

DRONE DETECTION SYSTEMS (C-UAS):

Technology for Commercial UAV Surveillance

UNDERSTANDING Drone Detection Technology

- Using Software-Defined Radios (SDRs)
- Identify unauthorized Unmanned Aerial Vehicles (UAVs)
- Frequency scanning across 2.4 GHz and 5.8 GHz bands
- Analyze signal characteristic, protocol signature, and signal strength
- Time-of-arrival calculations for position estimation

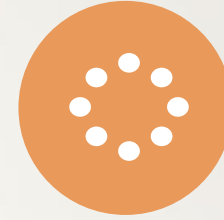


SYSTEM ARCHITECTURE



RF Sensors

SDR hardware deployed at strategic locations to capture RF emissions across frequency bands



Classification Engine

Protocol decoding to classify detected signals as specific drone models



Signal Processing

Real-time analysis of captured signals to identify drone-specific characteristics



Position Tracking

Triangulation and signal strength analysis to determine drone location and movement patterns

CHALLENGE 1: Problem Definition & Understanding



- Proprietary protocols and encryption methods
- Frequency agility and channel hopping behaviors
- Emerging drone models and protocol updates
- Counter-detection measures employed by malicious operators
- Ongoing research and reverse engineering efforts

CHALLENGE 2: Sensor Limitations

Frequency Coverage Constraints

Full spectrum: **70 MHz to 6 GHz**
Commercial SDR: **60 MHz** window
High-end SDR: **200+ MHz** simultaneously

Processing Power Requirements

Analyze multiple bands **simultaneously**
GPU-acceleration - **faster but not mobile**

Time Resolution Trade-offs

Continuous monitoring = **power & process consumption**. **Balance** between coverage & time resolution

Hardware cost vs. Performance

High-performance: **\$300–\$3,000+**
Trade-off between **quality** and **quantity**

CHALLENGE 3: Testing & Validation



Target Variety

- Different Drone models
- Different Protocols
- Different Frequencies



Protocol Complexity

- Frequency Hopping
- Encryption
- Protocol evolution



Testing Environment

- RF Noise & Interference
- Various Drone models & Protocols
- Antenna coverage & limitations

CHALLENGE 4: Integration & Standardization



BSI Flex 355 (SAPENT)

Command and Control (C2)

CHALLENGE 5: Partnership & Knowledge Sharing

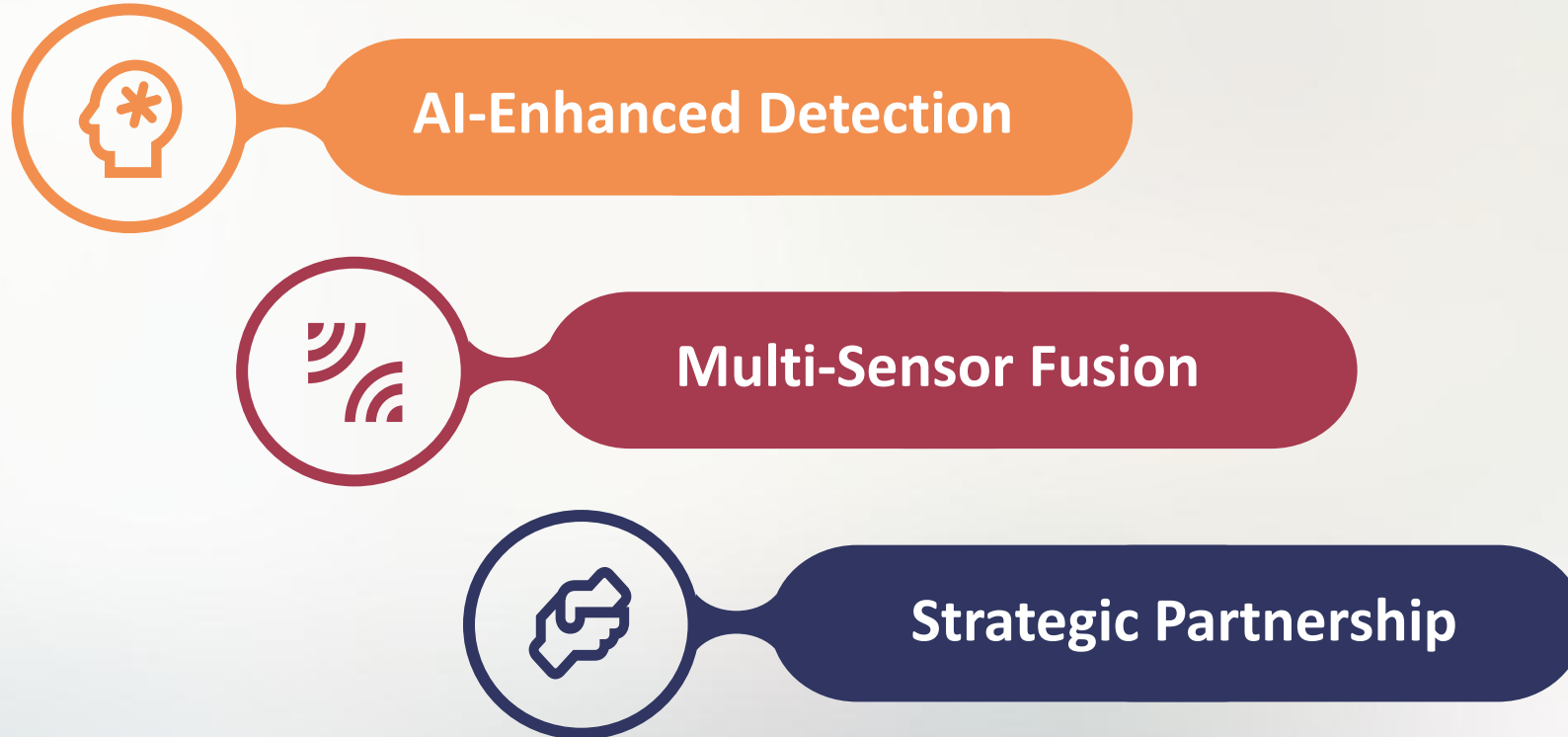


CHALLENGE 6: The Human Factor

- AI & Automation
- Social Networks & Advertisement
- Training & Awareness



Next Steps 1/2



Next Steps 2/2



Our Short Demo



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**LET'S DO THE NEXT
GREAT THING
TOGETHER !**