



AWS IoT and Amazon Kinesis Video Streams for Connected Home Applications

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Agenda

- What are the challenges associated with building smart home solutions?
- What are AWS IoT and Amazon Kinesis Video Streams (KVS) and what do they offer?
- Camera Doorbell – Customer Use Case
- How do we build this smart home solution with AWS IoT and Amazon KVS?
 - Provisioning a new device
 - Ingesting Video Streams
 - Storage of Media Fragments
 - Playback
 - WebRTC
 - Alexa Integration
- Wrap up
- Q&A

AWS customers are innovating in every part of the home

Home security & monitoring



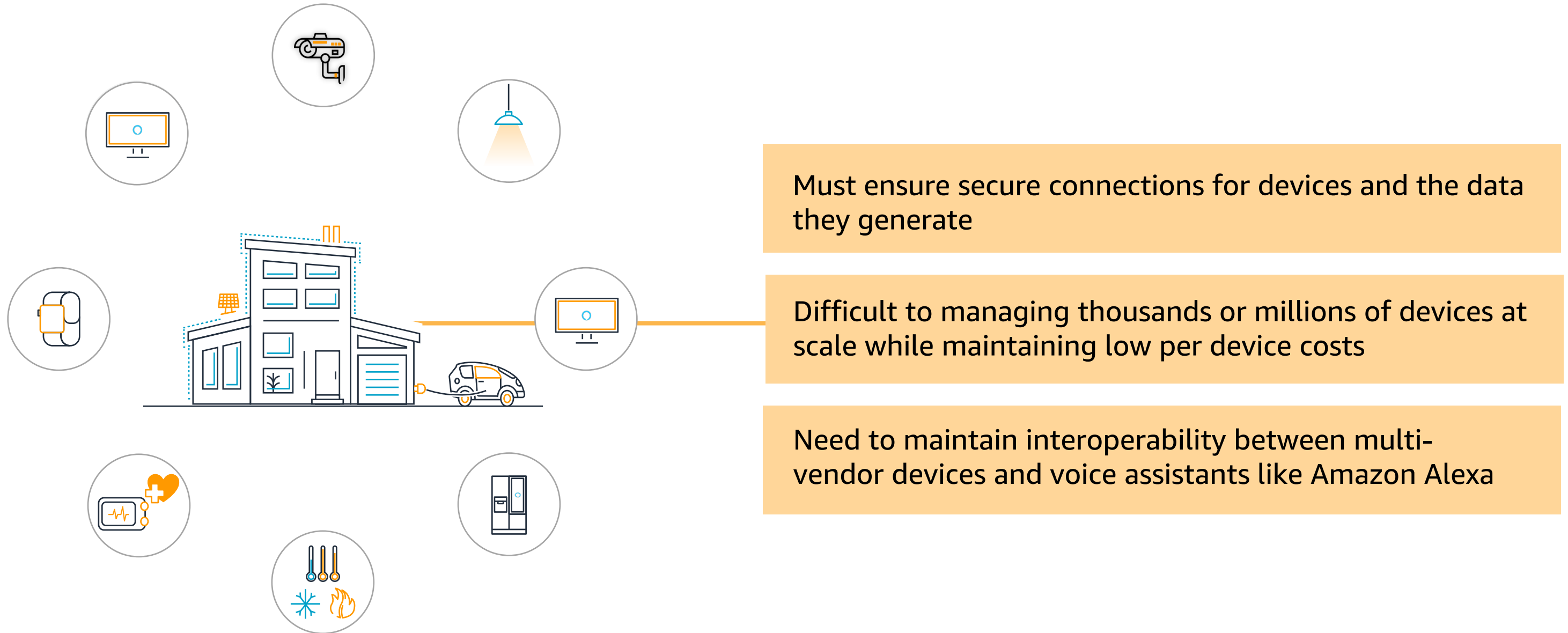
Camera-Enabled Appliances



Lifestyle & Wellness Cameras



It can be complex to build and manage smart home IoT solutions



Media Services Design and Architecture is Complex



Support for multiple media streaming technologies, protocols, codec support, and development environments.



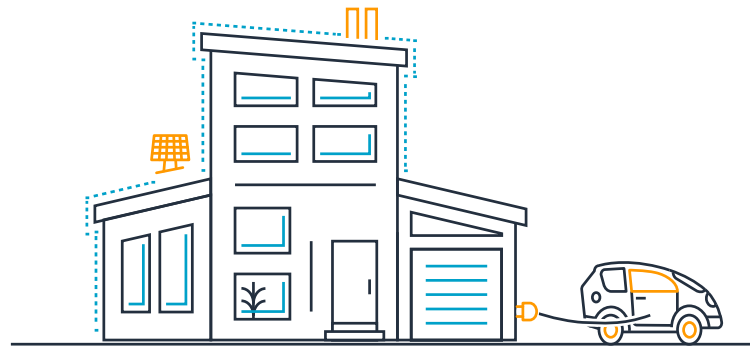
Create and manage infrastructure for secure, fast and reliable streaming.



Scale and support for millions of devices.



Requires engineering teams with video expertise.



Customer – Case Studies

**“Focus on differentiating feature set.
Push all commodity features to
suppliers.”**

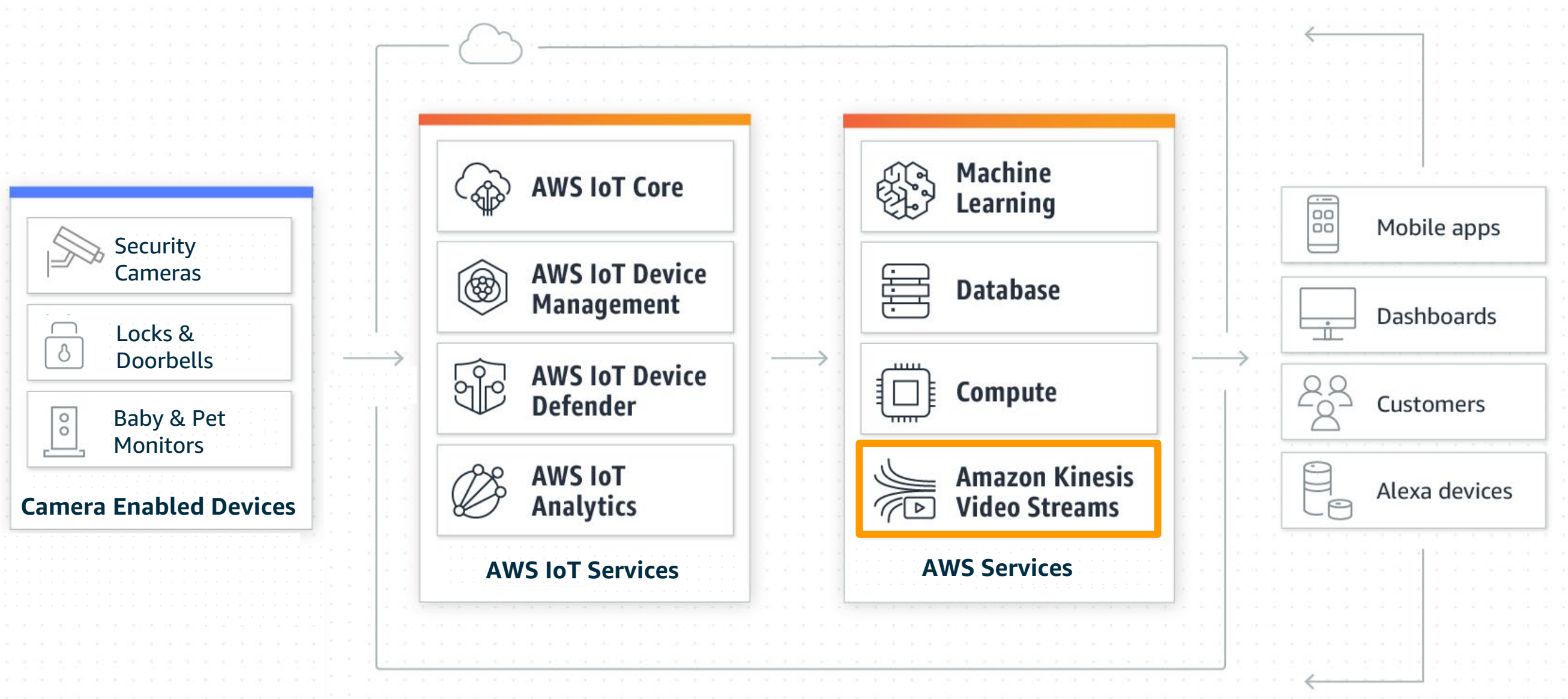
Frederik Delacourt – Sr. Director Technology
and Services Wyze Labs



Wyze Cam

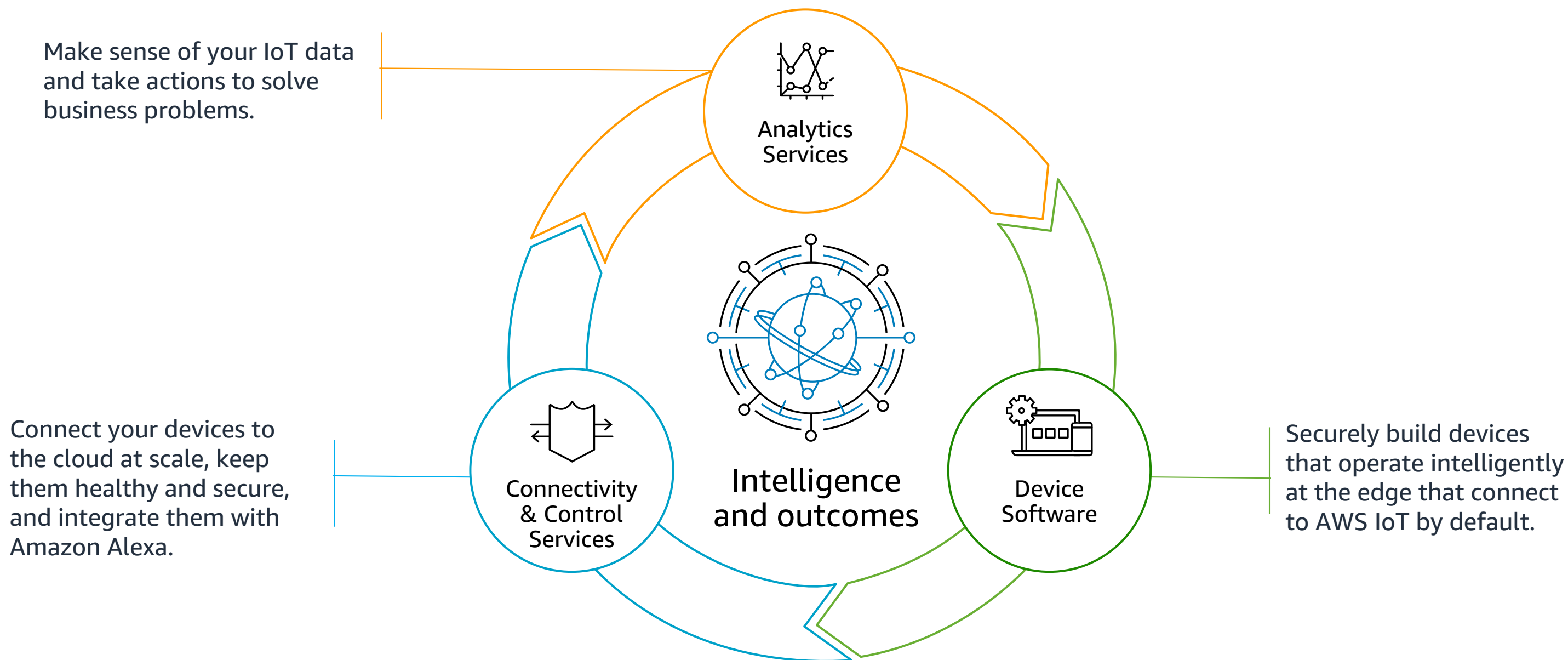
Learn More - <https://youtu.be/c9crp1vQ0II?t=1643>

AWS IoT + KVS together provide a managed solution for managing Smart Home devices and the video data they generate

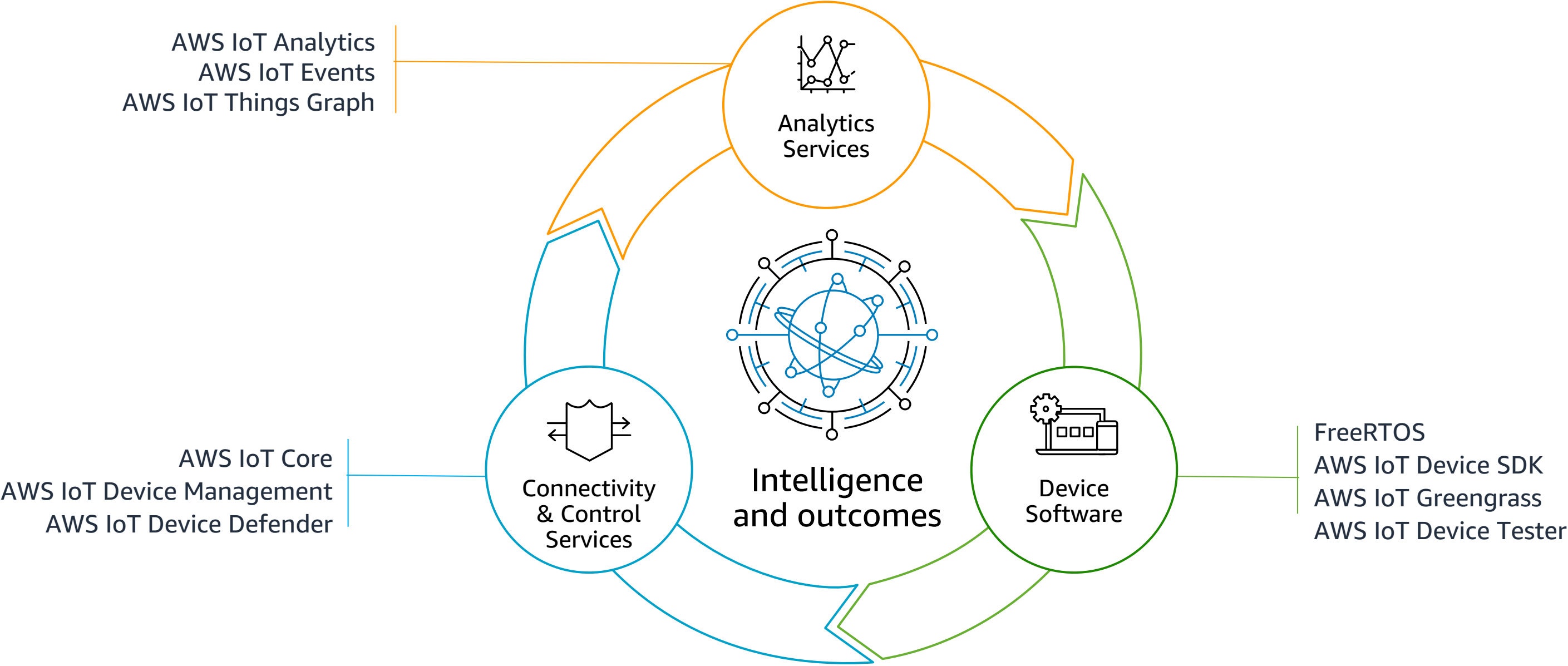


AWS IoT

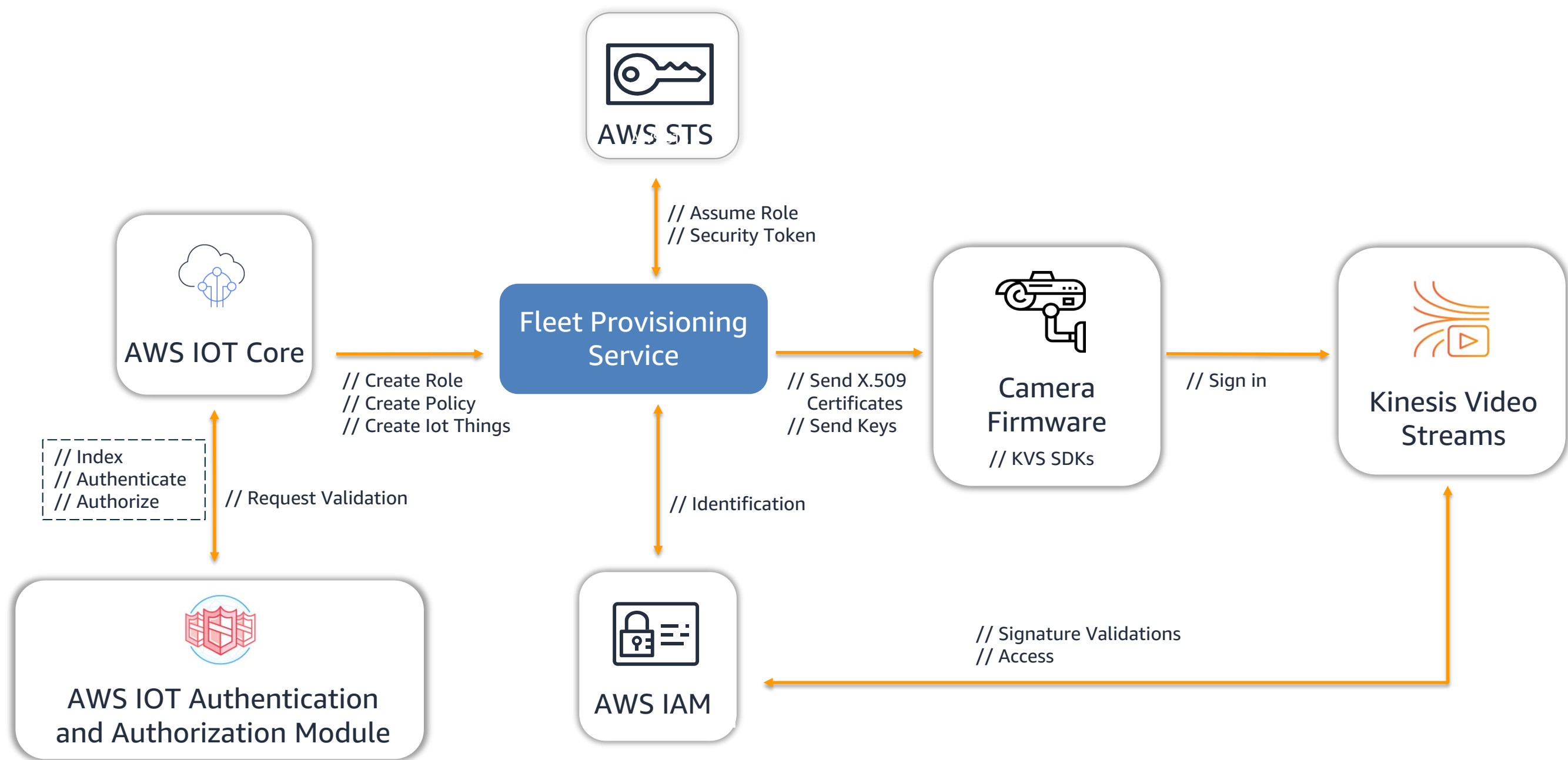
Easily build secure connected home products and solutions at scale with AWS IoT



Easily build secure connected home products and solutions at scale with AWS IoT



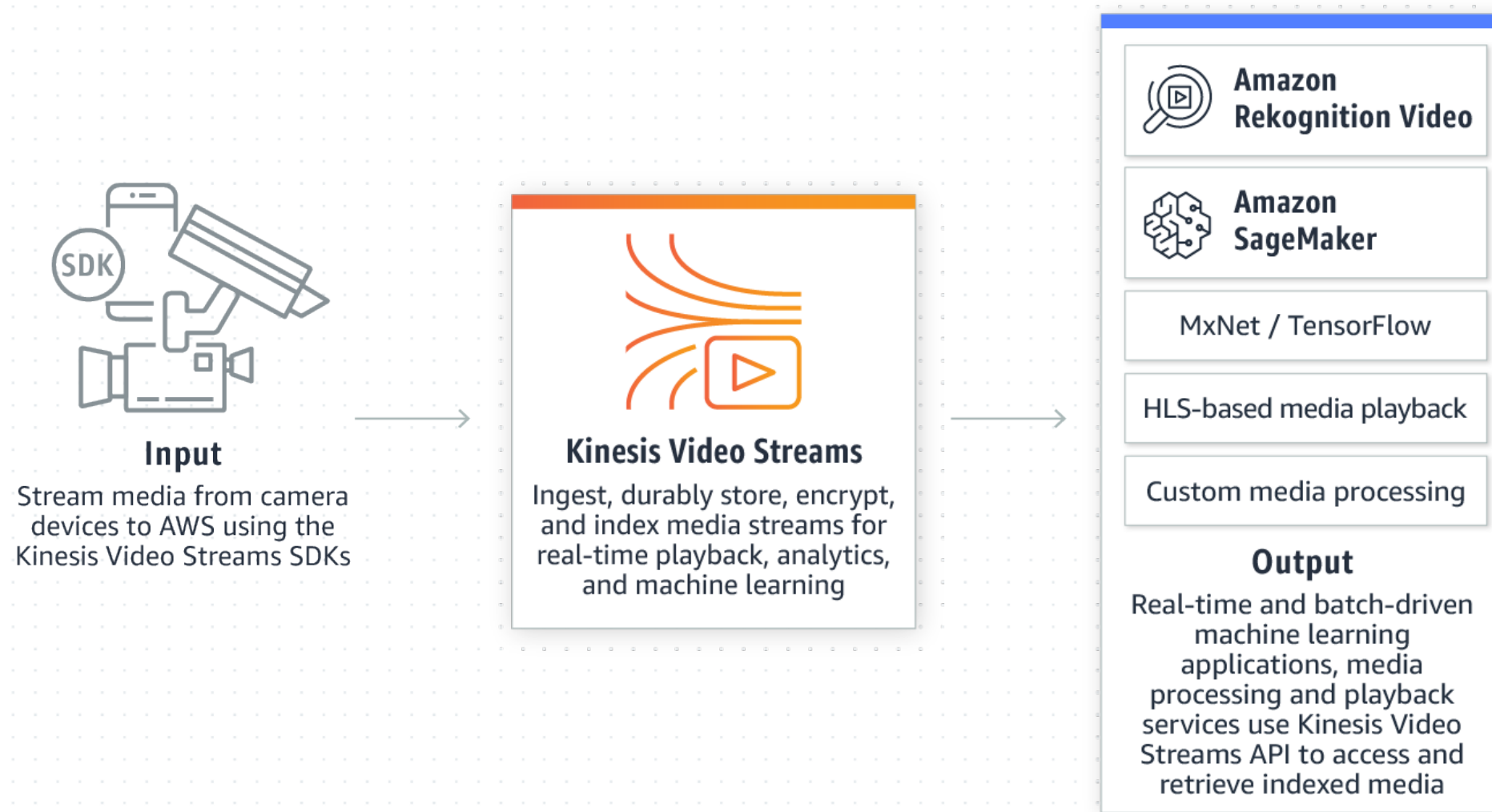
Device Provisioning with AWS



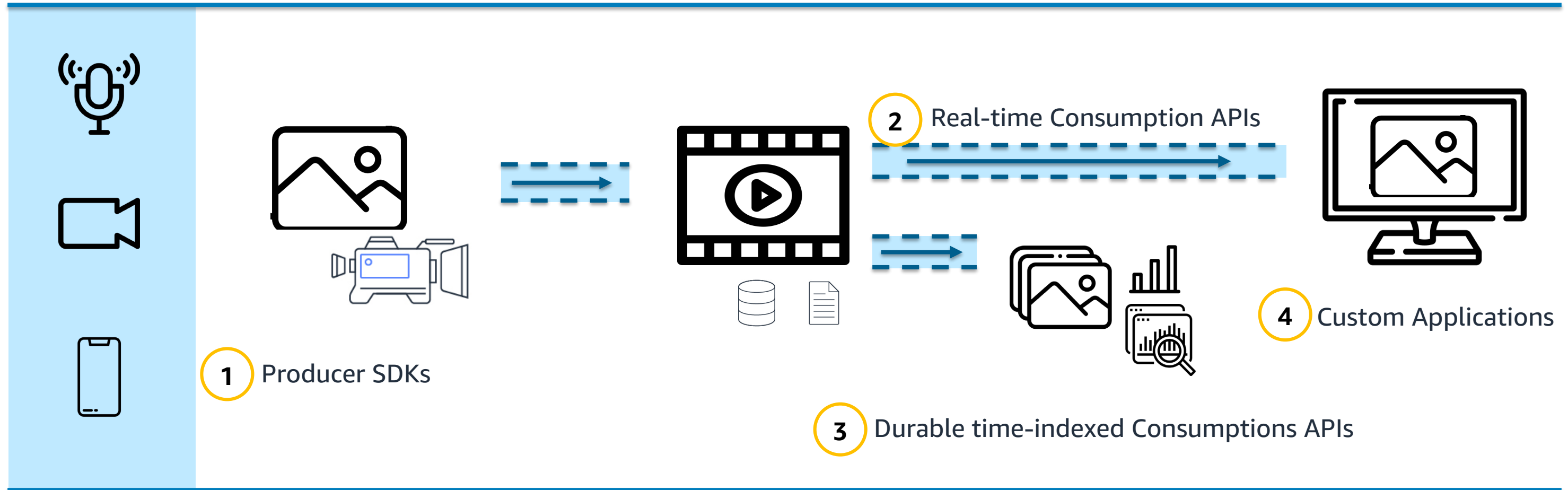
Amazon Kinesis Video Streams

Amazon Kinesis Video Streams (KVS) Introduction

Enables secure stream of media between connected devices and to AWS



Amazon Kinesis Video Streams (KVS) Architecture



Input

Kinesis Producers create data and send it into KVS through a stream

Store

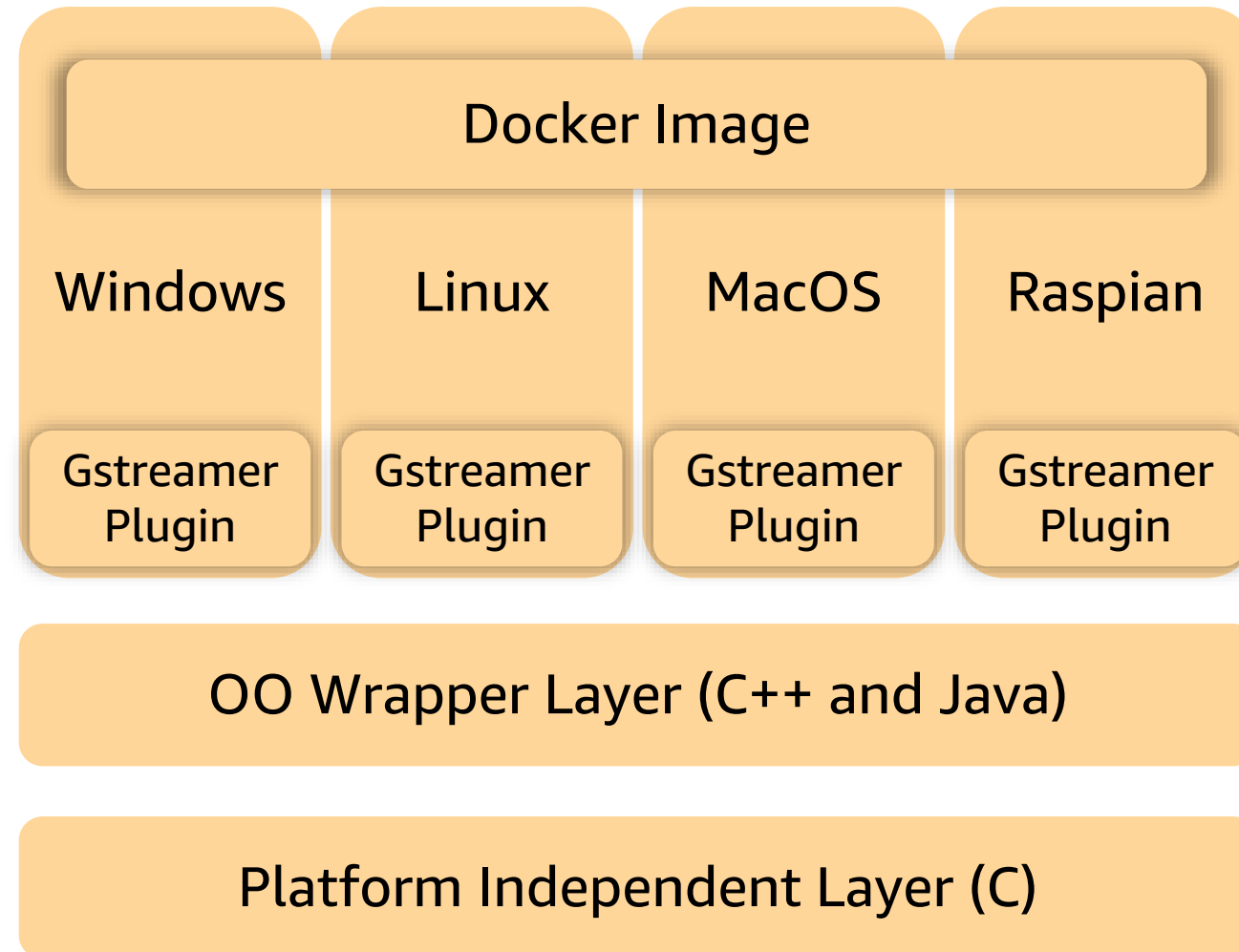
Kinesis Video Streams stores and indexes streams of data

Consume

Kinesis Consumers request and display live streams and streams of stored fragments.

Some consumers analyze or process streams to derive new insights

Easily Connect and Stream using Producer SDKs



// Use SDKs to extract the video data and upload to KVS

// Get started with a Docker Pull to stream videos on certain OS

// Integrate existing media pipeline using Gstreamer Plugin

// Producer libraries available in Java, C++ and C

// PutMedia API handles ingestion and supports .mkv container formats

Storing the Media in Kinesis Video Streams



Store

Ingest and store time indexed data using managed resource



Encrypt

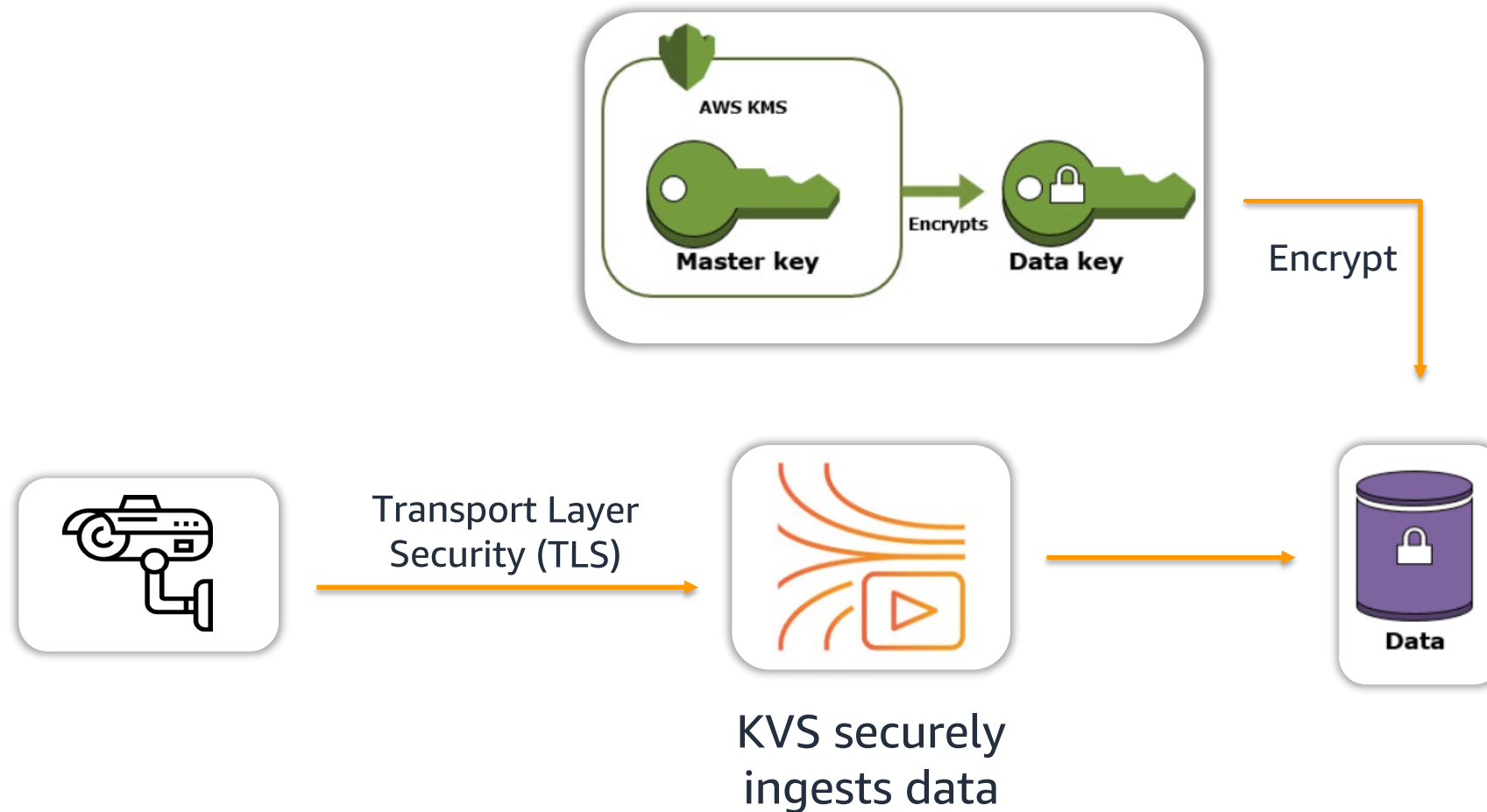
Data is encrypted both in transit and at rest using TLS protocol and AWS KMS respectively



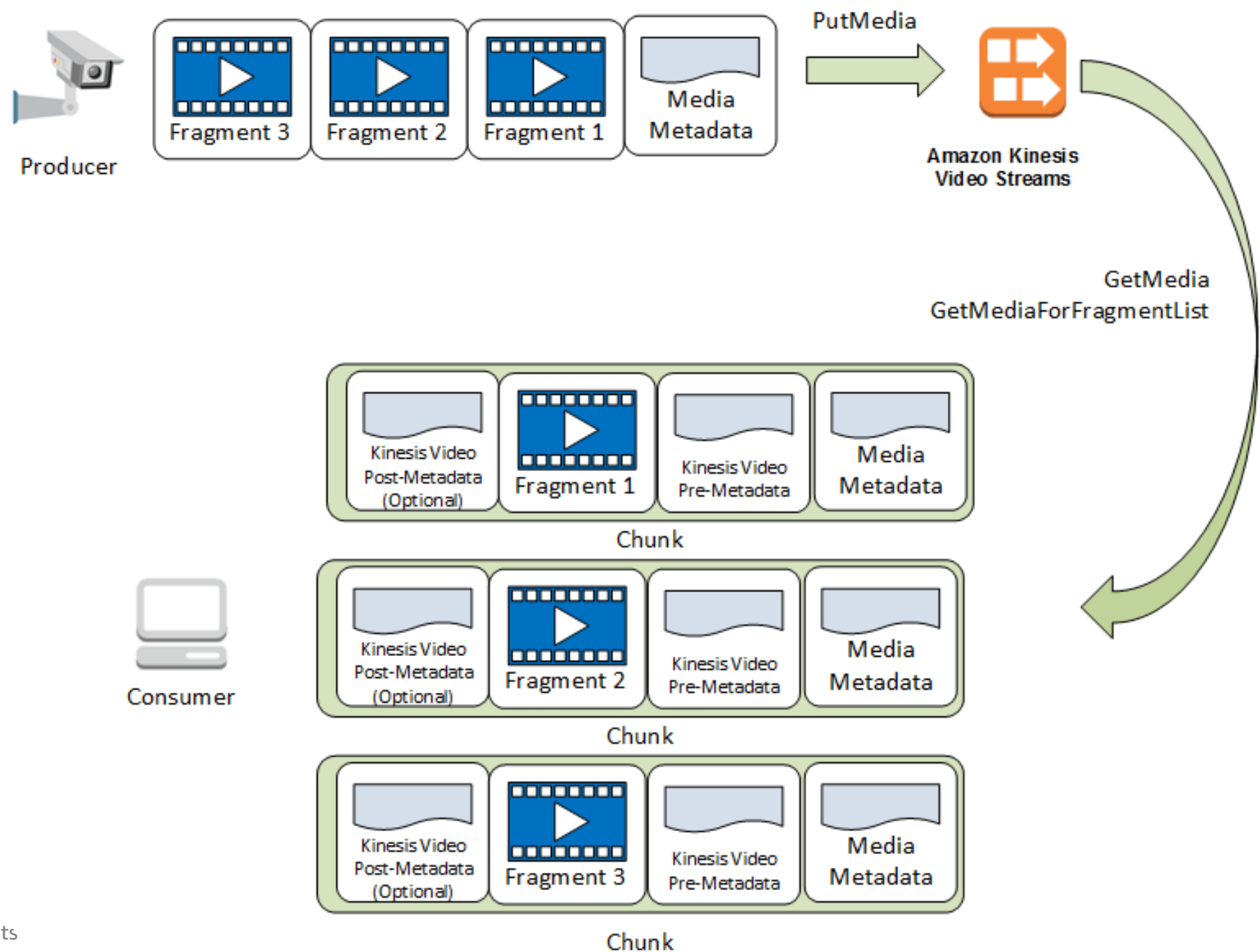
Audit

Easily audit and monitor usage, apply access control and authentication policies

Server-side Encryption automatically encrypts data at rest using AWS Key Management Service and in transit using TLS



KVS Data Flow for Fragments



KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Gets an endpoint for a specified stream for either reading or writing

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Use this API to retrieve media content at a rate of **200 mbps** up to **five times per second per stream**

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Downloads an MP4 file (clip) containing the archived, on-demand media from the specified video stream over the **specified time range**

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

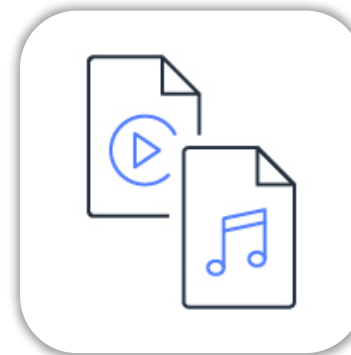
GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Retrieves an MPEG Dynamic Adaptive Streaming over HTTP (DASH) URL for the stream



Video – h.264 | h.265 | A_AAC
Audio – AAC

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

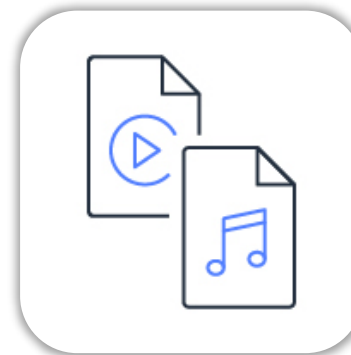
GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Retrieves an HTTP Live Streaming (HLS) URL for the stream



Video – h.264 | h.265 | A_AAC
Audio – AAC

MPEG-4 form (fMP4 or CMAF)
MPEG-2 form (TS chunks)

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Gets media for a list of fragments (specified by fragment number) from the archived data at a rate of **200 mbps** up to **five times per second per stream**

KVS Consumer APIs

GetDataEndpoint

GetMedia

GetClip

GetDASHStreamingSessionURL

GetHLSStreamingSessionURL

GetMediaFromFragmentList

ListFragments

Returns a list of archived Fragment objects from the **specified stream** in a **timestamp range**

Amazon Kinesis Video Streams WebRTC

Enables real-time two way communication between different web applications via simple API calls

Key Technical Components



Signaling



Peer-to-peer
Connectivity

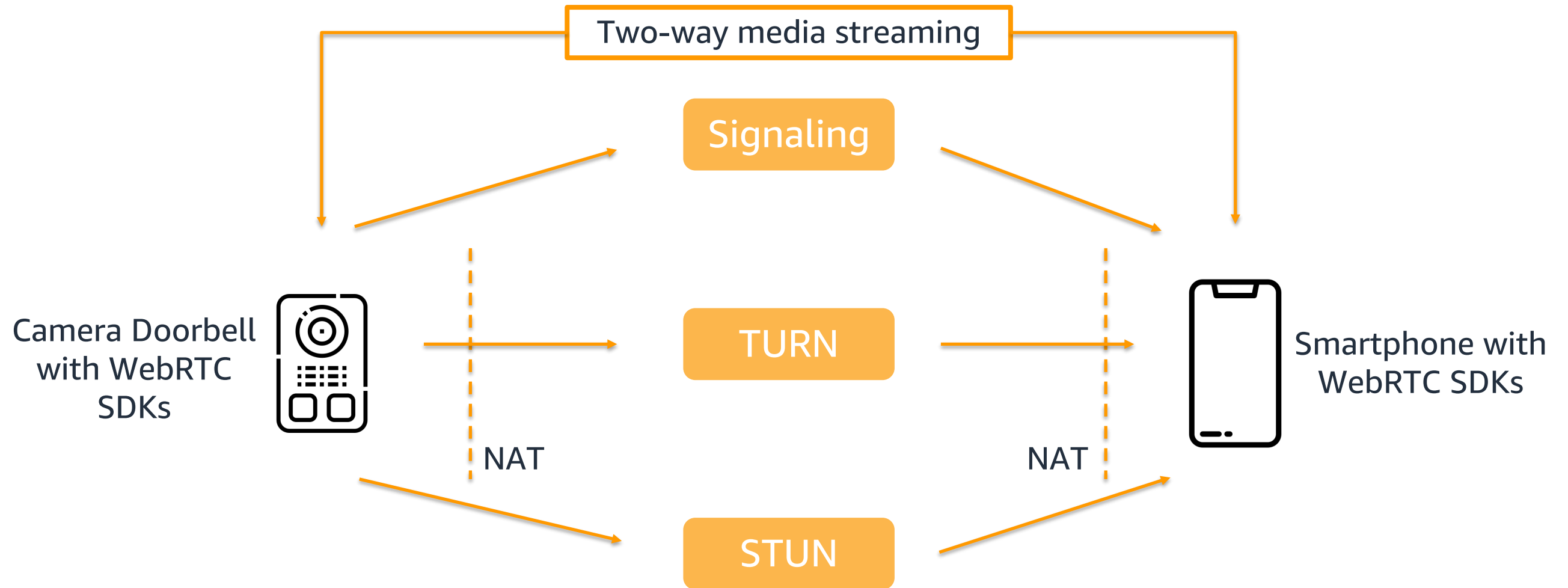


Low Latency
Media Delivery

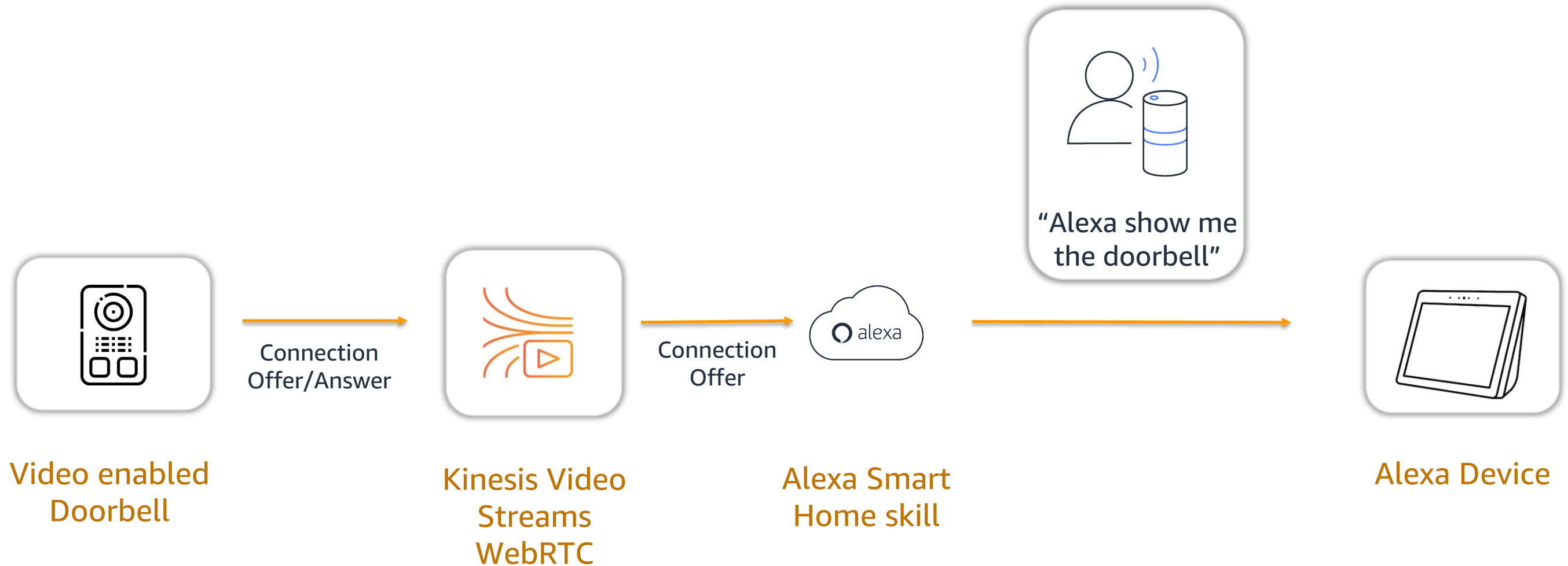


End-to-end
Encryption

Amazon KVS WebRTC - Workflow



Amazon Kinesis Video Streams Integration with Alexa



Video Doorbell Customer Use Cases



Devices must securely provision and onboard.



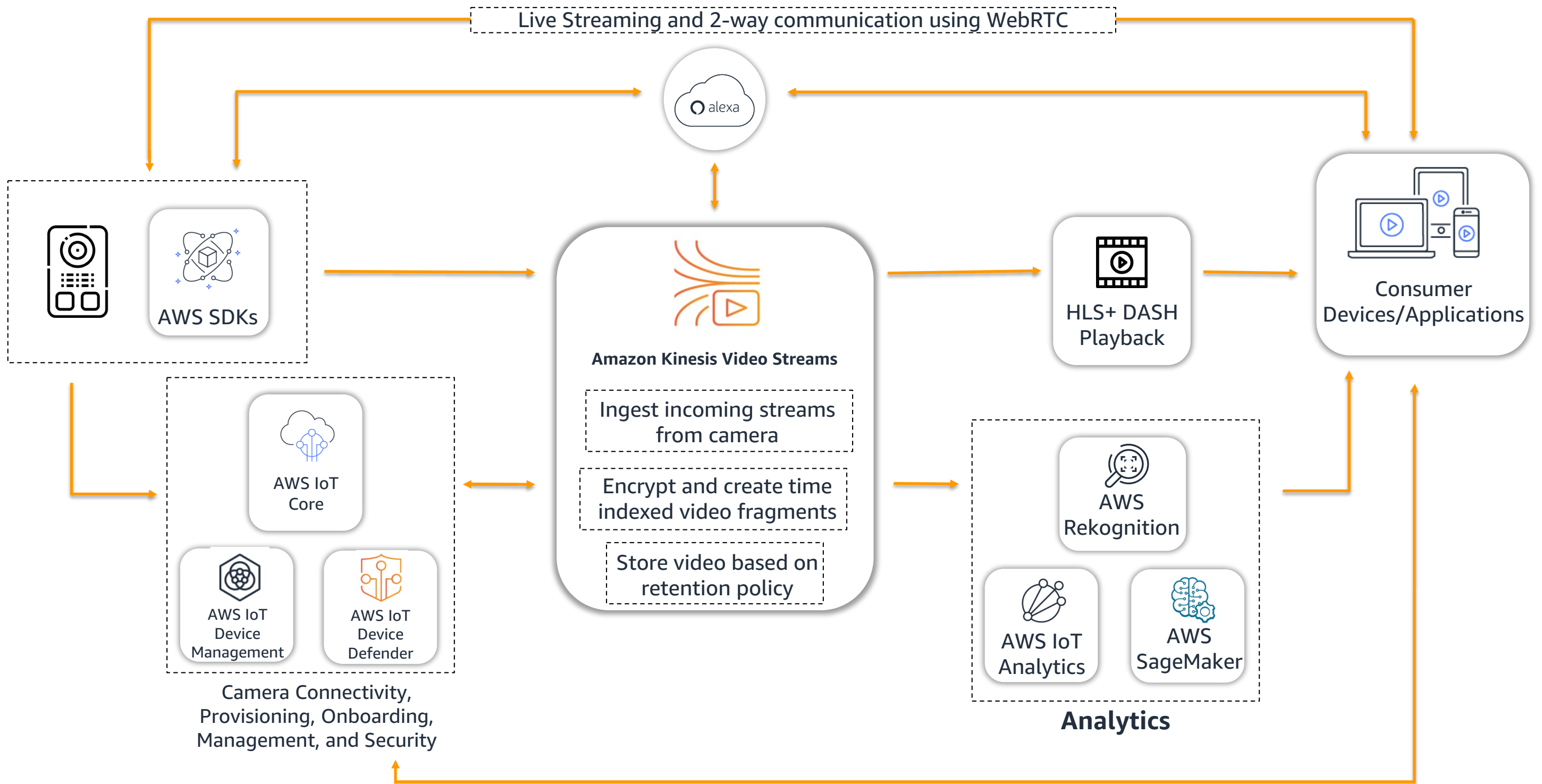
User is away from home, gets a notification and engages in 2-way communication.



Camera detects motion and stores the media for playback.



Video streaming and communication channel are enabled using voice commands.



Wrap Up

Smart Home Video Streaming market is complex

AWS IoT makes it easy for you to build scalable IoT applications and manage connected home devices without having to manage any infrastructure. Amazon Kinesis Video Streams provides a scalable solution for live streaming the media generated by connected cameras, data ingestion, storage, analytics, and playback as a managed offering.

Multi-Layered Security

Provisioning a device with AWS introduces built-in device authentication, authorization and data encryption, and threat detection to keep your devices and data secure.

Scalability and Interoperability

Leverage AWS infrastructure to onboard millions of streaming devices on your fleet with ease. Integrate voice assistants like Amazon Alexa and Google Home with AWS IoT and Kinesis Video Streams.

Simple to Implement and Useful Functionalities

Stream media in real-time with two-way communication using WebRTC.
Elastically store different file formats (mp4 and mkv) without the need to create additional software.
Playback media in HLS and MPEG-DASH protocols using simple APIs.
Integrate with other AWS services to run analytics and derive useful insights.

Focus on building solutions faster

Accelerate your time to value with fully managed AWS Services that allow you to focus on your core competencies rather than managing IoT and media streaming infrastructure.

Resources

For further information, please refer to the following documentation –

1. Fleet Provisioning - <https://aws.amazon.com/blogs/iot/how-to-automate-onboarding-of-iot-devices-to-aws-iot-core-at-scale-with-fleet-provisioning/>
2. IoT Authorization Calls - <https://docs.aws.amazon.com/iot/latest/developerguide/authorizing-direct-aws.html>
3. KVS Producer Libraries - <https://docs.aws.amazon.com/kinesisvideostreams/latest/dg/producer-sdk.html>
4. KVS Playback documentation - <https://docs.aws.amazon.com/kinesisvideostreams/latest/dg/how-playback.html>
5. KVS Developer Guide - <https://docs.aws.amazon.com/kinesisvideostreams/latest/dg/kinesisvideo-dg.pdf>
6. KVS Security - <https://docs.aws.amazon.com/kinesisvideostreams/latest/dg/security.html>
7. KVS WebRTC FAQs - <https://docs.aws.amazon.com/kinesisvideostreams-webrtc-dg/latest/devguide/what-is-kvswebrtc.html>
8. Wyze Labs- <https://youtu.be/c9crp1vQ0lI?t=1643>

Q&A

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Thank You!

