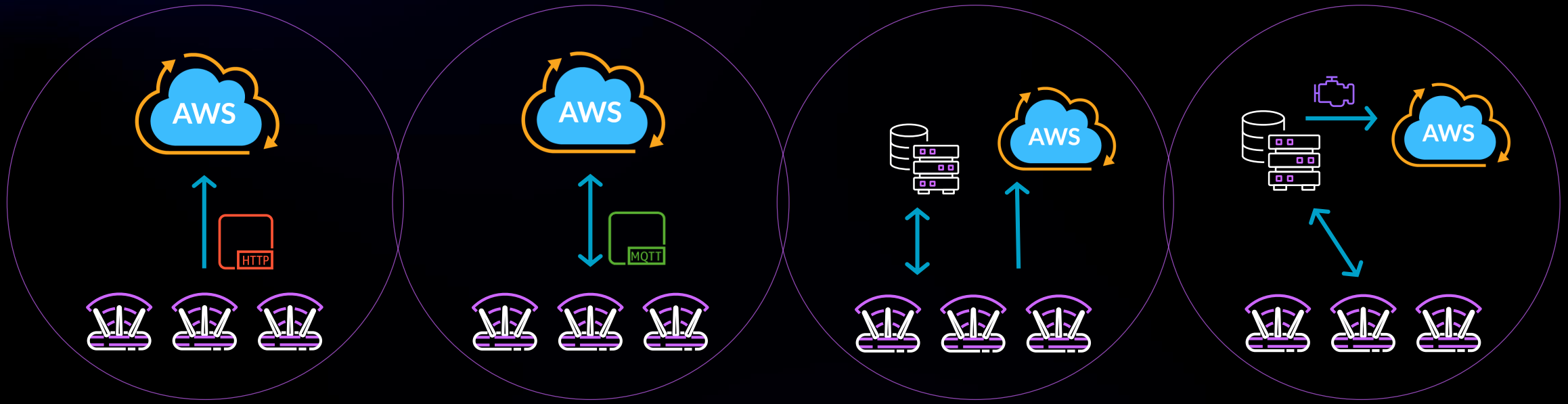
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Liberating CPE data



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CPE data collection options



TR-069/369 bulk data collection

MQTT with advanced capabilities

Custom CPE agent

On-prem data store to AWS (behind ACS)

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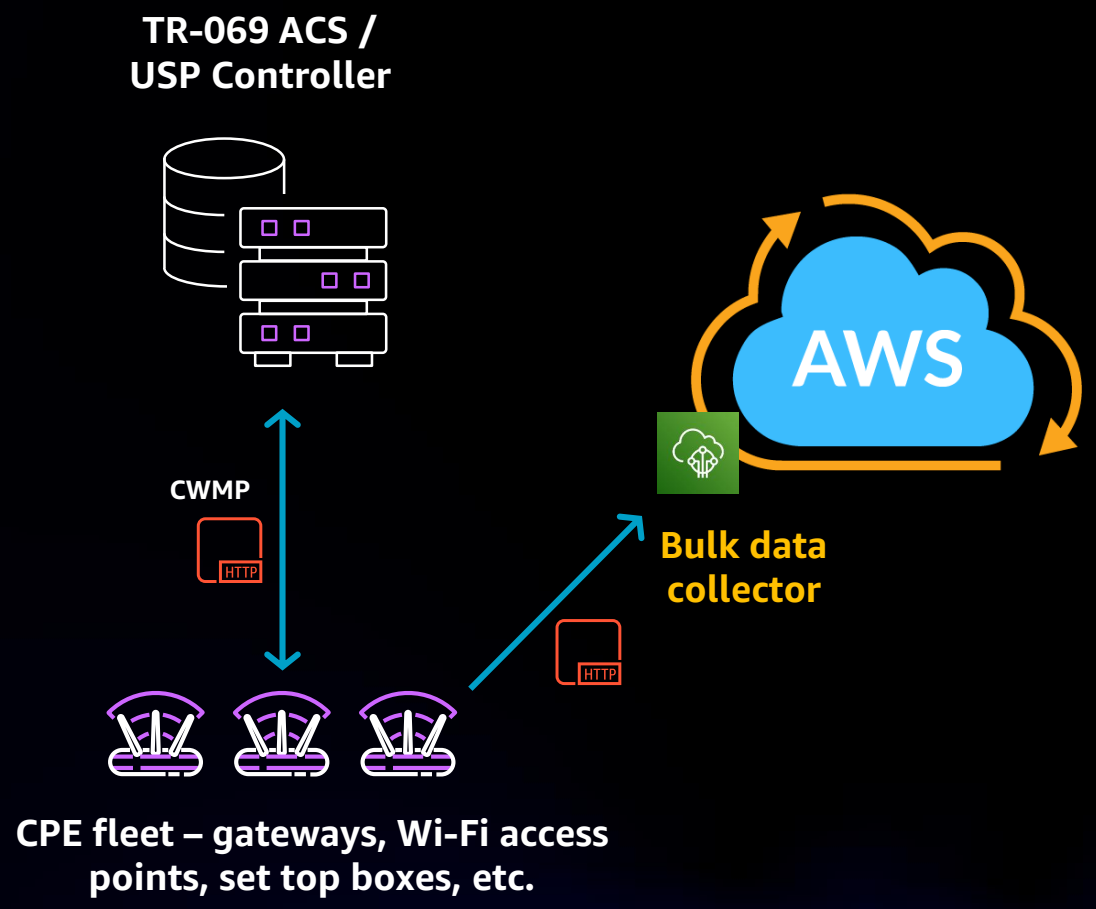
Bulk data collection with TR-069/369

Overview

- TR-069 Amendment 6, Annex N defines the “HTTP bulk data collection mechanism”
- ACS or USP Controller configures the CPE fleet to send TR-181 information to an HTTP bulk data collector
- Creates a data path outside of the ACS management channel dedicated to CPE data collection

Benefits

- Fast, lightweight, and simple
- Takes data collection load off the ACS or Controller



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Top use cases for Broadband fleet telemetry

CPE Heartbeat – Improved Customer Care



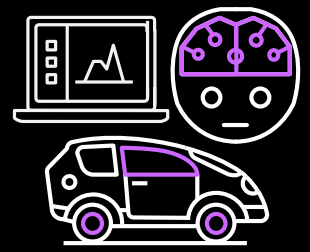
Reduce customer calls by 30% by taking action before an issue is reported

WiFi diagnostics and optimization



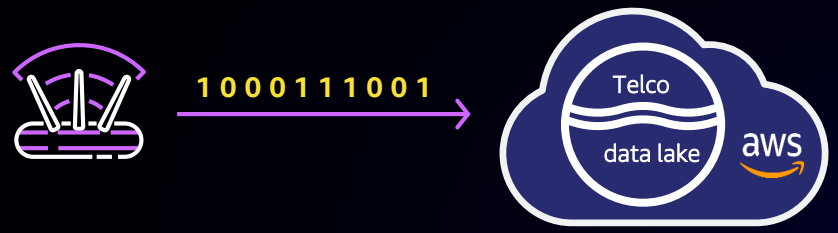
Improve quality of experience for customers by adjusting the network based on real-time data

Avoidable truck roll



Save millions of dollars by reducing avoidable truck rolls by 10% annually

Top AWS cloud use cases using Broadband data and AI/ML

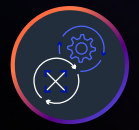


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OPTUS

Optus is one of the largest telecommunications companies in Australia, providing mobile, telephony, internet, satellite, entertainment, and business network services to more than 10 million customers each day



CHALLENGE

An accurate, **real-time view** of quality of service issues, related to broadband connectivity from a variety of CPEs

Increase the quality of service for home broadband customers working from home during the COVID-19 pandemic



SOLUTION

Built a **Network Analytics Data Platform** to provide insights to Optus teams

Used **serverless and microservices** architecture to ingest data from broadband devices for running **proactive diagnostics and analytics**



BUSINESS OUTCOME

- **Zero service disruptions** for users on the Optus platform
- **Reduced costs** for services while **improving performance** for customers
- **Real-time** visibility of network performance

"Real-time network and data processing are critical for analytics that enable proactive responses and deliver a great customer experience."
Matthew Sharpe
Director, Strategic Capability & Technology Smart Spaces

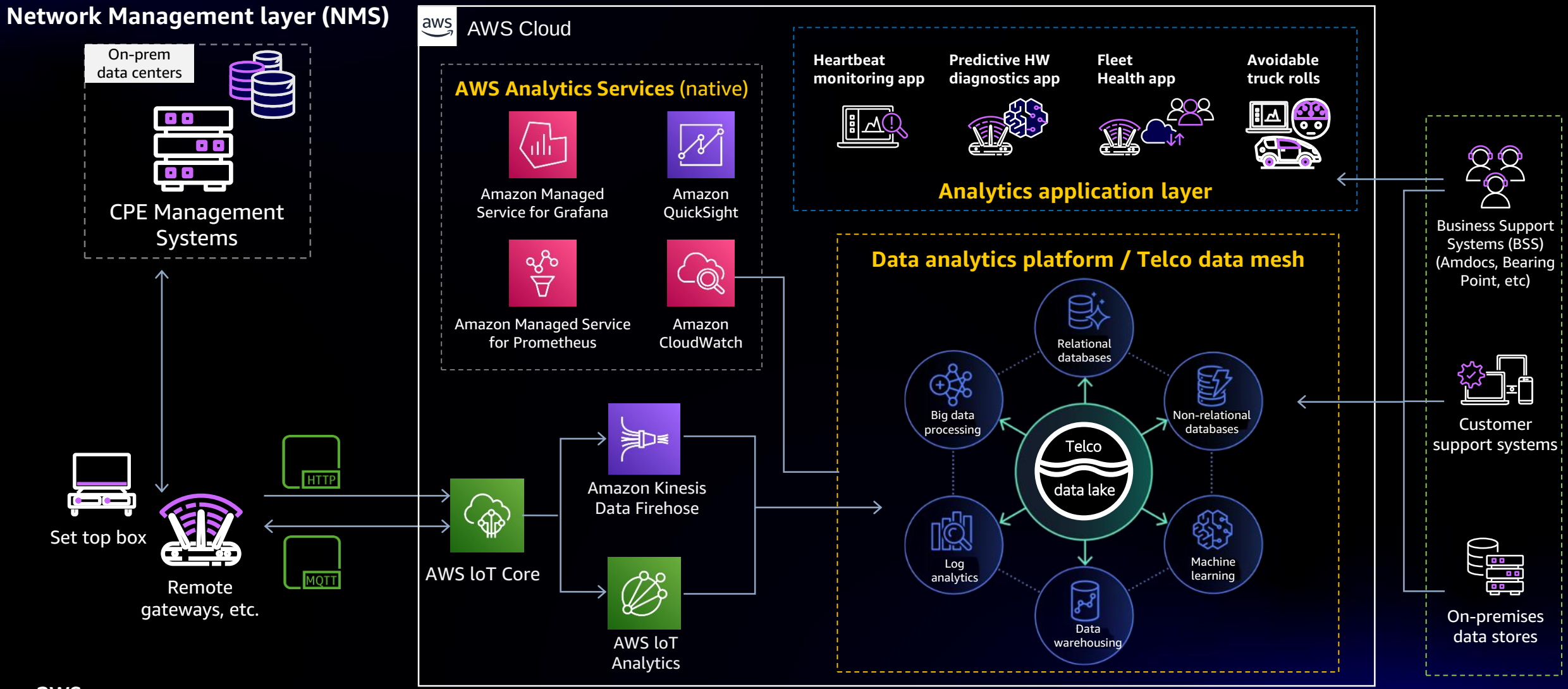
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Section 2: Reference architectures and data collector deployment

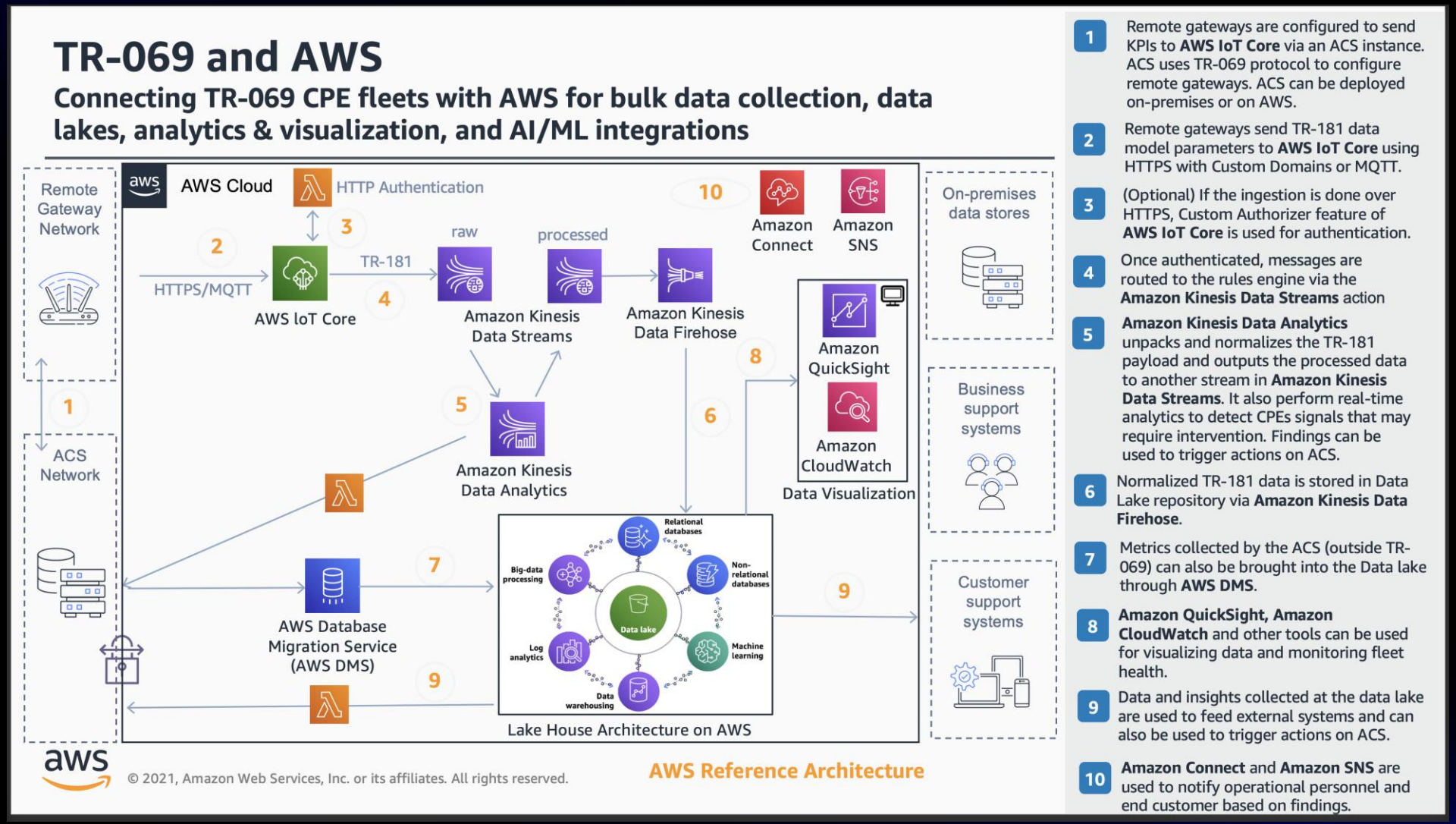
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CPE data collection & analytics ref. arch. with AWS



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TR-069 and AWS reference architecture



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Utilizing TR-069 for bulk data collection



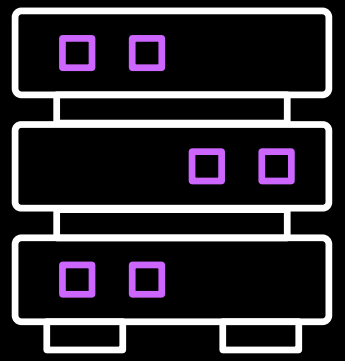
CPE with TR-069 or USP/TR-369 agent

TR-069 Protocol

GetParameterNames / GetParameterValues

SetParameterValues

`Device.BulkData.Enable`



Auto-configuration server (ACS)

HTTP Protocol

Bulk Data Report (CSV, JSON)

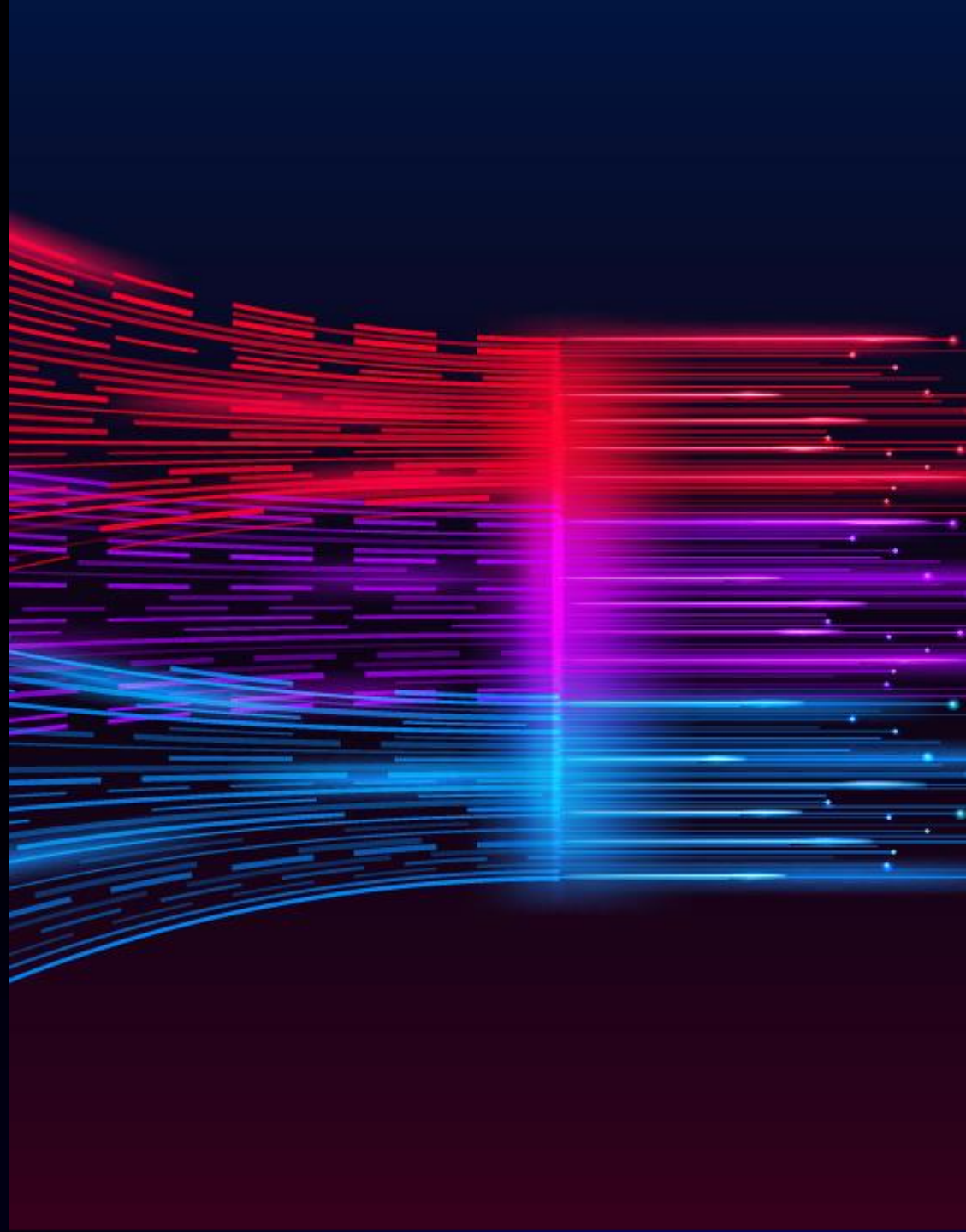


Bulk data collector

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TR-069 bulk data and the TR-181 data model

- Profile created via `Device.Bulkdata.Profile{i}`
- Per-profile parameters
  - HTTP URL
  - Reporting interval
  - List of parameters
  - Friendly formats (CSV, JSON)



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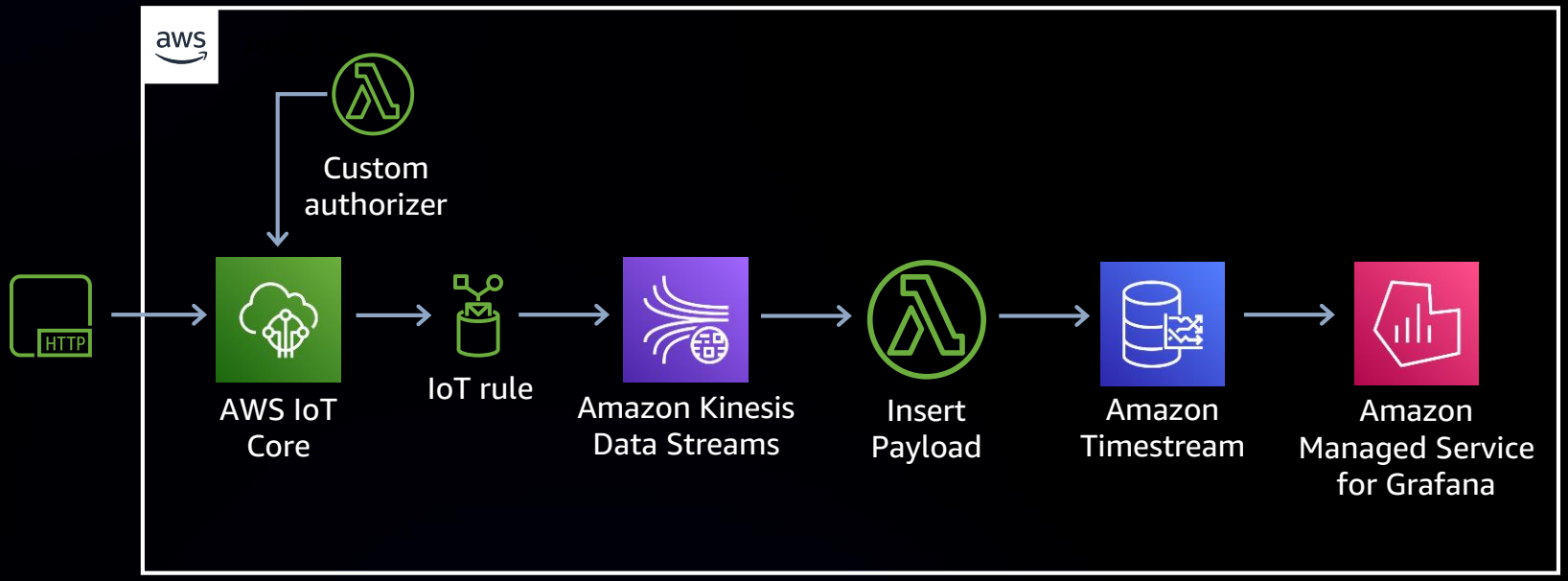
Bulk data in action

- Create cloud resources
- Configure CPE for bulk data
- Monitor message flow
- View results from portal



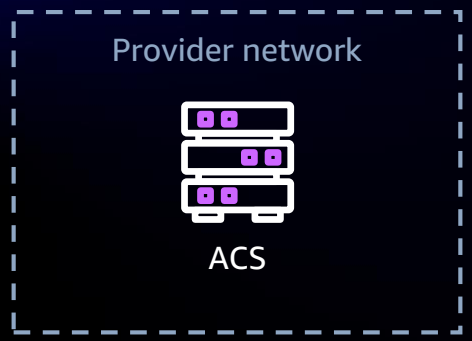
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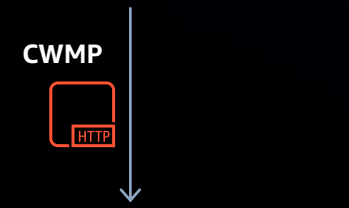
Step 1: One-click deploy cloud infrastructure for bulk data collector

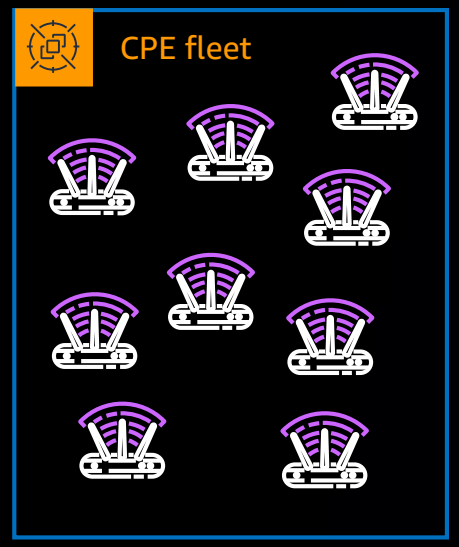


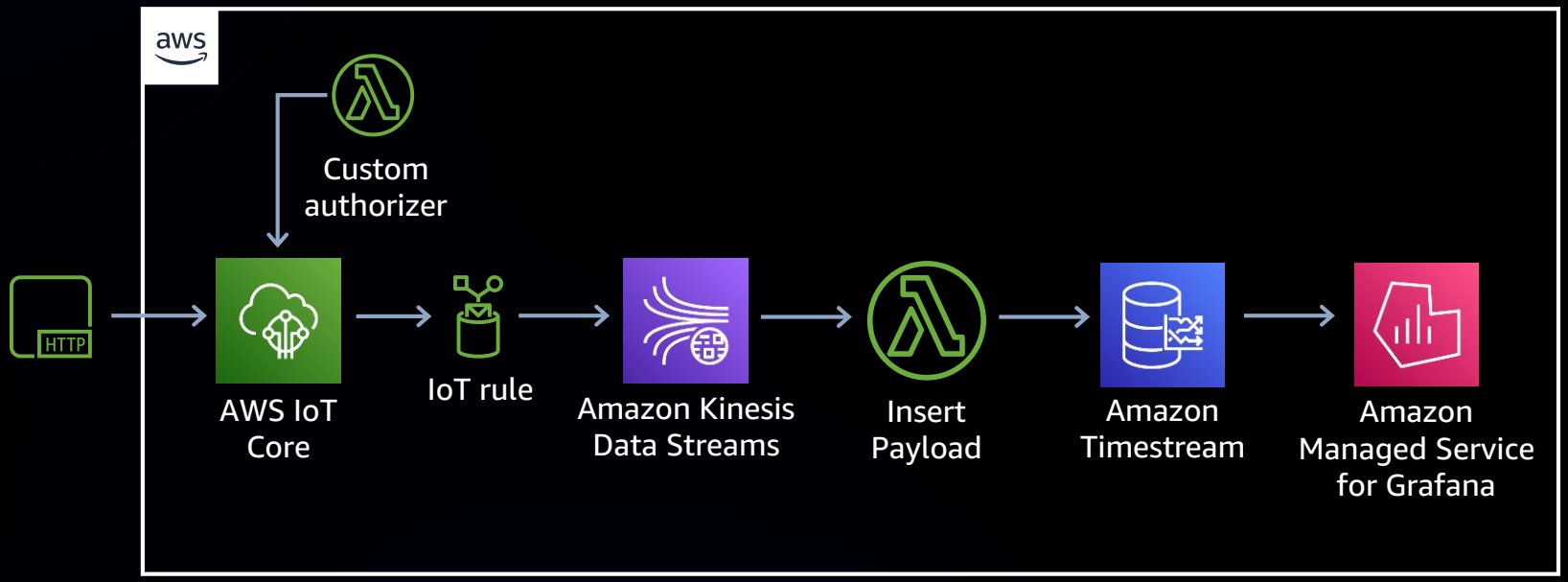
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Step 2: Configure CPE fleet for bulk data





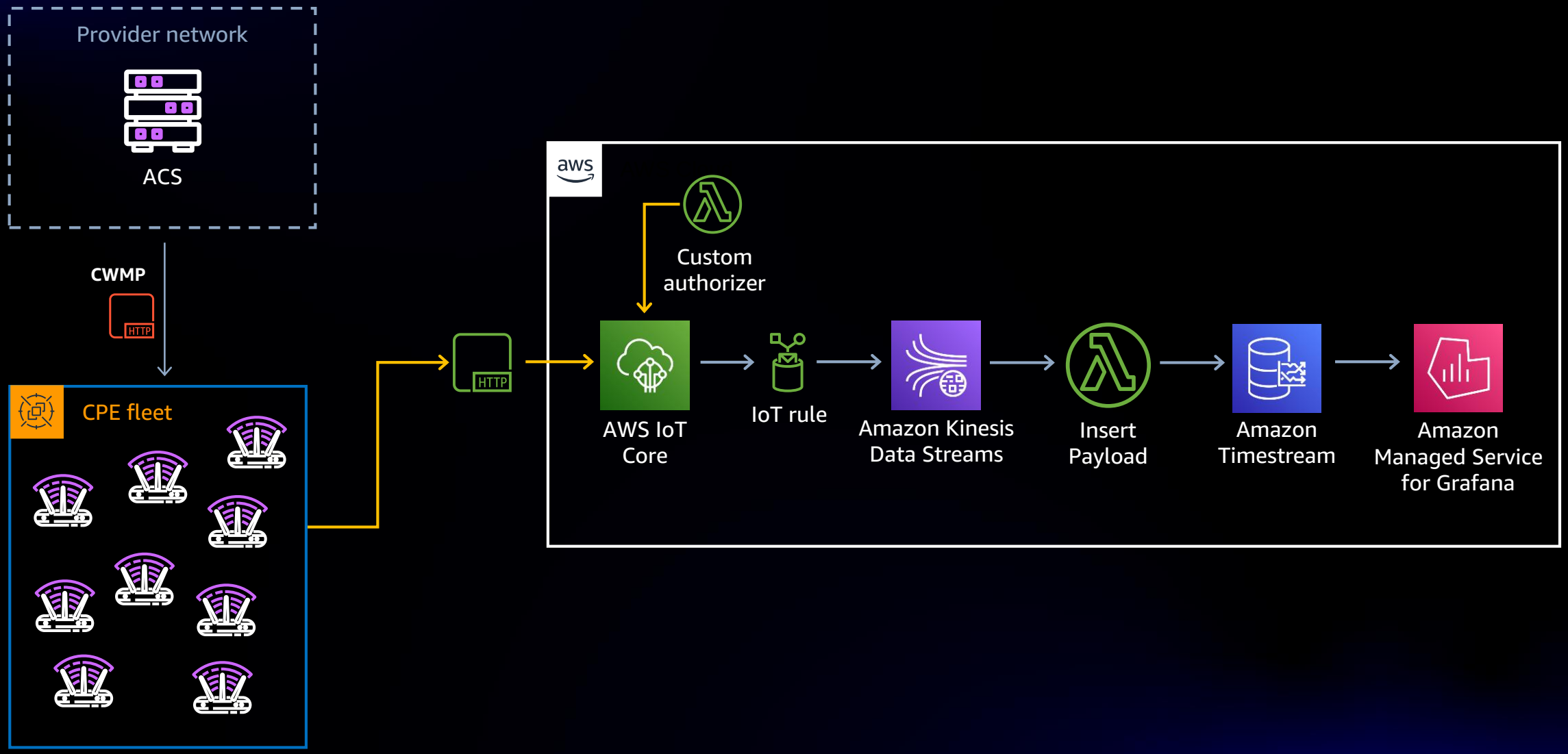




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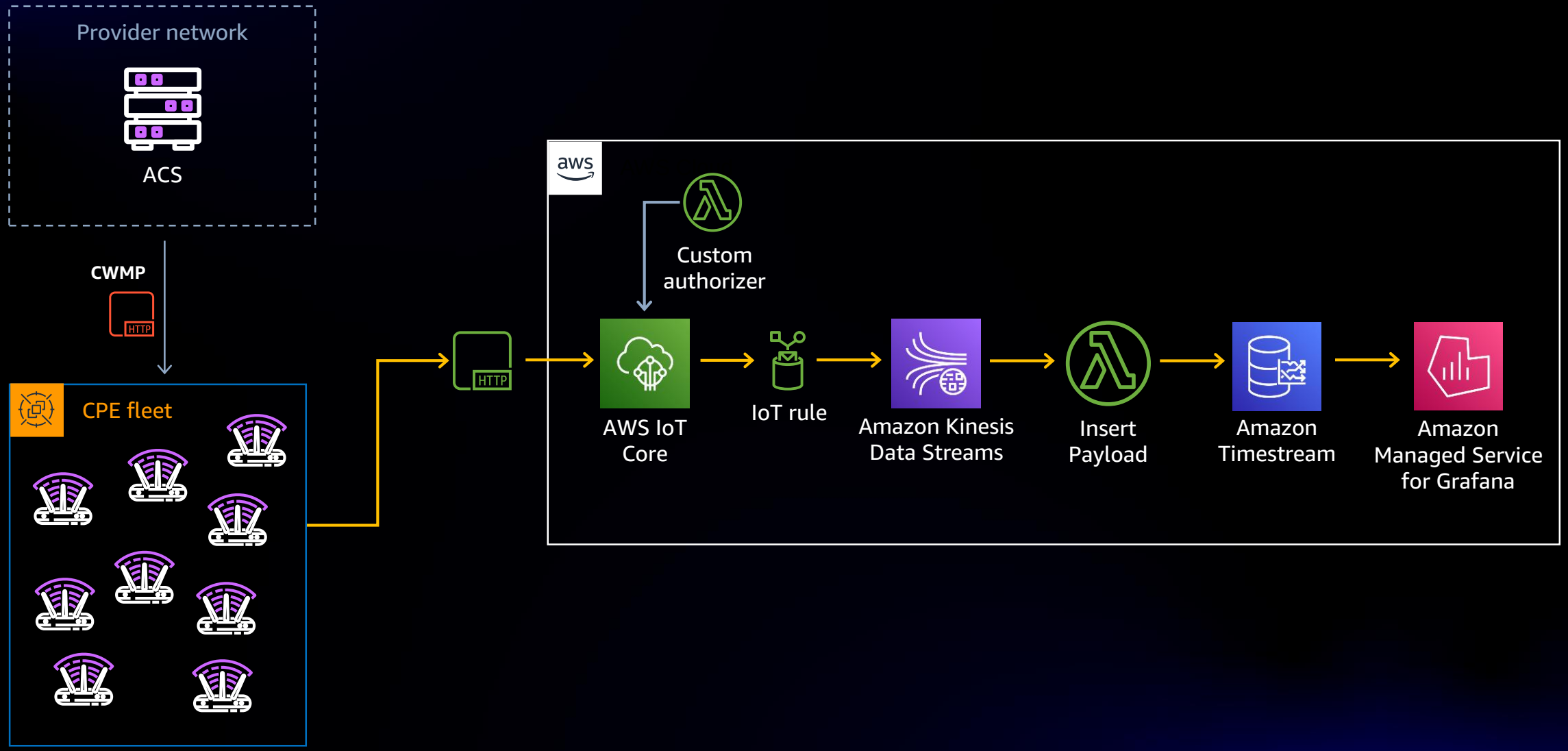
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Step 3: CPEs start sending telemetry to bulk data collector



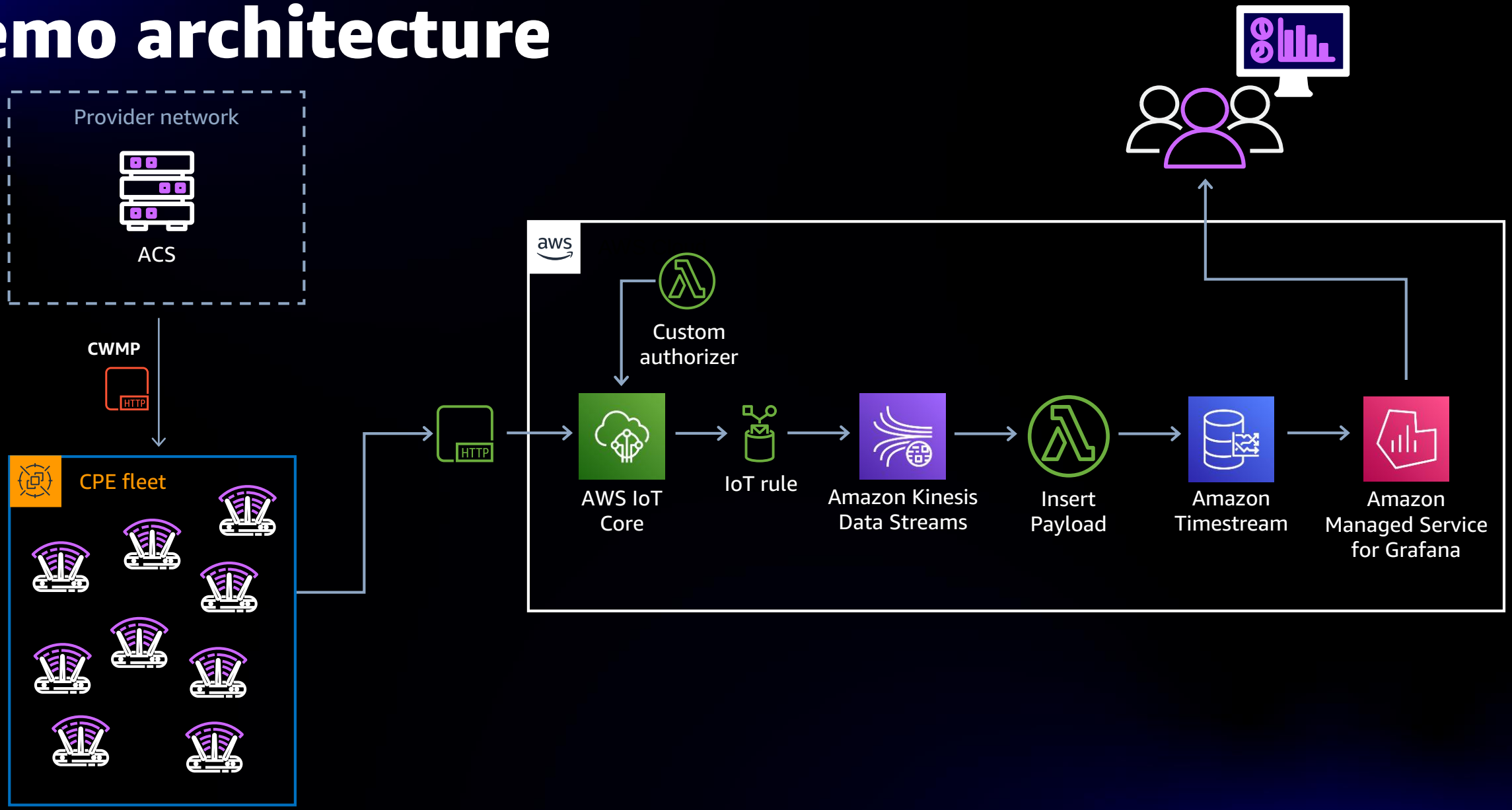
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Step 4: Deliver messages to AWS services



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Demo architecture



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Summary

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Summary

1. Data is the foundation for innovation and product transformation
2. Various options for integrating CPE fleets with AWS
3. How to use AWS as a data collector with the TR-069 bulk data collection object

Related sessions:

TLC303 – Telecom data lake and analytics

IOT207 – Closing the loop: Innovating with IoT on AWS

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Thank you!

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