



## Spherix, Inc. (NasdaqCM: SPEX)

**January 7, 2014**  
**Target Price: \$25.25**  
**Recent Price: \$8.31**

### Market Data

Fiscal Year	December 31
Industry	IP Monetization
Market Cap	\$29.7M
Market Cap (FD)*	\$196.6M
Price/Book (mrq)	2.6x
Institutional Ownership	16.5%
Shares Outstanding	3.6M
Shares Outstanding (FD)*	23.7M
Float	1.9M
Avg. Daily Vol. (3 mos.)	122,263

As of January 6, 2014

\*Includes all convertible preferred stock

### Balance Sheet Snapshot

	ProForma
Cash*	\$4.8M
Debt	\$0.0M

\*Includes proceeds from Nov '13 equity financing

## Patent Monetization Company with Strong Management Team and Patent Portfolio

Spherix is an IP-monetization firm that seeks to create value for shareholders by utilizing its patent-enforcement expertise. The Company owns over 320 patents and patent applications and is the first publicly-traded IP-monetization company to begin patent-assertion activities for IP assets owned by the Rockstar Consortium; Rockstar is jointly owned by Apple, Microsoft, Sony, Ericsson and others and manages a patent portfolio valued at \$4.5 billion.

### Valuation

We are applying a 1.5x multiple to the NPVs of SPEX's existing lawsuits (\$265.5 million \* 1.5), giving a value of \$398.3 million. Additionally, we are applying an initial valuation of \$200 million to the recently acquired patents and patent applications from Rockstar, based on 1% of the estimated 2013 total addressable market of \$20 billion. Adding the two values together (\$398.3 million and \$200.0 million) and dividing by the fully diluted shares outstanding of 23.7 million gives a target price of \$25.25.

### Investment Highlights

- Management team has experience in all current patent monetization methods and many different industries.
- SPEX has a partnership with the Rockstar Consortium, which has a portfolio of over 4,000 patents. SPEX has obtained 105 patents and patent applications from Rockstar, with an estimated total addressable market of over \$20 billion in 2013.
- Using a NPV, we are valuing SPEX's lawsuit against VTech and Uniden at \$99.5 million.
- Using a NPV, we are valuing SPEX's lawsuit against T-Mobile at \$74.7 million and against AT&T at \$91.3 million; significant upside exists in potential infringement by other wireless carriers.
- SPEX presents a diversified IP play, as opposed to many other patent monetization companies that focus on one industry.
- Pantros IP, an independent patent rating company, rates SPEX's Rockstar portfolio to be of high quality.

## Investment Highlights

**Management team has experience in all current patent monetization methods and many different industries.** New CEO Anthony Hayes is exceptionally well suited for the position as indicated by his successful patent monetization experience against major companies, including Broadcom, Nokia, Ericsson, Tellabs, and Alcatel-Lucent. In addition, Mr. Hayes has shown himself to be very successful in monetizing patents through both sales and licensing agreements. Previous returns from Mr. Hayes before joining SPEX include:

- *Case 1:* A large portfolio (70+ patents and patent applications) in the cosmetic laser space. The entire portfolio was sold in nine months for a “pure return/gross return” of 600%.
- *Case 2:* A licensing program in the DSL communication space was led by Mr. Hayes over a two year period for a “pure return/gross return” of 495%.
- *Case 3:* Mr. Hayes sold a publicly traded company’s IP in cloud computing for a seven figure profit in six months. This company’s stock, after Mr. Hayes involvement, went from \$0.07 per share to a high of \$0.51 along with declaring a \$0.34 per share dividend. Taking into account the dividend, the post-high return on the stock was over 1,100%.

These returns are impressive compared to other companies in the IP monetization space. For example, Acacia Research Corp.’s CEO, at Acacia’s July 2013 analyst day, stated that ACTG expects to recover 100% of its upfront investment in its IP portfolios within eighteen months and realize a 200% ROI within five years. Mr. Hayes’s past returns are superior to this, both in terms of gains and “time to money.” Given this, and considering SPEX’s partnership with the Rockstar Consortium, we believe that the large difference in market cap (ACTG MC of \$719M vs. SPEX fully diluted MC of \$197M) is unwarranted.

SPEX’s patent diversification strategy is made possible due to Mr. Hayes’ previous experience in multiple industries, as indicated in the cases above. He has also been able to make use of his relationships in the IP market by successfully recruiting contacts and experts for new dealings. In case 1 and case 3, Mr. Hayes’ successfully put together a team of inventors, industry experts, and patent brokers to help drive strong returns. He is doing this again with SPEX’s Technology Advisory Board.

**SPEX has a partnership with the Rockstar Consortium, which has a portfolio of over 4,000 patents. SPEX has obtained 105 patents and patent applications from Rockstar, with an estimated total addressable market of \$20 billion in 2013.** In July of this year, SPEX entered into a “monetization partnership” with Rockstar Consortium, the successor to over 4,000 Nortel Networks (NRTLQ) patent assets and technology. Rockstar Consortium is jointly owned by Apple, Microsoft, BlackBerry, Ericsson, Sony and EMC Corporation and was formed to negotiate licensing for patents. These patents were

originally part of an auction of 6,000 patents from bankrupt Nortel Networks, which was sold to the owners of the Rockstar Consortium for \$4.5 billion.

Rockstar has received common stock (176,991 shares) in exchange for SPEX's acquisition of four families of mobile communication patents which were the basis of SPEX's lawsuits against Uniden and VTech. On December 31, 2013, SPEX acquired over 100 patents and patents applications from Rockstar Consortium for \$60 million in common stock (7.2 million common shares, assuming eventual conversion of preferred stock). The newly acquired portfolio covers a number of areas which pertain to how voice and data moves through the internet. Some of the patents in the portfolio are considered industry standard essential patents, thus potentially making these patents quite valuable. The new patents have many end users, giving the potential for many lawsuits from these patents, and there is overlap between these patents and the prior patents acquired from Rockstar. Preliminary estimates place the total addressable market in 2013 to be over \$20 billion in the U.S.

In addition, the two firms continue to work together through consulting and other potential IP dealings. We believe that Rockstar's substantial equity stake (31.1% of fully diluted shares) indicates confidence in the SPEX management team, along with providing Rockstar a strong incentive to sell high value patents to SPEX. Rockstar's newly-filed case against Google shows that the firm is becoming increasingly aggressive in pursuing patent monetization.

**Using a NPV, we are valuing SPEX's lawsuit against VTech and Uniden at \$99.5 million.** VTech Communications Inc. and Uniden Corporation, both of which SPEX filed patent litigation against, are the largest manufacturers of cordless telephony, currently generating billions of dollars with the technology SPEX claims these companies have infringed on.

- VTech is reported to have earned over \$2.1 billion in revenue from cordless phones that infringe on one or more of SPEX's patents since 2007.
- Uniden's revenue in cordless phones totaled nearly \$1 billion since 2007.
- VTech and Uniden have approximately 75% of the U.S. cordless phone market.
- Neither VTech nor Uniden have ever taken a patent infringement case to trial, indicating an attractive "time to money" expected for SPEX.
- Litigation against both VTech and Uniden have been assigned to the same Judge and both be participating in the Federal Patent Pilot Program (a program created to increase judicial efficiency in patent cases), which means that SPEX could see shorter time to trial.

VTech's revenue from its telecommunications segment, and Uniden's revenue from its cordless phone manufacturing segment, since FY08, is shown below in USD.

	FY08	FY09	FY10	FY11	FY12	FY13
V-Tech	688	620.7	742.3	727.9	706.3	666.4
Uniden	377.6	351.5	261.4	284.9	261.9	210.7

*in US\$ millions*

(Source: Bloomberg)

To value the cases against VTech and Uniden, we determined the claim of revenue for SPEX's patents from FY08 to the present and applied a 3% royalty rate to each year's total. We used 100% of the revenue from Uniden's cordless phone manufacturing segment and 75% of the revenue from VTech's telecommunications segment (VTech offers other telecommunications products, with cordless phones making up the majority of revenue). From 2013-2020, we project the VTech revenue that can be attributed to telecommunication products will grow by 5% per year, and Uniden's revenue attributed to cordless phone manufacturing will decline by 8% per year. We also apply a 75% operating margin (this is consistent with the long-term EBIT margin of 75-80% estimated by Gilford Securities analyst Robert V. Tango, Jr. for VirnetX) and 35% tax rate (based on U.S. corporate tax rates) to the royalties. Applying a 10% discount rate to these cash flows yields an NPV of \$132.7 million. Given SPEX management's historical track record, we apply a 75% probability of success to our base case scenario. This results in an NPV of \$99.5 million.

		FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Vtech		516	466	557	546	530	556.2	584.0	613.2	643.9	676.0	709.8	745.3	782.6
Uniden		378	352	261	285	262	241	222	204	188	173	159	146	134
Royalty Rate	3.0%	26.8	24.5	24.5	24.9	23.7	23.9	24.2	24.5	24.9	25.5	26.1	26.7	27.5
Operating Income	75%	20.1	18.4	18.4	18.7	17.8	17.9	18.1	18.4	18.7	19.1	19.5	20.1	20.6
Taxes	35%	7.0	6.4	6.4	6.5	6.2	6.3	6.3	6.4	6.5	6.7	6.8	7.0	7.2
Cash Flow		13.1	11.9	12.0	12.2	11.6	11.7	11.8	12.0	12.2	12.4	12.7	13.0	13.4

NPV	\$132.70
Disc Rate	10%
Prob. Of Success	75.0%
<b>NPV</b>	<b>\$99.52</b>

*in US\$ millions*

Given uncertainties around what the ultimate probability of success or royalty rates will be, we have provided a sensitivity analysis for the NPV, giving a range of claims around VTech's and Uniden's probability of success (between 55%-95%) and royalty rates (between 1%-6%).

		Royalty Rate					
		1.0%	2.0%	3.0%	4.0%	5.0%	6.0%
Probability of Success	55.0%	\$24.33	\$48.66	\$72.98	\$97.39	\$121.64	\$145.97
	65.0%	\$28.75	\$57.50	\$86.25	\$115.01	\$143.76	\$172.51
	75.0%	\$33.17	\$66.35	\$99.52	\$132.70	\$165.87	\$199.05
	85.0%	\$37.60	\$75.20	\$112.79	\$150.39	\$187.99	\$225.59
	95.0%	\$42.02	\$84.04	\$126.06	\$168.09	\$210.11	\$252.13

**Using a NPV, we are valuing SPEX’s lawsuit against T-Mobile at \$74.7 million; significant upside exists in potential infringement by other wireless carriers.** Geolocation technology on mobile devices has always been used. A quote from T-Mobile’s website says, “The use of mobile device location is not new – it’s always been used by wireless carriers to provide mobile service. Indeed, in order for mobile communications to work, the carrier (e.g., T-Mobile) must remain aware of the approximate location of all mobile devices using the carrier’s network.”

Uses for mobile geolocation have been growing since 2004 with the introduction of Yelp, which was one of the first social media apps aimed at connecting people to local businesses. In 2009, FourSquare debuted and became a tremendous success by allowing users to check-in to a location and earn points in the process. While FourSquare’s user base was growing by the millions, Facebook launched its own location-based service called Facebook Places. Facebook’s enormous user base provides the potential for geolocation services to continue to grow rapidly. More recently, Apple introduced Siri, with the ability to set reminders based on the user’s location. Also, Google’s personal assistant service, Google Now, uses geolocation to deliver data important to the user based on his or her location, and ever since Android version 4.2 “Jelly Bean,” all Android smartphones are forced to use geolocation.

Location-based services are projected to continue to grow in value. According to a white paper titled “Mobile geo-location advertising will be a big number in 2015” by Nick Lane, Chief Strategy Analyst at MobileSQUARED, geolocation, as it relates to mobile ad spend, will grow from a value of \$162.7 million in 2011 to \$904.8 million in 2014. Geolocation services are integral both to the use of basic mobile communications and for a suite of new geolocation services and location-based targeted advertising.

We valued SPEX’s litigation against T-Mobile by estimating that the claim of T-Mobile’s total revenue is 3%, due to the importance of geolocation for T-Mobile. We have used consensus analyst estimates for T-Mobile’s revenue for FY13-FY15, and then we modeled T-Mobile’s revenue to grow by 5% per year. By again applying a 3% royalty rate, 75% operating margin, 35% tax rate, the NPV for this case comes out to \$124.5 million using a 10% discount rate. Attributing a 60% chance of success results in an NPV of \$74.7 million.

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
T-Mobile	3%	656.6	645.9	640.4	618.5	591.6	769.2	825.7	866.9	910.2	955.7	1003.5	1053.7	1106.4
Royalty Rate	3%	19.7	19.4	19.2	18.6	17.7	23.1	24.8	26.0	27.3	28.7	30.1	31.6	33.2
Operating Income	75%	14.8	14.5	14.4	13.9	13.3	17.3	18.6	19.5	20.5	21.5	22.6	23.7	24.9
Taxes	35%	5.2	5.1	5.0	4.9	4.7	6.1	6.5	6.8	7.2	7.5	7.9	8.3	8.7
Cash Flow		9.6	9.4	9.4	9.0	8.7	11.2	12.1	12.7	13.3	14.0	14.7	15.4	16.2

NPV	\$124.48
Disc. Rate	10%
Prob. Of Success	60.0%
<b>NPV</b>	<b>\$74.69</b>
Total NPV	<b>\$174.21</b>

*In US\$ millions*

We have provided a sensitivity analysis for the NPV of the T-Mobile claim, with claim of revenue ranging between 1%-9% and royalty rates of 1%-6%.

		Royalty Rate					
		1.0%	2.0%	3.0%	4.0%	5.0%	6.0%
Claim of Revenue	1.0%	\$8.30	\$16.60	\$24.90	\$33.19	\$41.49	\$49.79
	3.0%	\$24.90	\$49.79	\$74.69	\$99.58	\$124.48	\$149.38
	5.0%	\$41.49	\$82.99	\$124.48	\$165.97	\$207.47	\$248.96
	7.0%	\$58.09	\$116.18	\$174.27	\$232.36	\$290.46	\$348.55
	9.0%	\$74.69	\$149.38	\$224.07	\$298.75	\$373.44	\$448.13

**Using a NPV, we are valuing SPEX's lawsuit against AT&T at \$91.3 million.** Spherix recently filed a claim against AT&T for infringement on its geolocation technology. We valued the litigation against AT&T by estimating that the claim of AT&T's total revenue is 1.5%, due to the importance of geolocation for AT&T. We modeled AT&T's revenue to grow by 8% per year. By again applying a 3% royalty rate, 75% operating margin, 35% tax rate, the NPV for this case comes out to \$182.7 million using a 10% discount rate. Attributing a 50% chance of success results in a NPV of \$91.3 million.

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AT&T	1.5%	737.6	802.6	877.5	948.2	1001.4	1081.6	1168.1	1261.5	1362.5	1471.5	1589.2	1716.3	1853.6
Royalty Rate	3%	22.1	24.1	26.3	28.4	30.0	32.4	35.0	37.8	40.9	44.1	47.7	51.5	55.6
Operating Income	75%	16.6	18.1	19.7	21.3	22.5	24.3	26.3	28.4	30.7	33.1	35.8	38.6	41.7
Taxes	35%	5.8	6.3	6.9	7.5	7.9	8.5	9.2	9.9	10.7	11.6	12.5	13.5	14.6
Cash Flow		10.8	11.7	12.8	13.9	14.6	15.8	17.1	18.4	19.9	21.5	23.2	25.1	27.1

NPV	\$182.65
Disc. Rate	10%
Prob. Of Success	50.0%
<b>NPV</b>	<b>\$91.32</b>

We have provided a sensitivity analysis for the NPV of the AT&T claim, with claim of revenue ranging between 0.5%-2.5% and royalty rates of 1% - 5%.

**AT&T**  
**Royalty Rate**

		1.0%	2.0%	3.0%	4.0%	5.0%
Claim of Revenue	0.5%	\$10.15	\$20.29	\$30.44	\$40.59	\$50.74
	1.0%	\$20.29	\$40.59	\$60.88	\$81.18	\$101.47
	1.5%	\$30.44	\$60.88	\$91.32	\$121.77	\$152.21
	2.0%	\$40.59	\$81.18	\$121.77	\$162.35	\$202.94
	2.5%	\$50.74	\$101.47	\$152.21	\$202.94	\$253.68

Additional upside exists with respect to potential lawsuits against other major U.S. telecom companies, such as Verizon, and Sprint. As these companies generate larger amounts of total revenue than T-Mobile USA, the potential for further settlements or licensing agreements provides the potential for significant upside not present in our valuation.

**SPEX presents a diversified IP play, as opposed to many other patent monetization companies that focus on one industry.** Patent monetization is an unregulated industry and its returns are uncorrelated with traditional investments. Additionally, SPEX offers an opportunity for investors to participate in the growing patent monetization sector through its diversified interests in undervalued assets. SPEX diversifies its patent portfolio across various industries, cordless phone manufacturing, telecommunications, and prescription refills. Mr. Hayes has also previously been involved in patent monetization in the cosmetic laser space, the DSL communication space, and cloud computing. This broad selection of patent technology that the Company intends to pursue will reduce the risk that its shareholders are exposed to.

**Pantros IP, an independent patent rating company, rates SPEX's Rockstar portfolio to be of high quality.** Pantros' report analyzed three critical factors that professionals need to determine patent value, and based on these findings, awarded SPEX its high rating. We believe this is a good indication for the Company's claims against Uniden, VTech, and others.



**The Company's business model is highly scalable.** SPEX has high operating leverage due to most of its expenses being fixed. This allows the Company to add additional patent assets and licensing without incurring a significant increase in operating expenses, leading to high and increasing margins over time.

**CompuFill patents provide cash flow and show ability of management to monetize its patent portfolios.** In April, SPEX acquired the CompuFill patents, a litigation-tested patent portfolio relating to the automatic refilling of prescriptions through the telephone, from North South. On November 19, SPEX entered into a settlement and license agreement with a leading technology company, representing the first settlement from the CompuFill portfolio since it was acquired. Recently, another case regarding this portfolio has been settled. The portfolio could allow for as many as 50 potential lawsuits.

## Market

**Patent monetization is a growing, multi-billion dollar a year industry with two main drivers:**

- Young tech companies like Google and Facebook are targets for older technology companies that hold massive patent portfolios.
- Companies are using patent litigation to gain market share by blocking the sale of competitors' products.

**The patent licensing market is a large, growing segment that is expected to reach \$500 billion in 2015.** In addition to patent litigation, the patent licensing market is a large, growing segment that is expected to reach \$500 billion in 2015 (sources: Ernst & Young; Athreye and Cantwell, 2005; The Economist), which is more than double global receipts of royalties and license fees of \$237 billion in 2011 (source: International Monetary Fund). This compares to a \$180 billion estimate made by the World Intellectual Property Organization in 2009 (15% near term growth rate) and \$27 billion in 1990 (11% long term growth rate).

## Peer Comparison

Ticker	Name	Price	Mkt Cap (M)	EV/Sales (ttm)	EV/Sales (FY14E)	EV/EBITDA (ttm)	EV/EBITDA (FY14E)	P/E (ttm)
IDCC	Interdigital Inc	\$29.11	\$1,199.1	2.1x	3.0x	6.0x	19.0x	23.4x
PRKR	Parkervision Inc	\$5.00	\$464.8	N/A	3.3x	N/A	3.9x	N/A
VHC	Virnetx Holding	\$19.29	\$987.7	497.2x	N/A	N/A	N/A	N/A
UPIP	Unwired Planet	\$1.48	\$161.5	1146.9x	5.1x	N/A	6.3x	N/A
PCO	Pendrell Corp	\$1.85	\$492.2	15.8x	N/A	N/A	N/A	N/A
ACTG	Acacia Research	\$14.40	\$718.9	2.5x	2.4x	23.8x	10.6x	N/A
VRNG	Vringo Inc	\$3.19	\$268.4	N/A	N/A	N/A	N/A	N/A
RPXC	RPX Corp	\$16.89	\$886.3	2.7x	2.4x	3.5x	3.4x	20.4x
Average		\$11.40	\$647.4	277.9x	3.2x	11.1x	8.6x	21.9x
Median		\$9.70	\$605.6	9.2x	3.0x	6.0x	6.3x	21.9x
SPEX	Spherix Inc	\$8.31	\$30.0	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg

As of January 6, 2014

## Valuation

We have chosen to value SPEX on the basis of its existing lawsuits (VTech, Uniden, T-Mobile, AT&T) and on a preliminary valuation of its 101 newly acquired patents and patent applications from the Rockstar Consortium. We are applying a 1.5x multiple to the NPVs of SPEX's existing lawsuits (\$265.5 million \* 1.5), giving a value of \$398.3 million. We believe that a multiple should be applied to the NPV, as additional lawsuits can be filed from those patents and proceeds from favorable outcomes can be reinvested into additional patent portfolios. Additionally, we are applying an initial valuation of \$200 million to the new patents acquired from Rockstar, based on 1% of the estimated 2013 total addressable market of \$20 billion. We expect to have a better idea of the value of the portfolio as lawsuits and/or licensing agreements are derived from these patents. However, we believe that the initial \$200 million valuation is fair for the following reasons:

- 1) A valuation of \$200 million implies a return on investment of 233% (\$200 million/\$60 million). In previous ventures before joining SPEX, CEO Anthony Hayes has delivered far larger returns.
- 2) Rockstar received the entire \$60 million payment in common/convertible preferred stock, becoming SPEX's largest shareholder in the process (31.1% of fully diluted shares). We believe this is a strong vote of confidence from Rockstar (owned by Apple, Microsoft, BlackBerry, Ericsson, Sony and EMC Corporation) in SPEX's ability to monetize the patents.

Adding the two values together (\$398.3 million and \$200.0 million) and dividing by the fully diluted shares outstanding of 23.7 million gives a target price of \$25.25.

The biggest risks to our target price include less favorable lawsuit rulings that would lower our estimates of projected cash flow and the Company being unable to procure additional valuable patent portfolios in the future.

## Management & Board

### **Anthony Hayes, *President & CEO***

Anthony C. Hayes is an attorney and former partner of Nelson Mullins Riley & Scarborough LLP, an AMLaw 100 firm. Mr. Hayes has successfully monetized patents through a wide variety of monetization methods, including price arbitrage and litigation licensing brought against companies such as Cisco, Broadcom, Nokia, Ericsson, Tellabs, and Alcatel-Lucent. Mr. Hayes has received national recognition during his legal career, including: Special recognition by President George W. Bush, American Board of Trial Advocates Young Lawyer of the Year; and City of Columbia "20 Under 40." Mr. Hayes earned a Juris Doctor from Tulane University School of Law in 1995 and his B.A. in Economics from Mary Washington College in Fredericksburg, Virginia in 1990.

### **Darrell Dotson, *Licensing & Litigation***

Mr. Dotson attended Texas A&M University in College Station, Texas and received a B.S. in Biology in 1988 and a second B.S. Degree in Zoology in 1989. After graduating from college, he attended The University of Texas Health/Science Center Graduate School of Biomedical Sciences in Houston, Texas, where he received his Ph.D. in Biochemistry and Molecular Biology in 1994. After graduate school, he attended University of Houston Law Center where he earned a J.D. in 1997.

He is licensed to practice in all state courts in Texas and before the United States Patent and Trademark Office. He is also licensed in the United States District Courts for the Eastern and Southern Districts of Texas.

For the past 13 years, Darrell has specialized in intellectual property litigation, including analysis of the infringement, validity and enforceability of patents.

### **Technology Advisory Board**

SPEX formed its Technology Advisory Board to help provide compensation to inventors of patent portfolios acquired by SPEX so that the inventors can share in proceeds related to the commercialization of their ideas and to provide advice, support, theories, techniques and improvements to the Company's technologies and business model by leading IP professionals.

### **Frank Reiner**

Frank Reiner is a seasoned and experienced patent licensing and monetization professional. Located in Silicon Valley and employed as the Vice President of Global Licensing for the Kudelski Group where his primary role is licensing a digital video patent portfolio. Prior to that Frank was the Vice President of Patent Licensing and Acquisition for Flextronics International Ltd. where he managed

patent assertions made against Flextronics designed products and was responsible for building a defensive patent portfolio via internal innovation, invention and through patent acquisitions. Previously, Frank was a Partner at Intellectual Value Creation Services, LLC whose charter was to work as a patent monetization team for the IP Investment Group at Collier Capital supporting patent acquisitions, sales and licensing both from a technical and business perspective. Frank started his patent and licensing career at InterDigital Communications, LLC as the Senior Director of Licensing where he was responsible for InterDigital's patent licensing program in the cellular and wireless space. He participated in numerous patent license negotiations and patent infringement litigations, and he supported, patent prosecution and the management of existing patent license agreements. Frank started his career as a software engineer in the defense industry where he developed high-end aircraft and tank simulators for the U.S. military. He achieved multiple positions of higher responsibility at General Electric, Martin Marietta and Lockheed Martin. He received a BS in Computer Science from Embry-Riddle Aeronautical University and an MBA from Villanova University.

### **Bruce H. Tsuji**

Bruce Tsuji received his BSc in psychology from Trent University and his MA from the University of Waterloo. His early career focused on user interface design followed by a series of positions in product management, marketing, and business development for organizations in the fields of business intelligence, telecommunications, network security, consulting, crisis management, and web services. He has co-founded 2 start-ups and is a co-inventor on 8 patents. After 25 years of technology experience, Bruce returned to university and completed his PhD in psychology at Carleton University where he now teaches human-computer interaction and psychology.

### **Robert J. Vander Zanden, Ph.D., *Chairman***

Dr. Robert J. Vander Zanden, Board Member since 2004, was elected Chairman of the Board in early 2009. Having served as a Vice President of R&D with Kraft Foods International, he brings a long and distinguished career in applied technology, product commercialization, and business knowledge of the food science industry to Spherix. In his 30-year career, he has been with ITT Continental Baking Company as a Product Development Scientist; with Ralston Purina's Protein Technology Division as Manager Dietary Foods R&D; with Keebler as Group Director, Product and Process Development; with Grupo Gamesa, a Frito-Lay Company, as Vice President, Technology; and with Nabisco as Vice President of R&D for their International Division. With the acquisition of Nabisco by Kraft Foods, he became the Vice President of R&D for Kraft's Latin American Division. Dr. Vander Zanden retired from Kraft Foods in 2004. He currently holds the title of Adjunct Professor and Lecturer in the Department of Food Science and Human Nutrition at Clemson University, where he also is a member of their Industry Advisory Board. His focus

on achieving product and process innovation through training, team building and creating positive working environments has earned him multiple awards for product and packaging innovation. Dr. Vander Zanden holds a Ph.D. in Food Science and an M.S. in Inorganic Chemistry from Kansas State University, and a B.S. in Chemistry from the University of Wisconsin - Platteville, where he was named a Distinguished Alumnus in 2002.

### **Harvey Kesner**

Mr. Harvey Kesner, a Board member since November 2012, is a partner with Sichenzia Ross Friedman Ference LLP. He has concentrated his practice on corporate finance and the structuring of complex domestic and international capital markets transactions. He has represented issuers, investors, underwriters, agents, lenders and financial intermediaries in public and private offerings of securities. He provides assistance to participants in all types of financing transactions including initial public offerings (IPOs), startup and venture capital financings and private placements including public company PIPE transactions. He also counsels clients on traditional merger and acquisition transactions, leveraged buyouts, restructurings, workouts and business disputes. He assists issuers with a broad range of securities regulatory and compliance issues including SEC filings, exchange listings, ongoing regulatory reporting and compliance, and responding to regulatory inquiries and investigations.

### **Douglas T. Brown**

Douglas T. Brown, Spherix Board Member since 2004, is Senior Vice President and Manager of the Corporate Banking Government Contracting Group for PNC Bank N.A., Washington, DC. Mr. Brown has been with PNC and its predecessor bank, Riggs Bank, since 2001 and previously worked for Bank of America, N.A. and its predecessor banks for 16 years as a Loan Officer, as well as a manager of Loan Officers in the Mid-Atlantic region. Subsequent to 1990, the majority of Mr. Brown's customers were companies that provided services to Federal and State Governments. Mr. Brown holds a B.A. degree in Political Science from American University and a graduate degree from The Stonier Graduate School of Banking at the University of Delaware.

### **Edward M. Karr**

Mr. Edward M. Karr, a Board member since November 2012, is the founder of RAMPartners SA, an investment management and investment banking firm based in Geneva, Switzerland. Since 2005, RAMPartners has helped raise more than \$200 million for small capitalization companies in fields such as natural resources, high technology, health care, and clean energy. RAMPartners is a member of Global Alliance Partners (GAP), a network organization of internationally minded financial partners focusing on the capital midmarket. Prior to founding RAMPartners, Mr.

Karr managed a private Swiss asset management, investment banking, and trading firm based in Geneva for six years. At the firm, he was responsible for all of the capital market transactions, investment, and marketing activities. In 2004, Futures Magazine named Mr. Karr as one of the world's Top Traders.

### **Alexander Poltorak**

Alexander Poltorak is the Founder, Chairman and the CEO of General Patent Corporation (GPC), a leading intellectual property firm focusing on IP strategy and valuation, IP licensing and enforcement -- the oldest such organization in the world. He also serves as the Managing Director of IP Holdings LLC, an IP-centric merchant banking boutique providing IP-focused financial, brokerage and advisory services, and operating an idea incubator. Alexander Poltorak was listed among world leading IP strategists by IAM Magazine in 2010, 2011 and 2012. Dr. Poltorak has co-authored two books, *Essentials of Intellectual Property* (John Wiley & Sons Publishers, Inc., 2d ed. 2011), and *Essentials of Licensing Intellectual Property* (John Wiley & Sons Publishers, Inc., 2004), and contributed a chapter to *Making Innovation Pay - Turning IP into Shareholder Value* (John Wiley & Sons Publishers, Inc., 2006). He also authored numerous articles on patent law, licensing and economics. He served on the editorial board of *Patent Strategy & Management*.

Prior to establishing GPC in 1987, Alex Poltorak was President and CEO of Rapitech Systems, Inc., a computer technology company that he had founded in 1983 and took public in 1986. Before that, he served as Assistant Professor of Biomathematics at the Neurology Department of Cornell University Medical College. He also served as Assistant Professor of Physics at Touro College. Dr. Poltorak has published papers in peer-reviewed scientific journals. Alexander Poltorak taught business law as Adjunct Professor at the Globe Institute of Technology. He was a regular guest-lecturer on intellectual property law and economics at the Columbia University School of Business.

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