Broad Area Maritime Surveillance Unmanned Aircraft System: Distributed Test

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Naval Air Systems Command 5.1.1.5

NAVAIR

Outline

- **BAMS Program Background**
- **BAMS System Description**
- **Distributed Test Drivers**
- **Distributed Test Challenges / Lessons Learned**
- **Summary**

Integrated Maritime Patrol Concept

Transformational Mixed Force: Effective, Efficient Mission Capability Tailored to the Warfighter's Requirements

Responsive Multi-Mission

- Robust Sensor Suite
- Cue to Kill
- Onboard Fusion
- Large Weapons Payload

Persistent ISR

- Long Dwell Sensor Suite
- C4I Network Node (FORCEnet)
- Combat Info from MCS
- Data Available to Intel Centers
- High Altitude, Fast, Reliable

ASW Kill
ASW Track
ASW Search

SuW Kill

SuW Classify/ID
SuW Track
SuW Detect

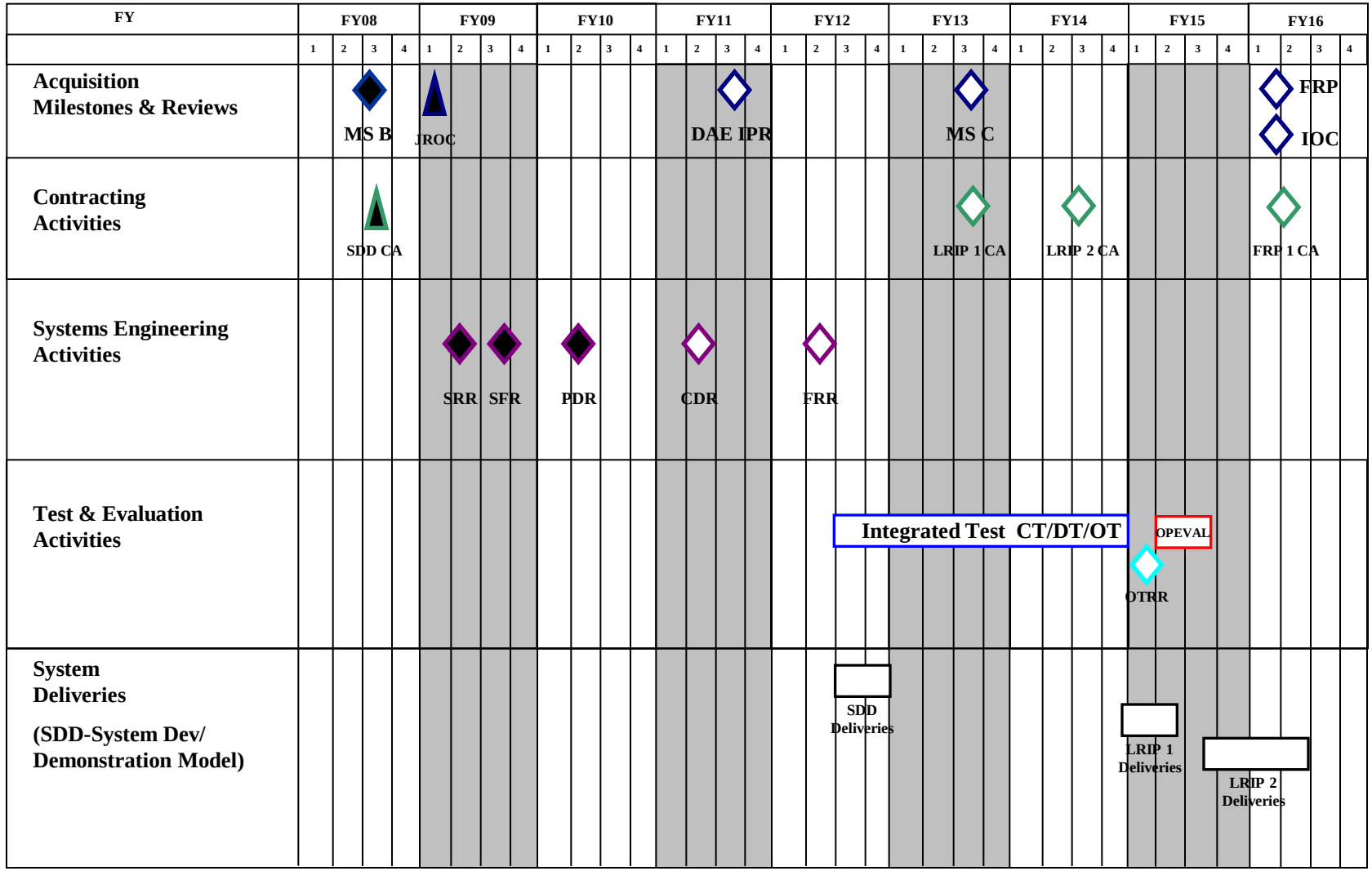
Maintain Maritime COP

FRP Tripwire

ISR in Support of IPE

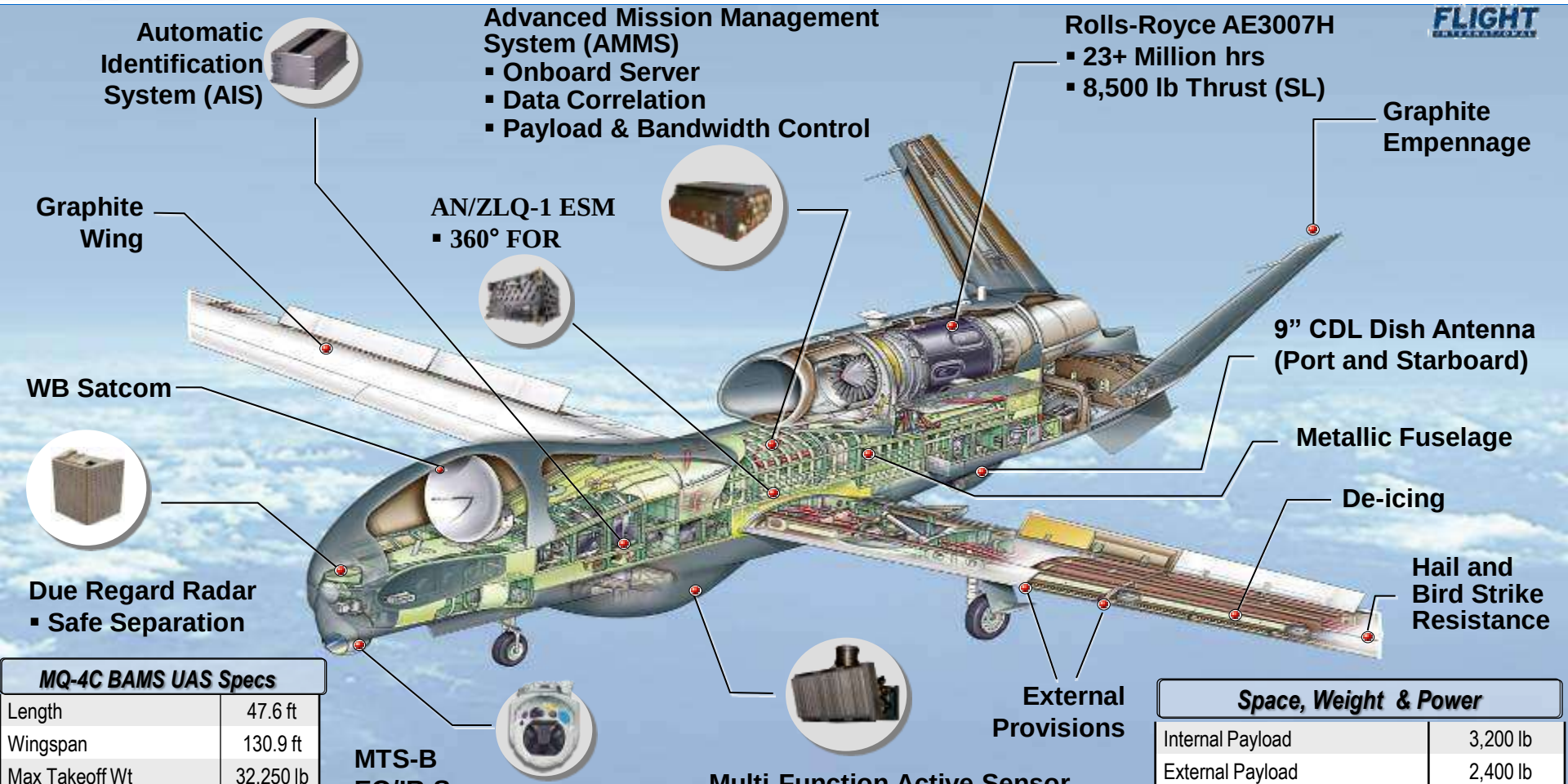
Navy Maritime Patrol Missions

BAMS UAS Program Schedule



Schedule Version 4 12 Jan 11

BAMS UAS
Air Vehicle Configuration



MQ-4C BAMS UAS Specs	
Length	47.6 ft
Wingspan	130.9 ft
Max Takeoff Wt	32,250 lb
Cruise Speed (KTAS)	330 knots
GTOW Rate of Climb (SL)	2,800 fpm
Operational Ceiling	60,000 ft
Max Un-refueled Range	>9,550 nm
Endurance	>27 hr

Space, Weight & Power	
Internal Payload	3,200 lb
External Payload	2,400 lb
Power AC	30.0 kVA
Power DC	400 A
Pressurized Space	180 cu ft
Unpressurized Space	45 cu ft
External Unpressurized Space	132 cu ft
Backup Battery Power	45 min

BAMS UAS Sensors

Sensors Common Across DoD With Inherent 360º Field of Regard

MFAS

AN/DAS-3

AN/ZLQ-1

Sperry Marine R4

ARC-210/MIDS Link-16

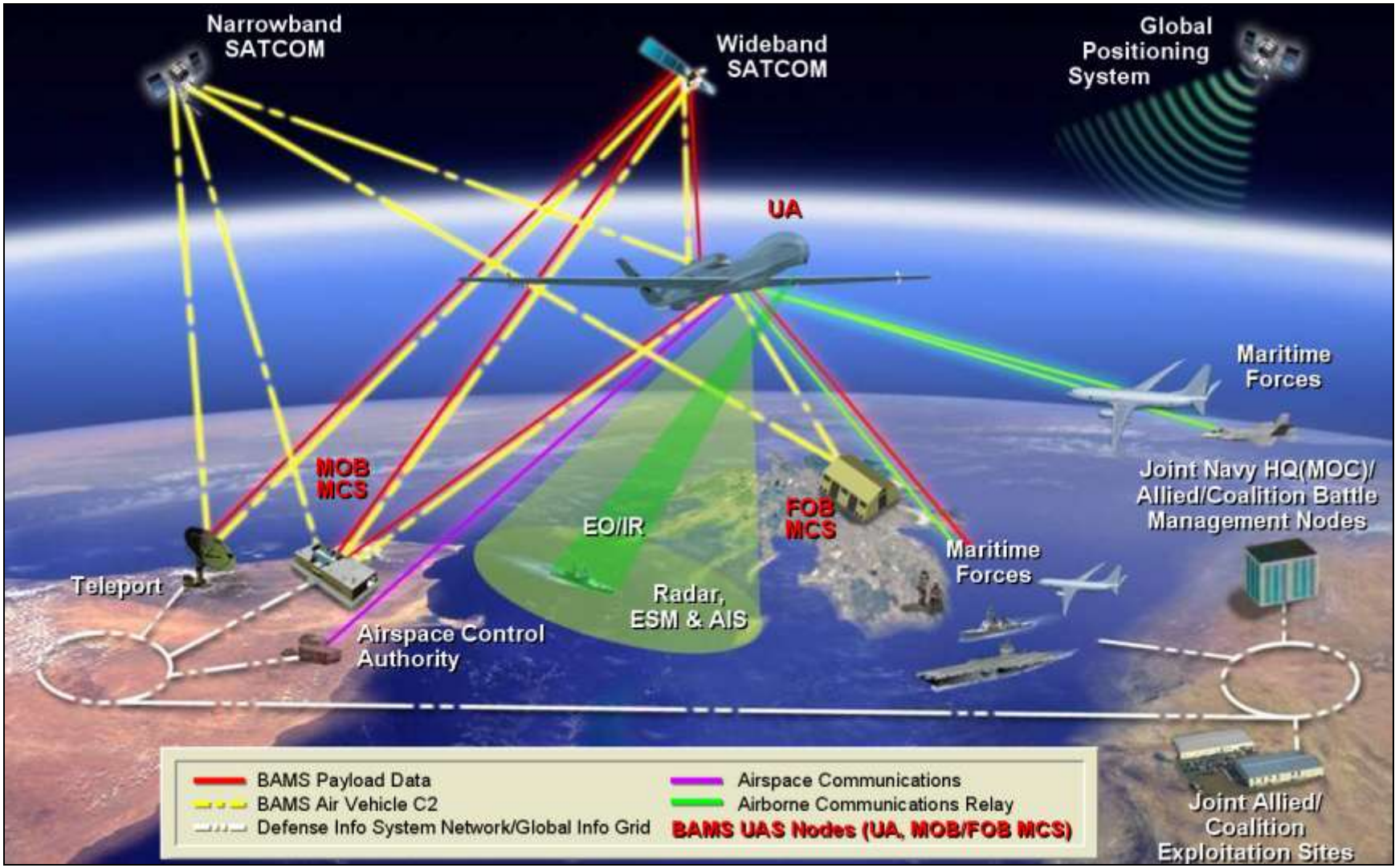
- **Radar**
  - **Multi-Function Active Sensor (MFAS)**
    - » **Maritime Search, ISAR, SAR**
    - » **AESA design and numerous subcomponents leveraged from other systems/platforms**
- **EO/IR**
  - **AN/DAS-3 (MTS-B variant)**
    - » **EO/IR/Full Motion Video**
    - » **Fielded on Air Force system**
    - » **Variant of AN/AAS-52 fielded on other systems/platforms**
- **ESM**
  - **AN/ZLQ-1**
    - » **Technology used on other systems/platforms**
- **AIS**
  - **Sperry Marine R4**
    - » **COTS**
- **Airborne Communications Relay**
  - **ARC-210 radios & MIDS Link-16 fielded on multiple platforms**

BAMS UAS KPP Requirements

-**Key Performance Parameters**

- **Persistent Maritime ISR at Mission Radius for 24 hrs for 7 days at a minimum of 80% Effective Time on Station (ETOS)**
- **Minimum Mission Radius of 2,000 nm**
- **Land-based Level I-V Air Vehicle and Sensor Command & Control**
- **Afloat Level II Payload Sensor Data Reception via Line of Sight**
- **Net Ready**
- **Minimum Ao of 0.7 @ IOT&E and 0.8 @ IOC + 2 yrs**
- **Maritime target standoff classification (classified)**

BAMS UAS OV-1



Distributed Test Drivers

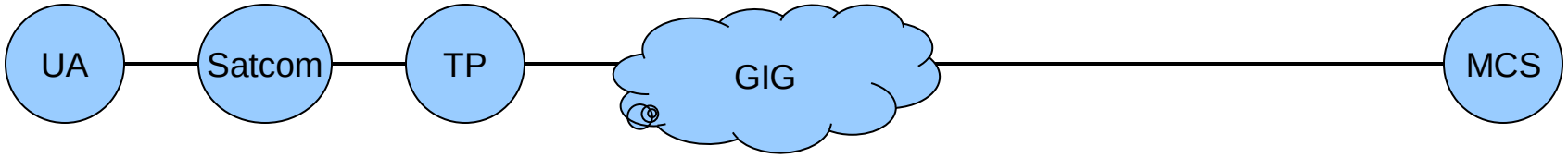
- **Distinct types of test data**
  - **UAS "organic" data – C2, sensor data, etc**
  - **Test-unique data –e.g. telemetry, SIL/lab connections, M&S**

- **Test network supports a variety of test needs**
  - **Programmatic needs**
  - **Engineering needs**
  - **Mission plans, test cards, etc distribution PRE-MISSION**
  - **Handle C2 and mission data REAL-TIME**
  - **Telemetry / further mission data distribution REAL-TIME**
  - **Recorded instrumentation / mission data distribution POST-MISSION**
  - **Connect test nodes together for early testing, especially in the case of System of Systems testing**

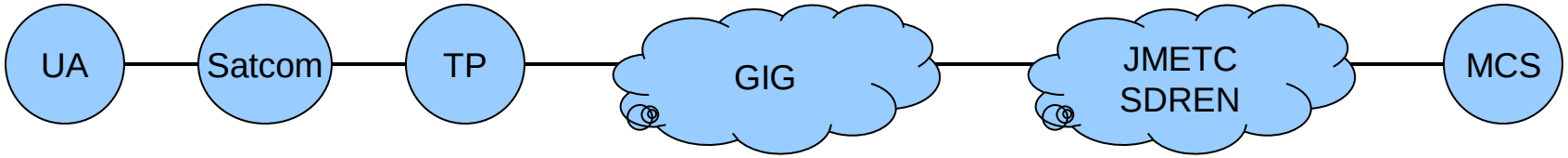
- **Planning to leverage Joint Mission Environment Test Capability (JMETC)/Test and Training Enabling Architecture (TENA) / Interoperability Test and Evaluation Capability (InterTEC) to the maximum extent practical**

Test Network Relationship to OV-1 Operational Architecture

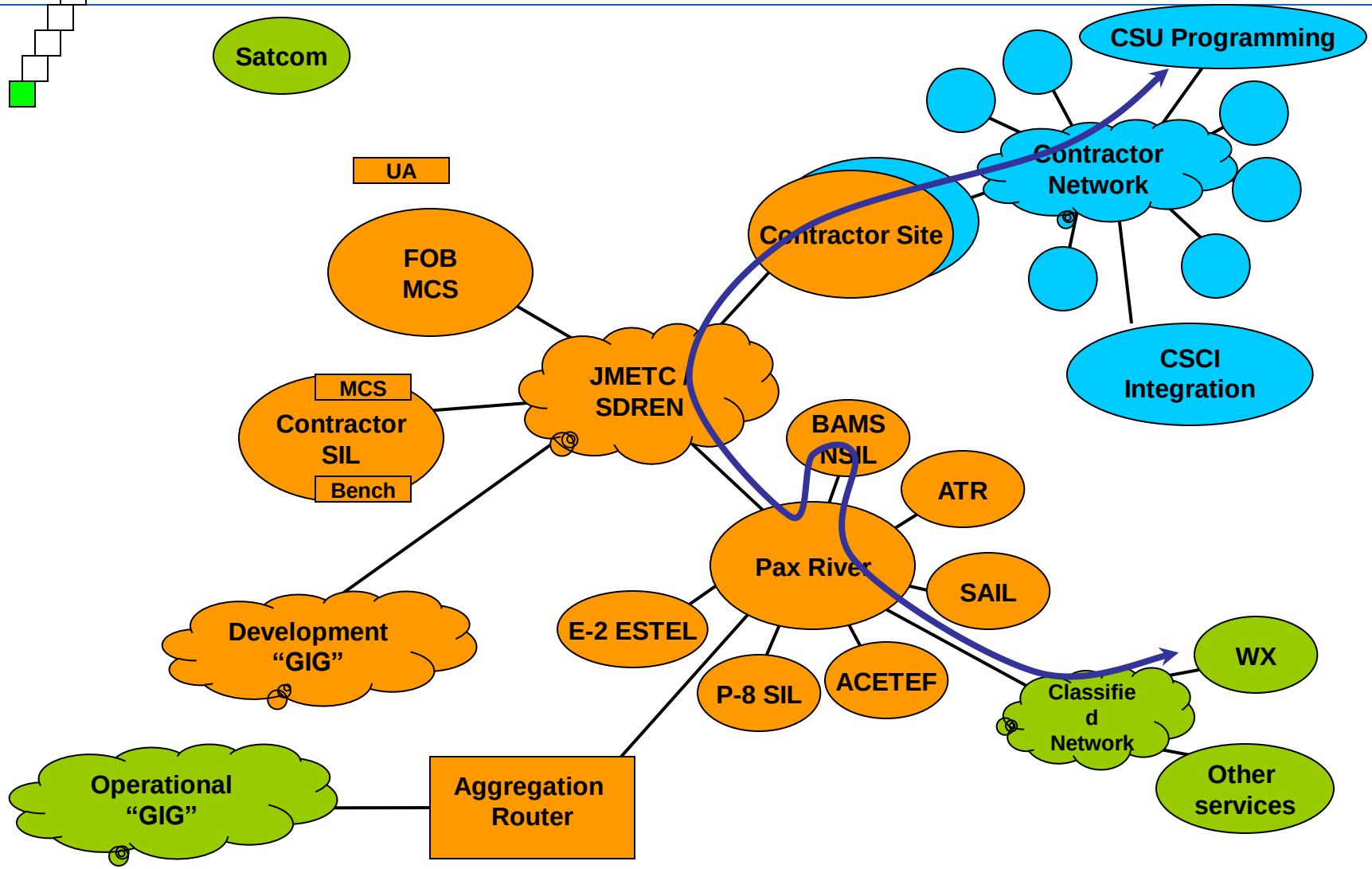
IOC+



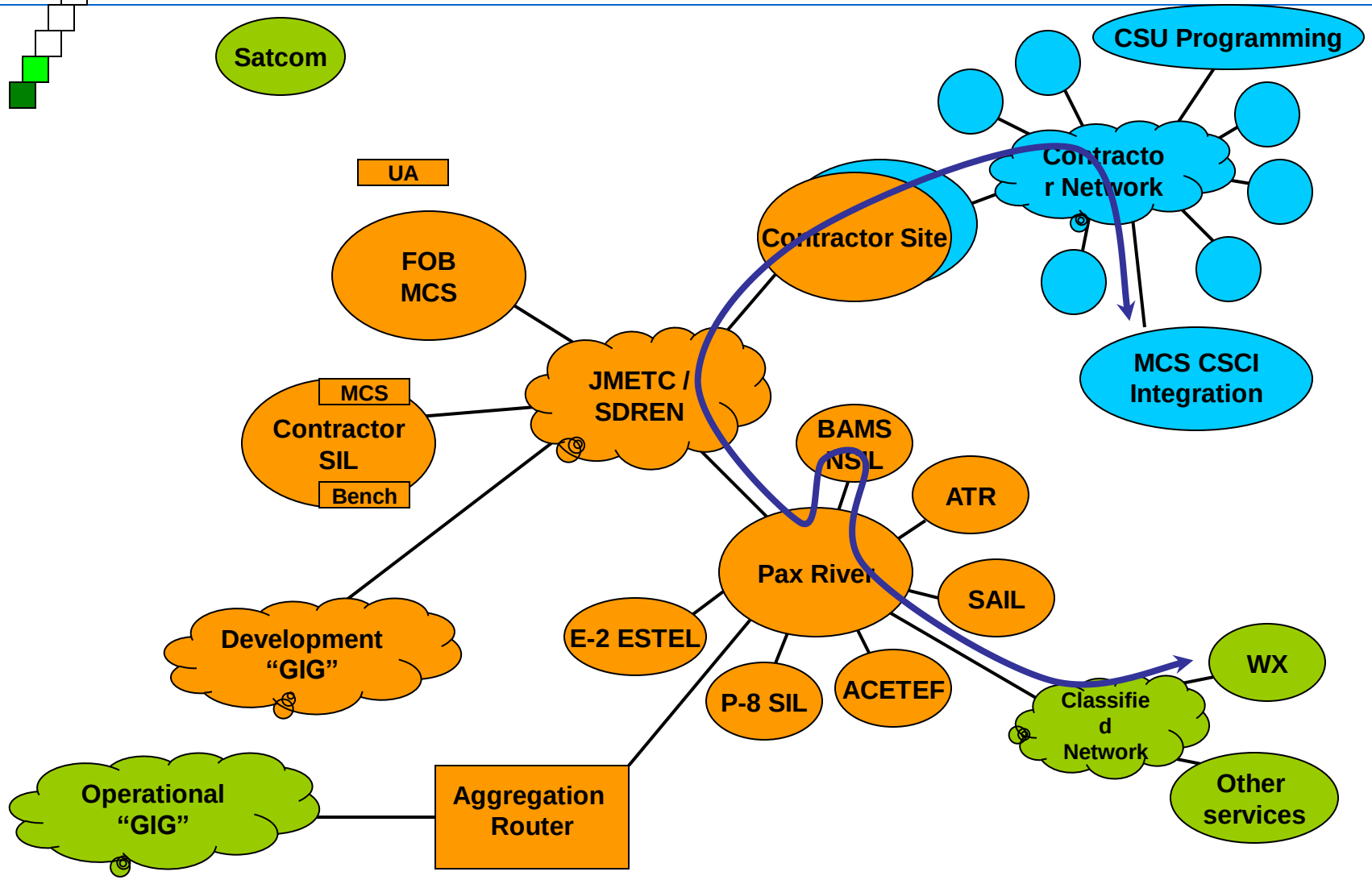
SDD Test Phase



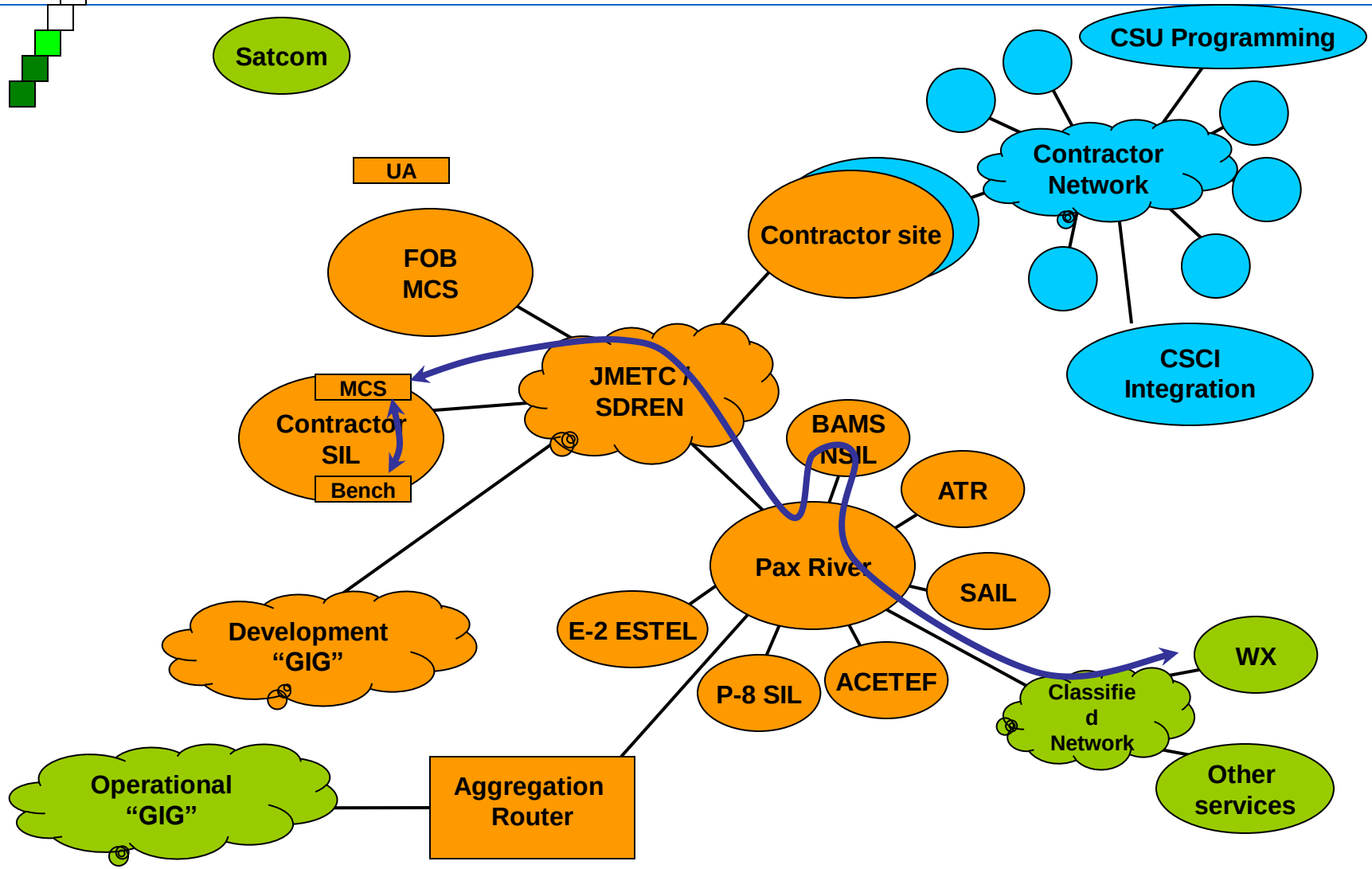
Unit Code Testing



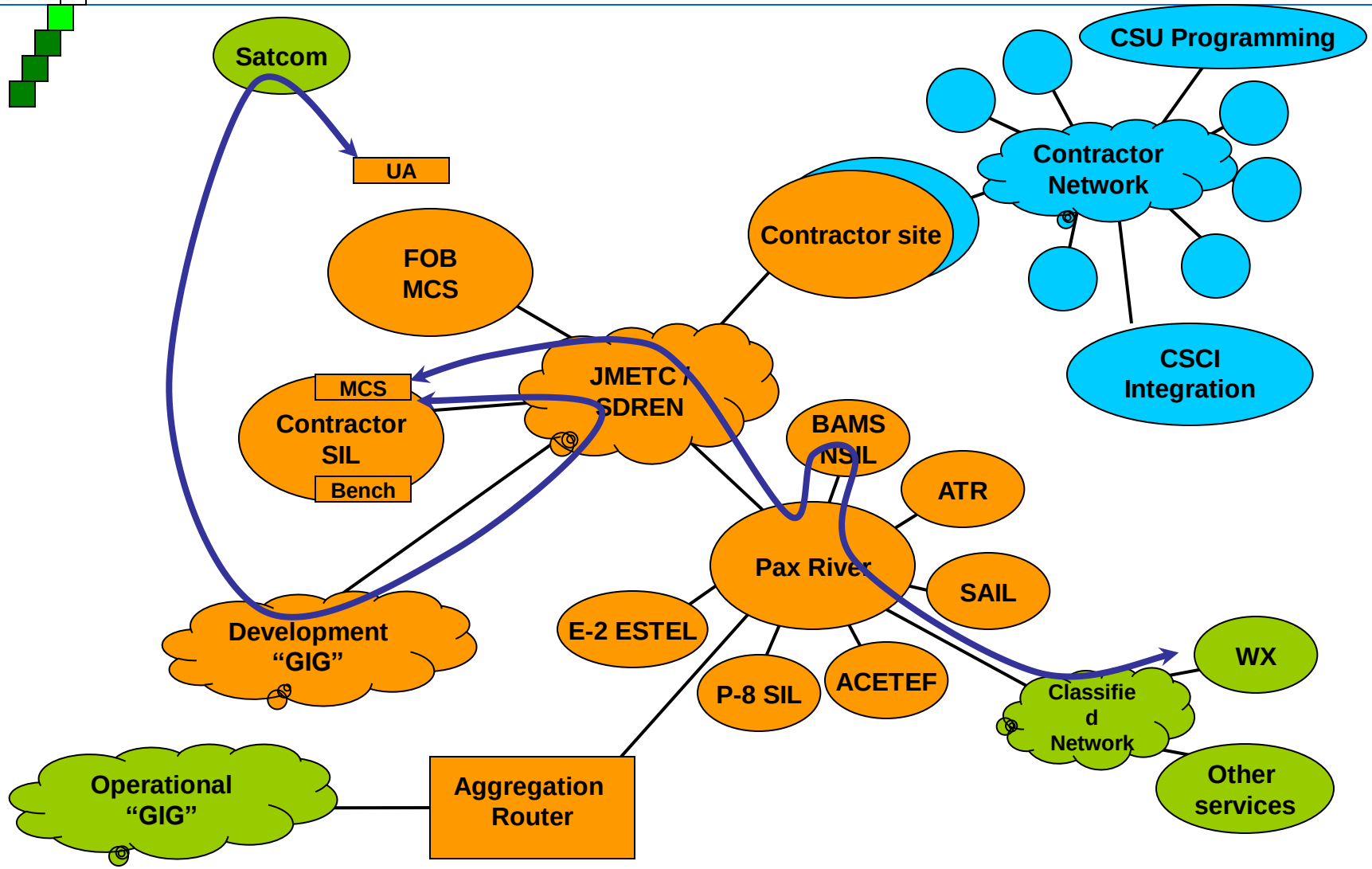
Segment Level Testing



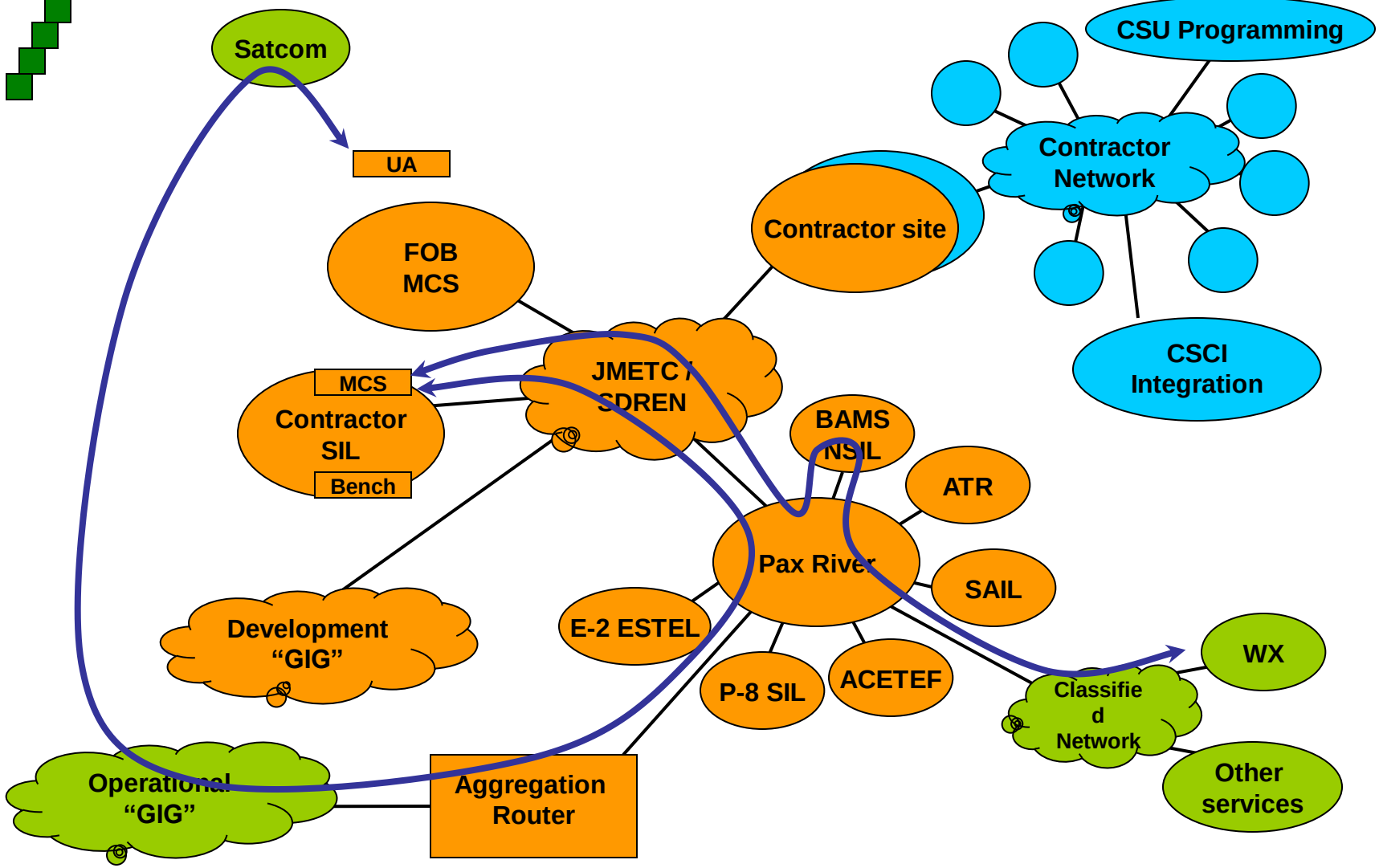
System Level Testing



DT/OT Ground/Flight Testing

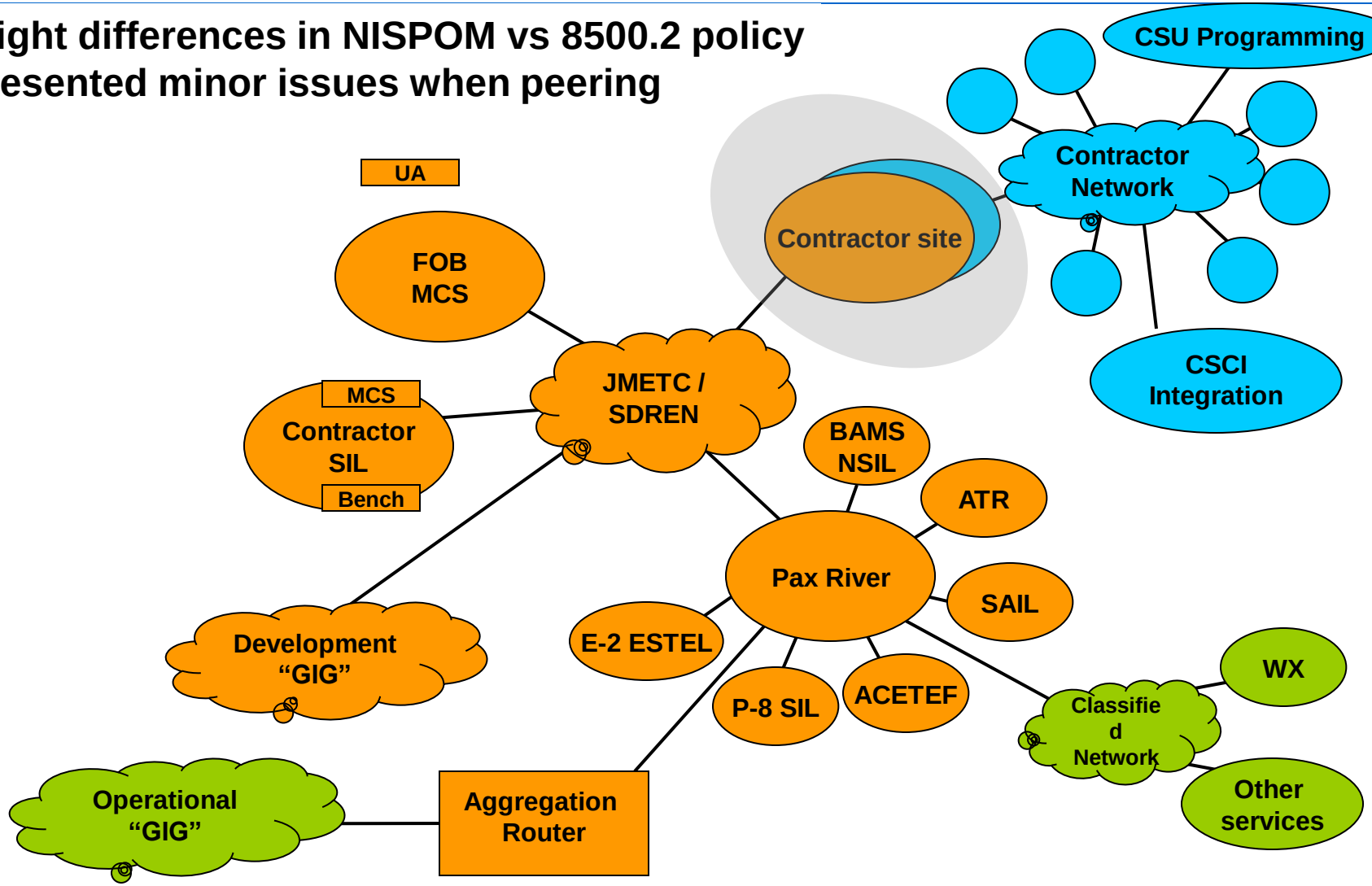


OPEVAL Testing



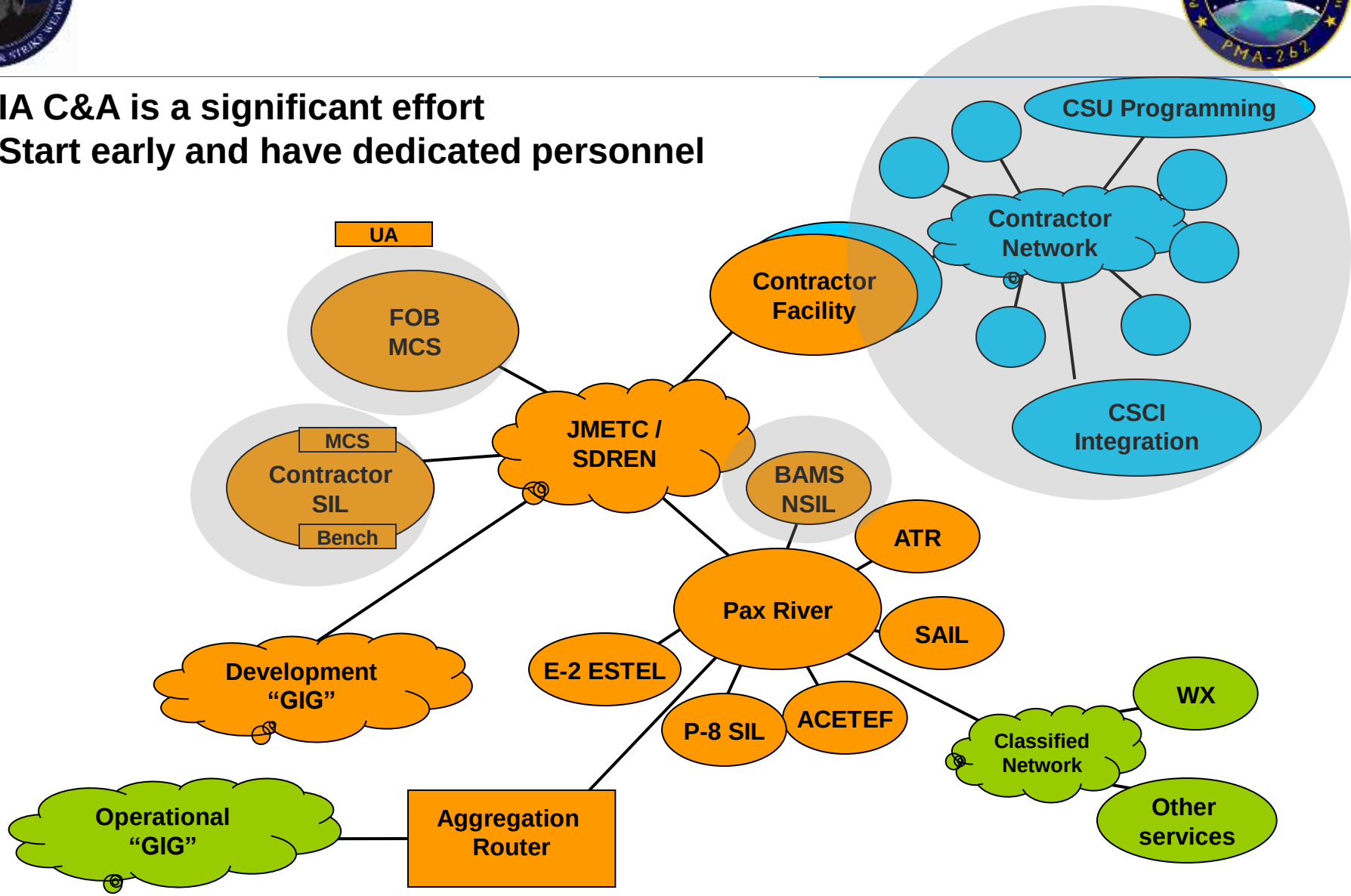
NISPOM vs DOD Instr 8500.2

- Slight differences in NISPOM vs 8500.2 policy
- Presented minor issues when peering



Information Assurance Certification and Accreditation

- IA C&A is a significant effort
- Start early and have dedicated personnel



Summary

- **Benefits of distributed test**
  - **Test early, test often**
  - **Greatly reduces risk, especially in System of Systems scenarios**
- **Lessons learned / challenges**
  - **Dealing with non fleet representative encryption**
  - **Use dedicated IA personnel for certification and accreditation efforts**
  - **Minor differences in NISPOM and 8500.2**
  - **Budgeting for SoS testing**
- **Looking to leverage existing test networks and tools to the maximum extent practical**

QUESTIONS?