



# Annual Report

for

The Software Defined Radio Forum Inc.,

doing business as

The Wireless Innovation Forum

for the Year Ending

30 June 2013



## ABOUT THE WIRELESS INNOVATION FORUM

Established in 1996, the Wireless Innovation Forum™ is a non-profit "mutual benefit corporation" dedicated to advocating for the innovative use of spectrum, and advancing radio technologies that support essential or critical communications worldwide. Forum members bring a broad base of experience in Software Defined Radio (SDR), Cognitive Radio (CR) and Dynamic Spectrum Access (DSA) technologies in diverse markets and at all levels of the wireless value chain to address emerging wireless communications requirements through enhanced value, reduced total life cost of ownership, and accelerated deployment of standardized families of products, technologies, and services. The Forum acts as the premier venue for its members to collaborate to achieve these objectives, providing opportunities to network with customers, partners and competitors, educate decision makers, develop and expand markets and advance relevant technologies.

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## BOARD OF DIRECTORS

<b>Eric Christensen</b>	Chairman
<b>Dr. Ruediger Leschhorn</b>	Vice Chair
<b>Bruce Oberlies</b>	Board of Directors Chair
<b>Mark Turner</b>	Treasurer
<b>Kuan Collins</b>	Secretary
<b>John Glossner</b>	Chief Technical Officer
<b>Manuel Uhm</b>	Chief Marketing Officer
<b>Keith Nolan</b>	Chief Regulatory Officer
<b>Vincent Kovarik</b>	Member At Large
<b>Terry Anderson</b>	Member At Large
<b>David Renaudeau</b>	ITU Region 1 Representative
<b>Peter Stanforth</b>	ITU Region 2 Representative
<b>R. Murali hadran</b>	ITU Region 3 Representative
<b>Claudio Armani</b>	Large Company Representative
<b>Bob Schutz</b>	Medium Company Representative
<b>James Neel</b>	Small Company Representative
<b>Hiroshi Harada</b>	Government/Non-Profit Group Representative
<b>Gerd Ascheid</b>	Academic Representative

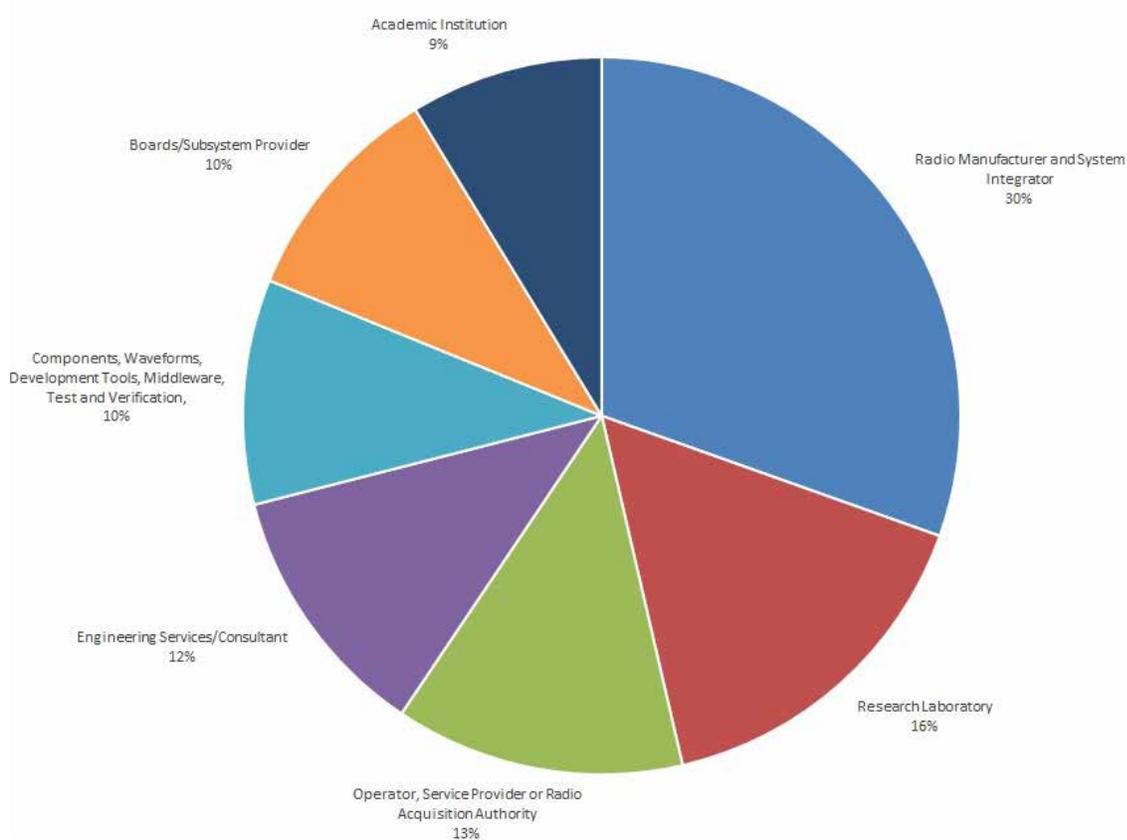
## THE WIRELESS INNOVATION FORUM

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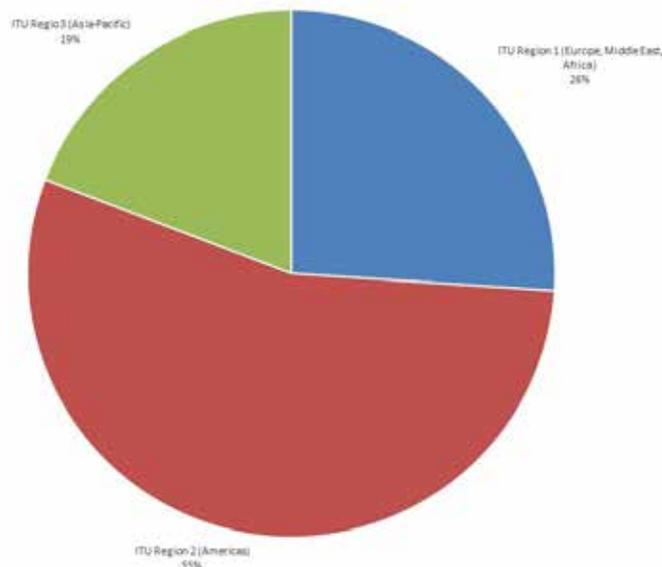
## 2012/13 MEMBERSHIP

The membership of the Wireless Innovation Forum (SDR Forum Version 2.0) consists of commercial, defense, and civil government organizations including wireless service providers, network operators, component and equipment manufacturers, hardware and software developers, regulatory agencies, and academia. Individual representatives from these organizations include decision makers, planners, policy makers, technologists, educators, and program/product managers. Presently numbering more than 75 organizations, the Forum's membership spans Asia-Pacific, Europe, and North America.



**Membership by Value Chain – 30 June 2013**

## 2012/13 MEMBERSHIP (CONTINUED)



**Membership by Region – 30 June 2013**

## 2012/2013 PROGRAM REVIEW (1 JULY 2012 - 30 JUNE 2013)

### **Organizational Structure**

The Organizational Structure of The Wireless Innovation Forum as of 30 June 2013 is presented in the diagram below. The Forum is organized around two standing committees, whose responsibilities are summarized as follows:

- The role of the Spectrum Innovation Committee is to advocate for the innovative utilization of spectrum, and advancing radio technologies that support essential or critical communications:
  - ◇ Works with wireless end users and their representatives, including network operators, government acquisition authorities and research sponsors to validate concepts and requirements against technology readiness, to document domain specific requirements, use cases and business models.
  - ◇ Supports member organizations in identifying new opportunities for next generation products and services in each defined market domain.
  - ◇ Works with the regulatory and public policy community to establish a global regulatory framework promoting the adoption of emerging technologies for advanced wireless systems.
  - ◇ Provides a venue for the exchange of information on emerging radio technologies important in wireless networking and produces reports, specifications and recommendations supporting the development and deployment of advanced wireless system and next generation radio devices

Management and oversight of this committee is provided by a Steering Group working in collaboration with a [Regulatory Advisory Committee](#). The Steering Group is comprised of the [Forum's Officers](#), and is responsible for drafting the Forum's "Top 10 Most Wanted Wireless Innovations" list and setting the Forum's "Advocacy Agenda" based on member input. These documents will be distributed to the members of the Forum for ballot following the Forum's standard process.

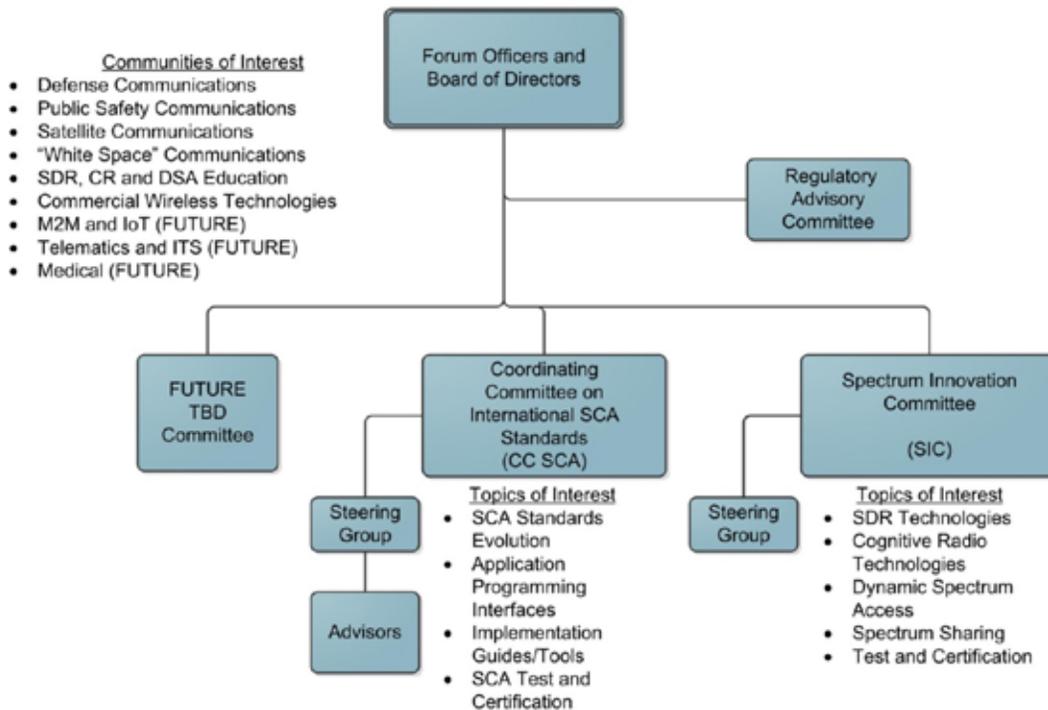
- Coordinating Committee on International SCA Standards: supports the harmonization of SCA based standards at the international level for the mutual benefits of all stakeholders to include:
  - ◊ Defining an industry driven SCA evolution roadmap for the international community
  - ◊ Profiling the SCA specification and related APIs to define internationally accepted variants that are hosted by the Forum
  - ◊ Developing extensions to the SCA standards that address any gaps between the defined SCA evolution roadmap and Forum accepted SCA specification variants
  - ◊ Providing implementation and certification guides, tools etc. easing implementation and supporting proliferation
  - ◊ Establishing and managing industry led certification programs where appropriate

Management and oversight of this committee is provided by a Steering Group working in collaboration with an [Advisory Council](#).

These committees are managed by the Forum’s elected officers, which include the Chair and Vice Chair of the Forum, the Chief Technology Officer, Chief Marketing Officer, Chief Regulatory Officer, the Secretary, and the Treasurer.

## Organizational Structure for The Wireless Innovation Forum

17 April 2013



**Figure 1: Wireless Innovation Forum FY2012 Organizational Structure**

Key deliverables for 2013 from each element of the organization are provided in sections that follow.

## **Collaboration on Reports, Recommendations and Specifications**

A primary purpose of the organization is to facilitate collaboration between members and the broader community to promote the advancement of software defined radio, cognitive radio and dynamic spectrum access technologies. To support this objective, the Forum held three General Meetings in fiscal year 2012. These meetings are the face-to-face working meetings of the Forum membership, providing them a venue to explore the reconfigurable radio market and to advance the Forum's work plan in support of the commercial, public safety, and international tactical radio communities. The general meetings held in FY2013 and the associated workshops are as follows:

- 73rd General Meeting: 31 Oct to 2 Nov, 2012 in Melbourne, Florida (Hosted by Harris)
- 74th General Meeting: 8 to 11 January, 2013 in Washington DC (held in conjunction with SDR-WinnComm)
- 75th General Meeting: 11 to 13 March, 2013 in Las Vegas, Nevada (held in conjunction with IWCE)

The Forum also hosted 4 webinars in FY2013

- "Facilitating Spectrum Sharing Between Secondary Systems" 28 Aug 2012
- "The Latest Design Strategies using Xilinx Virtex-7 FPGAs for Software Radio" 26 Sep 2012
- "Declarative Policies for DSA" 18 Dec 2012
- "Techniques for RF/IF Signal Processing" 2 Apr 2013

The Forum plans to continue these webinars in FY2014. Participation in these webinars will always be free for members, but non-members may from time to time be invited to participate for a fee.

In addition to these meetings and workshops, the Forum also provides teleconferencing and web conferencing services to facilitate collaboration between meetings, and maintains a group portal supporting file libraries, document management and discussion forums. Through these services, the members of the Forum balloted and approved the following work products in FY2013, which have been made publically available through the Forum's document library ([http://www.wirelessinnovation.org/page/Document\\_Library](http://www.wirelessinnovation.org/page/Document_Library)):



- International Radio Security Services API (Document WINNF-09-S-0011-V2.0.0)
- Wireless Innovation Forum Top 10 Most Wanted Wireless Innovations (Document WINNF-11-R-0014-V3.0.0)
- Response to the National Telecommunications and Information Administration (NTIA) Notice of Inquiry on the FirstNet Conceptual Network Architecture (Document WINNF-12-R-0006-V1.0.0)
- Wireless Innovation Forum Advocacy Agenda (Document WINNF-R-12-0007-V1.0.0)
- Business Models for New Entrants in the SDR Tactical Radio Market (Document WINNF-13-P-0001-V1.0.0)
- Wireless Innovation Forum's Comments to the FCC regarding the Notice of Proposed Rulemaking and Order on Enabling Innovative Small Cell Use in the 3.5GHz Band (Document WINNF-13-R-0002-V1.0.0)
- Assessment of Cognitive Radio Technologies for Public Safety Communications (Document WINNF-13-P-0003-V1.0.0)
- IRSS API Functional Requirements Analysis and Specification (Document WINNF-13-S-0004-V1.0.0)

Members also collaborated on the development of a number of other work products that are expected to be balloted in FY2014:

- **“Integrated Communications Systems Model (ICS)”**. This model is being created for developers of SDR communications systems across multiple market and government segments who require the development of integrated systems models that encompass both hardware and software architectures within a single integrated design paradigm. The project will produce a reference architecture and design model describing SDR-based communications systems which, unlike predominantly software-focused design and implementations, will provide an integrated systems model for communications systems that can be used as a foundation for software-based communications systems across a variety of domains, hardware types and applications. This model will be developed using a SysML/UML tool to represent and capture the architecture aspects of the communications system model.
- **“Receiver Performance Guidelines and Evaluation Criteria”**. 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 users 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.
- **“Modeling Language for Mobility (MLM)”**. This specification is being developed for developers of next generation communication systems who want to develop flexible and efficient communication protocols between advanced radio systems to support next generation features of vertical and horizontal mobility, spectrum awareness and dynamic spectrum adaptation, waveform optimization capabilities, feature exchanges, and advanced applications. The Report will include use cases, corresponding signalling plan, requirements and technical analysis of the information exchanges that enable these next generation features. It is intended to lead to specifications/standards for languages and data exchange structures to support these capabilities, with the ontology and the MLM language developed in this project providing opportunities for development of interoperable radios by independent vendors by providing a common language for knowledge and information exchange between multiple radios. This project is also being coordinated with the IEEE P1900.5 project with several of the MLM members participating in that P1900.5 working group and providing contributions to that effort.
- **“SCA Test Lab Recommendation”**. The purpose of this recommendation is to provide an overview understanding of an SCA Test Lab. This document sets out to identify artifacts that are the inner workings for an SCA Test Lab's existing. This document identifies the business case as it pertains to the financial concerns as a business entity.
- **“SCA Next Recommendations”**. The **SCA Next Work Group** will support the continued evolution of SCA Standards through the technical analysis, evaluation and recommendation of corrections, extensions and improvements, delivering formal recommendations to JTRS JPEO for consideration of incorporation into future versions of the specifications. This will include evaluation and recommendation of SCA Standards extensions that could come from other Programs (i.e., ESSOR Program, SvuFA Program). The anticipated cadence for providing recommendations is every 6 months.
- **“SCA Waveform Applications Portability Guidelines”**. The SCA Implementer's Work Group will develop and publish a set of SCA waveform application portability guidelines for the waveform developers

and radio platform manufacturers who require reducing the cost, effort and time needed to perform the development and porting of waveforms among different processing architectures (i.e: DSP, FPGA). The report will provide a compilation of portability recommendations, guidelines and best practices for waveform development with portability as the main target.

- **“SCA API Requirements Specification”**. The SCA API WG will generate and release a specification that establishes a set of requirements of what normative material a complete API must contain.

In addition, the Forum's Spectrum Innovation Committee Steering Group will work to publish a revision of the Forum's "Top 10 Most Wanted Wireless Innovations" and "Advocacy Agenda" in Fiscal Year 2013.

## **Technical Conference**

The Forum held its annual US technical conference and product exposition January 8th to 11th, 2013 at the Wardman Park, Marriott in Washington DC. This event acts as the primary vehicle for the organization to fulfill its education mandate, and featured more than 80 papers and presentations focusing on software defined and cognitive radio technologies, standards, regulatory issues and business activities - presented by an international array of researchers and organizations in the commercial, civil and defense communications markets to attendees from over 22 countries. The event provides an international perspective on the current state of the art for advanced wireless communications and included keynotes, workshops, panels, tutorials and product demonstrations from over 21 exhibitors.



*Keynote speaker Michael Calabrese*

In support of this event, in FY2013 the Forum arranged a travel grant with the US National Science Foundation to provide support to students at US Universities active in software defined radio and cognitive radio in attending the conference. The goal of this grant was to provide students with exposure to industry and the real problems they will face when entering the workforce in the design, development, manufacture and deployment of advanced wireless systems. Such exposure will help them to better understand how their course work at university applies in a real world setting, and will accelerate the pace at which they become productive upon graduation. At the conference they will meet and interact the leading researchers and practitioners in this field. 17 travel grant awards were made by the conference's program committee, with grants of up to \$950 made to students living within 300 miles of the event, and grants of up to \$1500 made for students living more than 300 miles away. Grants were made against actual expenses, and receipts were required before payment was made. The Forum also provided lodging at the conference hotel for a fixed number of nights as a matching contribution.

The Forum is scheduled to hold its next annual US technical conference and product exposition March 11 to 13, 2014 at Motorola Solutions Customer Briefing Center in Schaumburg, Illinois. In FY2013, the Forum formed a Technical Program Committee, issued the call for papers, tutorials, demonstrations and workshops for this event, and began soliciting for sponsors and exhibitors.

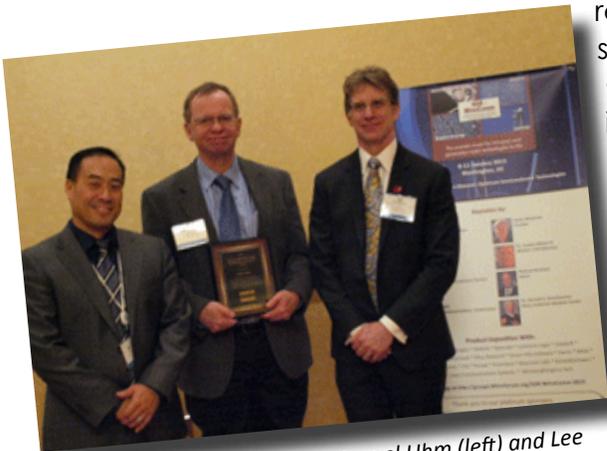
In addition, in FY2013 hosted its third European Conference on Communications Technologies and Software Defined Radio. This conference was held June 11 to 13, 2013 in Munich, Germany and featured over 32 papers and presentations focusing on research and development related to software

defined radio, cognitive radio and dynamic spectrum access in European Programs. The conference attracted over 103 delegates from 25 countries representing organizations at all level of the wireless value chain. The conference also included a small exhibition with 9 exhibitors.

## **Achievement Awards**

Each year, the Forum presents awards in three categories:

- Wireless Innovation Forum International Achievement Award – This award is presented to an individual, group of individuals, or organization that made especially significant contributions to international furtherance or acceptance of Software Defined or Cognitive Radio
- Wireless Innovation Forum President's Award – This award is presented to individuals in recognition of their sustained outstanding contributions in support of the Wireless Innovation Forum and its activities.
- Wireless Innovation Forum Technology of the Year – This award is presented to an individual or organization for a breakthrough product or technology in the field of software defined or cognitive radio as selected by the members.



*Dr. Jeffrey Reed (center) with Manuel Uhm (left) and Lee Pucker*

In FY2013, Dr. Jeff Reed from Virginia Tech was awarded the International Achievement Award, Dr. John Glossner of Optimum Semiconductor Technologies was awarded the President's Award, and Weightless was awarded the Technology of the Year.

## **Other Member Services**

The Forum manages a number of other smaller programs for its members that are collectively referred to as "other member services". These include the following:

- Linked-In Group – The Forum manages a members-only Linked-In group to facilitate networking among representatives of its member organizations. During FY2013 we continued to use it as a communication tool to effectively reach membership, as previous research has shown it to be one of the important social media outlets for our membership.
- Member Newsletter – The Forum provides up to date information on opportunities and news within the advanced wireless community through the Forum's "SDR, CR and DSA News and Opportunities" e-newsletter. In FY2013, we switched to daily delivery to be as immediately responsive as possible to the timeliness of news stories included.
- Member Discounts – The Forum negotiates discounts for its members for relevant market studies, events and other items. In FY2013, the Forum secured discounts as follows:

### *Products/Services*

- ◇ 10% Discount on membership in The Object Management Group.
- ◇ 15% Discount on Real Wireless marketing report "White space devices: Market, technology, risks and opportunities"
- ◇ 50% discount for members interested in purchasing Frost and Sullivan's report "U.S. Military Software Defined Radio Markets"
- ◇ 10% discount for members interested in purchasing Forward Concepts Markets Study market research study number 8030 entitled – "Cellular Handset and Chip Markets '08, An In-

Depth, Global Analysis of Cellphones, Chips & Subscribers" and their market research study number 7020 entitled - Cellular Handset and Chip Markets 07, An In-Depth, Global Analysis of Cellphones, Chips and Subscribers.

- ◇ 10% discount for Wireless Innovation Forum members on the applicable "North American Price" for all Elsevier Communications Engineering print books that are in-stock.
- ◇ One hard copy version at a discount of 25% off the then applicable "North American Price" or "International Price" or one electronic version of the Report (in .pdf format) and an "Enterprise License" to distribute copies thereof to the eligible Forum Member's employees on a worldwide basis, at a discount of 25% off the then applicable "Enterprise License" price discount for Wireless Innovation Forum members interested in purchasing ARCchart Market Research Report entitled "Software-Defined Radios in Mobile Phones, an Analysis of the Maturing Wireless Technology Set to Disrupt the Mobile Ecosystem.
- ◇ 25% discount on the "Single User" or "Multi-User" price as shown on their report website for Pioneer Consulting to provide a discount for members interested in purchasing their market research study entitled "Commercial Software Defined Radio - The Emergence of Multiprotocol Multiband Support in Base Stations".
- ◇ Avis is offering a year-round link for rental discounts for Wireless Innovation Forum members.

#### *Events*

- ◇ 20% discount to Antenna Systems 2012, 18-19 September, Denver, Colorado
  - ◇ 20% discount to Super Wi-Fi Summit, 3-5 October 2012
  - ◇ 20% discount to Mobility Tech Conference, 3-5 October 2012
  - ◇ 15% discount to Broadband World Forum 2012, 16-18 October 2012, Amsterdam
  - ◇ £100 discount to Global MilSatCom 2012, 27-29 November 2012
  - ◇ 25% discount to IWCE 2012, 13-14 March 2013, Las Vegas
  - ◇ 15% discount to Broadband MEA, 19-20 March 2013, Dubai
  - ◇ 15% discount to Broadband Asia and TV Connect Asia 2013, 9-10 April 2013, Hong Kong
  - ◇ 10% discount to IMS World Forum, 23-25 April 2013, Barcelona, Spain
  - ◇ 15% discount to Connections, 20-23 May 2013, Las Vegas
  - ◇ 15% discount to Critical Communications World 2013, 21-24 May 2013, Paris, France
- Product and Services Directory – This directory provides insight into products and services offered by Forum member organizations to help individuals operating at all levels of the wireless value chain to quickly find partners that can help address their specific requirements. There is no cost for members to participate in this directory, and members are offered assistance in ad creation if desired.

## MEMBERS

Aeroflex Corporation  
Air Force Research Lab - IFGC  
Alliance for ESSOR (a4ESSOR)  
Al Yah Satellite Communications Company  
Artisan Wireless Solutions, LLC  
Aselsan AS  
Aviacomm  
Battelle Memorial Institute  
Bharat Electronics Limited (Central Research Lab)  
Boeing  
Center of Excellence  
CERDEC Space & Terrestrial Communications Directorate  
Cognitive Radio Technologies, LLC  
Coherent Logix, Inc.  
Communications Research Centre (CRC)  
CTVR  
DataSoft Corporation  
Datron World Communications Inc.  
DEAL-DRDO  
DSO National Laboratories  
Elektrobit Wireless Communications Ltd  
Engility  
Etherstack  
ETRI  
Ettus Research LLC  
FMV  
Fraunhofer-Institut  
General Dynamics C4 Systems  
GIRD Systems, Inc.  
Gonzaga University  
Hanyang University  
Harris Corporation  
Hitachi Kokusai Electric Inc.  
Indra Sistemas  
Innovative Integration  
Institute for Infocomm Research  
Institute for Telecommunications Research  
ITT Exelis  
Key Bridge Global, LLC  
MIT Lincoln Laboratory  
MITRE Corp (Washington C3 Operations)  
Motorola Solutions  
NASA Glenn Research Center  
NAVSYS Corporation  
NCOIC  
NEC Corporation  
NICT  
Oak Ridge National Laboratory  
Objective Interface Systems, Inc.  
OMG  
Optimum Semiconductor Technologies, Inc.  
Pentek Inc.  
PrismTech  
QinetiQ  
Radmor SA  
Rafael Advance Defense Systems Ltd.  
Raytheon  
Research in Motion Limited  
Reservoir Labs  
RFEL Ltd.  
Rockwell Collins  
Rohde & Schwarz  
Rolta  
RWTH Aachen University  
SAIC  
Selex ES  
Southwest Research Institute  
Space Coast Communication Systems, Inc.  
SPAWAR  
Spectrum Bridge, Inc.  
Spectrum Signal Processing by Vecima  
Tata Consultancy Services  
Tata Power SED  
Thales Communications  
U-Blox  
University of Oulu  
VISTology, Inc.  
Wireless @Virginia Tech

SUMMARY FINANCIAL STATEMENTS

**Summary Statement of Forum Assets, Liabilities, and Net Assets (Modified Cash Basis) for Year Ending 30 June 2013**

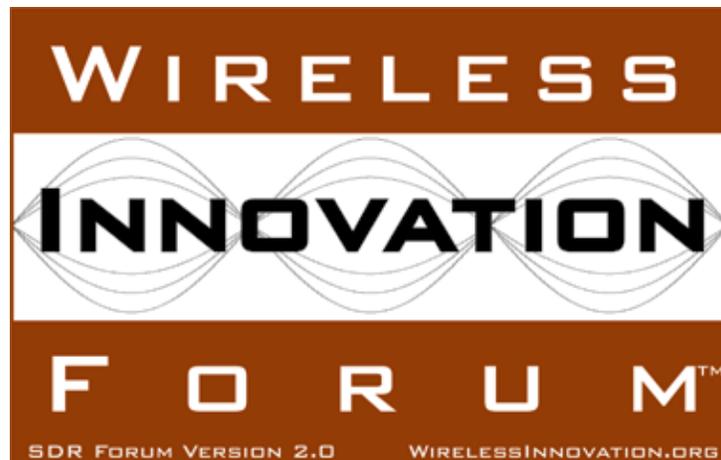
30 June 2013	
<b>Assets</b>	
Current Assets	
Cash and Cash Equivalents	\$211,870
Short Term Investments	
<i>Total Current Assets</i>	<i>211,870</i>
Long Term Investments	-
<i>Total Other Assets</i>	<i>10,829</i>
<b>Total Assets</b>	<b>222,699</b>
<b>Liabilities and Net Assets</b>	
Current Liabilities	<b>4,155</b>
Net Assets	
Unrestricted Net Assets	218,544
<i>Total Net Assets</i>	<i>218,544</i>
Total Liabilities and Net Assets	\$ 222,699

<sup>1</sup>Summary statement is based on the report from the independent auditor, and should not be considered complete. Full audited financial statements, including notes, are available for review upon request. The Software Defined Radio Forum Inc.'s Form 990 filings with the US Internal Revenue Service are publically available at <http://www2.guidestar.org>.

**Summary Statement of Forum Revenues, Expenses, and Change in Net Assets (Modified Cash Basis) for Years Ending 30 June 2011, 30 June 2013.**

	30 June 2013
<b>Unrestricted Net Assets</b>	
Revenue	
Membership Fees	\$297,385
Facility Fees	278,281
Program Fees	72,788
Government Grant	17,673
Interest and Other Revenue	3,266
<i>Total Revenue</i>	<b>669,393</b>
Program Expenses	
Advertising	-
Consulting	27,199
Facilities and Event Food	159,776
Insurance	2,154
Management Fees	93,292
Office Expense	5,181
Payroll Expense	5,607
Scholarships/Prizes/Awards	17,673
Travel and Transportation	13,305
<i>Total Program Expenses</i>	<b>324,187</b>
General and Administrative Expenses	
Payroll Expenses	207,171
Advertising and Publications	1,512
Bank Charges	26,397
Consulting	6,844
Currency Exchange Loss	4,601
Dues and Subscriptions	52
Insurance	8,799
Management Fees	81,000
Miscellaneous and Other Expenses	203
Office Expense	31,466
Outside Services	4,369
Professional Fees	12,080
Telephone	5,958
Training and Seminars	227
Travel and Transportation	7,408
Website	6,202
<i>Total General and Admin. Expenses</i>	<b>404,269</b>
<b>Total Expenses</b>	<b>728,456</b>
<b>Change in Net Assets</b>	<b>(59,063)</b>
<i>Net Assets Beginning of the Period</i>	277,607
<b>Net Assets End of the Period</b>	<b>\$218,544</b>

<sup>2</sup>Summary statement is based on the report from the independent auditor, and should not be considered complete. Full audited financial statements, including notes, are available for review upon request. The Software Defined Radio Forum Inc.'s Form 990 filings with the US Internal Revenue Service are publicly available at <http://www2.guidestar.org>



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