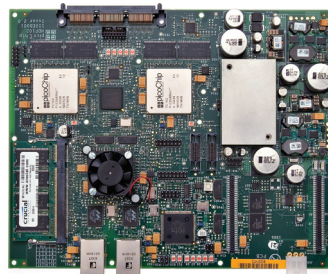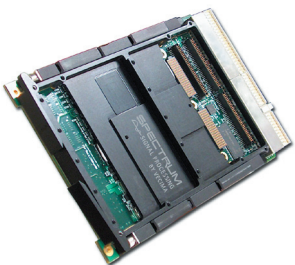# Annual Report

for the Year Ending
31 December 2007

About the SDR Forum

Established in 1996, the SDR Forum™ is a non-profit international industry association dedicated to promoting the success of next generation radio technologies. The Forum's 100-strong membership comprises world class technical, business and government organizations from EMEA, Asia and the Americas who are passionate about creating a revolution in wireless communications based on reconfigurable radio. Forum members span commercial, defense and civil government organizations at all levels of the wireless value chain including service providers, operators, manufacturers, developers, regulatory agencies, and academia. SDR Forum is the only organization in the world dedicated to serving the industry's needs through advocacy, opportunity development, commercialization and education.

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Board of Directors

John Chapin	Chairman
Dr. Seungwon Choi	Vice Chair
Ruediger Leschhorn	Vice Chair
John S. Powell	Board of Directors Chair
Mark R. Turner	Treasurer
Peter G. Cook	Secretary
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Manuel Uhm	Markets Committee Chair
Bernard Eydt	Regulatory Committee Chair
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Murat Bicer	Medium Company Representative
Dr. David Murotake	Small Company Representative
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Seppo Tiainen	Network Operator/Service Provider Rep
Fred Frantz	Member At Large
Christian Serra	ITU Region 1 Rep
Peter Tenhula	ITU Region 2 Rep
Hiroshi Harada	ITU Region 3 Rep

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Forward by the Chair of the SDR Forum

2007 was a productive year for the SDR Forum. A number of major documents were finalized and published, representing hundreds of hours of effort on the part of the Forum's members in building consensus opinions representative of the Forum's membership. These documents include an analysis of the London Underground bombing of 2005, illustrating how the use of Software Defined and Cognitive Radio technologies could have helped the incident responders to communicate more effectively; a cognitive radio definitions document, developed in collaboration with the IEEE P1900.1 group to provide a single set of definitions that is supported by both organizations; a smart antenna application programming interface specification, which addresses a key need in the SDR community and represents the first specification developed following the Forum's revised standards process; and a document containing the consolidated recommendations from the SDR Forum to NASA on the Space Telecommunications Radio System (STRS).

In addition to documents developed by members, the Forum also released 4 new market study reports on cognitive radio, public safety radios, WiFi/WiMax, and telematics. These reports were commissioned by the SDR Forum's Markets Committee from Jim Gunn, a market research and technology consultant, and were intended to help our members gauge the state of technology readiness in various market segments.

2007 also saw the completion of the first SDR Forum Smart Radio Challenge. The Challenge brought 8 student teams to the SDR '07 Technical Conference to compete for scholarships and awards by solving problems using software defined and cognitive radio technologies.

Organizationally, the SDR Forum created a new position of Chief Executive Officer and hired Lee Pucker to serve in that role. The Forum undertook a process to create a new strategic plan for 2008 to 2011 which the CEO has primary responsibility for carrying out.
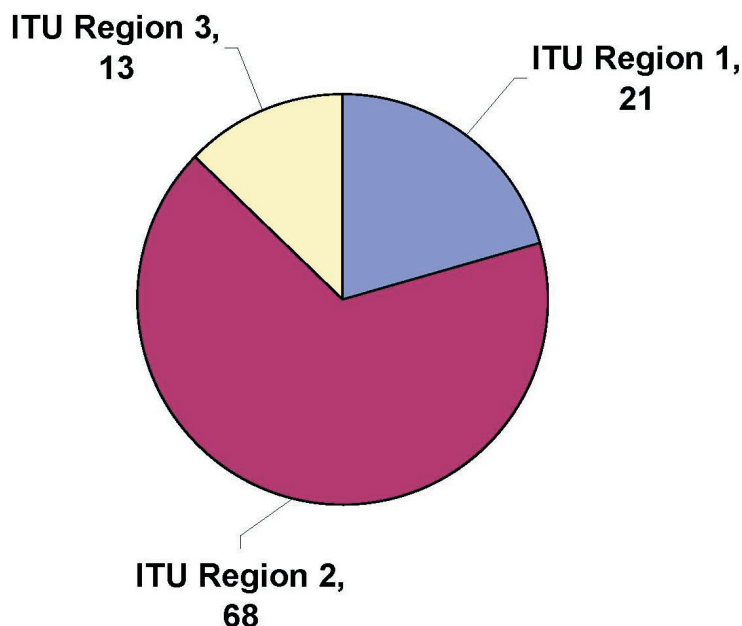
This is an exciting time in the advanced wireless market. The end-user and regulatory perspectives brought by the SDR Forum's members when coupled with our member's collective technical and business expertise have made the SDR Forum in 2007 a valued and successful enterprise.
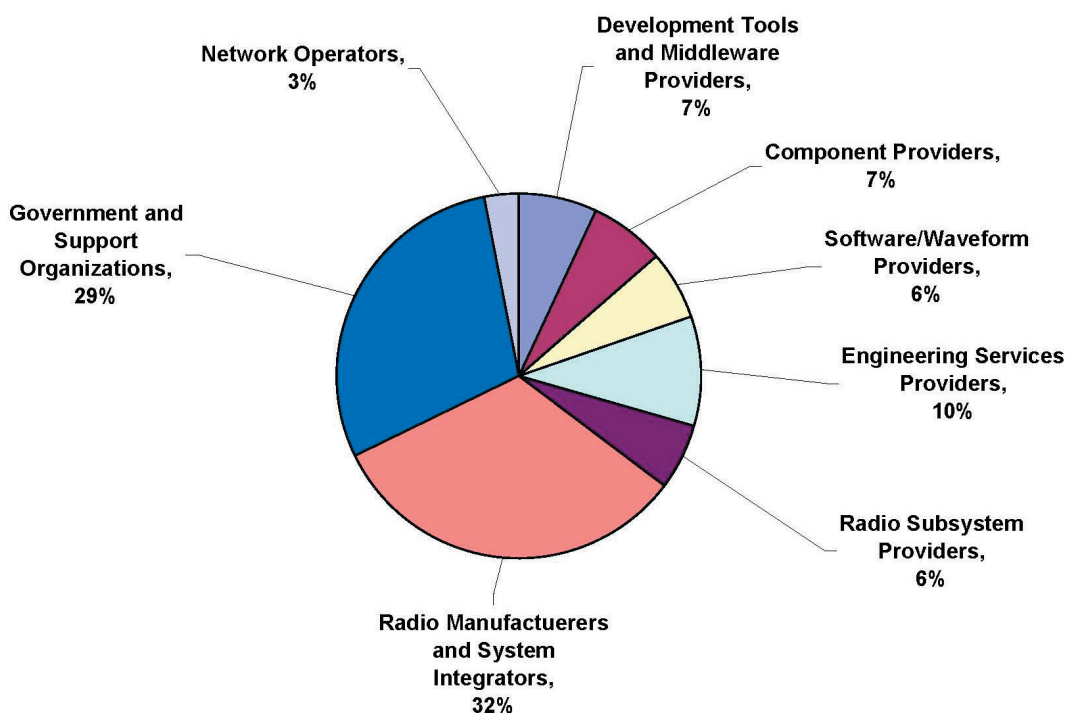
John Chapin
Chair of the SDR Forum

2007 MEMBERSHIP

The membership of the SDR Forum 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. Currently numbering more than 100, the SDR Forum's membership spans Asia-Pacific, Europe, and North America.

SDR Forum Membership by Region - 31 December 2007

ITU Region 3, 13

ITU Region 1, 21

ITU Region 2, 68

SDR Forum Membership By Value Chain - 31 December 2007

Network Operators, 3%

Development Tools and Middleware Providers, 7%

Component Providers, 7%

Software/Waveform Providers, 6%

Government and Support Organizations, 29%

Engineering Services Providers, 10%

Radio Subsystem Providers, 6%

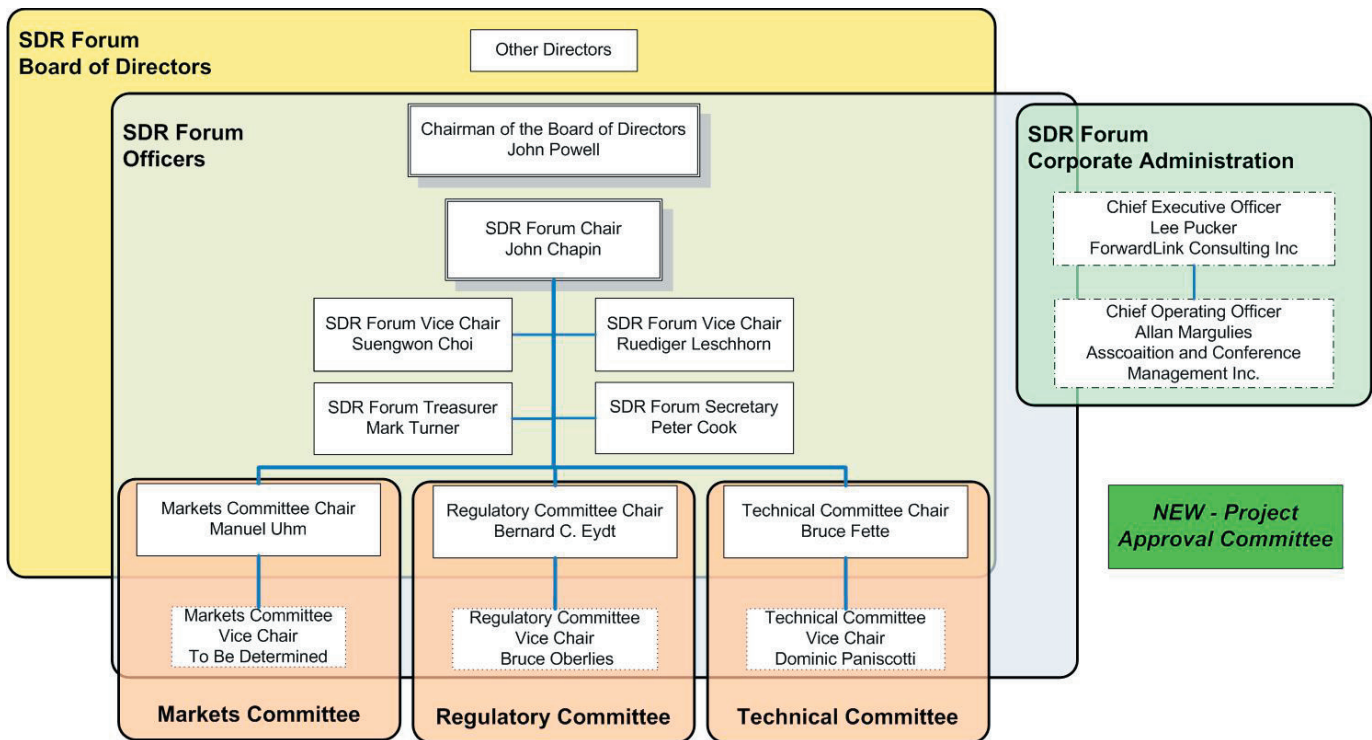Radio Manufactuerers and System Integrators, 32%

2007 Program Review

Organizational Structure

The Organizational Structure of The SDR Forum as of 31 December 2008 is presented in the figure below. The Forum is organized around three primary committees, whose responsibilities are summarized as follows:

- *The Markets Committee:* Defines domain specific requirements, use cases and business models that will drive the activities of the Regulatory and Technical committees. The Markets Committee also has responsibility for supporting member organizations in identifying new opportunities and developing new markets for reconfigurable radio products and services.

- *The Regulatory Committee:* Works with the regulatory and public policy community to establish a global regulatory framework promoting the adoption of reconfigurable radio technologies. The work of the Regulatory Committee is facilitated by a Regulatory Advisory Committee made up of regulators from around the world working on issues relevant to reconfigurable radio technologies.

- *The Technical Committee:* Produces technical documents defining the "state of the art" in reconfigurable radio technologies, and facilitating standards, certification and demonstration projects that will reduce the costs (development, production, operations) and time to market/ time for deployment of reconfigurable radio technologies.

Key deliverables for 2007 from each element of the organization are provided in sections that follow.

2007 Technical Committee Deliverables

The SDR Forum Technical Committee delivered the following three work products in 2007:

Smart Antenna API Specification (Document Number SDRF-07-S-0016-V1.0.0): This document defines an application programming interface (API) that standardizes the set-up, dataflow and control of multi-antenna platforms supporting beam forming, direction finding and multiple-input/multiple-output (MIMO) applications. The goal of this new API is to facilitate the formation of an ecosystem of vendors supporting a unified architecture for smart antenna technologies, providing telecommunications equipment manufacturers, radio vendors and network operators in multiple segments of the market with a cost effective tool for optimizing signal quality, capacity, and coverage. Following balloting on this document, the approved specification was submitted to the Object Management Group (OMG) in response to a Request For Proposal (RFP) from the OMG's Software Based Communications Domain Task Force (SBC-DTF) to mature the specification following the OMG's ANSI approved standards process.

SDRF Cognitive Radio Definitions (Document Number SDRF-06-R-0011-V1.0.0): This document was developed to communicate a set of definitions in the area of Software Defined Radio and Cognitive Radio. These definitions were developed to communicate to practitioners in the field the approach of the Software Defined Radio Forum to these technologies. The approved definitions were developed from a working document used to facilitate collaboration between the SDR Forum and the IEEE P1900.1 working group on terms of mutual interest.

Comments on Software Communications Architecture Specification Version 2.2.2 (Document Number SDRF-06-A-0012-V1.0.0): This document was developed by the The SDR Forum SCA Working Group to provide formal feedback to the Joint Program Executive Office (JPEO) Joint Tactical Radio System (JTRS) on the Software Communications Architecture Specification Final / 15 May 2006 Version 2.2.2. The comments contained within this documents were provided for consideration of incorporation into future versions of the SCA Specification.

2007 Markets Committee Deliverables

The primary deliverable from the Markets Committee in 2007 was the document entitled **Use Cases for Cognitive Applications in Public Safety Communications Systems Volume 1: Review of the 7 July Bombing of the London Underground (Document Number SDRF-07-P-0019-V1.0.0).** This report is the first in a planned series of reports to be written by the SDR Forum to develop concepts for the application of cognitive radio technology to enhance the communications capabilities of public safety first responders, and provides an analysis of the events of 7 July 2005, a terrorist attack involving coordinated explosions of bombs in and around the London Underground. This analysis is not an evaluation of that response, but instead uses the lessons learned from real events and the observed response to envision how evolving cognitive technology could enhance the ability of responders in the future to communicate more effectively and efficiently than available technology allowed.

In addition, the Markets Committee delivered three commissioned markets studies in 2007:

- "The Cognitive Radio Market": This study provides a comprehensive look at the technology that many industry stakeholders identify as an essential enabling technology to achieve future goals in key wireless industry market segments, including the commercial, public safety and military sectors.
- "Wi-Fi, WiMAX, and Beyond 3G/4G": This study provides a comprehensive look at broadband wireless access market opportunities for the SDR community and the challenges it faces.

- "The U.S. Public Safety Market": This study provides a comprehensive look at a very fragmented public safety communications market consisting of a multitude of federal, state and local agencies; city, county and regional jurisdictions; and police, fire and emergency medical functions.

2007 Regulatory Committee Deliverables

The SDR Forum Regulatory Committee produced the following two work products in 2007 which were delivered as recommendations to the US FCC:

SDR Forum Response to FCC MOO (Document Number SDRF-07-A-0012-V1.0.0): This response was submitted as a Petition for Reconsideration to the Memorandum Opinion and Order provided by the Commission on policies to facilitate the legal operation of software and cognitive radio. The petition supported the Commission's position on security mechanisms that ensure that unauthorized radio software do not cause harmful radio interference or have other adverse affects counter to the public interest, but asked for reconsideration of language the members of the SDR Forum felt could inadvertently pose a barrier to the development and wide implementation of security techniques that would ensure compliance with Commission rules.

Software Defined Radio (SDR) Forum Comments on The FCC Memorandum Opinion and Order (MO&O) and Further Notice of Proposed Rulemaking (NPRM) Adopted June 19, 2007 (Document Number SDRF-07-R-0023-V1.0.0) - In this response, the SDR Forum offers general comments on issues related to spectrum etiquettes. Through this response, the SDR Forum indicated to the Commission that it considers spectrum etiquettes an important regulatory tool for maximizing the economic and social benefit of the electromagnetic spectrum. The Forum further stated that trends in the wireless industry almost certainly point towards a much greater proliferation of wireless devices supporting a wider variety of data intensive applications than exist today, and that some degree of spectrum sharing will be necessary to achieve this vision.

Other Committee Deliverables

The Markets, Regulatory and Technical Committees collaborated to produce a joint document entitled **Considerations and Recommendations for Software Defined Radio Technologies for the 700 MHz Public/Private Partnership** (Document Number SDRF-07-R-0024-V1.0.0). This report describes how software defined radio (SDR) technologies can help achieve the public/private partnership goals of the upcoming US FCC 700 MHz frequency band spectrum auction. This report also covers cognitive radio (CR) and dynamic spectrum access (DSA) technologies as well. The context for this report is the Second Report and Order (FCC 07-132, released 10 August 2007) which establishes rules governing wireless licenses in the 700 MHz band.

New Initiatives

The SDR Forum undertook three new initiatives in 2008 in support of the needs of its member organizations:

The Transceiver Subsystems Interfaces Task Group: Created under the umbrella of the SDR Forum Technical Committee, this task group was formed to facilitate industry convergence on open specifications supporting the software interface between the radio frequency (RF) front end and baseband processing/modem subsystems in reconfigurable radio products. These APIs will act as an abstraction layer for the transceiver hardware – facilitating the insertion of new or updated physical-layer waveform applications and air interface standards while the radio is in operation and, at the same time, improving the portability of these applications and standards from radio to radio.

Test and Measurement Work Group: Also created under the SDR Forum Technical Committee, this task group was formed to define the standard features needed in wireless Test and Measurement (T&M) equipment to support physical layer testing of software defined and cognitive radios.

International Tactical Radio Special Interest Group: Formed under the SDR Forum Markets Committee, this role of this new group will be to focus on activities designed to benefit the worldwide tactical radio community. Sales of tactical radios in North America, Europe, Asia, and other areas have grown dramatically in recent years, spurred in part by the global war on terror and the widespread modernization of radio and networking equipment by military, paramilitary and homeland security forces around the world. A large number of these new radios have been software defined, driving the Forum to create this new SIG to provide an international venue for discussing the lessons learned in developing and deploying these current-generation SDR devices.

2007 Meetings and Events

SDR Forum General Meetings

The SDR Forum held five General Meetings in calendar year 2007. These meetings are the face-to-face working meetings of the SDR Forum membership, providing them a venue to explore the reconfigurable radio market and to advance the SDR Forum's work plan in support of the commercial, public safety, avionics, and international tactical radio communities. Each general meeting also includes a one day workshop exploring a specific technical topic relevant in the members. The general meetings held in 2007, and the associated workshops, are as follows:

- 52nd General Meeting, January 15 to 18, San Diego, California
  - o Workshop on SDR test and measurement techniques
- 53rd General Meeting, April 16 to 17, Dublin, Ireland
  - o In conjunction with the IEEE DySpan Conference
- 54th General Meeting, June 18 to 21, Portland, Oregon
  - o Workshop on the Software Communications Architecture
- 55th General Meeting, September 17 to 20, Philadephia, Pennsylvania
  - o Workshop on SDR rapid prototyping techniques
- 56th General Meeting, November 9, Denver, Colorado
  - o In conjunction with the SDR 07 Conference

SDR 07 Technical Conference and Product Exposition

The SDR Forum held its annual technical conference and product exposition November 5 to 8, 2007 at the Denver Marriott Tech Center in Denver, Colorado. Highlighting this year's conference were more than 130 papers presented by individuals from an international array of organizations in the commercial, civil and defense communications markets. In addition to the paper session, the conference featured keynote speeches from Shuzo Kato of National Institute of Information and Communications Technology in Japan on "Cognitive Radio for Best Spectrum Utilization through SDR
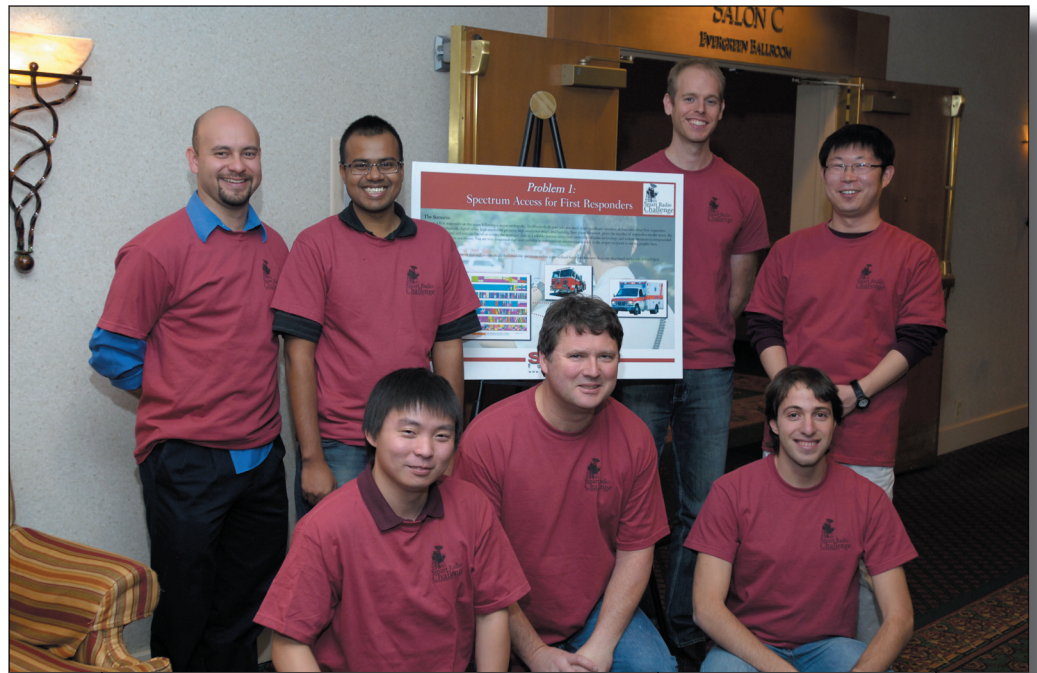
– Various Definitions and Implications," Ian Farrell, from Microsoft on "The Often Forgotten Layer 8" and Joseph Kielman from the US Department of Homeland Security providing an "Overview of the Office for Interoperability and Compatibility." Finally, the conference included an exposition with products and services from more than 32 companies, including Elektrobit, Etherstack, GE Fanuc, General Dynamics C4 Systems, Green Hills Software, Lyrtech, Objective Interface Systems, Pentek, PrismTech, Space Coast Communications Systems, Spectrum Signal Processing, Synplicity, Vanu, Xilinx, and Zeligsoft.

2007 Smart Radio Challenge

2007 represented the inaugural year for the SDR Forum Smart Radio Challenge. the Smart Radio Challenge is a worldwide competition in which student engineering teams design, develop and test software defined and cognitive radio technologies that address specific problems relevant to the advanced wireless community. The grand prize winner for the 2007 Smart Radio Challenge was Virginia Tech CWT, with additional awards presented to teams from Pennsylvania State University, The Royal Institute of Technology in Stockholm, The University of Utah and Virginia Tech MPRG teams. Other teams in the finals were France's Supélec (Ecole Supérieur d'Electricité), Universiti Putra Malaysia, and Clemson.

MESSAGE FROM THE TREASURER

I am pleased to present the audited financial report for the SDR Forum, indicating that the overall financial health of the organization continues to be strong. The SDR Forum's Statement of Financial Position showed assets of $636,760 as of December 31, 2007.

Fiscal Year 2007 completed with SDR Forum financial performance exceeding plan, with a net loss of $ 20,648 as compared to the 2007 budget plan with a net loss of $ 62,499. The fiscal Year 2007 financial annual operating budget was targeted for a small net loss to accommodate organizational and operational changes, in particular as the SDR Forum added a CEO to manage the business of the organization. Other key Fiscal Year 2007 financial performance parameters include:

- Total Revenue of $ 929,388
- Total Expenses of $ 950,036

The SDR Forum is a tax exempt organization under Section 510(c)(6) of the Internal Revenue Code and operates on a modified cash accounting basis in accordance with Statement of Financial Accounting Standard (SFAS) No 117, *Financial Statements of Not-for-Profit Organizations*. Fiscal year 2007 began January 1, 2007 and ended December 31, 2007.

I submit this report with the certainty that the SDR Forum continues to be a financially sound organization.

Mark Turner
SDR Forum Treasurer

Summary Statement of SDR Forum Assets, Liabilities, and Net Assets (Modified Cash Basis) for Year Ending 31 December 2007

Assets	
Current Assets	
Cash and Cash Equivalents	$433,338
Other Current Assets	3,077
Short Term Investments	200,345
Total Current Assets	*636,760*
Total Assets	**$636,760**
Liabilities and Net Assets	
Total Liabilities	*$0.00*
Net Assets	
Unrestricted Net Assets	$636,760
Total Net Assets	*$636,760*
Total Liabilities and Net Assets	**$636,760**

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.

Summary Statement of SDR Forum Revenues, Expenses, and Change in Net Assets (Modified Cash Basis) for Year Ending 31 December 2007

Unrestricted Net Assets	
Revenue	
Membership Fees	$460, 654
Facility Fees	336,802
Program Fees	97,537
Interest and Other Revenue	34,395
Total Revenue	*$929,388*
Program Expenses	
Advertising	$21,811
Facilities and Event Food	211,977
Technical Reports	27,500
Professional Fees	123,844
Legal 18,313	
Other Program Expenses	15,655
Total Program Expenses	*$419,100*
General and Administrative Expenses	
Bank Charges	$17,393
Consulting	287,747
Dues and Subscriptions	8,897
Insurance	7,135
Miscellaneous and Other Expenses	31,987
Office Management	14,020
Office Rent and Expense	24,818
Promotional Items	28,905
Public Relations	45,450
Telephone	2,053
Travel and Transportation	49,760
Website	12,771
Total General and Administrative Expenses	*$530,936*
Excess of Expenses Paid Over Revenue	*($20,648)*
Net Assets Beginning of the Year	*$657,408*
Net Assets End of the Year	*$636,760*

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.

SDR forum™

www.sdrforum.org

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