Secure Data Resilience in Hostile DDIL Environment
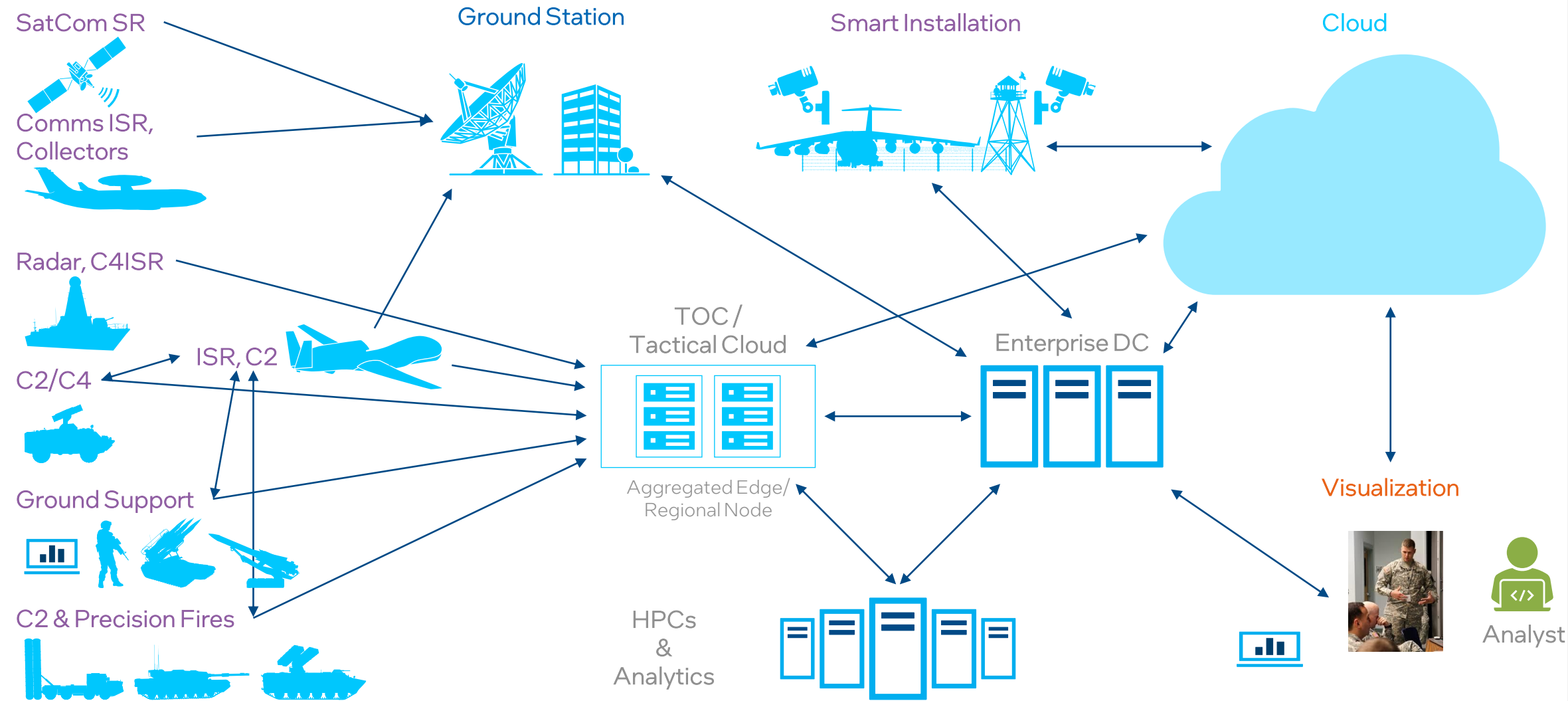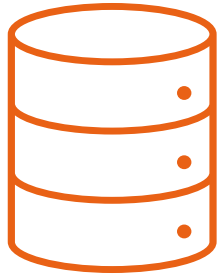
Darren W Pulsipher – Chief Solution Architect Public Sector
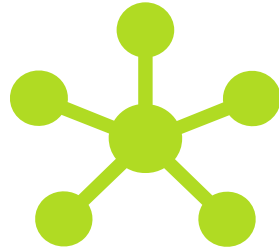
intel.

The Mission Space is complex

SatCom SR

Comms ISR, Collectors

Ground Station

Smart Installation

Cloud

Radar, C4ISR

ISR, C2

C2/C4

TOC / Tactical Cloud

Enterprise DC

Visualization

Ground Support

Aggregated Edge/ Regional Node

C2 & Precision Fires

HPCs & Analytics

Analyst

EMBRACING DIGITAL TRANSFORMATION

Intel Proprietary
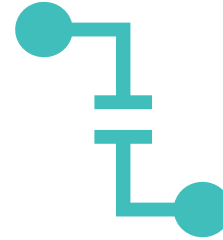
intel

Pain Points in the Problem Space

Large Data Volume

Large Ecosystem

Quick Development

Hostile DDIL Envrionment

Autonomous Edge

Security

Data Management Approaches

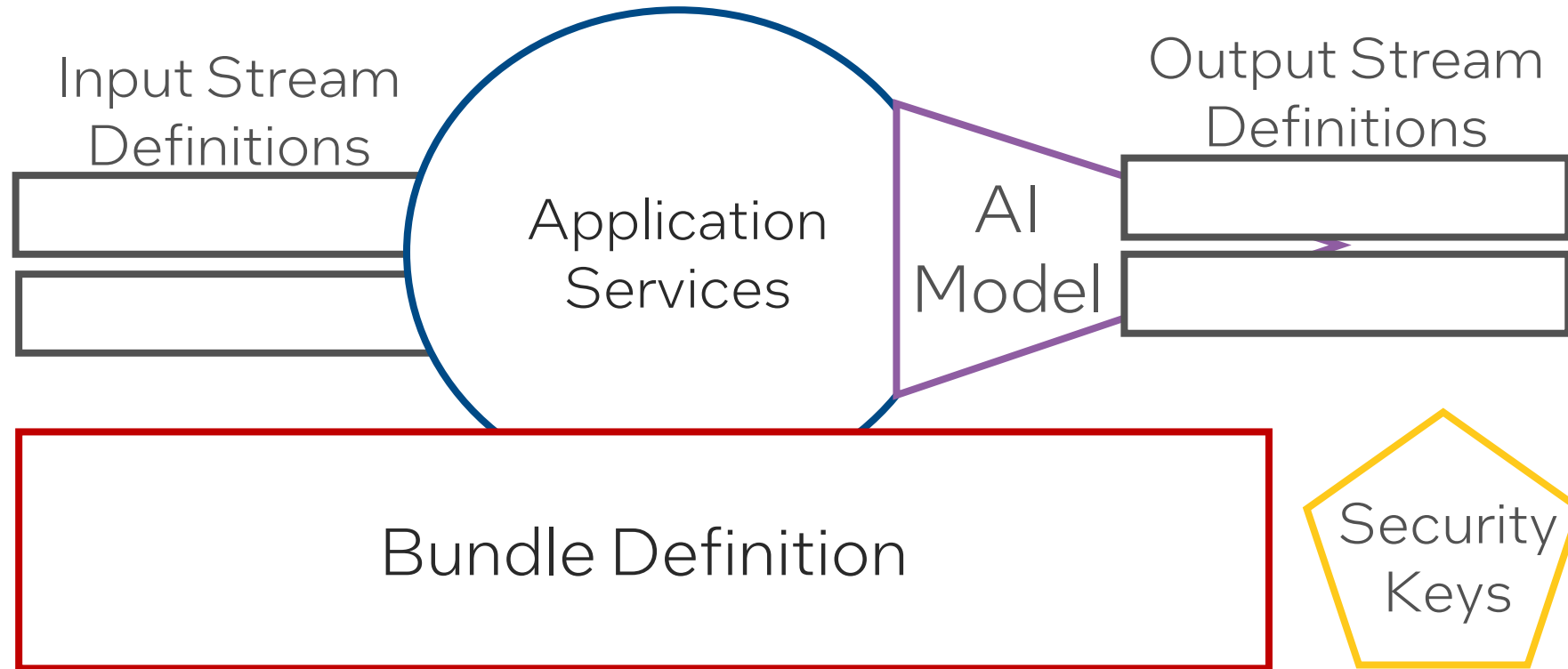| Centralized Processing (Move Data)	Distributed Processing (Move Applications)	Data Exchange (Move Data & Apps)	Intelligent Data Streams (Dynamic)
▪ Intelligently move Data when defined by Policy, Application, or Environment ▪ Move Data to the Data Center from the edge ▪ Move data between edge nodes	▪ Move and manage applications to be closer to the data. ▪ Follow Policies, Compliance, Access ▪ Inference/Data Analytics on the edge ▪ Secure During Use Computing on the Edge (Homomorphic, Secure Enclaves - SGX)	▪ Break up the application to run close to the data in place ▪ Gate access and results based on Policies and Compliance ▪ Aggregate the results ▪ Handles Multi Security Domain Data	▪ Push the decisions to the Edge, AI algorithms ▪ Only moved data when needed ▪ Highly distributed systems ▪ Intermittent Communications ▪ Dynamic Data Mesh

Build an Intelligent Data Stream Architecture

Sentient Agent Bundle Resource (SABR)
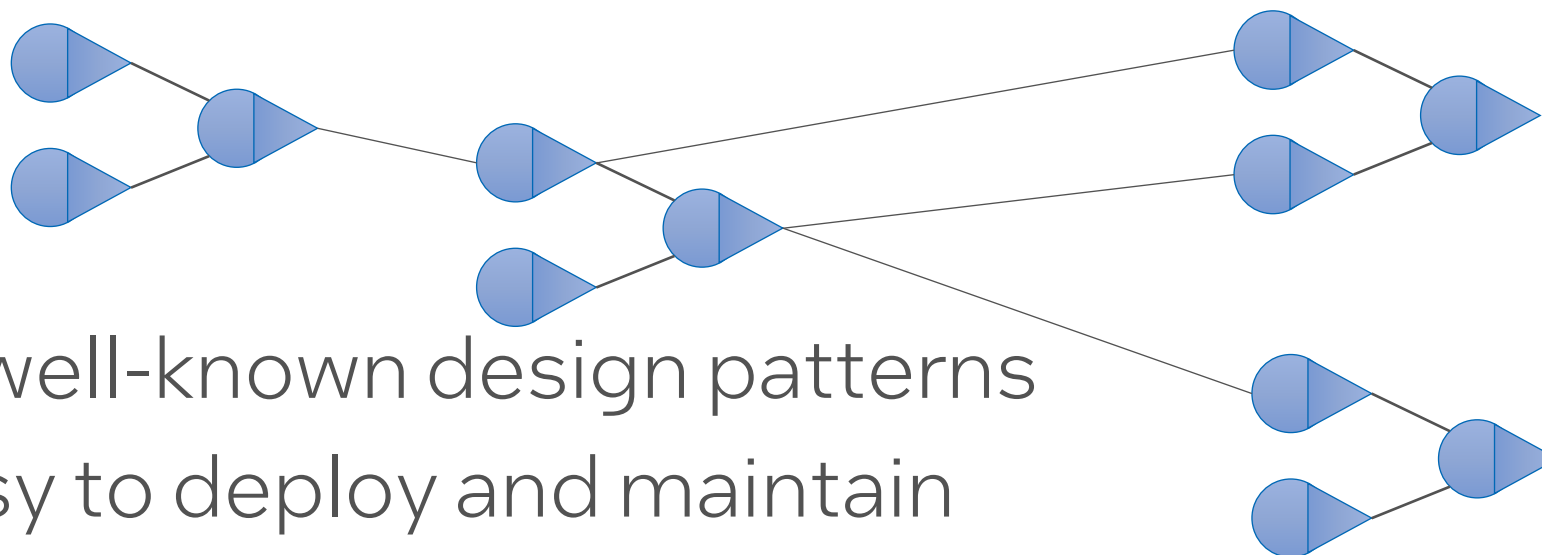
- Leverage well-known design patterns
- Make it easy to deploy and maintain
- Small footprint (<100 MB)
- Resilient to conditions and change

Sentient Agent Bundle Resources

SABR Secure Secret Vault
(Root of Trust and Zero Trust Architecture)

Encrypted Secret Vault

Input Stream
Decryption

Output Stream
Encryption

Unencrypted
Secrets

Bundle Encryption

Bundle Decryption
(Unlock the Secret Vault)

Attested Hosted Device
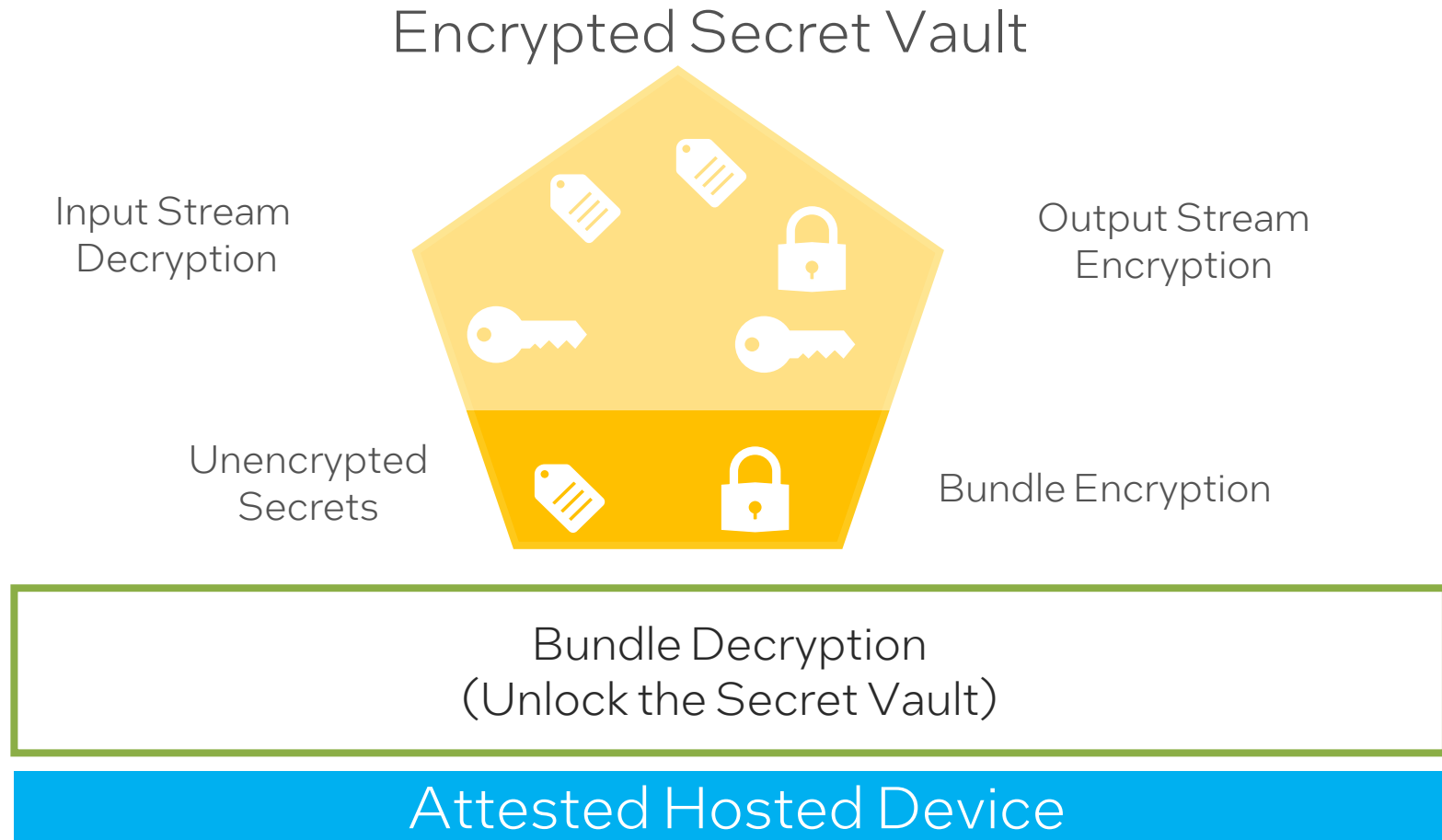
SABR Spoofing Protection

Adaptors:
Rest Interface,
gRPC,
JavaScript,
WebSocket,
Python,
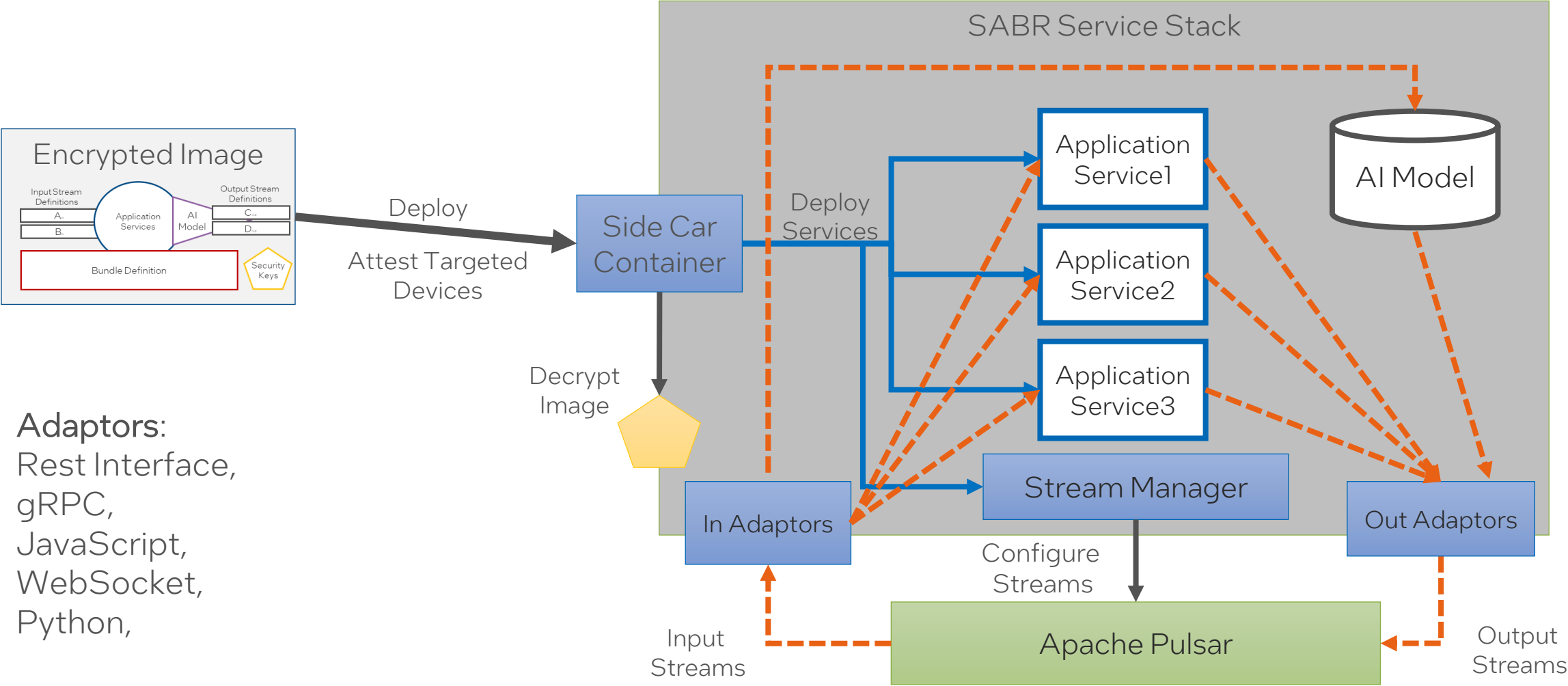
Protecting Data Streams in Hostile DDIL Environments

Input Stream Definitions
- A_in
- B_in

Application Services

AI Model

Output Stream Definitions
- C_out
- D_out

Bundle Definition

Security Keys

Stream Policies
Create Channels
Prioritize Channels

Applied to
SABRs
Groups
Fleet

Deploy

Stream Manager

Policy Manager

Keys

Channel
Create
Prioritize

Protect
Encrypt
Decrypt

Sentient Agent Bundle Resource (SABR)

A_in.Summary
A_in.Historical
A_in.Realtime

C_out.Historical
C_out.Summary
C_out.Realtime

Learning_in

Learning_out

B_in.Realtime
B_in.Summary
B_in.Historical

D_out.Realtime
D_out.Summary
D_out.Historical

Apache Pulsar

SABR's Application of Design Elements

Utilize these design elements in an architecture that is:

Reusable	Extendable	Resilient	Adaptable

Build specific subsystems utilizing the design patterns that fit into the architecture

Get More Information

Check out the "Embracing Digital Transformation" Podcast

Join LinkedIn Group "Embracing Digital Transformation"