

## Practical Methods for SCA Radio Compliance and Deployment

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# Presentation Overview



- JTRS Program – Enabled by the SCA standard.
- SCA test, evaluation and certification current process and key challenges.
- Application of a Generic Role Based Process to various operating models
- Conclusions.



# JTRS Program – SCA Enabled



## JTRS Increment 1 Tactical Networking Capability



- Mission:
  - Develop and produce a family of interoperable, affordable SDRs at moderate risk, which provide secure wireless communications capabilities for Joint Forces.
- Key Objective:
  - Extend the Global Information Grid (GIG) to “last tactical mile” providing mobile ad-hoc networking capabilities for the War-fighter enabling battlefield superiority
- Approach:
  1. Transformational communications focus (> networking).
  2. Subset of current Force communications (< legacy).
  3. “Enterprise Business Model” for product development.
  4. Provide incremental capabilities over time.



# Key JTRS Characteristics

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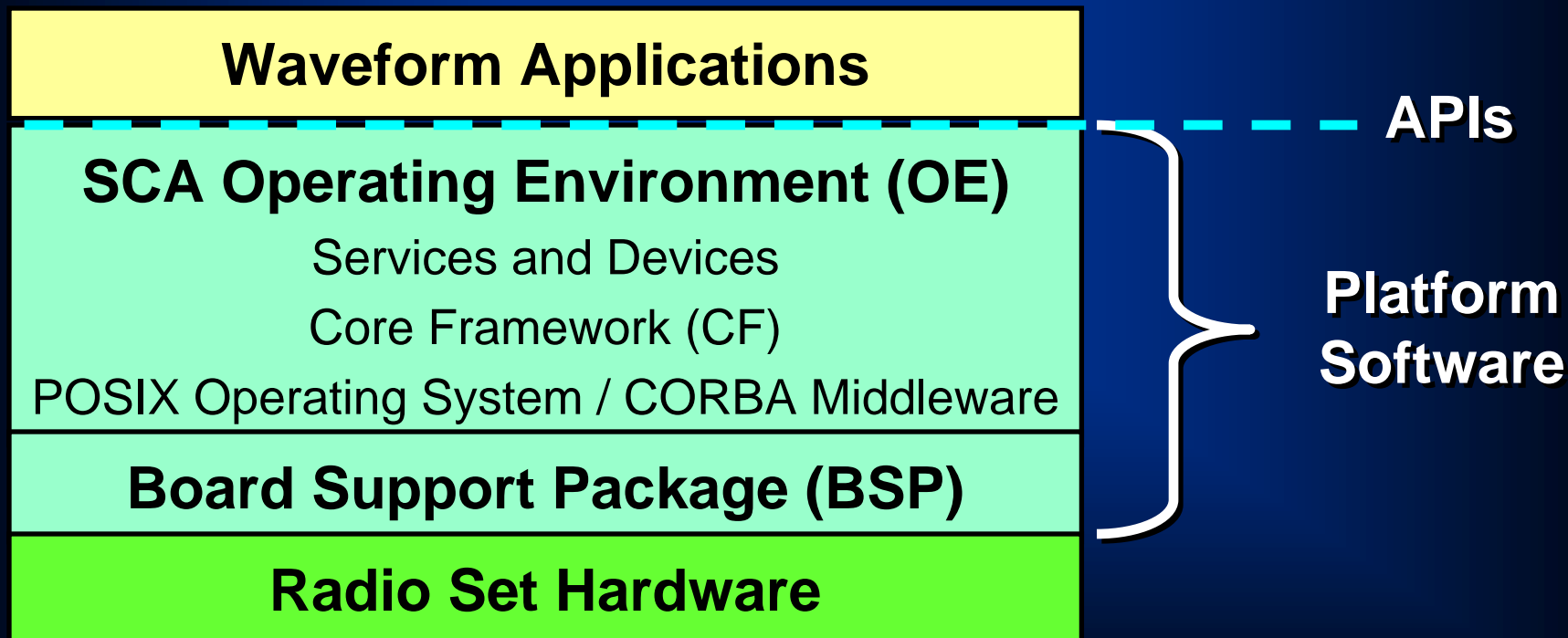
- 2 MHz – 2 GHz frequency range.
- Multiple, simultaneous channel operations.
  - Re-transmission across bands and waveforms.
- Legacy radios / waveforms interoperability (subset).
- Programmable Information Security (INFOSEC).
- Portability of Waveform Applications software.
- Network connectivity across RF spectrum to support network-centric warfare.
- Scaleable, enables additional future capacity.
- Modular, “pluggable” technology insertion.



# Software Communications Architecture



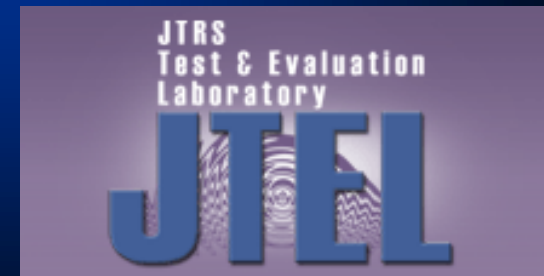
- Standard is foundation for JTRS Program
- Set of rules and protocols for SDR applications.
- Component Based Design (CBD) technology.
  - “Interchangeable SW parts” built on predefined specifications.



# JTRS Test & Evaluation Laboratory



- Located at USN SPAWAR facilities in San Diego CA and is administered by the JTRS JPEO.
- Designated authority to provide development and test support for DoD SCA Compliance certification.
- Maintains an evolving test capability to eventually include entire JTRS Standard Set.
- Conducts formal SCA compliance testing of radio platforms, evaluates test results for compliance.
- Recommends certification or non-certification to the JTRS JPEO for final determination.





## Current Process and Key Challenges



# Stakeholders and Key Objectives



- Stakeholders
  - Product and systems users (mission communicators)
  - Governments and procurement authorities
  - Radio providers (developers and manufacturers)
  - 3<sup>rd</sup> party software developers (applications providers)
  - Tools providers (supporting developers, testers)
  - Others (i.e., independent test and certification entities)
- Key Objectives
  - Provide users and procurement authorities with confidence that products and systems procured and deployed to the War-fighter meet expectations.
  - Radio providers are assured that their products meet requirements adopted by customer community.

# JTEL SCA Testing Process



- JTEL SCA test and evaluation utilizes a combination of “white box” test methods.
  - From automated verification of component level software interfaces to manual inspection of radio source code.
- Approved, standard test procedures and tools used to perform testing, including JTRS Test Application (JTAP).
- Scope currently limited to specific revision of SCA OE requirements (i.e., v2.2.2), expectation that SCA API compliance will be tested in future.
- Test report generated from test results.
- Recommendation provided to JTRS JPEO for final determination of certification.
- Experience shows this process works.
  - AN/PRC-152 (C), AN/PRC-117G (C)



# Challenge #1: Intellectual Property



- Current process requires radio providers who develop SCA implementations at private expense to submit critical and/or high value Intellectual Property to the Government.
- Radio provider IP represents private investment which must be carefully protected through complex agreements with the Government and 3<sup>rd</sup> parties.
  - AN/PRC-117G (C) > 2.5 MSLOC
- Uncomfortable (potentially exposed) position for radio providers.



## Challenge #2: Time-to-Market

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- Certification cycles can be on the order of 70 business days (14 calendar weeks) to complete.
- Several factors influence the duration of the test and evaluation period:
  - Depth of the JTEL work queue in conjunction with the relative priority of radio platforms to be tested.
  - Scope of the testing (limited to OE requirements today).
  - Specific findings encountered during test and evaluation activities.
- Cumulative effect of multiple radio platforms with multiple product releases per year will dramatically increase need for capacity.
  - Types/frequency of releases needs to be addressed.

## Challenge #3: Cost



- SCA test, evaluation and certification can potentially add significant cost to Radio providers.
- Radio platforms developed at private expense must pay out-of-pocket for JTEL services
  - Typical JTEL services for one cycle ~ \$ 120,000 USD
  - On-site support provided to JTEL ~ \$ 30,000 USD
  - In-house dry runs and preparation ~ \$ 50,000 USD
  - **Total cost for a radio platform release ~ \$ 200,000 USD**
- JTEL provides approved SCA test procedures and tools to Radio providers minimizing likelihood of failures discovered during formal testing.





## Challenge #4: SCA Revisions



- Simultaneous test, evaluation and certification support for multiple SCA revisions necessary to ensure timely flow of radio platforms and capabilities to the War-fighter.
- Transitions between published SCA revisions needs to be carefully managed.
  - Rolling out of software bug fixes or software changes to support hardware component obsolescence should not be delayed or deferred due to SCA revision transitions.
- Some pre-defined period of overlapping SCA revisions for test, evaluation and certification could mitigate issue (similar to other standards).

# Greater Future Challenges



- Previously identified challenges will be exacerbated as the demand for SCA test, evaluation and certification expands beyond the U.S. DoD.
- Specific interests of international bodies will need to be accommodated:
  - For example, National sovereignty and security



# SCA Test, Evaluation & Certification



**Generic  
Role  
Based  
Process  
Approach**

- SDR Forum SCA T&E Working Group
  - Development and recommendation of a process to certify SCA compliance, targeted at procurement authorities (other than JTRS JPEO), radio providers, other stakeholders.
  - Defined a generic role based SCA test, evaluation and certification process in SDR-09-0007-V0.08 “Test and Certification Guide for SDRs Based on the SCA”.
    - Includes both a certification preparation phase and a certification execution phase.
    - Can be applied to different operating models where the defined roles are performed by different sets of organizations.

# Role Definitions (1 of 2)

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- **Standards Body**
  - Develops, issues and maintains the SCA standard.
- **Specification Bod(ies)**
  - Responsible for developing specifications containing radio systems requirements, including application of the SCA.
  - Specifications are used to develop test materials.
  - Provides feedback & recommendations to Standards Body.
- **Definition Body**
  - Provides interpretations and clarifications of the standard.
    - Examples include: development of guide documents, holding workshops, providing reference implementations.
  - Provides feedback & recommendations to Standards Body.

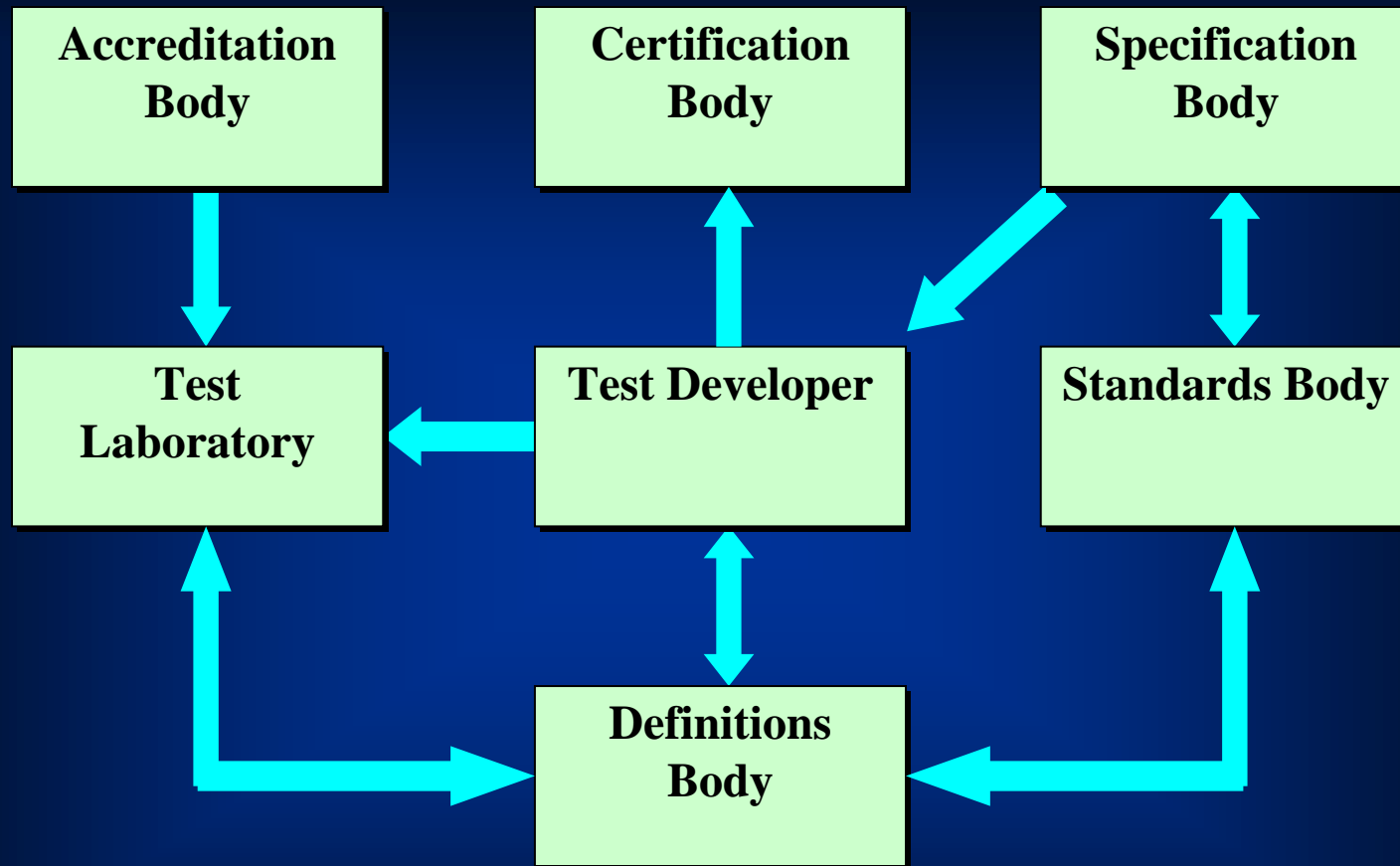


# Role Definitions (2 of 2)



- **Test Developer**
  - Develops and maintains test procedures, test tools and test report forms for usage by the Test Laboratories.
- **Test Laboratories**
  - Responsible for executing tests in an accredited SCA test environment using approved test procedures, tools, forms.
  - Test results are collected and reported in standard formats.
- **Test Laboratory Accreditation Body**
  - Certifies that a test laboratory has capability, competence, discipline and suitable quality assurance to reliably and credibly perform SCA testing.
- **Certification Bod(ies)**
  - Grants SCA compliance certification based on results provided by an accredited test laboratory.

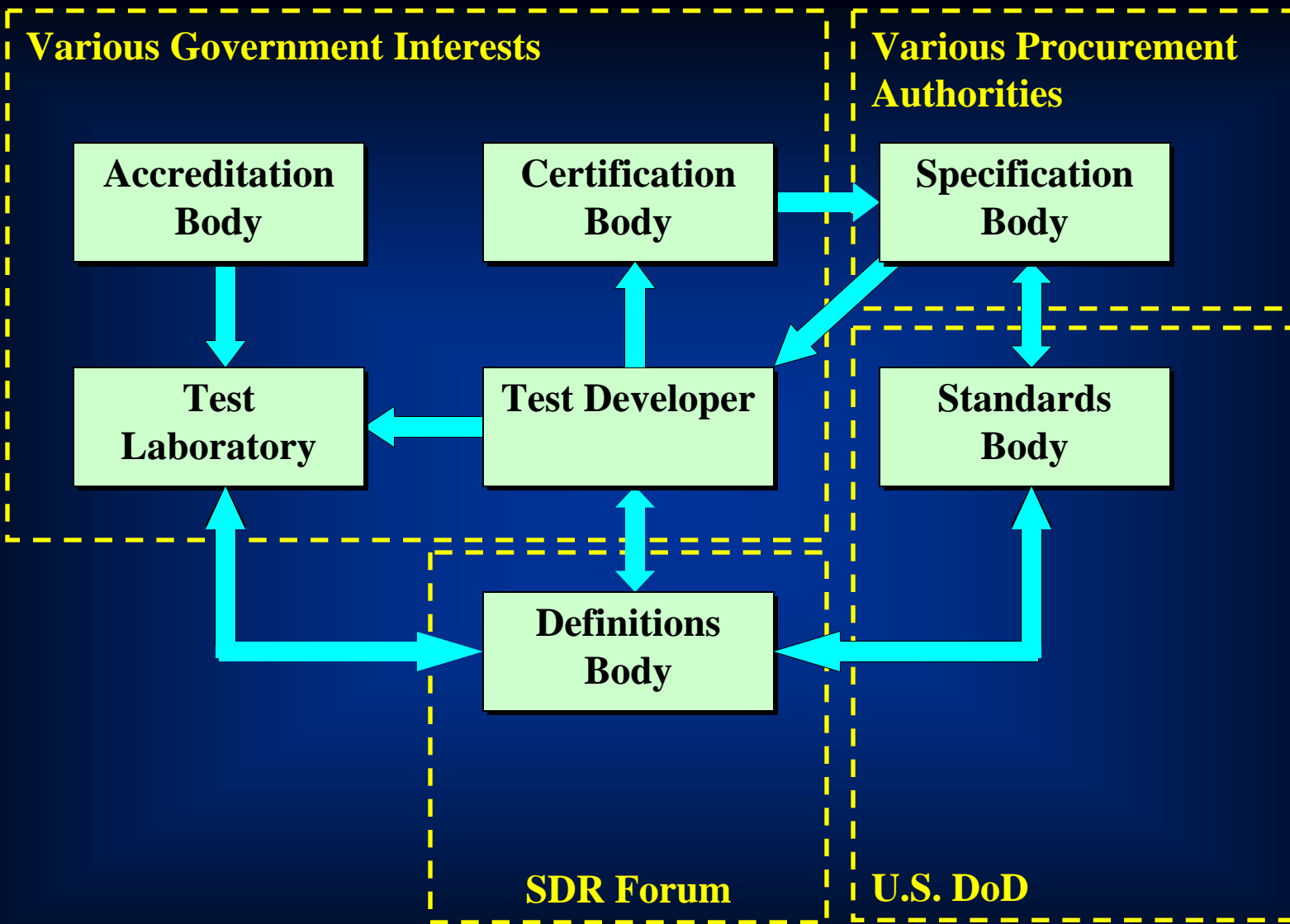
# Roles and Interactions





## Application of Generic Role Based Process to Various Operating Models

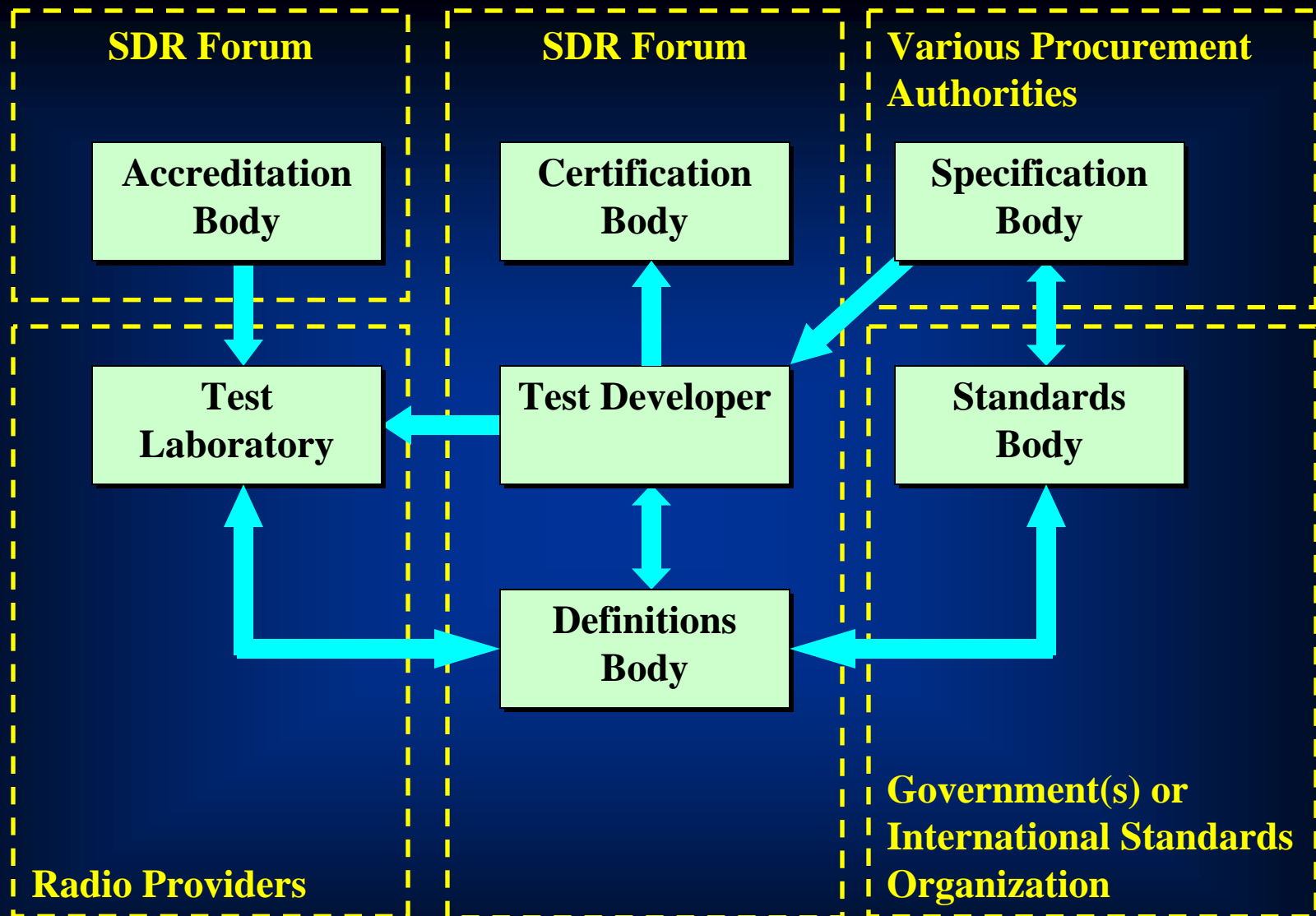
# Current Operating Model



- **Benefits**
  - Potentially minimizes interactions and information flows for Governments (which are responsible for multiple roles).
- **Issues**
  - Time-to-Market and Cost
    - Lack of scalability - requires multiple instantiations of current model to support international interests, linear expansion of SCA test, evaluation and certification cycles.
    - Significant expense, time for each radio platform SW release.
  - Intellectual Property Protection
    - Proliferation of IP across multiple Government organizations and staff.
  - Supported SCA Versions
    - No method for coordinating multiple supported versions



# Recommended Operating Model



- **Benefits**

- Time-to-Market and Cost

- Facilitates significant expansion of Test Laboratory capacity vs. current Government oriented model.
    - Economies of scale achieved through in-house efficiencies and singular Test Developer and reuse of test materials.

- Intellectual Property Protection

- Critical data does not leave owner's facilities.

- Supported SCA Versions

- Manage multiple version support in coordinated manner.

- **Issues**

- SDR Forum business scope does not currently support Test Developer, Accreditation and Certification Body roles.

- Forum actively considering expanding of capabilities based on growing needs of the international military SCA community.

# Conclusions



- Growth of SCA beyond JTRS Program drives need for more effective SCA test, evaluation & certification.
  - Key challenges include: Time-to-Market, Cost, IP protection and support for multiple SCA revisions.
- SDR Forum SCA Test & Evaluation WG proposed a scalable and affordable generic role based process.
  - **Accredited Test Laboratory approach increases testing capacity while reducing costs and time-to-market.**
  - Inherently Protects Radio Provider's IP.
  - Can support multiple SCA revisions in controlled and coordinated manner.
  - SDR Forum could provide high value across multiple roles in the process.



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