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UAS Cybersecurity

Present to ICAO NACC UAS/RPAS Workshop
by David Chen AUS-420

09/29/2021

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"All view

Drone and Cybersecurity in the News

➤ December, 2018, London Gatwick Airport

1:38
Gatwick Airport Closes After Drone Is Spotted

Biggest HACK of 2020
FIREEYE
Microsoft
11:06
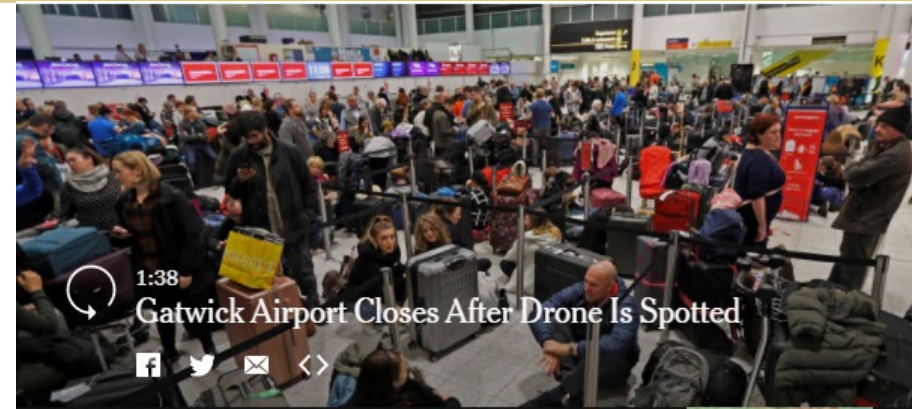
➤ April, 2020, SolarWinds – Supply Chain Attack

➤ May, 2021, Colonial Pipeline – Ransomware Attack
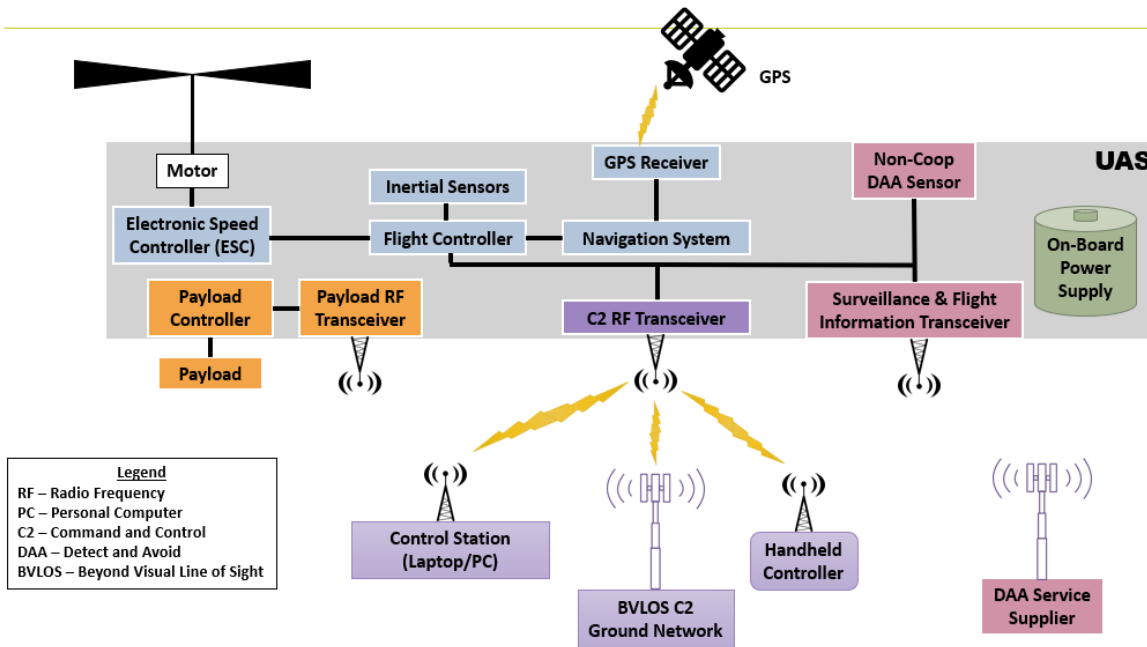

OUT OF GAS

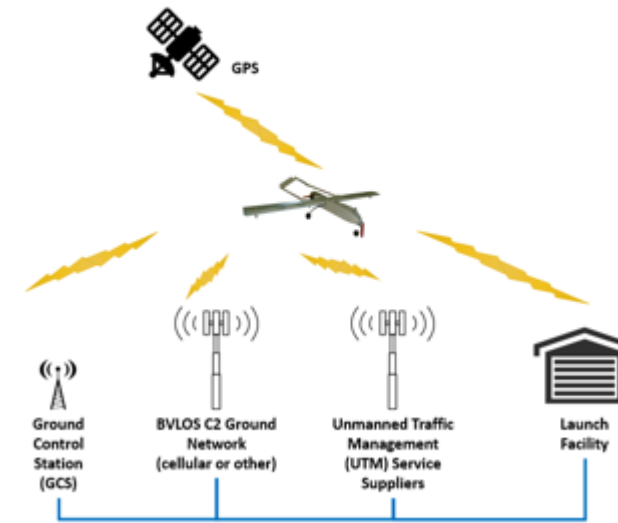➤ Aug, 2021, Canada: Police drone hits plane approaching runway; 'major damage' reported
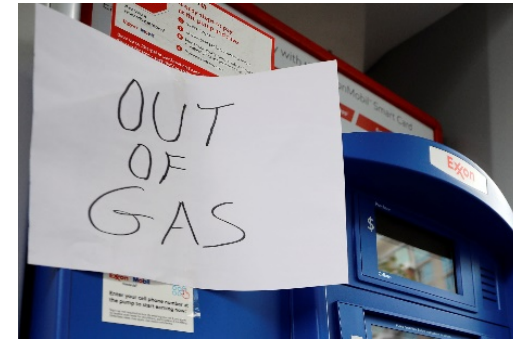
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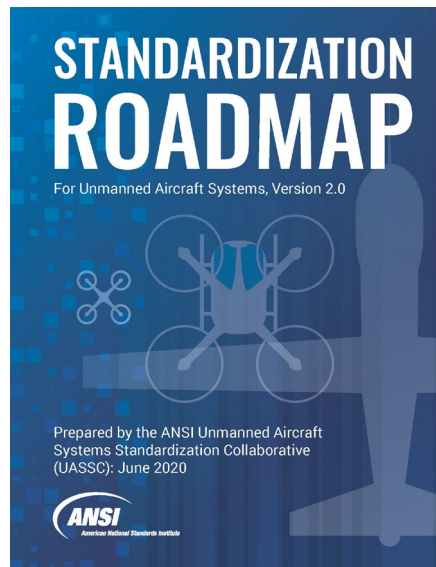
UAS Cybersecurity – Componentry

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UAS Cybersecurity – Standardization

STANDARDIZATION ROADMAP
For Unmanned Aircraft Systems, Version 2.0

Prepared by the ANSI Unmanned Aircraft Systems Standardization Collaborative (UASSC): June 2020

ANSI American National Standards Institute

Steering Committee Survey to Rank 40 High Priority Gaps
Tier 1 – Most Critical (14)

- Gap A1: UAS Design and Construction (D&C) Standards
- Gap A5: Command and Control (C2)/Command, Control and Communications (C3) Link Performance Requirements
- Gap A7: UAS Navigational Systems
- Gap A8: Protection from Global Navigation Satellite Signals (GNSS) Interference Including Spoofing and Jamming
- Gap A9: Detect and Avoid (DAA) Systems
- Gap A10: Software Dependability and Approval

- Gap A12: UAS Cybersecurity
- Gap O2: Operational Risk Assessment and Risk Mitigation
- Gap O3: Beyond Visual Line of Sight (BVLOS)
- Gap O4: UAS Operations Over People (OOP)
- Gap O8: Remote ID and Tracking: Direct Broadcast
- Gap O9: Remote ID and Tracking: Network Publishing
- Gap S9: Counter-UAS/Drone (C-UAS) Operations
- Gap P8: Flight Control Automation and System Failures
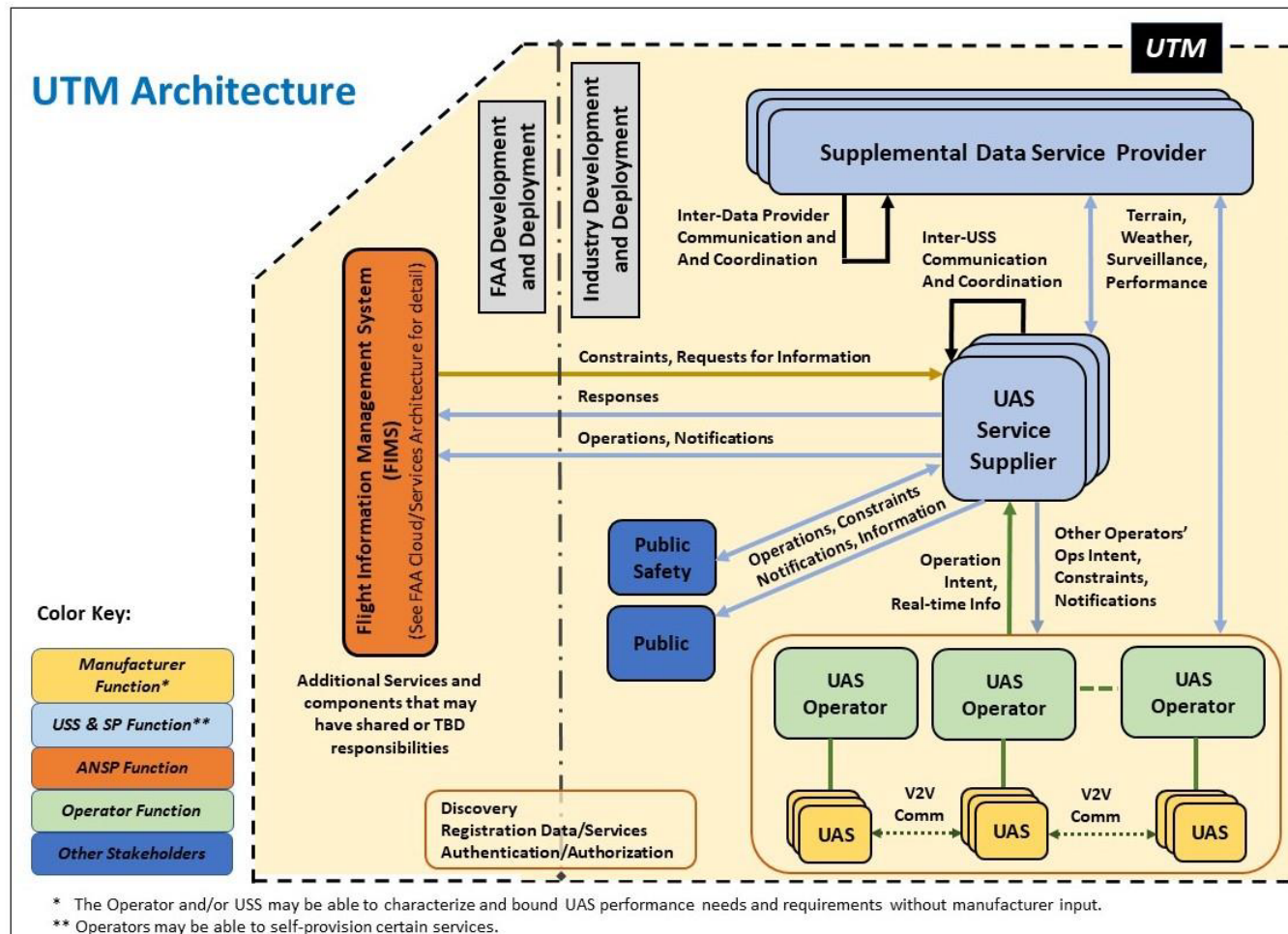
ANSI

ANSI UASSC Project Overview   ©2019 18

*   American National Standards Institute (ANSI)

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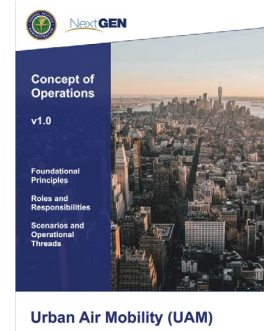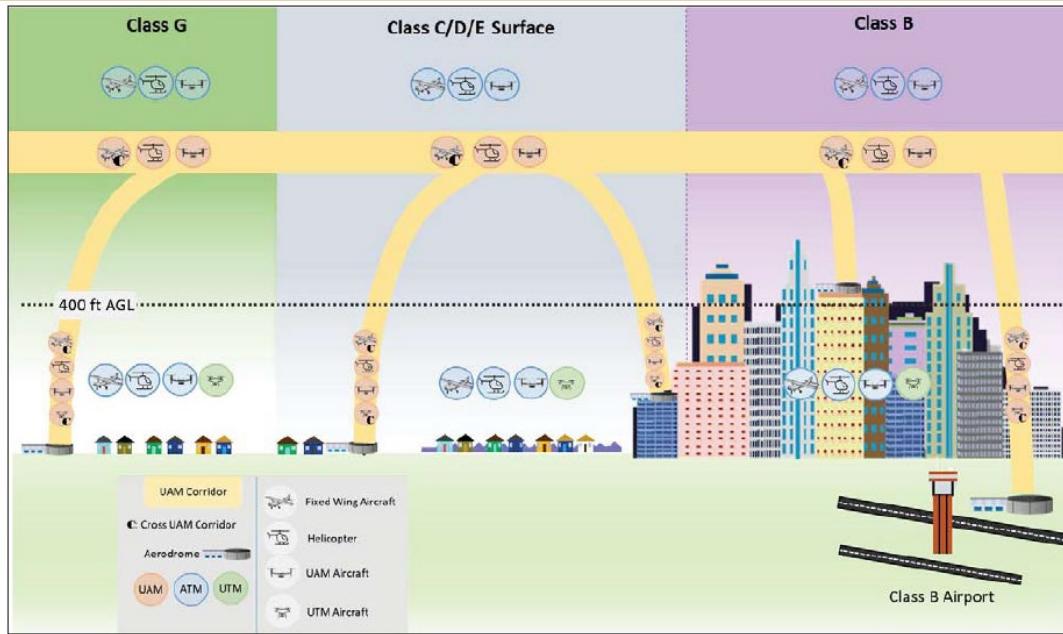# UAS Cybersecurity – UAS Traffic Management (UTM)

UTM Architecture

Unmanned Aircraft System (UAS) Traffic Management (UTM)

Concept of Operations v2.0
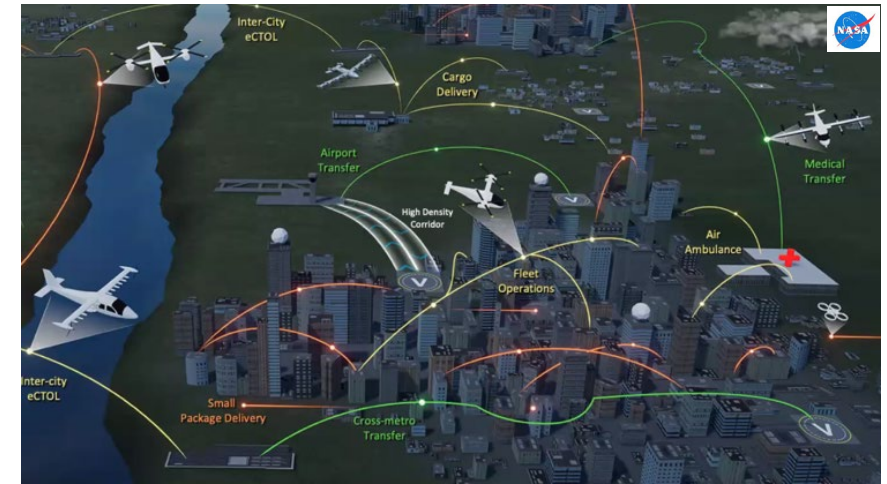- Foundational Principles
- Roles and Responsibilities
- Scenarios and Operational Threads

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UAS Cybersecurity – Urban Air Mobility (UAM) and Advanced Air Mobility (AAM)
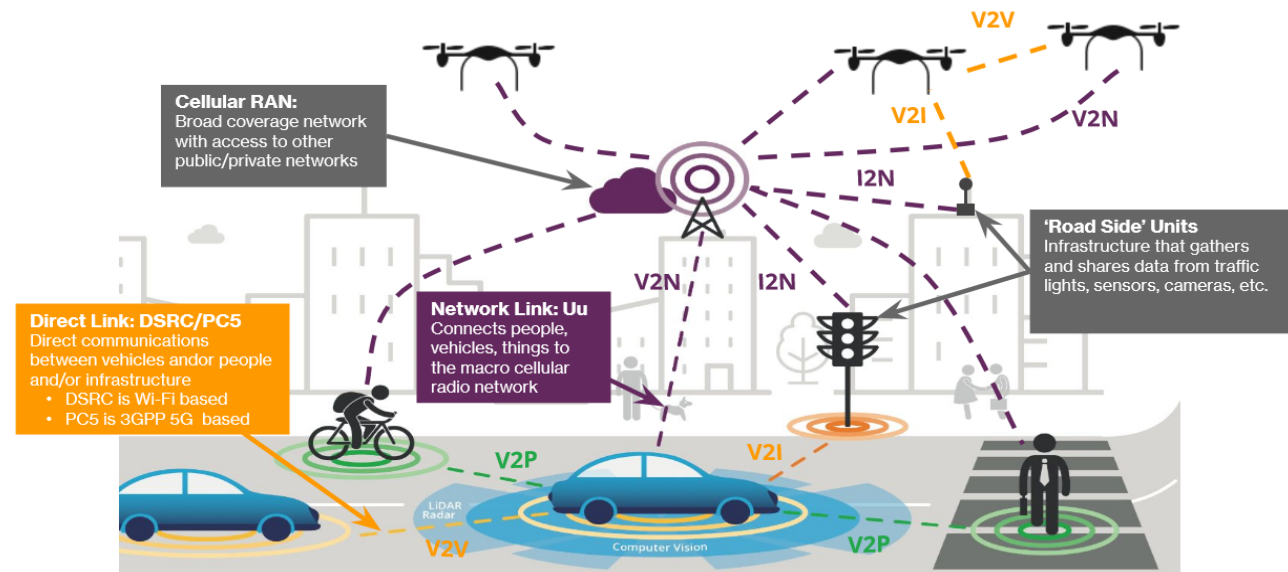
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UAS Cybersecurity – Technology Trend

➔ 5G/LTE

➔ Edge – Cloud

➔ AI/ML

➔ Highly automated /Autonomous UA

➔ Internet of Thing (IOT)

➔ Connected Sky / Smart Airport/
Smart City/ Connected Transportation
Ecosystem

verizon✓

Universal Cellular Vehicle to Everything (C-V2X)

Cellular RAN:
Broad coverage network with access to other public/private networks

'Road Side' Units
Infrastructure that gathers and shares data from traffic lights, sensors, cameras, etc.

Direct Link: DSRC/PC5
Direct communications between vehicles andor people and/or infrastructure
• DSRC is Wi-Fi based
• PC5 is 3GPP 5G based

Network Link: Uu
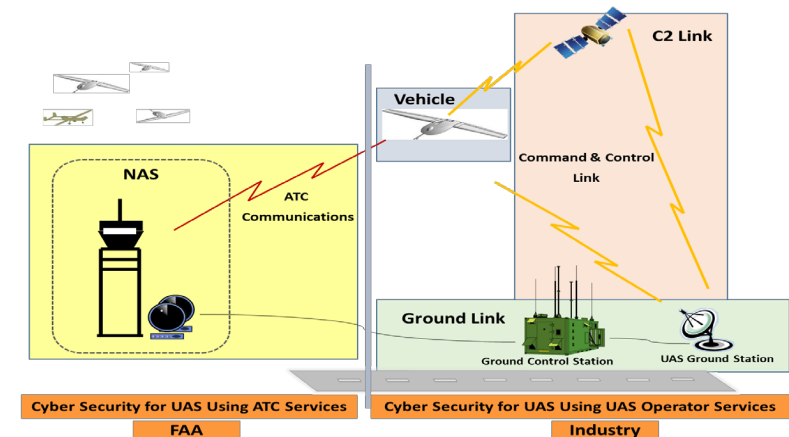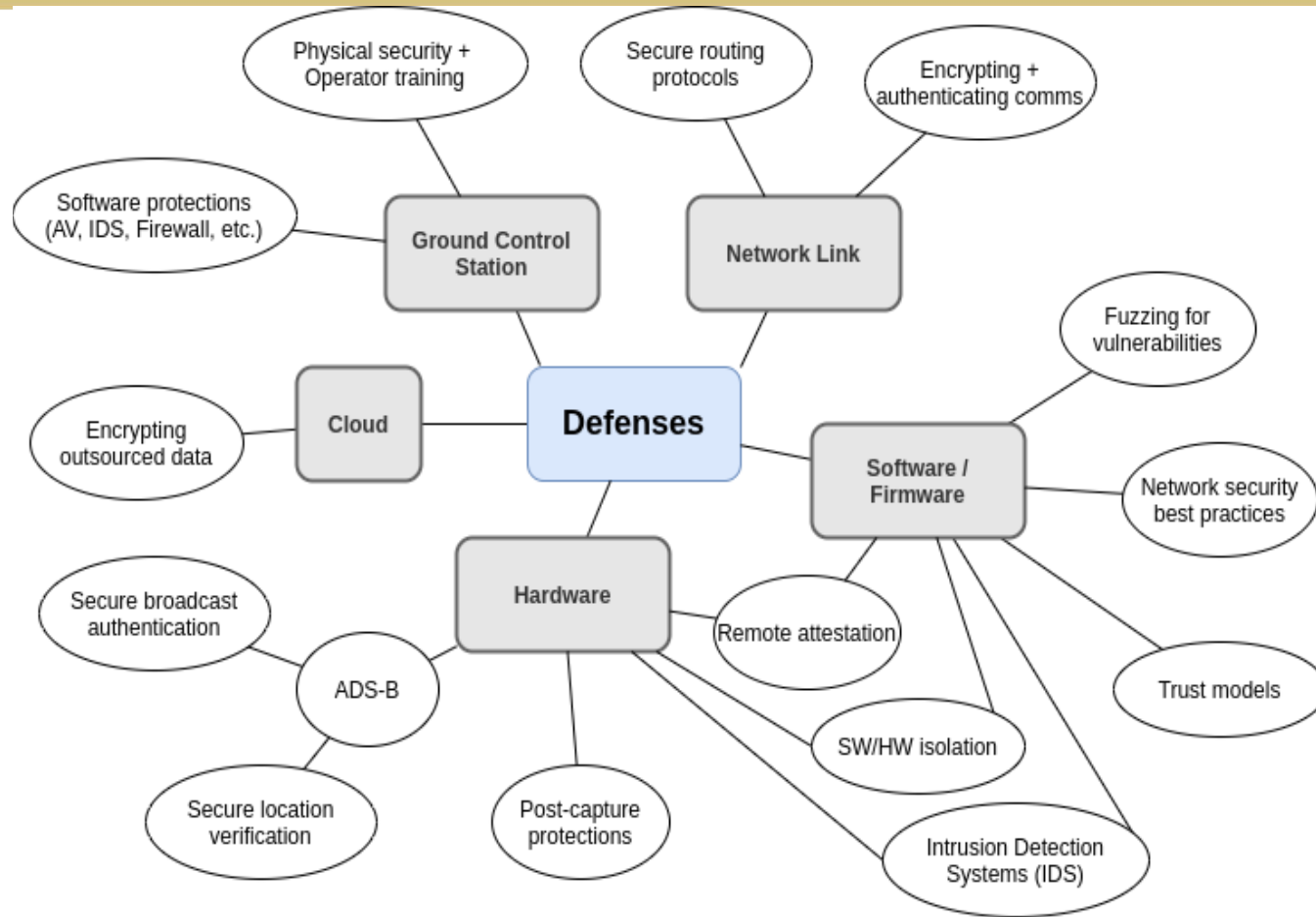Connects people, vehicles, things to the macro cellular radio network

Confidential and proprietary materials for authorized Verizon personnel and outside agencies only. Use, disclosure or distribution of this material is not permitted to any unauthorized persons or third parties except by written agreement.
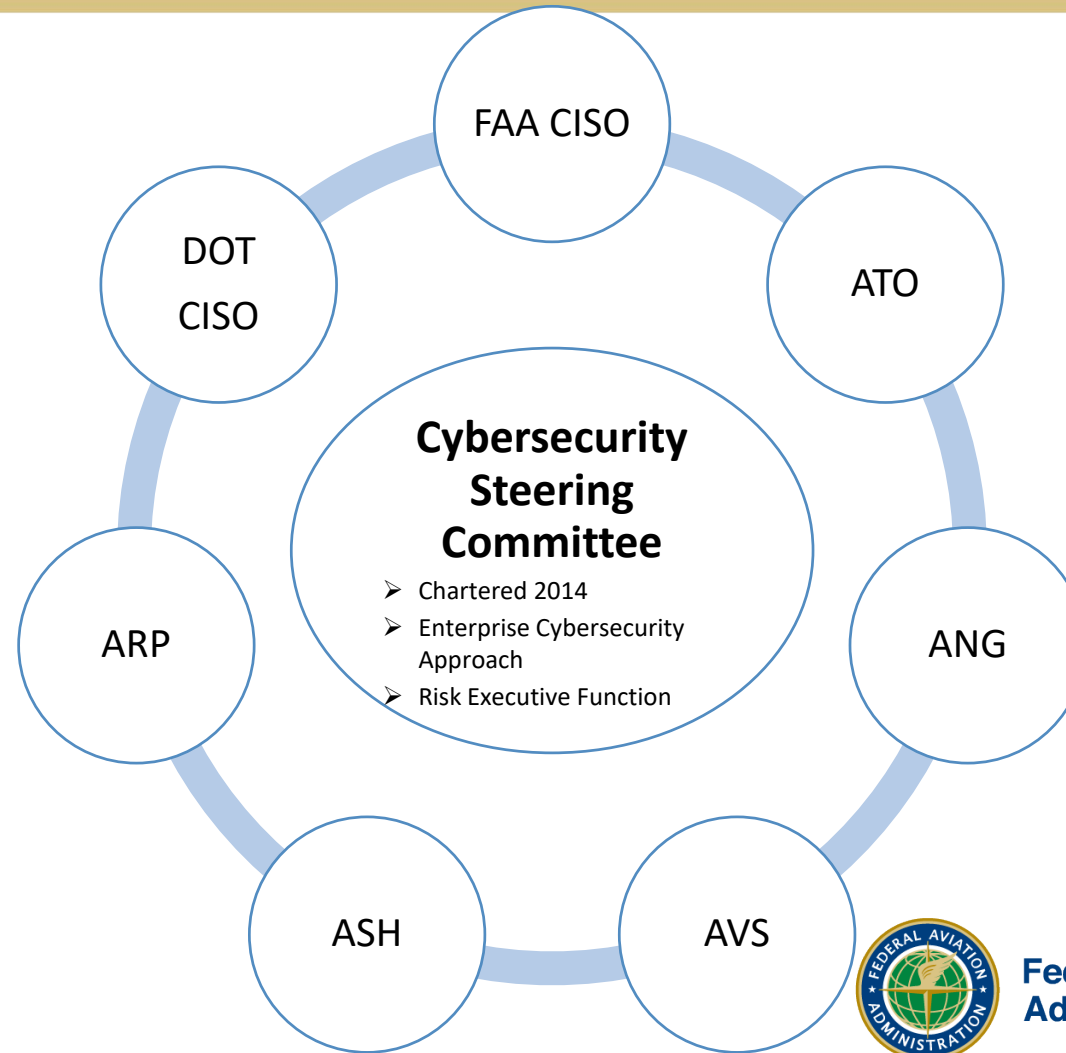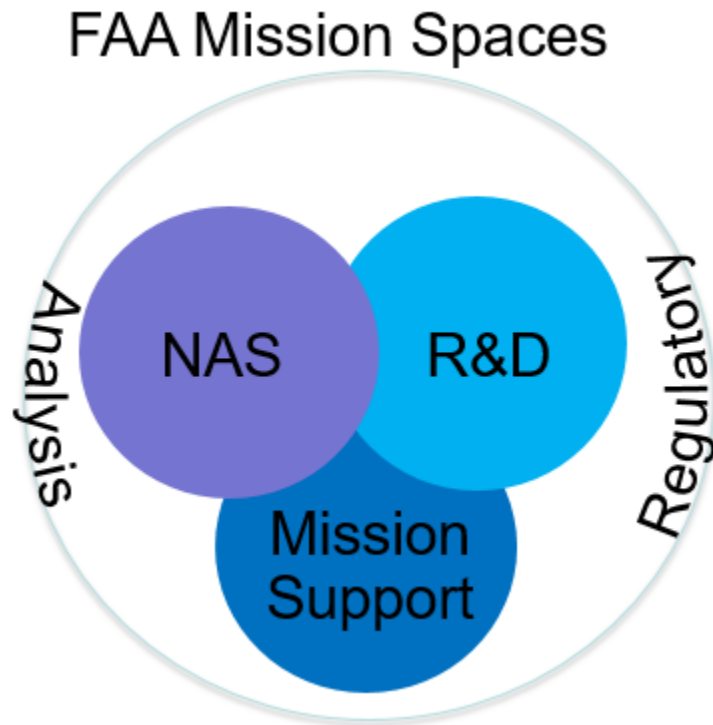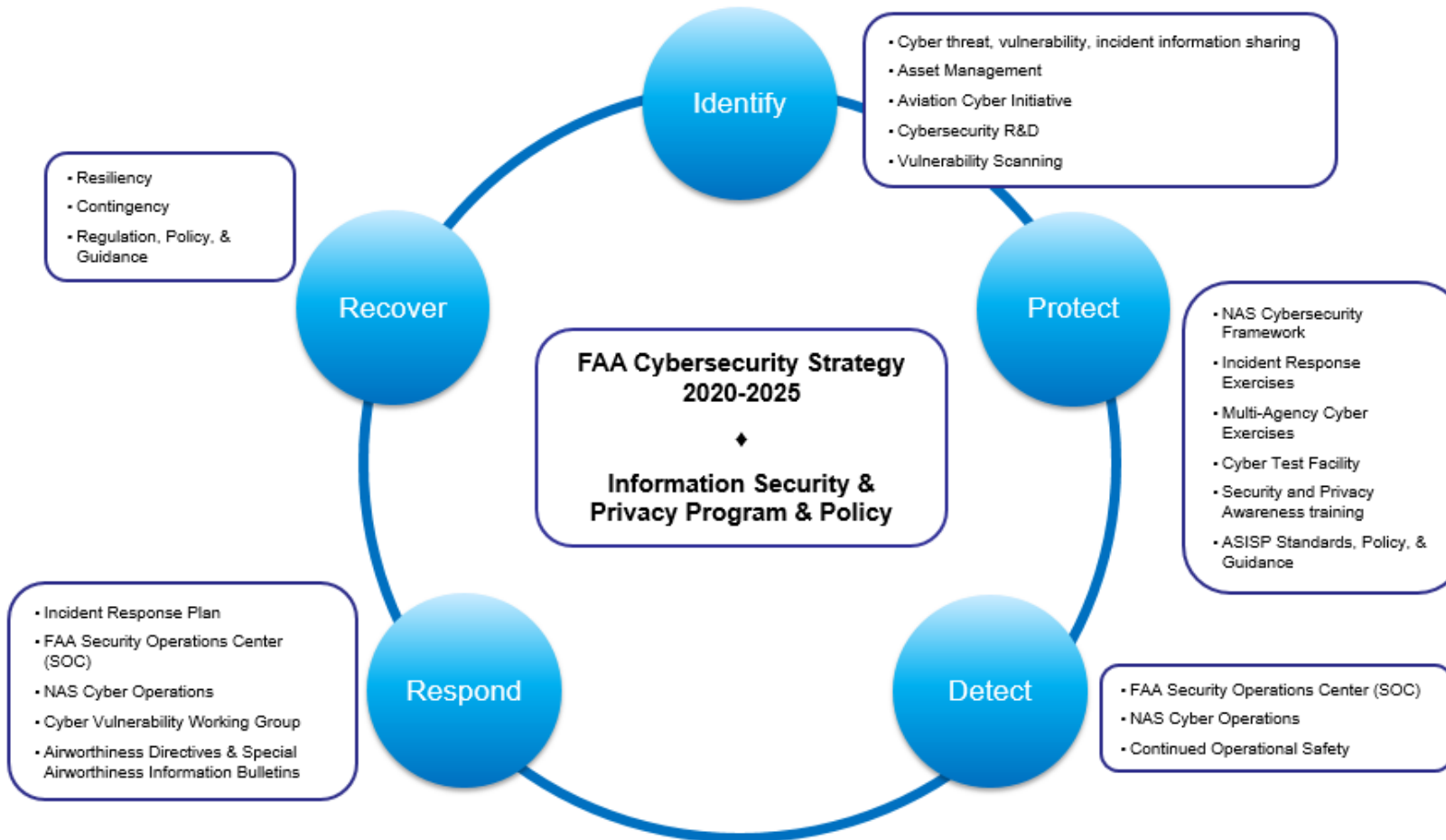
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UAS Cyber Resilience

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FAA Cybersecurity Governance

FAA Mission Spaces

Analysis — Regulatory

NAS — R&D — Mission Support

FAA CISO

DOT CISO

ATO

ARP

ANG

ASH

AVS

Cybersecurity Steering Committee
- Chartered 2014
- Enterprise Cybersecurity Approach
- Risk Executive Function

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FAA Cybersecurity Initiatives

FAA Cybersecurity Strategy 2020-2025

♦

Information Security & Privacy Program & Policy

Identify
- Cyber threat, vulnerability, incident information sharing
- Asset Management
- Aviation Cyber Initiative
- Cybersecurity R&D
- Vulnerability Scanning

Protect
- NAS Cybersecurity Framework
- Incident Response Exercises
- Multi-Agency Cyber Exercises
- Cyber Test Facility
- Security and Privacy Awareness training
- ASISP Standards, Policy, & Guidance

Detect
- FAA Security Operations Center (SOC)
- NAS Cyber Operations
- Continued Operational Safety

Respond
- Incident Response Plan
- FAA Security Operations Center (SOC)
- NAS Cyber Operations
- Cyber Vulnerability Working Group
- Airworthiness Directives & Special Airworthiness Information Bulletins

Recover
- Resiliency
- Contingency
- Regulation, Policy, & Guidance

FAA uses NIST Framework for Cybersecurity Governance.

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FAA Cyber Community Engagement

U.S. Government

- Aviation Government Coordinating Council (AGCC)

- Aviation Cyber Initiative (ACI)

Department of Homeland Security (DHS)

    National Cybersecurity & Communications Integration Center (NCCIC/US CERT)

Department of Defense (DoD)

    National Air and Space Intelligence Center (NASIC)

The U.S. Intelligence Community (IC)

    National Intelligence Manager- Aviation (NIM-A)

Air Domain Intelligence Integration and Analysis Center (ADIAC)

Private Sector

- Aviation Sector Coordinating Council (ASCC)

- Aviation Information Sharing & Analysis Center (A-ISAC)

- Aerospace Industries Association (AIA)

- Airports Council International North America (ACI-NA)

- Standards Development Organizations

RTCA DO-326A/ED-202A
RTCA DO-356A/ED-203A
RTCA DO-355/ED-204A
RTCA DO-178C/ED-12C
RTCA DO-254 / ED-80
...

ASTM
SAE

International

- International Civil Aviation Organization (ICAO)

- Single European Sky ATM Research (SESAR)

- European Aviation Safety Agency (EASA)

➤ SSGC
➤ TFSG
➤ ...

The list above identifies primary engagement entities. It is not all-inclusive.

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The Aviation Ecosystem: Phases of Flight

Thank You

Questions?

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