

Annual Meeting Software Defined Radio Forum, Inc

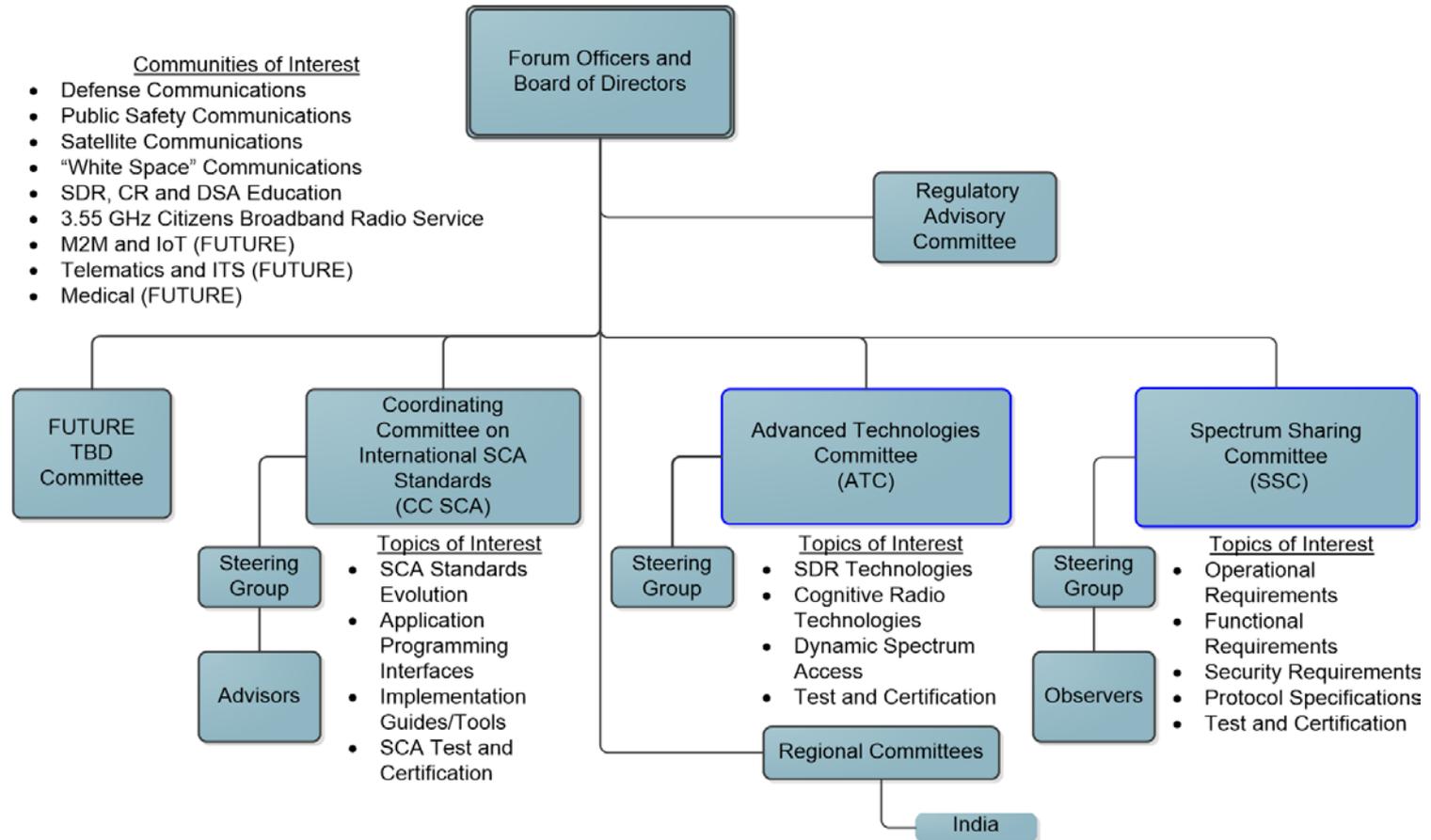
Advanced Technologies Committee (Formerly the Spectrum Innovation Committee) Report

8 December 2016

Current Structure: Connecting Experts with Experts

Organizational Structure for The Wireless Innovation Forum

10 November 2015



Slide 2

ATC Activities (FY2016)

- **What was accomplished in FY2015 (1 July 2015 to 30 Jun 2016)**
 - Report:
 - Elements of Context for Cognitive Radio Based Public Safety Communications Systems WINNF-13-R-TBD Version V012016, Jan 2016
 - Recommendations:
 - Response to OFCOM Call for Information on 3.8-4.2 GHz WINNF-16-R-0058-V0.6.0

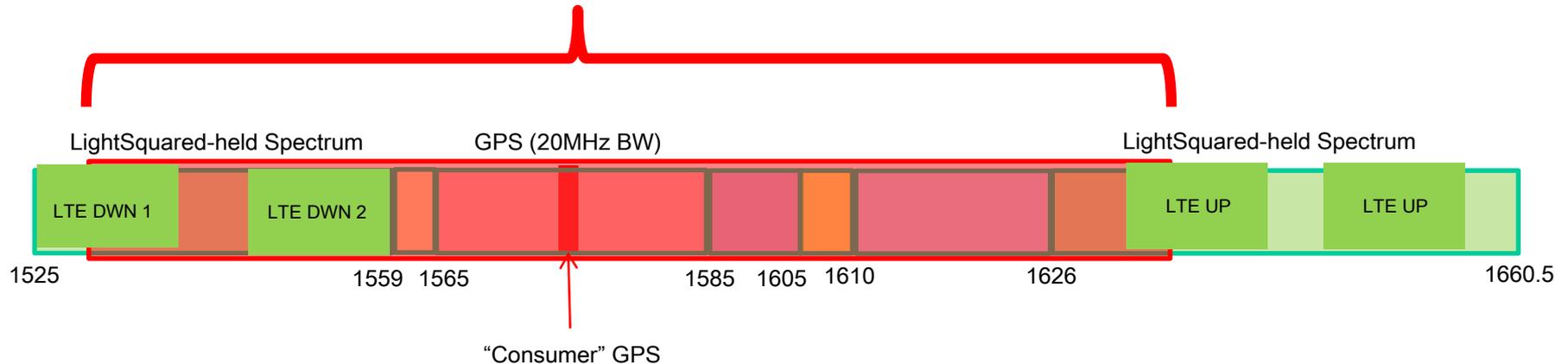
ATC Activities (FY2017)

- **Planned for FY2017 (1 July 2016 to 30 June 2017)**
 - Receiver Performance Technology Working Document WINNF-16-P-0020 Version V0.6.0 9 September 2016
 - Electromagnetic Spectrum Sensing Study Group
 - **Update:**
 - Top 10 Most Wanted Wireless Innovations
 - Advocacy Agenda

Slide 4

Current Project: Receiver Performance Guidelines

Spectrum Unusable Due to consumer GPS RX Design



- **LightSquared followed all of the rules...**
- **Without GPS receiver spec, market did not design to allow spectrum reuse**
- **Because of GPS receiver interference issues, the FCC rescinded authorization**
- **\$2.7 B Investment lost**
- **Receiver Minimum Performance Guidelines will be a necessary part of spectrum sharing solutions**

Receiver Performance Guidelines Project

This report is being developed for regulators, designers, manufacturers and users of wireless communications systems

who are developing wireless policy and equipment to access shared spectrum or to coexist with adjacent spectrum uses while understanding impact to current spectrum users.

The report will produce a set of actionable guidelines to design and evaluate the performance of receivers that will coexist in shared & adjacent spectrum bands that can be used as a foundation for future radio systems.

Electromagnetic Spectrum Sensing Study Group

This report is being created for any party wishing to develop, deploy and operate a remote spectrum sensing capability

who require a standardized set of methods, practices, data formats and protocols to configure, control and receive data from one or more remote spectrum sensor devices.

The “Use Cases”, “Implementation Guidelines” and, if applicable, “Data Format and Protocol” documents are publicly available resources will describe industry best practices and provide implementation resources plus guidelines to achieve technical interoperability between sensor systems and various middleware based on open standards.

Top 10 Most Wanted Wireless Innovations

- Innovation #1: (modified) Techniques for Efficient Porting of Waveform Applications Between Embedded Heterogeneous Platforms**
- Innovation #2 (new) Network Management of Mobile Ad-hoc Radios**
- Innovation #3: (modified) Receiver Performance Interference Thresholds**
- Innovation #4: Low Cost Wide Spectral Range RF Front-End (Multi-octave Contiguous) (Tx,Rx)**
- Innovation #5: Efficient Techniques to Minimize Power Amplifier Spectral Regrowth in Non-contiguous Spectral Environment**
- Innovation #6: Increase Communications Time on Battery Charge by an Order of Magnitude**
- Innovation #7: Context Aware Cognitive Radio**
- Innovation #8: Interference Mitigation Techniques**
- Innovation #9: Standardized Computer Interpretable Policy Language for Cognitive Radio**
- Innovation #10: Flexible Regulatory Framework for Temporary, Cooperative and Opportunistic Access**

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CC SCA Report

8 December 2016

CC SCA Mandate

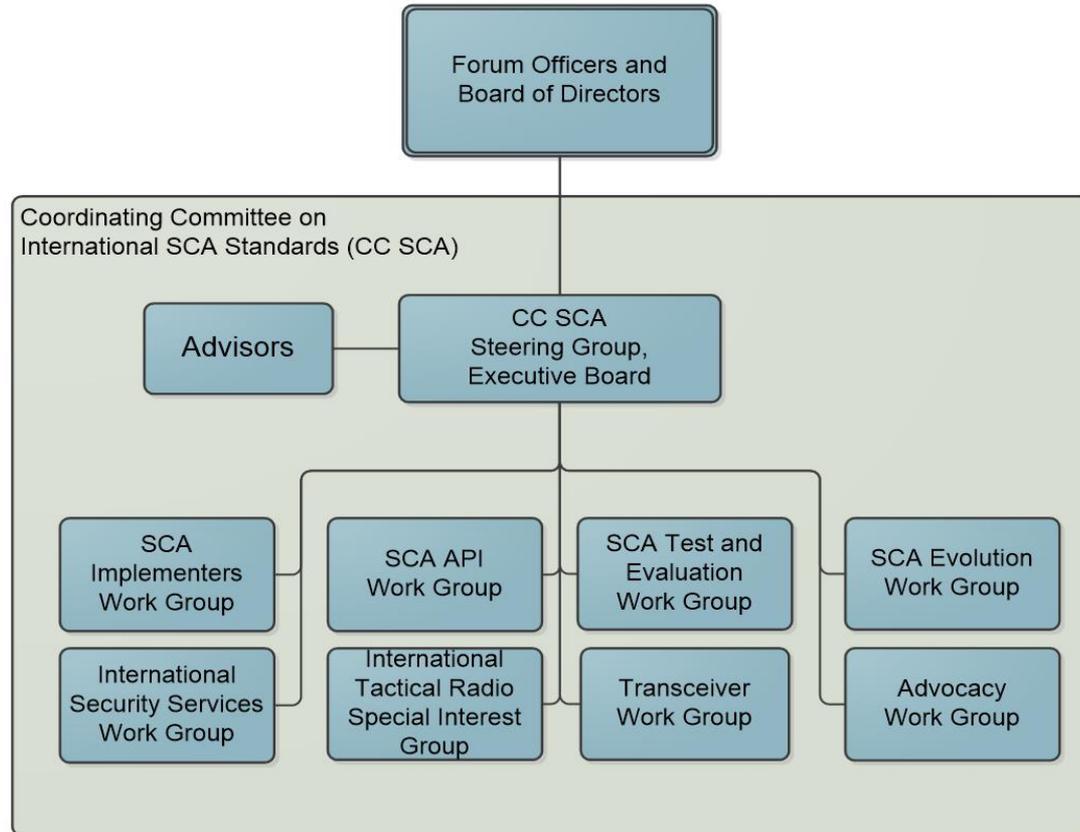
To support the harmonization of the SCA standards at the international level for the mutual benefits of all stakeholders to include:

- Defining an industry driven SCA evolution roadmap for the international community
- Developing extensions to the SCA standards that address any gaps between the defined SCA evolution roadmap and Forum accepted SCA specification variants
- Profiling the SCA specification and related APIs to define internationally accepted variants that are hosted by the Forum
- Providing implementation and certification guides, tools etc. easing implementation and supporting proliferation
- Establishing and managing industry led certification programs where appropriate

CC SCA Structure

Structure for Coordinating Committee on International SCA Standards

15 Jun 2015



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The CC SCA is led by a Steering group of worldwide tactical radio manufacturers

HARRIS

THALES


ROHDE & SCHWARZ

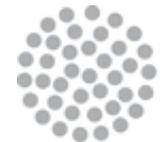
Raytheon

**Rockwell
Collins**



Hitachi Kokusai Electric

 **LEONARDO**

 **indra**

CC SCA Advisory Council

Grouping together the Steering Group and CC SCA Advisors

- Answering to the essential need for a venue for manufacturers and customers to interact
- Advisors provide direction and feedback on CC SCA activities
- Met at least twice a year since creation (~2011)

Who are Advisors?

- Individuals related to MoDs active in the area of International SDR Standards
- Current list of Advisors covers JTNC, OCCAR-EA, FR, Ge, IT, SW, NOR MoD, FL, EDA, NATO
- Appointed upon invitation issued by the Steering Group

WinnF Standards for SDR

Standards serving SDR in the general sense

- Stemming from the SCA
- Developed by
 - Partner entities (e.g. JTNC Standards)
 - WinnF



SCA 2.2.2 and 4.1

WinnF-developed Standards: Transceiver API, IRSS, (U)Lw AEPs, PIM IDL Profiles

Policy setting efforts underway

- Web-based Issues collection mechanism, open to all
- Architecture Board operation in installation

FY2016 Accomplishments

REPORTS

WINNF-16-P-0025.V0.6.0 (IR1) SCA 4.1 Compliancy Interim Release 1

SPECIFICATIONS

WINNF-14-S-0016-V2.0.1 IDL Profiles for Platform Independent Modeling of SDR Applications

RECOMMENDATIONS

WINNF-16-R-0085-V1.0.0 Endorsement of SCA 4.1

WINNF-16-R-0066-V1.0.0 Comments on SCA 4.1 Candidate

FY2017 Plans: SCA 4.1 compliancy

Started early 2016 aiming for completion end 2016

Chaired by JTNC Standards

Project to deliver WInnF specification capturing compliancy criteria for all SCA 4.1 requirements

Interim deliveries already available (on partial scope)

- Release expected early 2017

FY2017 Plans: Transceiver Next

Started early 2015

Project now to deliver

- PIM standard by end 2016
- PSM standards (C, SCA, VHDL, ...) to follow closely

Delayed for best reason: active participation

- Cobham, DGA , Harris, FKIE, HKE, JTNC Standards, NordiaSoft, Rockwell-Collins, Rohde & Schwarz, Thales
- TEMs so far : Paris, Ottawa, Wichita, Erlangen, Rennes, Ottawa, Paris
- Weekly 2h teleconferences

Follow-up projects to aim at

- Domain-oriented profiles for portability improvement
- Capabilities extensions

Coalition interoperability

Started early 2016 aiming for completion end 2016

Project to deliver exploratory report identifying technology / standards gaps for coalition contexts

Contributions and involvement from government stakeholders remain welcome (NATO countries and beyond)

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Spectrum Sharing Committee Report 8 December 2016

Spectrum Sharing Committee: Scope

- **Serve as a common industry and government standards body to support the development and advancement of spectrum sharing technologies**
- **Initial focus on 3.55 GHz, with aims to advance this technology for all applicable spectrum bands that can benefit from it.**
- **This Committee is intended to facilitate the interpretation and implementation of FCC rulemaking to a level that allows industry and government parties to collaborate on implementation of a common efficient, well functioning ecosystem around this technology.**

Spectrum Sharing Committee: Scope

The main activities that will be conducted in the Committee include:

- Detailing common industry and government functionality and architecture for Spectrum Access Systems (SAS), sensors, and devices
- Interoperability requirements and protocol definition to allow for open competitive and well functioning systems
- Common framework for testing and integration of components of spectrum sharing technologies to allow for rapid certification and deployment and predictability, thus expanding the ecosystem and increasing utility of the spectrum
- Details of requirements, processes, and methods for protection of incumbent users as required by the spectrum rules
- Operational procedures definition for the well functioning of the system as it pertains to spectrum assignment, managements and interoperability

Participation to Date – 200+ People, 50+ Organizations

Members

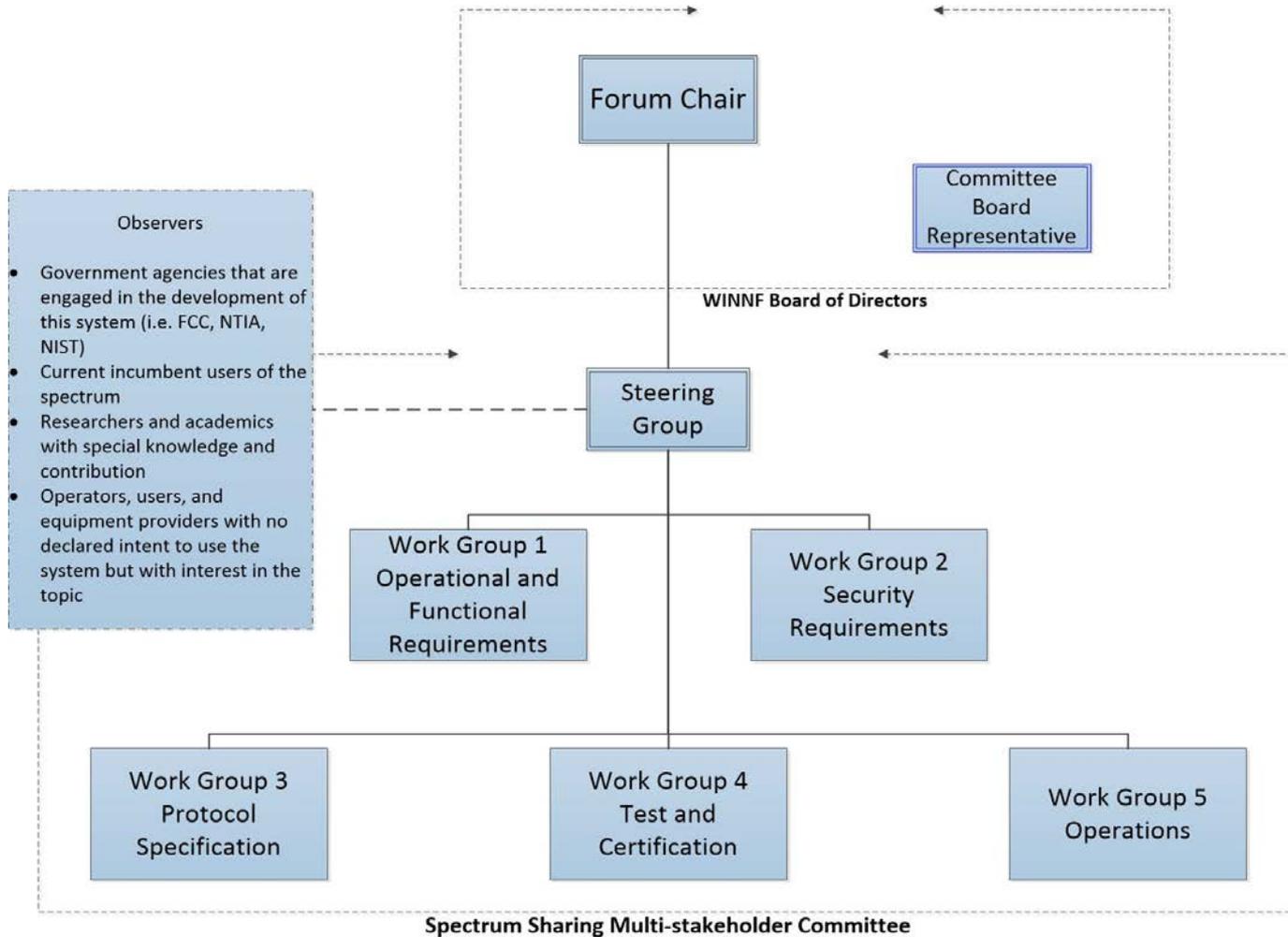
- Airspan Networks
- Amdocs
- Astrapi
- AT&T*
- Cable Labs
- CTIA*
- Communications Research Centre, Canada
- ComSearch*
- Ericsson*
- Federated Wireless*
- Google*
- Harris Corporation
- Huawei*
- Idaho National Labs
- Intel
- ITS (NTIA)
- Key Bridge Global*
- LGS Innovations
- LS Telcom
- MITRE

** Denotes Steering Group Member*

Observers

- IEEE DySPAN-SC
- DMI for US DoD
- Kingfisher Systems for US DoD
- New America Foundation
- NAB
- Roberson and Associates for US DoD
- US Army/CIO
- US DISA DSO
- US DoD/CIO
- US Navy
- US NIST
- US NSWC
- US NTIA
- Utilities Telecom Council
- WiMAX Forum

Committee Structure



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FY2016 Approved Documents

REPORTS

WINNF-15-P-0051-V1.0.0 Interim SAS to SAS Protocol Technical Report-A

WINNF-15-P-0023-V1.0.0 Interim SAS to CBSD Protocol Technical Report-A

WINNF-15-P-0060-V1.0.0 SSC WG4 Certification Process

WINNF-15-P-0047-V1.0.0 SAS Functional Architecture

WINNF-15-P-0062-V1.0.0 Interim SAS to CBSD Protocol Technical Report B

WINNF-16-P-0063-V1.0.0 Interim SAS to SAS Protocol Technical Report B

WINNF-16-P-0089-V1.0.0 CBRS Threat Model

SPECIFICATIONS

WINNF-15-S-0112-V1.0.0 CBRS Operational and Functional Requirements

WINNF-15-S-0071 CBRS Operational Security

RECOMMENDATIONS

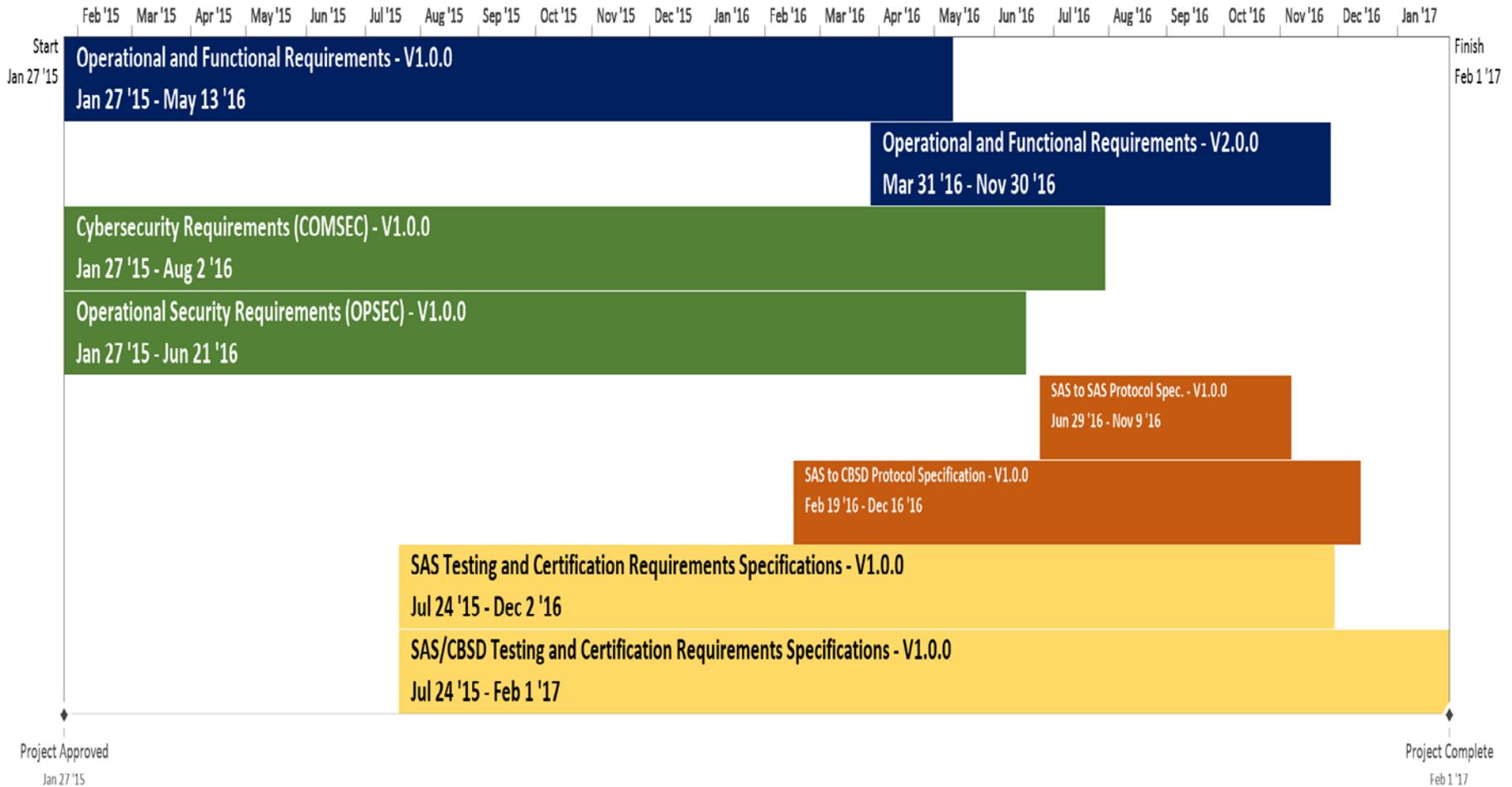
WINNF-15-R-0200-V1.0.0 WinnForum Comments on 3650 Protection Contours

WINNF-15-R-0092-V1.0.0 Emission Measurement Ex Parte

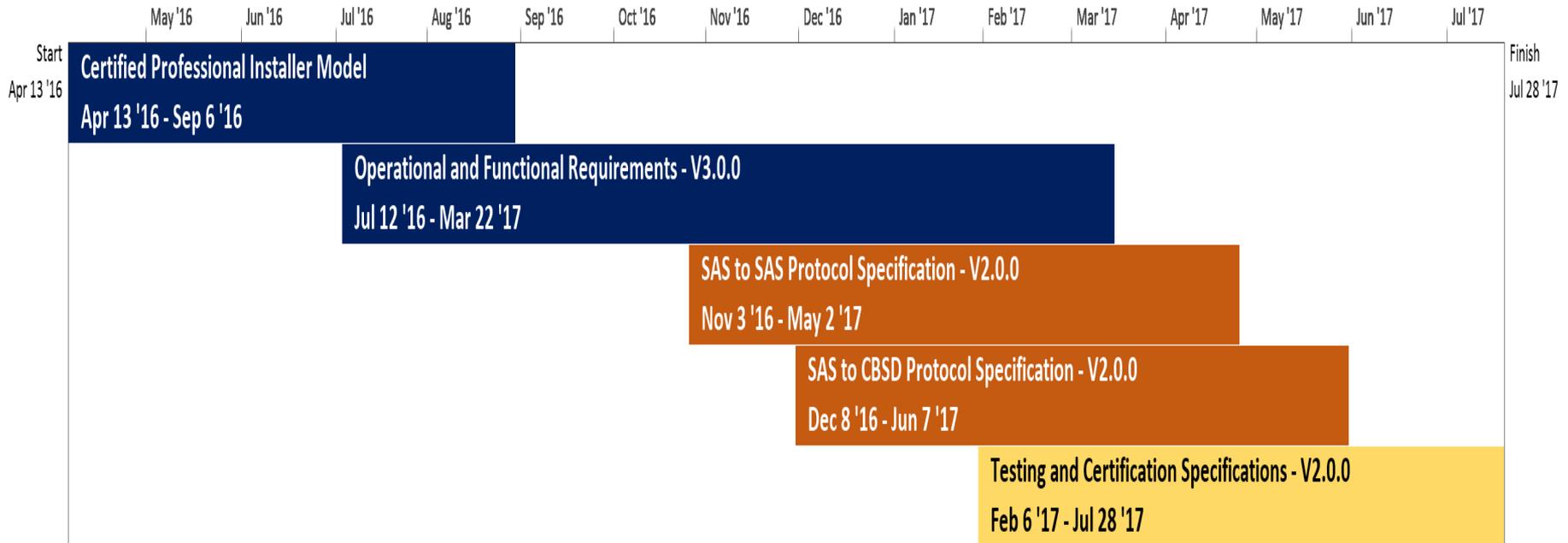
WINNF-15-R-0058/0059-V1.0.0 Reply Comments on the Second FNPRM

WINNF-15-R-0045-V1.0.0 WinnForum Comments on the Report and Order

Release 1 Publication Timeline



Release 2 Publication Timeline



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Operations Report

8 December 2016

Total Membership (As of 30 October Each Year)



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New Members Since the Last Annual Meeting - 16

Airspan

Amdocs

CableLabs

Cambium Networks

Cognitive Systems

CrownCastle

CTIA

Digicert

iPosi

LGS Innovation

Ligado Networks

LS Telecom

Luminate Wireless

NIST

Sensling

Telrad

Lost Members Since Last Meeting - 15

Astrapi

Alcatel Lucent

Bharat Electronics Limited

Battelle

Cognitive Radio Systems

Comsonics

Datasoft

Datron

Hanyang University

Institute for

Telecommunications

Research

Lime Microsystems

NEC

Siru Innovations

Spectrum Bridge

Telecast Technologies

FY2016 Meetings and Events

General

- WInnComm Europe 2015: 6 to 8 October
- WInnComm 2016: 15 to 17 March

CCSCA Events

- Hosted Webinars
 - JTNC SCA 2.2.2 to SCA 4.1 Migration Briefing – 30 Sep 2016
- Transceiver Next Meetings
 - Jul 2015
 - Sep 2015
 - Jan 2016

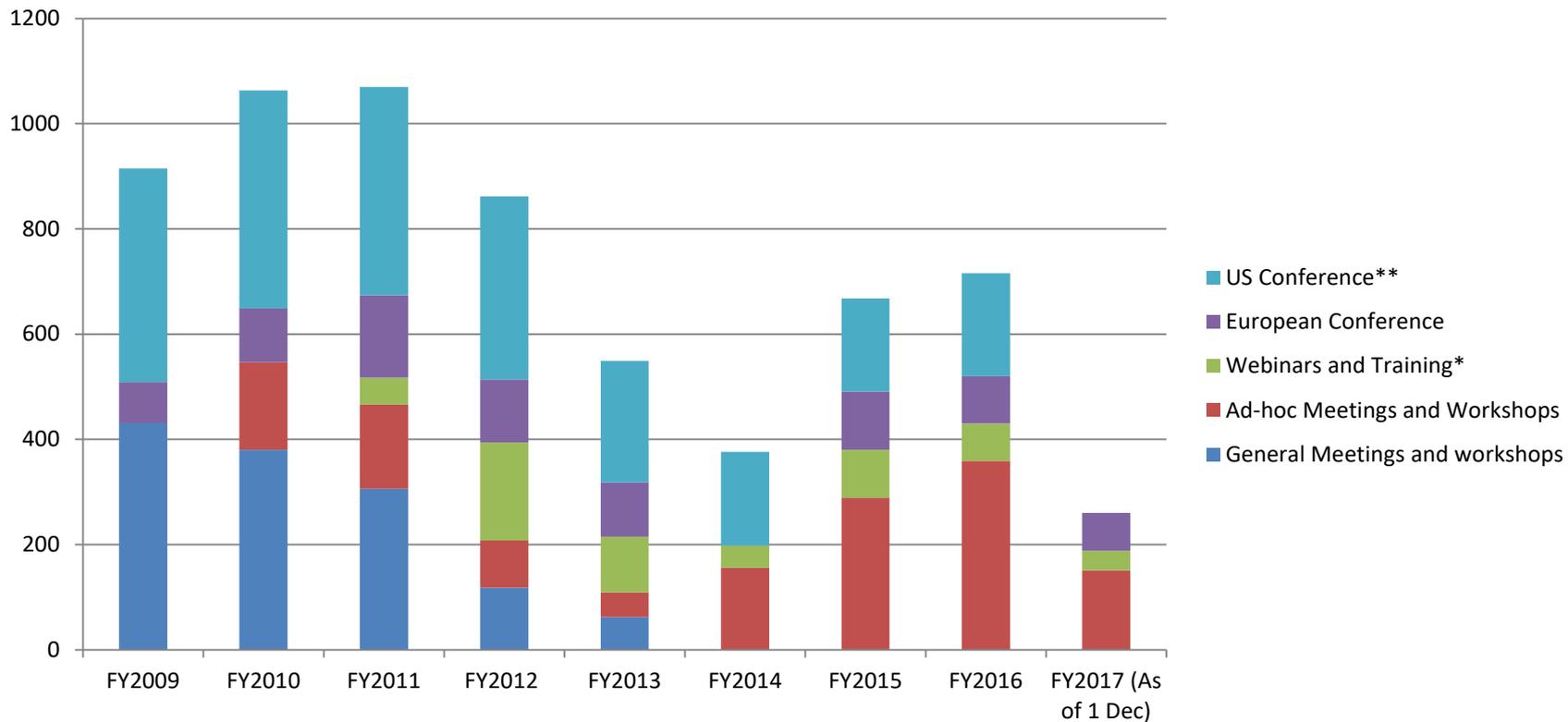
India Regional Committee Meetings

- July 2015
- Jun 2016

Spectrum Sharing Committee Events

- Webinars
 - Review of the WInnForum CBRS COMSEC Document – Feb 2016
 - SSC SAS to CBSD and SAS to SAS Early Release Protocols - Jun 2016
- Committee Meetings
 - Aug 2015
 - Sep 2015
 - Nov 2015
 - Jan 2016
 - Feb 2016
 - Mar 2016
 - May 2016
 - June 2016

Performance by Attendance



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THALES

Supporting Collaborative Development of Reports, Recommendations and Specifications

Professional Tools

- Group Portal
 - Document Development
 - File Management
- Tele/Web Conferencing
 - Go To Meeting

The screenshot shows the SDR Forum website for the Transceiver Facility Task Group. The page includes a navigation menu with options like Home, Communities, News, Forums, Files, Members, Surveys/Polls, Blogs, and Admin. The main content area features a 'Links' section, 'Admin Links', and a 'News' section with a recent entry: 'News: Transceiver System Interface Task Group News - Transceiver Facility V1.0.0 approved on 28-Jan-09 (Feb 19, 2009 02:40 PM)'. There is also a 'Forum' section and a 'Meetings for November 2009' calendar.

Staff Support

- Technical Editing
- Graphic Design
- Configuration Management
- Balloting

The screenshot shows the SDR Forum website for the SCA WG NEXT group. The page includes a navigation menu and a 'Links' section. The main content area features a calendar for November 2009, a 'Forum' section with a list of document library entries (e.g., 'Document Library: S013 FOCUS Architectural Consistency'), and a 'File Library' section. There is also a 'Meetings for November 2009' calendar and an 'Announcement Lists' section.

Memberships and Partnerships



Wireless Innovation Forum Memberships and Partnerships

Website Page Views

	2011	2012	2013	2014	2015	2016
External Main Site	183,016	117,633	68,150	83813	67,994	68,753
Groups Main Site		121940	116045	128974	102,399	100,810
External US Conference	54613	23418	16168	17321	27,866	29,229
External Europe	30901	16342	8492	5971	16,106	11,019
Total	268,530	279,333	208,855	236,079	214,365	209,811

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Document Downloads

	FY2012	FY2013	FY2014	FY2015	FY2016
Conference Proceedings	114,015	122,221	152,866	103,404	49,825
Workshop Proceedings	15,740	15,248	22,671	12,553	51
Work Products					
• Reports	5,140	9,116	12,107	19,321	18,091
• Recommendations	4,891	6,270	8,604	17,407	17,426
• Specifications	2,337	2,558	2,929	6,051	5,338
Market Studies	1,272	1,339	1,663	2,867	2,929
SCA Standards Portfolio	2,784	3,541	4,858	4,974	3,808
Webinars	1,453	2,033	186	-	-
Other	15,926	16,970	31,597	75,027	39,525
Total	163,558	179,297	237,481	241,604	145,202

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FY2016 You Tube Channel Views: 2608

Latest Design Strategies using Xilinx Virtex 7 FPGA for Software Radio	475
Understanding the New U S 3 5 GHz Band	438
Cognitive Radio Networking In The Ism Band	408
The Software Communications Architecture	317
The ADCs of SDR: Parameters, Design Considerations and Implementations	260
Top Down Design Of Wireless Systems	199
Review of WInnForum s CBRS COMSEC Document and Other Security Related Topics	80
Wireless Innovation Forum Top Ten Most Wanted Wireless Innovations	80
Facilitating Spectrum Sharing Between Secondary Systems	77
Introduction To Spectrum Policy For Technologists	76



Press Releases

28 Press Releases published thus far in CY2016

Topics include:

- Project initiation
- Formation of new groups
- Approval and publication of reports, recommendations and specifications

<http://www.wirelessinnovation.org/forum-news>

Member Discounts

Dozens of discounts negotiated for Forum Members

- Market Studies
- Events
- Products and Services

See Website for Details

Social Media, etc.

RSS news feed:

- <http://feeds.feedburner.com/SDRForumNews>



Twitter

- <http://twitter.com/winnforum>



Linked In:

- <http://www.linkedin.com/groups?mostPopular=&gid=95572>



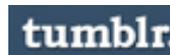
Facebook:

- <http://www.facebook.com/WInnForum?ref=sgm>



Tumblr

- <http://winnforum.tumblr.com/>



Wikipedia

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Finance Committee Report

8 December 2016

Balance Sheet

ASSETS	FY2016	FY2015
CURRENT ASSETS:		
Cash and cash equivalents	\$285,898	\$241,625
Total Current Assets	\$285,898	\$241,625
OTHER ASSETS:		
Deposits	\$4,615	\$4,615
Total Other Assets	\$4,615	\$4,615
Total Assets	\$290,513	\$246,240
LIABILITIES AND NET ASSETS		
CURRENT LIABILITIES		
Credit card payable	\$4,137	\$6,305
Total Current Liabilities	\$4,137	\$6,305
NET ASSETS:		
Unrestricted net assets	\$286,376	\$239,935
Total Net Assets	\$286,376	\$239,935
Total Liabilities and Net Assets	\$290,513	\$246,240

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