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IATI Annual Review: Israel ICT Industry, 2012

Sponsored by: Israel Advanced Technology Industries

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September 2012

IDC OPINION

Despite facing an increasingly challenging global economic environment, the Israeli high-tech industry has proven its resiliency and continues to serve as one of the world's main sources for technology innovation. Over the past few years, the "start-up nation" has solidified its position with the development of innovative technologies delivered by established vendors and a steady stream of start-up companies. An indication for Israel's vital role in the global technology industry can be found in the increasing volume and value of acquisitions of local companies by international buyers recently, as well as in the rising levels of foreign VC investments. Furthermore, tech giants such as Apple and Facebook have recently joined the other global major technology vendors in acquiring local talent and establishing Israeli R&D activities.

The ICT industry is in the midst of a "once every 20–25 years" shift to a new technology platform for growth and innovation — which IDC defines as the third platform — built on mobile devices and apps, cloud services, mobile broadband networks, Big Data analytics, and social technologies. Israeli companies are highly active in these areas, most of which are closely in line with the traditional fields of expertise for the local industry. In addition, the expansion into new technology domains continues with an increasing number of companies are driving innovation in areas such as connected devices, automotive, energy, consumer technologies and various others.

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This study provides an overview of the Israeli IT and telecommunication (ICT) industry in 2011-2012. It discusses global trends and provides an overview of traditional and emerging areas of expertise of Israeli companies, as well as analysis of recent investment and M&A trends affecting the local high-tech industry.

SITUATION OVERVIEW

Introduction

The global high tech industry is undergoing fundamental changes, driven by the emergence of a new technology platform for growth and innovation. Built on smartphones, tablets and other connected devices, mobile broadband networks, cloud services, Big Data, social media, and a range of other technologies, the new model of computing is expected to revolutionize the ICT industry. Despite global economic uncertainty due to the expanding European debt crisis and concerns over U.S. economic growth, the pace of technological change appears unrelenting, creating substantial new opportunities both for the ICT industry and for the industries it serves.

One of the key characteristics of the emerging computing platform is that it enables the introduction of advanced technologies into new areas, which traditionally have fallen behind the technology curve. As technology seeps into more and more aspects of our everyday lives and becomes accessible for an expanding range of usages, innovation is increasingly required across all industries in order to keep up with rapidly changing environments.

Technology innovation has been the cornerstone of the success of the Israeli high-tech industry over the last decades. Today, Israeli companies are playing a key role in shaping the new computing model, and across all layers of the technology stack – from the chip level all the way up to the application. Building on the legacy of companies that pioneered new technologies and became industry leaders in various fields, Israeli high-tech companies continue to excel.

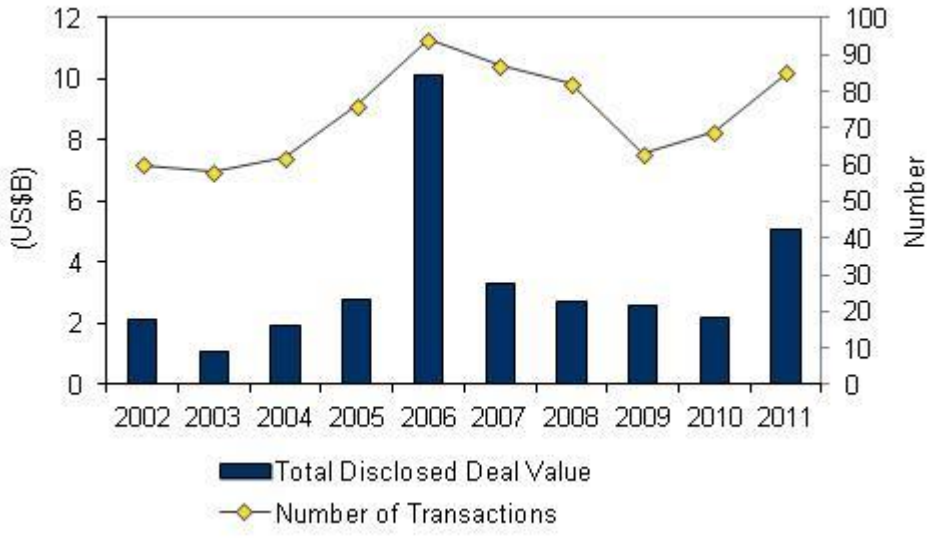
The numbers are instructive: Approximately sixty Israeli companies are currently traded on NASDAQ, one of the largest numbers of companies listed for non-U.S. countries. Israel has consistently been a leader in categories such as expenditure on R&D as a percentage of GDP, percentage of engineers among residents, and others. Israeli start-up companies continue to raise significant amounts of funding from local and global investors. In fact, Israel is leading the world in terms of per capita VC investment, and is second only to the U.S. in terms of number of start-ups.

Israel's established excellence in technology development has been recognized by the global industry. Many of the leading international high-tech companies have established R&D activities in Israel. **Intel**, **Microsoft**, **Cisco**, **IBM**, and others have located their first development centers outside the U.S. in Israel. In addition, following its acquisition of Israeli flash memory chip designer **Anobit**, **Apple** has recently established its first hardware R&D facility outside the U.S. in Israel. These companies and many others continue to develop major product lines in their Israeli facilities. Furthermore, many Israeli executives are currently serving in management positions at international technology companies.

In many cases, major international technology vendors started their local R&D activity following the acquisition of Israel firms. As shown in Figure 1, hundreds of Israeli companies have been acquired over the last decade. In parallel with the global market, after experiencing a significant decrease in M&A activity due to the global economic crisis in 2009-2010, there has been a renewed surge in acquisitions of Israeli ICT companies in the last 1-2 years. In 2011, 83 Israeli ICT companies were acquired for a total disclosed value of more than $5 billion. This trend has continued into 2012, as approximately 40 Israeli ICT companies were acquired in the first half of the year for a total disclosed value of more than $3.5 billion (not including Cisco's $5 billion acquisition of NDS, originally an Israeli start-up company).

FIGURE 1

Israeli High-Tech Companies M&A, 2002–2011

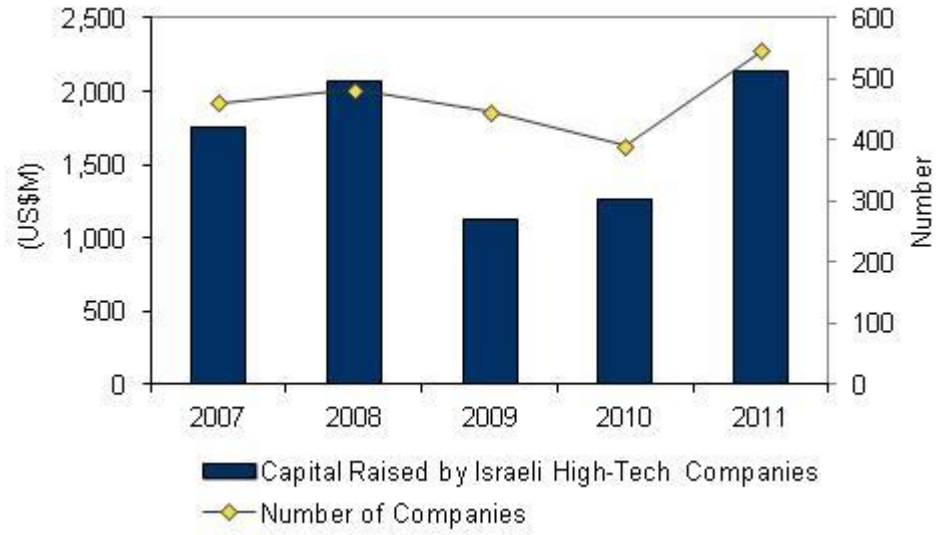


Sources: IDC, IVC Research Center, 2012

As shown in Figure 2, the Israeli start-up industry suffered a 46% year-on-year decrease in investments in 2009. During that year, 447 companies raised $1.12 billion, compared with $2.08 billion raised by 483 companies in 2008. While this decrease is strongly related to the global decline in VC investments, concerns have been raised over the volatility of the local industry. Israeli companies adapted to the financial environment, and found ways to maintain operations with lower level of funding. As a result, the local industry was poised to rebound as economic conditions improved. In 2010, investment levels picked up again with 391 Israeli high-tech companies raising $1.26 billion. The following year saw VC investments returning to pre-recession levels with 546 companies raising a total of $2.14 billion. Investment levels were largely retained in the first half of 2012, with 270 companies raising a total of $936 million.

FIGURE 2

Capital Raised by Israeli High-Tech Companies 2007–2011

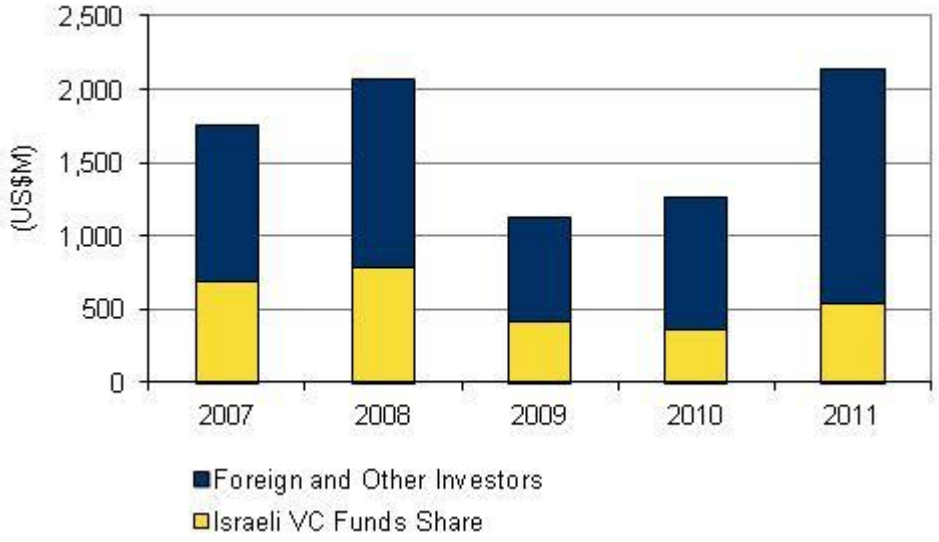


Source: IVC Research Center, 2012

The major contribution to the increase in investment levels has come from foreign investors, including top tier VCs like **Sequoia**, **Accel**, **Greylock**, **JK&B Capital**, **Benchmark**, **Bessemer**, **Intel Capital**, **DAG Ventures**, **Battery Ventures**, **Index Ventures**, **Canaan**, **DFJ**, **Charles River**, **Norwest Venture Partners**, **Venrock**, **USVP**, **Lightspeed**, and others, which have all participated in and sometimes led funding rounds of Israeli companies in recent years. The attractiveness of the Israeli market as a destination for VC was recently highlighted by the 2012 Global Venture Capital Confidence Survey from Deloitte and the National Venture Capital Association, where Israel was ranked fourth in overall confidence in investing, after the U.S., Brazil and China. Another key indication for Israel's position as a favorite destination for global investors is foreign direct investment (FDI) levels. According to the recent UN World Investment Report, FDI inflow to Israel totaled $11.37 billion in 2011, 106% more than the $5.51 billion in 2010. FDI inflow to Israel accounted for 25% of gross capital formation in 2011, up from 16.9% in 2010.

FIGURE 3

Foreign Investors Share of Total Investments in Israeli High-Tech Companies 2007–2011

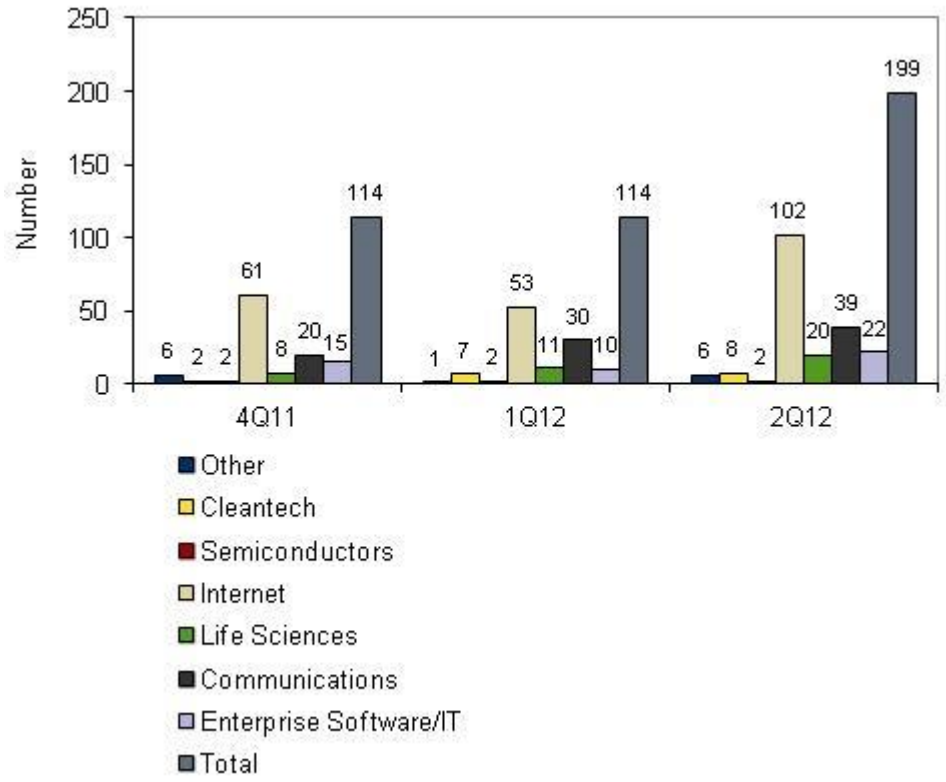


Source: IVC Research Center, 2012

Another indication of the resilience of the Israeli start-up industry is the pace with which new companies are founded, a critical part of the technology innovation lifecycle. In times of economic uncertainty, founding new companies becomes a challenging task, as VCs slow their investments and focus more on existing, typically later-stage portfolio companies. However, as shown in Figure 4, it appears that the Israeli start-up industry has been able to find ways to deal with the situation, with new companies established across all major sectors. In the second quarter of 2012, 199 new start-up companies were founded in Israel compared to 114 in each of the previous two quarters, driven mainly by a substantial increase in the number of new Internet companies. This may be considered an indicator of the entrepreneurial spirit that has been one of the main drivers of the Israeli start-up scene.

FIGURE 4

New Companies Founded by Main Sector, 4Q11–2Q12



Source: IVC Research Center, 2012

Israel High Tech Industry Dynamics: Expanding Beyond ICT

The Israeli high tech industry has been the source of many technological breakthroughs. Firewall (**Check Point**), voicemail (**Comverse**), USB flash drive (**M-Systems**), VoIP (**Vocaltec**), digital printing (**Indigo**), are just a few examples for such technologies, which Israeli companies have pioneered or were among the first to commercialize.

Today, Israeli start-ups continue to drive innovation globally across all major technology sectors. Significant activity revolves around the traditional areas of expertise in which notable Israeli companies have established a global leadership position. This includes, for example, **Amdocs** and **Comverse** in telecommunication applications, **Mercury** (now part of **HP**) in IT management, **Check Point** in security, **DSPG** in semiconductors, **Mellanox** in Infiniband, and **Verint** and **NICE** in contact center applications.

Beyond ICT, another industry where Israeli companies have built a reputation as global leaders is defense technologies. Based on the vast experience and knowledge obtained in the development of military technologies for Israel's army, local companies have been successful in the design of civil security systems as well as commercialization of military products. **Elbit, Israel Aerospace Industries, Rafael,**

Tadiran, Israel Military Industries, Elisra, Aeronautics Defense Systems, Plasan and **Magal** are examples of well-established Israeli companies in the defense industry developing innovating military and civil systems in areas such as aviation, maritime, counter terrorism, law enforcement, and physical infrastructure protection. Israel is also considered a global leader in the development of unmanned aerial vehicles.

In the printing field, Israeli companies have heralded new technologies that have largely shaped the evolution of the industry. This includes digital printing pioneers **Scitex** and **Indigo**, and wide-format inkjet printer manufacturer **Nur**. All three companies were acquired by **HP**. Another Israeli player, **Press-Sense**, a developer of workflow and management solutions for print providers, was acquired in 2010 by **Bitstream**. **Electronics for Imaging** (EFI) was founded in 1988 by Scitex founder Efraim Arazi, and provides digital imaging and print management solutions for commercial and enterprise printing. Today, Israel's innovation in the printing industry continues with companies such as **Objet**, a pioneer in the field of 3D printing. The company, which offers 3D printing systems and a range of over 100 materials that enable the building of prototypes that accurately simulate the true look, feel and function of an end-product, merged with U.S.-based **Stratasys**, in April 2012 in a $634 million deal. Another prominent Israeli printing company is **Landa Corporation**. Founded by Indigo's founder Benny Landa, the company has recently announced Nanography, a new digital printing technology that utilizes nano-size pigment water-based particles, and enables printing on almost any material.

The Israeli high-tech industry is mainly focused on selling to the corporate sector. However, over the last years more and more Israeli companies are targeting the consumer market, and especially consumer electronics.

Designing and developing consumer electronics requires a specific skills set and know-how that do not entirely overlap with traditional software and telecom knowledge. Nevertheless, there are quite a few Israeli companies that have managed to bridge that gap and successfully bring end-user products to the market.

Active in the emerging field of connected TVs, **Boxee** developed a stylized set-top-box that enables its users to watch TV shows from the Internet and movies from services such as Netflix. The service also enables users to gain access to their social graph for recommendations and viewing suggestions.

The mobile phones market is a real battlefield for global electronic manufacturing giants. Nokia, Samsung, Apple and RIM are spending billions in development and marketing and introduce a new set of mobile devices each year. Israeli companies in this space include **Emblaze**, which introduced its own mobile device in 2009. Another company is **Powermat,** which gets rid of clutter with its wireless power charging board. The device is compatible with the products of leading smartphone vendors, such as Apple, RIM and HTC, as well as with the Nintendo DSI.

Israeli companies continue to innovate in the Cleantech sector. Israel has traditionally faced challenges with limited water and fuel resources, and has developed a strong skills and knowledge-base in areas such as renewable energy, water technologies, and agro technologies. The country has gained international recognition as an innovation hub. In 2012 Israel was ranked second behind Denmark in the Global Innovation Index by The World Wildlife Fund in conjunction with Cleantech Group, based on its high concentration of start-ups, VC investments and environmental patents. Israel was also cited as a world leader in water management and irrigation technologies for agriculture by the World Bank.

The cleantech sector is dominated by early-stage companies with a handful of internationally established commercial brands mostly concentrated in the water sector. Notable companies in this space include **Netafim** (water efficient irrigation), **Arad Technologies** (water metering), **IDE Technologies** (water desalination), **Amiad** (waste water treatment) and **Bermad** (Water Control Solutions). In 2012, Kibbutz Naan sold its 50% stake in **NaanDanJain Irrigation** to its Indian partner **Jain Irrigation Systems** for around $35 million. Among start-ups that raised funds in 2011-2012 are **Aqwise** (water and wastewater treatment), **Emefcy** (energy efficient wastewater treatment), **Desalitech** (desalination)**, Takadu** (SaaS solution for water-loss management) and **Checklight** (water monitoring). The major share-holder in Checklight is another Israel-based company, **Whitewater** , a provider of water quality, management and security solutions, which increased its share to 80% in April 2011.

Within the renewable energy sector, solar technologies take most of the limelight, with a number of prominent start-ups. In 2011, **BrightSource Energy**, a provider of thermal solar power solutions, raised $200 million in equity and finalized a $1.6 billion loan guarantee from the U.S. Department of Energy for the Ivanpah Solar project in the U.S. The company was close to making an IPO in 2012, but withdrew its IPO plans in response to weak market conditions. The challenging global market conditions also saw **Solel Solar**, which was bought by **Siemens** in 2009, become part of Siemens' newly named business unit, Siemens Solar Thermal Energy, after struggling to generate sales. However, several Israeli start-up companies have continued to raise money and gain recognition. Players to watch include **SolarEdge** and **Tigo Energy** (solar inverters), **Pythagorus Solar** (building integrated solar photovoltaics), and **TIGI** (solar thermal). Another notable Israeli company in the renewable energy space is NYSE-traded **Ormat**, a provider of geothermal energy solutions.

The global focus on cleaner energy and energy efficiency has become a key driver for smart metering, smart grid and electric vehicle technologies. A number of Israeli start-ups have looked to leverage the country's strong base in semiconductors, power electronics, communications, and IT to target these markets. Most notably, **Better Place** is among the major players in the emerging electric vehicle industry. Founded by Shai Agassi, formerly president of the Products and Technology Group at SAP and a member of the SAP Executive Board, Better Place is looking to become a global leader in the emerging electric vehicle industry. With approximately $750 million in funding from top tier global and Israeli investors, the company is developing the infrastructure and a range of network services to support the widespread adoption of electric vehicles while optimizing energy use. Other smart grid related Israeli companies include **Greenlet Technologies** and **Panoramic Power** (energy management), **PowerCom** (smart metering) and **Metrolight** (energy efficient lighting).

Major international cleantech companies are also gradually increasing their involvement in the local industry. In 2011, **GE** invested in several Israeli companies (e.g., Better Place, SolarEdge and Emefcy), and selected start-up companies **Winflex** (wind turbines), **GridON** (grid management) and Pythagoras Solar to partner with as part of its GE ecomagination clean energy initiative, and acquired Lightech, a provider of LED drivers. **IBM Research Labs center** in Haifa is active the development of smart water systems that improve quality of service, distribution, and management, as well as partnering with Israeli companies specializing in water elements, such as smart meters, valves, quality sensors, water purification, water safety, and water system engineering.

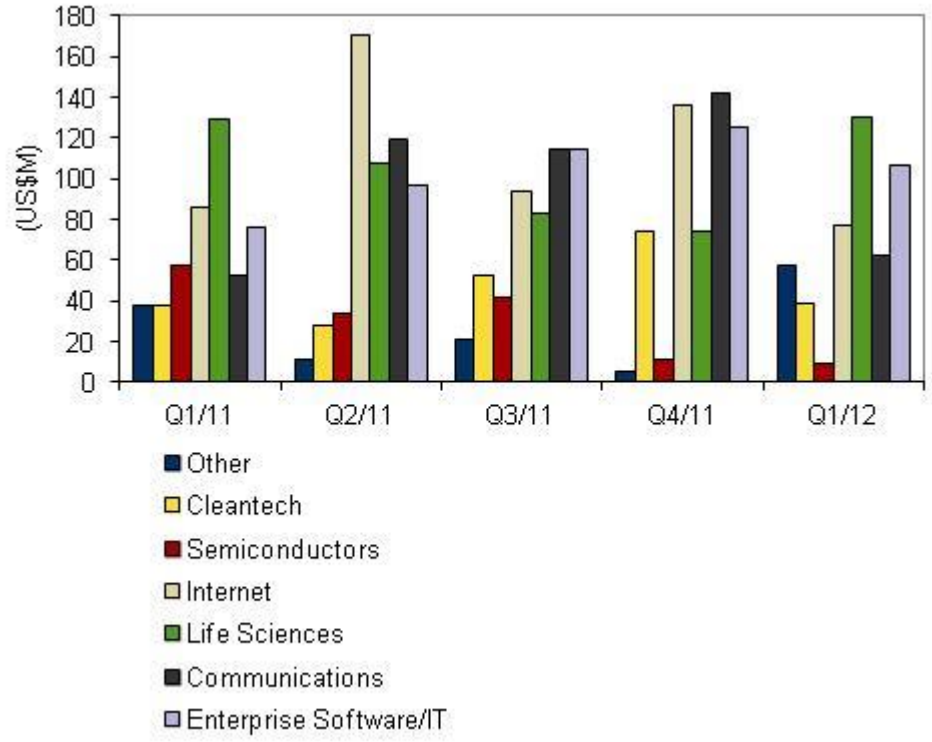
In addition to Better Place, other Israeli companies in the automotive field include telematics players such as **E-Drive Technology** and **GreenRoad**; as well as navigation application providers such as **Telmap**, which was acquired by **Intel** in 2011 for an estimated $300 million, **Waze** (see the Mobile Applications section) and **NavNGo**. Other players in the automotive field include **Mobileye**, which develops vision-based driver assistance technologies; **CogniTens**, a developer of 3D optical measurement solutions that enable automotive companies to improve manufacturing processes, and **iOnRoad**, which combines GPS/location services, cameras, and accelerometers with advanced algorithms to warn drivers of dangerous situations on the road through their mobile phones.

In light of increasing local activity in this field, Israel is becoming more attractive for automotive giants. For example, **General Motors** has operated an R&D center in Israel since 2008, focused on innovations in areas of strategic importance to the automotive industry. Current R&D projects include; smart sensing and vision systems, including perception algorithms and sensing systems for active automotive safety, autonomous driving, driver monitoring and robotics in flexible and intelligent manufacturing systems; speech technologies and adaptive human-machine interface; wireless enablers, including UWB, 4G cellular, software definable radios, RFID, TCP/IP etc.; and vehicle controls and robotics, including cognitive-like functionalities for vehicle active safety, automated driving and intelligent manufacturing systems. General Motors Israel is also one of two GM Ventures global sites outside the Corporate VC in Detroit, MI (the other site is based in Silicon Valley), investing in local start-ups and technology companies.

In addition, Israeli IT services companies have been gradually growing and expanding globally. Major players in this category include **Matrix, Malam-Team, Ness Technologies** (now owned by U.S.-based private equity firm **Citi Venture Capital**), and **Taldor**, as well as software testing services companies such as **Tesnet** and **Tescom**.

FIGURE 5

Capital Raised by Israeli High-Tech Companies by Sector ($M)
1Q11–1Q12



Source: IVC Research Center, 2012

Telecommunications

The Israeli telecom industry has been one of the founders of the global market. Many recognized telecommunications standards and protocols, such as WiMAX, VoIP, and TDMoIP, were developed and pioneered in Israel, and a versatile cluster of companies in all sizes and areas of expertise have emerged there. Local companies have proven their expertise through all parts of the telecom value chain, attracting world-renowned investors and partnering with leading global telcos. Global telecom players have long shown their confidence in the Israeli communications sector by establishing fully-fledged local R&D centers. This has been done either by leveraging a promising acquisition or founding a new local extension from scratch.

Motorola has backed innovation in Israel for many decades, opening a local research center in the country in 1964 and paving the way for more multinationals to follow. The company's Israeli branch was responsible for the development of the Spirit, the first car phone with voice recognition. Telecom equipment giants **Cisco** and **Alcatel Lucent**, as well as telecom semiconductors leaders **PMC-Sierra** and **Broadcom**, all have a prominent presence in Israel. Some of those companies also have a long history of investments and acquisitions in the country.

Cisco has made eleven acquisitions over the years with an overall disclosed value of over $6 billion, placing it as one of the top foreign acquirers of Israeli technologies.

Over the years, the telecom equipment company acquired companies such as **Infogear Technology** for $308 million, **P-Cube** for $200 million, **Sheer Networks** for $122 million and the recent $5 billion buyout of **NDS,** which will strengthen Cisco's position in the service provider video ecosystem. In addition, Cisco has been acting as a strategic investor for many telecom-related start-ups, investing in at least one venture per year since 2004. Among the company's investments are prominent start-ups such as **Celeno**, **Amobee** (which was acquired in March 2012 by **Singtel** for $340 million), **Compass EOS** and **CTERA**. Other leading global telecom companies that operate a local R&D center include **Avaya**, **Samsung** (STRI - Samsung Telecom Research Israel), **Polycom** and **Sandvine**.

Among native Israeli companies, **Rad Data Communications**, **VocalTec**, **ECI**, and **Telrad** (as well as **Comverse**, which will be discussed in the Mobile section) are regarded as pioneers of the local telecom industry. Founded in 1981, Rad Data Communications deals with various aspects of access and backhaul solutions for fixed-line and mobile carriers and enterprises. ECI Telecom was founded in 1961 and deals with network infrastructure, optical networks, and broadband solutions, including VoIP.

The demand for high-bandwidth applications such as HDTV, the increasing usage of VoIP applications, and ever-growing rates of Internet data traffic have all contributed to the telecom industry's most pressing need – bigger pipes. While some service providers try to squeeze their legacy networks to the limit, other network operators are investing heavily in both fiber to the home (FTTH) and fiber to the node (FTTN) networks. In light of this, issues such as networks management, providing support for new applications and creating innovative ways to better monetize subscribers and decrease OPEX, are becoming critically important. These challenges provide substantial opportunities for Israel's thriving telecom sector. Catering to the emerging needs of the global industry, many local telecom vendors leverage their vast experience in one domain to introduce solutions in adjacent fields, thus growing into multi-layer telecom service providers. Therefore, it is quite common to come across the same vendor in different telecom segments, as depicted below.

VoIP & Video Conferencing

The Voice over IP technology has its roots buried deep in the Israeli telecom industry. In 1995, local company **Vocaltec** introduced the first commercial Internet phone software. The company later went public and in July 2010 merged with **YMAX**, the developer of the magicJack VoIP USB device. The merged company, maintaining both Vocaltec's brand and its Israeli R&D, is looking to become a major VoIP player. The company is offering a softphone solution available across multiple platforms, including PCs, PCs with a femtocell-enabled magicJack, as well as via mobile applications on various mobile devices and platforms. Another early entrant in this field is **Delta3**, which was founded in 1996 and is now traded on OTCBB.

VoIP technology, either as facilities-based products or over-the-top (OTT) services, gained huge traction in the past few years. In addition, the prevalence of unlimited data plans along with the dominance of smartphones in Western markets have also greatly contributed to the rise of mobile VoIP. This trend brings new challenges to VoIP providers, who will need to find the right balance in expanding their VoIP customer bases and driving revenues. Telecom operators will continue to introduce facility-based VoIP solutions as an integrated part of multiplay bundles and will have to consider whether to partner with Web-based OTT VoIP providers or develop their own Web-based OTT VoIP capabilities.

Among notable Israeli players in this space is **Audiocodes**, a developer of VoIP and converged VoIP and data networking products, including media gateways and servers. The company helps service providers and enterprises to integrate packet-based solutions into their voice networks. Its VoIP network products feature VoIP media processing platforms and terminals for IP-based applications in the enterprise and service provider markets. With a growing number of businesses addressing issues of security concerning their SIP trunking and hosted services, Audiocodes has recently launched a series of solutions aimed at providing reliable connectivity, and expanding the company's offering and addressable market. Other local companies who provide VoIP services include **Spikko**, **10Levels**, **callme**, **phone.com** and **EIM telecom**. In addition, in December 2009, **Telefonica** acquired Israeli **Jajah**, a provider of IP-based managed services, for around $200 million. At the time of the acquisition, Jajah reported that 25 million users in 125 countries worldwide were using its product, which essentially allows for users to have low cost phone calls directly from their telephone device.

On the video conferencing front, demand is rising for conferencing applications that combine chat, video, audio, VoIP, social capabilities and others, which can be accessed via the desktop and across multiple mobile form factors. At the same time, ensuring high-quality resolution as well as obtaining video bandwidth management capabilities to minimize service interruptions, are becoming increasingly important. Among Israeli players in this market segment is **Vidyo,** which enables multi-point videoconferences on room systems, desktop computers, laptops, Netbooks, and smartphones. Another competitor is **VCON** (a subsidiary of **Emblaze**), a provider of end-to-end videoconferencing solutions over IP networks. In addition, **Radvision** develops technologies for unified visual communications over IP and 3G networks. The company is a key technology partner of Alcatel-Lucent.

Ethernet Access Devices

Ethernet access device (EAD), also known as an Ethernet network interface device (NID), is a last-mile technology that provides a demarcation between the carrier network (WAN) and a customer's network (LAN). Traditionally, Ethernet technology has been used in enterprise LAN or carrier transport network applications. An EAD provides a bridge between these two networks and enables the provisioning of Ethernet services from the service provider core all the way to the customer premises. This market segment experiences significant growth, with the vast majority of deployments focused on the delivery of Ethernet business services, Ethernet wholesale services, and wholesale mobile backhaul applications. Currently, the main driver in the EAD market is the growing traffic flow across backhaul networks as well as the increasing demand for business connectivity.

One of the global leaders in this segment is **Actelis Networks**, which according to IDC research held 7.7% of the Worldwide Ethernet Access Device market in terms of revenue in 2011. Founded in 1998, the company also provides a wide variety of Ethernet over copper solutions, including Ethernet aggregation switches and Broadband Accelerators (BBAs). In 2011, Actelis bought the intellectual property of **Phylogy**, a broadband transmission products vendor, for $4.5 million. In 2012, **Pulsant**, one of largest providers of managed networks in the UK, selected Actelis to deploy a new network acceleration solution that would negate heavy investment in fiber. **RAD Data, Teleco Systems** (a subsidiary of **BATM**), **FibroLan** and **Telrad FibroLan** are other local vendors who compete in this market.

Carrier Ethernet & IP Networking

The carrier Ethernet market is driven by business migrating to multiservice VPNs and broadband services aggregation, which brings more flexibility and capacity for connecting multiple locations and connecting to the public Internet.

Multiproduct Telecom vendor **ECI Telecom** offers a suite of demarcation units that aim to seamlessly integrate legacy TDM traffic with voice, video and data services over Ethernet – between providers and between networks. The company developed a series of switches and routers designed to address the transition from circuit to packet networks. ECI is considered to be one of the largest high-tech companies in Israel with more than 2,400 employees worldwide and a strong presence in international markets. In April 2011, ECI Telecom made a move to expand its presence in the Chinese market by establishing a partnership with ECS Technology, one of the leading ICT distributors in China, to supply next-generation network solutions. Recent reports have speculated that ECI is to be sold to Russian-based Rosatom for $2.5 billion.

Other prominent Israeli companies in this market segment include **Orckit – Corrigent**, which facilitates telecommunication providers' delivery of high capacity broadband residential, business and mobile services over wireline or wireless networks, as well as enabling advanced packet and legacy services over packet networks. **MRV** enables the delivery of next-generation optical transport and Carrier Ethernet services over fiber infrastructure.

Optical Networks

IDC expects service providers will continue to deploy metro Wavelength Division Multiplexing (WDM) with packet aggregation on a card and packet optical systems. For new network aggregation and metro applications, service providers will deploy Packet Optical Transport Platform (POTP) systems with centralized packet switch fabrics. POTP systems provide more flexibility and connectivity for service providers that are positioned to offer a variety of services, from traditional Time-Division Multiplexing (TDM) services to private line and managed packet business services. Overall, the optical networks segment represents a very challenging market for revenue growth, which calls for vendors with specific expertise in packet aggregation and optical transport platforms.

In July 2012, Fiber optics specialist **Finisar** acquired Israel-based **Red-C** for a total of $43.7 million. By acquiring Red-C, Finisar will be able to augment its current offering with optical amplification technologies that are essential cost-effective building blocks of high speed, low latency networks. Finisar already had an Israeli presence prior to the Red-C acquisition. In 2007, optical subsystems designer and manufacturer, Optimum, acquired local Kailight Photonics, a developer of 40Gb/s optical transmission products. A year later, Finisar and Optimum combined operations in an all-stock merger deal.

ECI Telecom also plays in the optical networks space, offering multiservice provisioning platforms aggregating multiple data services for mobile backhaul, residential triple play, and business services, as well as optical transport network platforms for customer premises and colocation in metro networks. **MRV** provides optical transport solutions that range from simple media conversion to high-end ROADM optical transport. The company offers two types of optical transport systems, the FiberDriver and Lambda Driver platforms. **Teldor,** a local telecom industry veteran, offers its range of fiber optics components, while **FiberZone Networks**

develops and markets solutions that facilitate the management of fiber optic and optical networks infrastructure. **TeliSwitch Solutions**, developed the Automated Optical Distribution Frame family, which is designed to meet the challenges of automating fiber switching at layer-0 of communication networks, without compromising on optical performance. Other companies playing in this field include **Packetlight Networks,** a provider of multi-service optical transport and access systems, as well as **Effdon**, **Gal Op**, **Compass EOS**, **Kilolambda, Oliver Solutions** and **HOLO-OR**

IPTV, Video and Broadcast

The growth in IPTV (sometimes referred to as telco TV) subscribers in the U.S. started in 2008 and was led by AT&T and Verizon. This was replicated in 2009 with over 2 million new subscribers added during that year. As a result, the IPTV market is expected to grow at a CAGR of 19.3% between 2009 and 2014, driven by the backing of **Google**, **Sony** and **Samsung**. As of 2011, the number stands at 8.4 million U.S. subscribers. IPTV presents many challenges for operators, while at the same time offers the potential to create new market segments, by leveraging its intrinsic interactive abilities. Whether as a managed QoS-backed service or as OTT, the IPTV arena represents numerous business opportunities for vendors and developers from across the ecosystem. In this segment we will focus on companies providing the backbone technology that enable IPTV.

In October 2011, Israeli **BigBand Networks** was acquired for $172 million by telecom U.S.-based technology company Arris. BigBand provides designated solutions to manage and monetize entertainment quality video. The company helps service providers to capitalize on existing infrastructure and deliver multi-screen video services. Other Israeli companies in this field include **Imagine**, which helps system operators to increase both the quality and quantity of digital video services over virtually any system, enabling them to introduce premium services such as HDTV and VOD. Another vendor, **Comulus TV**, develops cloud-based streaming servers for IPTV devices.

Shipments of TV set top boxes for the three primary digital pay TV segments — cable, satellite, and IPTV — are forecast to grow to over 112 million units in 2013, representing a 2008–2013 CAGR of 5.7%. This affects directly companies dealing with digital content delivery. On a related note, **Cisco** executed one of the largest tech M&A deals of 2012, paying nearly $5 billion for video software and content security solutions vendor**, NDS**, in a move that IDC believes will further strengthen Cisco's home entertainment platform for service providers, Videoscape, and bolster its position within the service provider video ecosystem. **NDS**, which was founded in Israel in 1990, offers a full range of open end-to-end solutions for pay-TV operators using one or more delivery networks. The company's VideoGuard manages conditional access and digital rights management (DRM) technology and according to NDS, is deployed on more than 138 million devices worldwide. Also in this space is **PeerTV**, which deals with OTT content, developing a dedicated set-top-box for Internet-based TV operators.

Online video is constantly increasing its share in the overall worldwide IP traffic, driven by independent video sites and IPTV video on demand (VOD). Users are shifting their attention from traditional MCTV and are rapidly getting used to consuming video on demand and via different platforms. TV providers' VOD services and pure online video providers such as Netflix and Hulu, offer their users a wide selection of movies and TV shows to watch whenever and wherever they wish,

sometimes regardless of geographical location. Several Israeli companies address this challenge from different perspectives. **Giraffic** has developed a fully distributed video acceleration cloud, enabling online video providers to crowdsource a significant amount of traffic delivery to myriad users worldwide, regardless of content popularity or global location. The company's solution improves end users' streaming performance and mitigates some of the need for dedicated bandwidth from online video publishers' servers or content delivery networks (CDNs), thus cutting costs and operational expenses for Giraffic's customers. **Contextrem** enables service providers to deploy and deliver cloud-based IP services, specifically video and multi-play telecommunications. This way, a user's request for VOD content will be routed to the best server available to support QoS. **Comcast** and **Verizon** are among the company's investors.

Other companies are focused on augmenting the TV experience by tackling the proliferation of available video content and offering personalization features. **Comigo** developed an advanced Smart TV platform that enhances the TV experience by extending viewing across all types of handheld devices, opening up personalization and interactive socialization capabilities. **Jinni** offers a semantic discovery engine that enables users to find movies and TV shows based on their personal taste. The company utilizes a team of cinema professionals and computer scientists to develop an entirely new taxonomy, titled Entertainment Genome that serves as the basis for entertainment discovery. Combining TV and console games, **Playcast** enables off-the-shelf games to be delivered as a digital TV service to existing cable, IPTV and hybrid satellite platforms. The company's solution is installed at operators' head-ends, streaming the audio-visual content as standard MPEG video over the existing video network to existing set-top-boxes. The company already signed deals with**Bouygues Telecom**, **CJ Hellovision** and **Portugal Telecom**, , among others.

Other companies are addressing various other aspects of the broadcast market. **Gilat** develops satellite and hybrid networking products that are optimized for broadband communications via satellite, thus empowering the company to deliver voice, broadband data and video services across different environments including enterprises, rural networks, cellular backhaul and government network applications. **Orbit** deals with mobile satellite communication systems, tracking systems and audio communication systems. The company provides audio communication solutions for a wide range of maritime and airborne platforms. **Starling**, **Shiron Satellite Communications** (Acquired in 2009 by Elbit), **NovelSat** and **Raysat** deal with satellite and broadcast communications.

LiveU offers a portable video solution that transmits live broadcast–quality video in real-time from anywhere using multiple cellular connections and other data networks (WiFi, WiMAX, LTE, etc.). Targeting TV networks, pure Internet media entities, professional consumers, and the government/surveillance markets, LiveU enables its customers to transfer real-time events such as news gathering and sports coverage to any remote client in a simple way while maintaining a high quality of experience. In mid-April, **Panasonic** and LiveU announced a collaboration to deliver an integrated camcorder and live video uplink solution. In another recent development, the company signed a strategic partnership with **Sprint**, to include LiveU's HD live video transmission solutions as part of Sprint's machine-to-machine (M2M) solutions portfolio.

Network and Traffic Management

As online content consumption continues to soar, service providers are constantly faced with new technological and business challenges. In 2011, end user–generated wireline broadband Internet traffic volume was 16,000PB/month, translating to an average bandwidth consumption of 26GB/end user each month. On the wireless front, end user–generated wireless broadband Internet traffic volume was 638PB/month, translating to an average bandwidth consumption of slightly less than 0.5GB/end user each month. IDC forecasts the demand for bandwidth to grow to 97,000PB/month (120GB/end user/month) and 19,000PB/month (5.6GB/end user/month) by the end of 2015 for wireline and wireless respectively.

Allot Communications provides several traffic management solutions, including network and subscribers services, bandwidth management, and service gateway platforms. The company's solutions are based on a proprietary deep packet inspection (DPI) technology and can be deployed on fixed and mobile services. Catering to the rapid increase in mobile video usage, in May 2012 Allot acquired **Ortiva Wireless**, which offers mobile carriers a dedicated video optimization gateway that reduces wasted bandwidth and improves mobile video quality of experience, for an estimated $16 million.

Catering to wireline and mobile carriers and cloud providers, **Radware** delivers visibility, optimization, resilience, scalability, security and control to effectively manage IP services. The company's suite of products enables customers to manage network traffic to support unified, IP-based service delivery, network transformation, and convergence processes. A member of the **RAD Group**, the company also offers application delivery and network security products.

Two local companies are considered world leaders in the field of media caching and acceleration, solutions that are essential for operators and networks that deal with an ever-increasing amount of streaming video traffic. **Oversi**, which was recently acquired by Allot for a total consideration of $21 million, and **Peerapp**, both offer carrier-grade Internet video caching solutions, accelerating P2P, streaming, and file hosting. The companies' solutions enable Internet service providers to improve their traffic management performance, thus cutting down operating costs and enabling QoE differentiation between standard and premium bandwidth packages. Other Israeli companies with traffic management operations include **BandWD** and **DiViNetworks.**

TABLE 1

Acquisitions of Israeli Telecom Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2012	Broad Digital assets	Malam Team (Guardian)	N/A	Telecom infrastructure
July 2012	RED-C Optical Networks	Finisar	43.7	Telecom infrastructure
March 2012	Teledata Networks	Taldan Capital	2.8	Telecom infrastructure
October 2011	BigBand Networks	ARRIS	172	Video/IPTV
October 2011	Starling	Panasonic	11	Satellite
June 2011	NetVision	Cellcom	437	Service providers networks
May 2011	Clariton	Alvarion	4	Mobile infrastructure
March 2011	Tadiran Telecom	Afcon	1.72	Telecom equipment
October 2010	Axerra Networks	DragonWave	9.5	NGN
July 2010	Mintera	Odaro	12	Optical Networking
July 2010	Trivnet	Gemalto	40	Telecom Applications
June 2010	TTI Team Telecom	TEOCO	58	Telecom Applications
May 2010	Veraz Networks	Dialogic	N/A	NGN
April 2010	Teledata Networks Ltd.	Enablence	50	Broadband Access
February 2010	Convergin	Oracle	85	NGN
January 2010	EthOS Networks Ltd.	Tejas	15	NGN
December 2009	Jajah Technologies	Telefonica O2	207	VoIP
December 2009	Xtellus	Oclaro	33	Optical Networking
December 2009	Outsmart	VocalTec	5	NGN
November 2009	BitBand Technologies	Motorola	12.5	Broadcast
October 2009	ECtel	Cvidya Networks	20.5	Telecom Applications
March 2009	Telrad Connegy	WiseCom	2.05	NGN
February 2009	Shiron Satellite Communications	Elbit	16	Broadcast
December 2008	Personeta Inc.	Smart Call	0.7	Telecom Applications
December 2008	Scopus Video Networks	Harmonic	86	Broadcast
November 2008	iamba Networks	Marvell Technology Group	10	Broadband Access
November 2008	MeeVee	Live Universe	N/A	Broadcast
April 2008	Compwise	Ectel	1.3	Telecom Applications
March 2010	Orca Interactive	Viaccess	21.4	Broadcast
February 2008	Civcom	Padtec	35	Optical Networking
February 2008	Vimatix	CallUp	0.3	Broadcast

TABLE 1

Acquisitions of Israeli Telecom Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
November 2007	Witech Communications	IIS Intelligent Information Systems	N/A	Broadcast
November 2007	Telecont Communications	Magal Security Systems	N/A	Telecom Applications
October 2007	Atrica	Nokia Siemens Networks	100	NGN
August 2007	CastUP	NDS	11.3	Broadcast
July 2007	PixelPlay	Oberon	50	Broadcast
June 2007	CableMatrix Technologies	Sandvine	4.5	Telecom Applications
April 2007	Terayon Communication Systems	Motorola	140	Broadcast
March 2007	Kailight Photonics	Optium	40	Optical Networking
March 2007	TVnet	Samsung	N/A	Broadcast
March 2007	Broad Digital Software	Six New Kopel Group	N/A	Enterprise Networking
February 2007	LEAD IP Systems	Rad Data Communications	3	VoIP
February 2007	CTI2 (CTI Squared)	AudioCodes	10	VoIP
January 2007	AppCell Systems	Teleclal	6	Telecom Applications
January 2007	SigValue Technologies	Amdocs	54	Telecom Applications

Sources: IDC, IVC Research Center, 2012

Mobile

Israelis feel strongly towards their mobile phones, reflected in penetration rates that are among the world's highest, at over 125%. This passion for mobile phones extends beyond the talking, texting and browsing aspects of the mobile experience, into the bustling activity surrounding all aspects of mobile developments. From mobile applications, and mobile value-added services, to mobile chipsets and wireless infrastructure, the Israeli mobile industry has shown robust growth since its early inception and has taken an active part in today's connected world.

Comverse is considered by many to be one of the founding companies of the local telecom and mobile industry. Founded in 1982, the company provides value-added services to mobile network operators and has several subsidiaries dealing with different telco-related areas. The company is considered a world leader in the nearly $2 billion convergent charging market, alongside **Ericsson** and **Huawei.** Comverse is also active in what it defines as Converged IP Messaging, a platform that can work with, and could ultimately replace traditional operator systems such as the SMS-C, MMS-C, and voicemail platform. In this model, storage becomes a commodity, so Comverse is also working on distributed network storage using flat file systems on local drives, enabling operators to provide storage as a service more cheaply. Comverse veterans can be found in many of today's leading mobile companies, serving in executive or R&D positions.

The worldwide smartphone market will reach a total of 686.0 million units shipped in 2012, up a strong 38.8% from the 494.4 million units shipped in 2011. A number of factors are driving volumes forward including the growing appetite of end users, lower prices, and more devices targeted at the mass market. With a thorough understating of the challenges ahead, Israeli mobile companies are poised to maintain their lead in this arena as well.

Since 2011, IDC has tracked 14 acquisitions of Israeli mobile vendors, dealing in various segments such as mobile applications, mobile infrastructure, mobile advertising and location based services, by leading tech giants such as **Intel**, **Corning**, **F5** and **Facebook**.

Mobile Applications

The proliferation of mobile applications in recent years has made them an indispensable part of the mobile phones ecosystem. Over 25 billion apps were downloaded as of March 2012 from Apple's App Store and 20 billion from Google Play as of June 2012 representing impressive numbers.

Whether controlling both the OS and the device, such as Apple and Nokia, or focusing mainly on the mobile operating system, as with Google, these market bellwethers are paving the way for smartphone dominance in the coming years. Israeli companies have been active in the smartphone applications domain since the inception of the App store by Apple and later on the Android Market and OVI Store. The combination of downloadable content along with powerful processors, touch screens, MP3 support and GPS enable users to consume new types of content and serve as great opportunity for innovative applications.

With 20 million registered users worldwide, including 1.1 million active users in Israel, **Waze** is one of Israel's top mobile app companies and a global leader in the navigation segment. The company offers a "crowdsourcing" mobile application to

provide drivers with an extensive range of real-time road information including traffic flow, road reports, and even warnings about where the latest speed traps have been set up. This application is distinct from other mobile navigation applications since it utilizes its users in the map-making process, relying on drivers to switch on the app and report events. By using the mobile phone's GPS, Waze can leverage the data gathered to generate maps and determine traffic directions, while simultaneously providing a social network for drivers. Most recently, **Apple** announced that it is using Waze as a source for iOS6 Maps operating system. In the coming year, Waze is moving into the automovtive market, and will be integrated as part of vehicles' entertainment systems.

The rise of unlimited data plans and Wifi hotspots have given rise to mobile VoiP applications. As one of the early players in this market, **Fring** provides its users with the ability to perform video calls, voice calls and live chat with other users of the app or with third-party online communities such as MSN Messenger, Google Talk and Twitter. Mobile VoIP has gained impressive traction with users in the last couple of years, as it allows calls to be made at almost no cost, using the data network or WiFi connectivity. Available for iOS, Android and Symbian, Fring was considered one the top downloaded applications in the App Store. **Viber Media** also offers a mobile VoIP app that allows users to make free calls to other Viber users over 3G and WiF.

Leveraging smartphones' LBS capabilities, **GetTaxi** enables its users to order a taxi with a click of a button, negating the need for a phone call or waiting on the street. Users can track the the dispatched cab on an interactive map and accumulate mileage points for using GetTaxi services to get free rides. The service is currently available in Israel, UK and Russia and the company plans to launch in the U.S., France, Germany, Italy and Spain in the coming year. Another company that deals with traffic and navigation is **TransMaze**, which delivers real-time information from public transportation operators regarding estimated arrival times of buses to a target bus stop, and calculates estimated walking distance and time to stops. Also in this space is **sPARK**, which has developed a cellular application for locating parking spaces in busy city centers.

Any.Do is a task management voice-driven application that translates voice input into written tasks that users may keep in files, adding tasks or reminders or clearing them by shaking their phones. The company is backed by, among others, Eric Schmidt’s Innovation Endeavors. Any.Do's founders are also behind another popular app – Taskos, which had more than 1.3 million users as of end 2011. **PageOnce** deals with personal finance and travel information on smartphones. At its core is a proprietary technology that collects and aggregates users’ personal information and publishes it in an easy to read format. It is the company behind popular mobile applications Personal Assistant, Mobile Minute Tracker and Trip Tracker.

Onavo enables mobile users to save money on mobile data consumption from both mobile applications and Web usage. The company developed a cloud-based compression algorithm and a client facing application that allows users to control and monitor their data traffic and plan their online behavior accordingly. **CellBuddy's** solutions reduce the roaming charges of mobile travelers by changing the identity of the user’s phone to local identity and thus enabling low cost voice, text messages and data. **Tapingo** offers a remote-shopping service that enables users to buy physical goods and services directly from their mobile phones. Tapingo integrates directly with merchant point of sale systems to present consumers with real-time inventory, providing a personalized shopping experience with multiple payment options.

Everything.me tries to go beyond the standard solution of links as search results. Instead, the app delivers results in the form of "InstantApps", essentially HTML5 mobile-optimized sites. **Mobli** is a real-time visual media platform made up of subject-based channels such as people, places and topics. With the integration of channels and geo-location, Mobli enables people to share and view photos and videos and share them with friends. Driven by the success of similar apps, such as Instagram, the company reported it has reached 3 million downloads as of May 2012. Additional notable mobile application players include **TuneWiki**, a developer of an innovative music player; **WeFi**, a provider of a connectivity solution; and **WorldMate**, a mobile travel application.

Mobile Content Management and Value Added Services

The value added services (VAS) infrastructure for today's telecom operators is largely software based, yet still relies on a large services component, either as a business partner affiliation between operator and broker or between technology supplier and in-house developers (among other possible arrangements). The VAS landscape usually includes mobile video, messaging, and advertising solutions. **M-Wise**'s products make it possible for mobile operators to deliver digital content to subscribers, while **Mobixell** enables operators to introduce multimedia based services to subscribers and is focused on video delivery. The company has recently introduced its new version of its converged mobile Internet solution, Seamless Access. Seamless Access 5 is claimed to have significant enhancements that both optimize bourgeoning data traffic on mobile networks and further improve user experience.

Israeli companies are engaged in other VAS developments. **Silent Communications** offers a suite of products, which include Silent VVM, a visual presentation of network voicemail on mobile devices, and other m-commerce solutions. In May 2012, the company's DANA-based mobile client applications crossed the 2 million users mark. **Celltick** enables mobile operators to stream content and advertisements to their mobile subscribers' idle phone screens by using cell broadcast. The company's solution is capable of significantly increasing mobile operators' data ARPU and leads to a better ROI on mobile marketing campaigns. As of July 2012, Celltick reached over 133 million, working with 50 mobile operators, including **Vodafone**, **America Movil** and **Airtel**.

Rapidly growing mobile content consumption has led to an increase in mobile advertising. IDC forecasts that spending on mobile ads will soar in the coming years, from $5.0 billion in 2011 to $20.5 billion in 2016, at a CAGR of 32.8%. This rapid growth was a key driver for one of the largest mobile ads related acquisitions in the past few years when **Singtel** paid $321 million for Israeli **Amobee** in May 2012**.** The deal price tag surpassed the $275 million paid by Apple in the acquisition of Quattro Wireless in 2010, making it the second-largest mobile ads deal recorded (after Google's $750 million acquisition of AdMob). Beyond the high valuation, the Amobee deal is interesting in other aspects. SingTel is one of the largest telecom groups in the APAC region, providing services for more than 400 million subscribers and holding a market cap of around $40 billion. Amobee was the first acquisition the company made outside Singapore. Founded in Israel in 2005, Amobee developed a platform that enables matching of relevant ads for all forms of mobile advertising — from a simple text message to a rich media experience —supporting the vast array of connected devices in the marketplace. According to different reports, Amobee brought in around $50 million in revenue in 2011, giving the deal a 6.4 times revenue multiple. **Massive Impact** manages a global mobile affiliate network with a result-driven mobile marketing model. Using a behavioral-targeting propriety technology, the company's

Affilimob service helps mobile website publishers (and app developers) maximize their advertising revenue, acquire users for their service and gain insight about users. Another company playing in this field is **Inneractive**, who aims to increase ads performance rates, while **MobiIn** (a subsidiary of **Datomo**) offers mobile advertising and marketing solutions.

Mobile Content Development and Deployment

The surge in smartphone adoption has paved the way for ubiquitous rich content consumption. Today, all of the major Web publishers have some sort of mobile presence, either as a dedicated mobile-adopted website or as a standalone application.

Several Israeli companies aim to address mobile browsing related challenges, catering to different customer groups. **Infogin** tackles content adoption issues at the operator side, enabling them to add their own offerings to the users' browsing experience. These may include enabling operators to define and customize their search service and deliver portal content and services. **UppSite** enables creators of online content to automatically port the content to mobile devices and create smart content applications. Upon visiting UppSite's website, the publisher enters the desired URL, after which a fully automated procedure creates the application. A smart plug-in is installed in the Web server, enabling the application clear operation without changing the Web management. **MobiApp** offers a similar solution. **DudaMobile** developed a mobile website creation platform that makes it easy to turn existing websites into mobile optimized sites.

Two Israeli companies dealing with bridging the gap between low-end phones, "feature" phones and the breadth of the Internet were acquired in the past couple of years. **Snaptu** developed a mobile application platform to deliver services that work on virtually every mobile phone. The company was acquired by **Facebook** in 2011 for $70 million to enable the social network giant to boost its efforts in the mobile domain, specifically in emerging markets where feature phones are abundant. **iSkoot**, which was acquired by telecom giant **Qualcomm** in 2010 for $70 million, provides feature phones that also have converged mobile devices capabilities, focusing mainly on mobile VoIP solutions.

Mominis and **Yubitech** are two other Israeli companies that deal with mobile content development and deployment. **Mominis** offers a white-label marketplace solution for content publishers where users can create, personalize, and share casual mobile games and entertainment applications. The offering allows content creators to produce and port games to a wide range of mobile devices, and, thanks to its timesaving features, enables the creation of up-to-date content in response to recent events. **Yubitech** focuses more on the mobile middleware market. The company developed a proprietary virtualization technology that makes it possible to control desktop applications (Web or non-Web) from any smartphone. The company claims this could save up to 90% of traditional mobile extension development. Mobile middleware, which consists of both on-premise and hosted mobility platforms that extend enterprise applications to mobiles devices, is a critical component in mobile deployments.

Wireless and Mobile Infrastructure

Demand for mobile broadband has been soaring dramatically in recent years, driven by data-heavy applications and protocols such as video streaming, gaming, and file

sharing. Long Term Evolution (LTE) and WiMAX are two mobile network technology standards that aim to answer the pressing need for mobile broadband services. IDC views LTE and WiMAX as co-existing technologies, each with its own target markets. While LTE aims to address capacity pressure in 3G networks and is geared towards developed markets, WiMAX remains viable technology for fixed wireless in underdeveloped markets, leading to new deployments in China, Latin America, and elsewhere over the next few years.

Israeli **Alvarion** is considered one of the global pioneers of the WiMAX industry and is currently offering connectivity solutions to verticals with special needs, such as oil & gas and utilities, as well as backhaul solutions. A founding member of the WiMAX forum, the company has a wide range of global customers, mainly wireless broadband services providers. Alvarion's portfolio of end-to- end 4G communications solutions includes radio base stations, core network elements, end-user devices, and network management solutions. **Runcom** is another prominent global player in the WiMAX industry. The company began to develop orthogonal frequency division multiple access (OFDMA) technology in 1997, and was the first to introduce it as a contribution to the IEEE.802.16 standard in 2001 (today known as WiMAX). Runcom's Network and Access division's range of solutions is ideally suited for end-to-end delivery of large scale, high-capacity fixed and mobile WiMAX networks. Another Israeli company in this space, **MobileAccess Networks**, a developer of distributed antenna system (DAS) solutions for wireless telecommunications coverage inside buildings, was acquired in early 2011 by **Corning** for $175 million.

A global leader in the roaming segment and one of its veteran players, **Starhome**, a subsidiary of Comverse, delivers over 50% of all global daily roaming traffic, enabling multi network mobility by integrating its roaming products into strategic suites. The company was recently acquired by Israeli private equity firm **Fortissimo Capital** in a $80.3 million deal.

Wireless Backhaul

Mobile operators are facing capacity issues and ever-increasing expenses due to an exponential increase in bandwidth demands. When streaming data between radio access base stations and the core of the network, operators are faced with different challenges, ranging from quality of service to planning the right capacity. Although fiber is the most popular choice for the job, it has its drawbacks – availability, cost, and the time it takes to deploy – which requires wireless alternatives. Transitioning cell site access networks with varying physical connection mediums (copper, microwave, optical) further compounds the bandwidth challenge as service providers migrate to 3G and 4G/LTE technologies. Solving this bottleneck calls for network solutions that are flexible to interoperate, and transition cost effectively, as bandwidth

demands grow. However, given current global economic uncertainty, operators remain reluctant to make major investments in LTE and are constrained by a lack of spectrum. As a result, HSPA+ remains the predominant near-term solution as many operators look to defer LTE costs. Mobile backhaul investments, including packet microwave and fiber where available, will be required to accommodate data traffic.

Ceragon, a major global player in wireless backhaul, has developed FiberAir, which features a variety of advanced radio frequency (RF) units covering all short- and long-haul deployment scenarios. The company is part of the RAD Group, which is made up of several voice and data communications companies. In March 2012, Ceragon announced the acquisition of Norwegian microwave transmission products developer

Nera Networks for $48.5 million. The acquired company has an extensive customer base in leading European, Latin American, and African mobile operators, which completes Ceragon's positioning in Europe, Asia, and North America. Furthermore, bringing together Ceragon's short-haul solutions and Nera Networks' long-haul capabilities has the potential to build a one-stop-shop vendor with a variety of access, aggregation, trunk, and multicarrier solutions for wireless backbone applications. Another company in the RAD group that is active in the wireless backhaul domain is **Radwin**, which also offers access solutions. **Siklu**, meanwhile, uses E-band spectrum to offer gigabit wireless solutions to mobile operators seeking to dramatically raise backhaul capacity. **ECI Telecom** introduced its solution in this field in mid-2010, while another local player in this domain is **BridgeWave**, which offers wireless backhaul and wireless point-to-point solutions utilizing their line of gigabit wireless bridges and wireless network extenders.

Wintegra and **Provigent** offer additional solutions to increase throughput on mobile networks, but from a different perspective. Both companies were sold in successful deals in recent years. Acquired by **PMC-Sierra** for $240 million in October 2010, Wintegra offers silicon and software-based solutions for mobile backhaul infrastructure products. The company's network processors and software support 2G, 3G, and LTE cell sites and provide connectivity to all the types of backhaul (including fiber optics, copper, and microwave and to base stations) and allow mobile operators to seamlessly migrate to packet-based networks. **Provigent**, a fabless semiconductor company, was sold to **Broadcom** for $313 million in April 2011 in a deal representing a revenue multiple of slightly over X10. The company offers system-on-a-chip (SoC) solutions to vendors of broadband wireless equipment that improve system gain, enabling extended link ranges, lower cost antenna arrays, and bolstered link availability.

TABLE 2

Acquisitions of Israeli Mobile Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
May 2012	AeroScout	Stanley Black & Decker	240	Machine to machine communications
March 2012	Logia Group assets	Mandalay Digital Group	N/A	Mobile applications
March 2012	Amobee	SingTel	321	Mobile advertising
February 2012	Traffix Systems	F5 Networks	135	Mobile infrastructre
Janurary 2012	Schema	TEOCO	9	Mobile infrastructre
November 2011	ComAbility assets	Ruckus wireless	N/A	Telecom infrastructure
November 2011	Wavion	Alvarion	30	Wireless infrastructure
September 2011	Telmap	Intel	300 (estimated)	LBS & Navigation
September 2011	Mirs	HOT	258	Service providers networks
July 2011	Zlango	Vringo	5	Mobile software infrastructure
May 2011	Modu's patents	Google	4.9	Mobile devices
March 2011	Snaptu	Facebook	70 (estimated)	Mobile applications
March 2011	M-Wise	Vringo	0.6	Mobile applications
Janurary 2011	MobileAccess Networks	Corning	175	Mobile infrastructure
October 2010	iSkoot	Qualcomm	70	Mobile Applications
May 2010	Lamda Communication Networks	Nice Systems	N/A	Wireless Applications
Janurary 2010	Azimuth Technologies	Elbit	46.5	Wireless Applications
November 2009	Orsus Solutions	NICE	22	Wireless Applications
September 2009	WiNetworks	RuggedCom	14	Wireless Infrastructure
September 2009	Mintmark	Walla	N/A	Mobile Applications
August 2009	NewACT	Amdocs	6	Mobile Applications
March 2009	Giant Steps	BATM	N/A	Mobile Applications
January 2009	Dekolink Wireless	Axell	N/A	Mobile Infrastructure
January 2009	CallMacom	DT InfoMotion Solutions	N/A (merger)	Wireless Applications
December 2008	Unipier Mobile	Flash Networks	10	Telecom Applications
November 2008	Bamboo MediaCasting	Runcom	N/A	Mobile Applications
September 2008	Eyal Microwave Industry	Herley Industries	30	Wireless Applications
September 2008	Rayfusion	Connect2Media	N/A	Mobile Applications
August 2008	AxisMobile	Synchronica	8.2	Mobile Applications
June 2008	YMax Telecom	Runcom	N/A	Wireless Infrastructure
April 2008	Contact	Unicell	1.85	Mobile Applications

TABLE 2

Acquisitions of Israeli Mobile Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
March 2009	ORBIT/FR	SATIMO	17	Wireless Infrastructure
March 2011	Dream 4 U	Teleclal	1	Mobile Applications
February 2008	Ping Mobile	Merged with RegiSoft	N/A	Mobile Applications
November 2007	Tadiran Communications	Elbit	N/A	Wireless Infrastructure
August 2007	Cellebrite Mobile Synchronization	Sun Corp	17.5	Mobile Applications
June 2007	IXI Mobile	Israel Technology Acquisition	N/A (merger)	Mobile Infrastructure
June 2007	Pure-RFID	Vuance	N/A	Wireless Applications
May 2007	MadahCom	Cooper Industries	43	Wireless Applications
April 2007	TippCom	Unicell	10	Mobile Applications
March 2007	Cellocator	Telocation	18.5	Wireless Applications
February 2007	Adamind	Mobixell Networks	5.5	Mobile Applications
January 2007	GO Networks	NextWave Wireless	24	Wireless Infrastructure
January 2007	Precision Location Systems	Parelec	N/A	Wireless Applications

Sources: IDC, IVC Research Center, 2012

Security

Israel is considered as one of the world's major hubs of innovation and entrepreneurism in the information security field. Since the 1990s Israeli security companies have been at the forefront of developing new technologies and solutions. The leading vendor in this group is **Check Point**. A pioneer in the firewall market, the company has been consistently among the market leaders of the worldwide security industry. Today, the company is focused on its 3D security concept, which is aimed at turning IT security from a collection of disparate technologies into a more centralized, higher-level business process. Taking a more business-oriented view of security has been widely used as a marketing theme by security vendors for years. However, the distributed nature and lack of interoperability between security systems have precluded this vision from becoming a reality. More recently, the increasing difficulty of dealing with mounting regulatory requirements has spurred the emergence of new concepts and technologies that aim to address this challenge.

Check Point's 3D strategy revolves around the need to integrate what it refers to as the 3 dimensions of security - policies, people and enforcement. Policies are the cornerstone of this concept, outlining the organization's requirements and business objectives. The next step is informing and educating users on security policies. Policies should then be enforced across the different security systems. In November 2011, Check Point acquired Israeli company **Dynasec**, a provider of on-premise and SaaS-based governance, risk management and compliance (GRC) solutions, for an estimated $35 million. Dynasec will play a key role in the 3D strategy, serving as a centralized platform for defining objectives, translating regulatory compliance requirements and corporate policies into security rules, and enforcing them.

Check Point's ongoing success has catalyzed and paved the way for other Israeli security companies, many of which were founded by ex-Check Point employees and executives. One of these companies is **Imperva**, which was founded and is headed by Shlomo Kramer, one of Check Point's co-founders. The company, a provider of data security solutions that offers an integrated approach for controlling the usage of enterprise data — from the database, through the application, to the accountable end-user. In November 2011, Imperva raised $90 million in an IPO on the New York Stock Exchange. The company's public debut was slotted as the overall best tech IPO in 2011 with a 93.4% return, ending 2011 with a market cap of $793.4 million. Another recent high-profile security IPO was carried out by **Palo Alto Networks**. Palo Alto Networks' cofounder and frontman, Nir Zuk, was one of the first employees at Check Point and one of the engineers that designed the company's stateful inspection technology.

Israel's proven success in developing innovative security solutions has also brought practically every major global security vendor to establish a local R&D presence, frequently following acquisitions of Israeli companies. This includes **McAfee**, **CA**, **Cisco**, **Microsoft**, **Intel (McAfee)**, **Websense**, **EMC (RSA)**, **IBM**, and others. A recent addition to this list is **GE**, which will soon open its first Israeli Global Research cyber lab for the purpose of building cyber protection capabilities for the company's product portfolio.

The worldwide IT security market is undergoing fundamental changes. For the most part, these changes are driven by the increasing adoption of new technologies in areas such as mobile, cloud computing, virtualization, social media, and others, which makes it increasingly difficult for organizations to keep track on how information is

accessed and used. As a result, there has been a shift in focus from perimeter security, which is aimed at protecting against traditional external threats, to data security, which is more geared towards safeguarding sensitive information against various internal (as well as external) threats. The increasing sophistication of cyber threats, driven by organized crime and terror groups, further exacerbates data-related risks, requiring organizations to realign their security priorities.

Another area of focus for security is mobile. The concept of "bring your own device" (BYOD) is rapidly gaining traction as it enables organizations to reduce the cost and burden involved in managing corporate-issued enterprise-grade devices. On the downside, IT departments that previously have been able to enforce corporate policies on corporate-owned devices are now dealing with employees that expect to keep working with the native applications of the devices they bought for personal use without compromising their experience. To address this challenge, there is an increasing demand for new security solutions to enable a unified security and control strategy for mobile devices and gain control over business data that flows through employee-owned devices.

Looking at the current main fields of activities of Israeli security start-up companies, it appears that local players are well positioned to address emerging security challenges. More specifically, as depicted below, there is a significant presence of Israeli companies in areas such as cyber security, cloud security, mobile security, information protection and control (IPC), identity and access management (IAM), and others, which are expected to experience strong growth in the coming years in light of the changes in the security threat landscape.

Information Protection and Control

Quite a few Israeli companies are playing in the IPC market, which according to IDC definitions includes solutions that enable the discovery, protection, and control of sensitive information contained in data in motion, data at rest, and data in use. This includes **Check Point**, which over the last years has been making moves into the IPC space. As part of this strategy, in 2007 the company acquired data security and encryption vendor **Pointsec** for $586 million; and in 2010 acquired **Liquid Machine**, a company specializing in encryption-based information-centric security solutions.

Check Point's acquisition of Liquid Machines highlighted a key trend within IPC, which revolves around the above mentioned challenges of controlling data access and usage. Catering to this need, Israeli companies such as **Secure Islands**, **Covertix**, and others have been among the first to identify the need for data-centric security, which is considered as the "next generation" of IPC that broadens the scope of earlier solutions – mainly in the area of data loss prevention (DLP). Technology-wise, data-centric security is aimed at addressing the shortcomings of traditional, perimeter-centric solutions to effectively protect sensitive information due to the growing complexity of IT environments and the need to apply protection on the multiple conduits through which sensitive data may leak out. Alternatively, data-centric security is based on embedding security into the data itself, rather than detecting and preventing unauthorized delivery at the exit points (e.g., through email and Web channels, USB drives, and mobile storage devices). This channel-agnostic approach can be used to protect information during its entire life cycle — through creation, distribution, and storage.

Additional Israeli IPC companies include; **Varonis**, a provider of data governance solutions for unstructured and semi-structured data; **Intellinx**, a provider of solutions

for monitoring end-user activity to prevent fraud, data leak and other threats; **WatchDox**, which is offering a solution for secure collaboration and data sharing in the cloud; and **ObserveIT**, a provider of user activity monitoring solutions.

Another IPC-related category is database security, wherein Israeli companies have recognized the need for dedicated solutions. In addition to **Guardium**, which was acquired by **IBM** in 2010 for $225 million, Israeli database security companies include **Imperva**, **Sentrigo** (acquired by **McAfee**) and **GreenSQL**.

Cloud Security

Many organizations are still reluctant to move into cloud environments due to information security concerns and regulatory requirements that restrict them from storing sensitive data in the cloud. In response, an increasing number of security companies are aiming to address this challenge, among them quite a few Israeli companies. This includes most of the aforementioned IPC players, which are targeting cloud security as one of their main markets. In addition, several Israeli IPC companies are developing dedicated data encryption solutions for cloud environments. In September 2011, Salesforce.com, one of the major providers of cloud enterprise software, acquired Israeli **Navajo Systems**, a provider of solutions that encrypt sensitive SaaS application data before it leaves the enterprise boundaries to the SaaS provider, for $30 million. Other Israeli companies developing data security solutions for cloud environments include **Vaultive**, **CloudLock, Porticor** and **Concealium**.

Beyond IPC, several Israeli start-ups are offering different solutions for addressing other cloud security related concerns. This includes **Dome9**, a provider of solutions that secure cloud servers and make them virtually invisible to hackers. **Cyber-Ark** and **Viewfinity** are two prominent players in the emerging privileged identity management (PIM) market. PIM solutions are aimed at providing better control over privileged accounts and passwords, which organizations use for the ongoing administration of critical systems. In addition to corporate employees, privileged users typically include third parties such as consultants, contractors, partners and others. These accounts pose a significant risk as they provide broad access to corporate systems, which may be exploited for various malicious purposes such as stealing sensitive information. By elevating access privileges at the application level, or for desktop functions, instead of providing full administrative rights, PIM solutions can have a key role in monitoring and securing access to cloud applications.

Mobile Security

As depicted above, IPC and mobile security are increasingly required as both fields introduce challenges related to protecting data outside the datacenter. On the mobile side, the explosion of mobile devices and applications raises the need to; secure mobile access to sensitive data; encrypt and secure corporate data stored on smartphones and other connected devices against theft and loss; protect against malicious code attacks; and other threats.

A number of Israeli security companies are currently developing mobile security solutions. Among them is **Discretix**, a pioneer in the area of embedded security. The company's solutions are based on an open architecture and are aimed at enabling mobile device manufacturers to secure the core hardware layer, middleware, and applications. **LetMobile** aims to address the BYOD challenge by abstracting security and management from the mobile devices in use and raising these capabilities up to

the cloud (public or private), thus allowing IT departments to define and enforce unified security and management policies across mobile platforms while maintaining user experience. Other Israeli companies catering to this need include **MobileSpaces**, which offers a BYOD policy management solution to protect mobile enterprise data against loss and leakage; and **AE Squared**, a provider of solutions that enable centralized control, security and regulatory compliance for corporate data used on smart devices. **Enlocked** is offering a free email security service that works across PCs, smartphones and tablets, and ensures that sensitive emails are always delivered securely to their destination. In addition, **DroidSecurity**, a provider of solutions to protect mobile devices and data against security, privacy and identity threats, was acquired in 2010 by **AVG**. Among other Israeli mobile security companies is **Lacoon Security**, which offers a solution – hosted in the cloud or by the mobile carrier – that analyzes communication data from the mobile device, identifies malicious behavior and contains the threat.

Cyber Security

Driven by the growing sophistication of cyber attacks, cyber security has become a major concern for government organizations and enterprises across a broad range of industries, including lucrative SMB targets. Over the past few years, there has been a substantial increase in the number of advanced persistent threat (APT) attacks, carried out by state intelligence services, terrorist organizations, organized crime groups, individual hackers and other parties. Typically consisting of customized malware designed to exploit zero-day vulnerabilities for purposes such as data theft, fraud, business espionage, sabotage, damaging systems, etc., these threats are challenging traditional anti-malware solutions that are practically ineffective against new, unknown threats (e.g., rootkits, botnets and targeted malware) as they depend on signature-based detection. To increase their effectiveness, APTs usually utilize botnets to take control of computers remotely, and combine multiple attack vectors such as spam, phishing, social engineering, and others.

The increasing awareness of cyber security has been prompting security vendors to develop dedicated solutions. Israel has a growing cluster of start-up companies that offer various methods for protecting against APT attacks. This includes **Seculert**, a provider of a cloud-based malware detection solution that intercepts and collects data from within live botnets, analyzes malicious content and activity, identifies cybercrime servers and detects corporate-specific attacks in real-time. **Cyvera** is offering a client-based solution to protect against targeted remote attacks on Windows-based endpoints, servers, virtual machines and terminals. **Light Cyber**'s solutions aim to detect behavioral changes in the network and abnormal behavior, enabling efficient containment and remediation while keeping track of the attack progress.

Several Israeli cyber security companies are offering solutions that are based on identifying threats in global IP traffic and providing early protection against them. This includes **Narus**, a developer of traffic monitoring solutions that detect and mitigate malicious traffic in real-time. The company was acquired by Boeing for $70 million in 2010. Another notable player in this space is **Commtouch**, a provider of cloud-based messaging and Web security solutions that are based on analyzing Internet transactions in real-time to identify new threats as they emerge. Over the past few years, Commtouch has been expanding into the antivirus space, targeting the OEM market. As part of this strategy, the company acquired the Command Antivirus division of Authentium in 2010. Most recently, it bought Iceland-based antivirus company FRISK.

Another Israeli cyber security player is **Waterfall**, which provides hardware-based security gateways that enforce one-way data flow at the physical layer and prevent data backflows. The company caters to the rising demand for higher levels of security to protect critical infrastructures and utilities, enabling them to securely connect their industrial networks to external systems, thus avoiding exposure to cyber-attacks, cyber terror hacking, and other threats.

Security Lifecycle Management

There is another notable cluster of Israeli companies in the security lifecycle management field, which refers to the automation of network security change and configuration management processes. The need to frequently monitor and update security policies to reflect changes in the threat landscape and regulatory requirements, coupled with the increasing complexity of corporate networks, is placing an enormous burden on IT departments. As a result, organizations are increasingly exposed to security vulnerabilities due to misconfigured network and security systems.

Israeli companies **Tufin, Algosec** and **Skybox** have been among the first to introduce the security lifecycle management concept, providing solutions that analyze security configurations and polices, and identify and alert on potential issues.

Network Security

IDC defines network security as a combination of hardware, software, and networking technologies whose primary function is to protect corporate networks and network-embedded resources from disruption caused by external threats. In the network security market, IDC includes firewall, unified threat management (UTM), intrusion detection and protection, and virtual private network products. Current major market drivers include the transition from firewall to UTM along with the increasing demand for application-aware solutions, and the adoption of virtualization.

Check Point maintains its position as one of the leaders of the network security market after a strong 2011 with $1.1 billion in revenue (14.5% share). In addition, quite a few other Israeli companies are playing in the network security space. This includes **Aladdin**, a market leader in the area of authentication tokens, which was merged in 2009 into **SafeNet** (in a private equity deal financed by **Vector Capital**), and is also playing in the network security market. As mentioned above, **Radware** is a provider of application and network security along with application delivery solutions. **Altor** develops solutions for monitoring, controlling and enforcing security policies in virtualization environments. The company was acquired in December 2010 by Juniper for $95 million. **Beyond Security** specializes in developing tools that find and help manage security weaknesses in networks, test software for the possibility of hostile external attacks and audit vendor products for security issues.

Among emerging Israeli network security companies is **Indeni**, which aims to address firewall and service downtime resulting from human errors, misconfigurations, and changes in the network environment. The company's solution is aimed at monitoring network firewalls and providing preemptive alerts for anticipated issues that may lead to network outages, thus reducing IT costs and freeing up IT personnel and resources for mission-critical tasks.

Web Security

Web security has been consistently growing in importance, driven by trends such as the increasing adoption of cloud applications that reside outside the firewall, the use of social media within the workspace, the BYOD movement, and the adoption of open Web technologies such as HTML5.

An increasing number of Israeli security companies are leveraging local expertise and capabilities to address emerging Web security concerns. Among notable players is **Trusteer**, a provider of solutions for securing sensitive Web browser transactions and communications between service providers (banks, brokerages, healthcare, retailers, etc.,) and consumers, as well as securing SaaS applications. **PineApp** is a provider of Web filtering as well as email security and email archiving solutions. **Applicure** offers website security solutions that protect against SQL Injection, cross-site scripting, path traversal, and other application-level attacks. Another prominent Israeli Web security company, **Finjan**, was acquired by M86 Security in 2009.

Other Israeli security companies are seeking to protect websites against cyber attacks. **SiteBlackBox** offers a cloud-based solution that monitors sitetraffic and user-interaction to distinguish, in real-time, users from abusers and humans from bots. **Foresight** offers a different approach for protecting websites against cyber threats, enabling organizations to withstand attacks and continue operating by duplicating websites and uploading them to the cloud. This way, users can be redirected to the duplicate site in response to high network traffic load, a Distributed Denial of Service (DDoS) attack, and other scenarios.

Incapsula offers a cloud-based Web application security service that enables organizations to protect Web applications, avoid hacks, blacklisting, achieve PCI compliance and gain better visibility into who is really accessing their website. Another company addressing this problem is **Hybrid Application Security**, which utilizes detection and tracking technologies to protect against zero-day attacks on Web applications and back-end business logic. **6Scan** protects websites against hackers by enabling users to automatically and immediately fix security vulnerabilities found on their website, before hackers can find and exploit them to gain access. **GamaSec** provides vulnerability scanning solutions and services to assess website vulnerability and ensure Web application security.

Another Web security market category with strong Israeli presence is parental control. Tens if not hundreds of millions of children worldwide are exposed to a variety of self-inflicted risks via Web communications as well as through smartphones, tablets, and other mobile devices. In light of the extensive use of social networks by children as a main platform for online interaction, the demand for advanced parental control solutions is on the rise. Several Israeli companies were founded over the past few years to address the need for child safety in Web environments and particularly social networks.

Founded in 1998, **PureSight** enables parents to protect their children from cyberbullies, Internet predators and unsolicited adult-oriented Web sites. The company uses proprietary algorithms that analyze and categorize data to identify and block undesirable contacts and potentially harmful discussions originating from cyberbullies, and block undesirable websites in real-time. **United Parents** offers a cloud-based service that follows the child's relevant traffic, covering instant messaging, chat, email, and other channels, whether Web or mobile based. Utilizing natural language processing techniques, the service monitors the child's online behavior, identifies the child's relationships, analyzes them, and creates detailed

profiles of the people the child has engaged with, and the relationships themselves. Once a potentially risky situation is identified, early alerts are provided to the parents via email or text message. **PG Guard** monitors children regardless of their location or the device they are using. The company has developed a social artificial intelligence technology that profiles the child as well as every friend and group connected to the child. When a suspicious event is detected, the PG Guard algorithm analyzes it based on participants' profiles and makes a decision on whether an alert should be sent.

Anti-fraud

Anti-fraud is one of the main areas of expertise for Israeli security companies, including various start-up companies as well as established vendors. Among the latter group is **NICE Systems**, which is offering anti-fraud solutions based on **Actimize**, which it acquired in 2007 for $282 million. The company offers various solutions in this space integrated under NICE's enterprise risk management framework, including; real-time, cross-channel fraud prevention, anti-money laundering, brokerage compliance, enterprise case management, and eDiscovery.. Another notable Israeli anti-fraud vendor is **Cyota**, which was acquired by **RSA** (the security division of IT infrastructure vendor EMC) in 2005 for $145 million and has served as its local R&D center since then. The acquisition of Cyota enabled RSA, traditionally an identity and access management player, to enter the payment fraud prevention space. Cyota provided much of the technology behind 3D Secure, a protocol designed for authenticating credit card transactions in eCommerce sites by requiring consumers to enter a password before a purchase can be authorized. 3D Secure is better known under the brand names of Verified by Visa and MasterCard SecureCode. According to RSA, it currently processes 70% of the world's 3D Secure transactions.

In 2011, EMC and RSA established a new R&D center in Beer Sheva, which is focused on the development of information infrastructure technologies in the areas of cloud computing, storage, data recovery, Big Data and information security, as well as other development projects in a wide range of EMC products. In addition, EMC also recently announced the unification of RSA's presence in Israel and EMC's multiple Israeli R&D facilities into one facility in Herzliya.

Cyota is not the only Israeli anti-fraud company acquired by a major technology vendor. In 2008, online payment giant **PayPal**, a subsidiary of **eBay**, paid $169 million for **FraudSciences**. The acquired company, which currently serves as eBay's Israeli R&D center, has developed a solution that protects against fraud and charge backs for online credit card payments, domestic and international. Another anti-fraud related company is **ClearForest**, which was acquired by Thomson Reuters in 2007 for $25 million. Clearforest's analytics software categorizes, classifies, and extracts various insights (e.g. entities, facts, relationships, dates, and opinions) from text. It then provides a visual representation of this information to facilitate its analysis for different purposes, including financial fraud detection. **Snapcentric**, acquired by **Verisign** (now part of Symantec) in 2006 for $12 million, was focused on providing transaction anomaly detection solutions to protect financial services companies against phishing, pharming and other online transaction fraud and misuse.

Among other Israeli anti-fraud companies is **Intellinx**, a provider of solutions that record and analyze end-user behavior at the application screen level to automatically identify abnormal behavior (including by privileged users such as systems and database administrators) that may indicate internal fraudulent activities, and provide an audit trail for investigation of suspicious events. **Trusteer** has developed a lightweight browser plug-in that can be automatically downloaded and installed on a

user's machine when browsing sensitive websites such as Internet banking, Webmail, or online payment pages. Once plugged in, the company's solution locks down the browser, preventing unauthorized access to Web pages and confidential information such as log-in details, transactions, and other information that flows through the browser. Also in this space is **Comitari**, a provider of solutions that protect Web users from client-side identity theft, online fraud and other attacks in real-time as they surf the Web, from within their browser applications; **Versafe,** which utilizes encryption and identification mechanisms to protect against various types of online fraud and identity theft attacks based on social engineering, including phishing, Trojans and pharming attacks; and early stage **FraudSense**, a Web service that enables a more secure Web browsing experience by identifying fake websites as they become active. In addition, **BillGuard** is offering a personal finance security service that analyzes consumer billing complaints to find erroneous and fraudulent charges on credit card and debit card bills.

Another anti-fraud related area of activity for Israeli security companies is authentication. Among Israeli companies catering to this market is **Top Image Systems**, a provider of solutions for managing and validating content, whether originating from electronic, paper or other sources. The company's solutions enable prevention and detection of financial fraud by extracting and validating any information entering the organization. Also in this space is **AU10TIX**, a provider of document acquisition, authentication and comprehension solutions that reduce identity fraud by automatically acquiring and identifying documents, and capturing and classifying content (whether visible, encoded, electronic or magnetic), while authenticating both document and data (primary & supplementary). **Algorithmic Research (ARX)** provides a digital signature solution that allows users to digitally sign documents, records, files, forms, and electronic transactions.

Quite a few Israeli companies are utilizing various types of biometric technologies for both logical and physical access control. **FST21** combines biometric and analytic technologies that include facial recognition, behavior analysis, speech recognition, voice recognition, and others, providing access control for residential high-rises, commercial buildings, housing authorities, police, military, border control and other Homeland Security agencies, as well as security authorities at municipalities, airports, railways, sea and other transportation authorities. Face recognition company **C-True Imaging** is offering various access control applications, including a solution that uses the individual's face as a key to grant access for use of devices, including ATM kiosks, gas pumps, mobile devices, PCs, car security systems and others. **PerSay**, a spin-off from **Verint**, is offering voice biometric solutions that authenticate a speaker during an interaction with a voice application or during the course of a natural conversation (the company was acquired by Nuance Communications late in 2010). **Sentropi** is providing an identification tracking solution that combines device fingerprinting technology with device "tagging" methods for online identification and fraud prevention. **BioGuard** is a provider of multi-factor identification solutions that integrate palm vein authentication, facial recognition, fingerprint identification, and voice recognition in a single product. **Ex-Sight** develops biometrics-based solutions in the areas of access control, data encryption, suspect detection and investigation, user login, Web authentication and face recognition control.

Security and Vulnerability Management

Security and vulnerability management (SVM) is defined by IDC as a comprehensive set of solutions that focus on allowing organizations to determine, interpret, and improve their risk posture. Software products in this market include those that; create,

monitor, and enforce security policy; determine the configuration, structure, and attributes for a given device; perform assessments and vulnerability scanning; provide vulnerability remediation and patch management; aggregate and correlate security logs; and provide management of various security technologies from a single point of control.

Included in the broad SVM market are application scanners, which test the robustness of an application or software to resist attacks. The application scanner market consists of static analysis tools that review source code looking for known programming errors and dynamic testing tools that look for vulnerability classes within functional software. Several Israeli companies operate in this space. **Seeker Security** is a provider of automated application security testing solutions aimed at identifying, demonstrating and mitigating critical application business risks. Seeker Security was recently acquired by **Quotium** in a $8 million deal. **Checkmarx** is a provider of secure source code solutions that cater to the increasing demand for automatic detection and fixing of security vulnerabilities early in the development phase – especially for Web and SaaS applications.

The SVM market also consists of proactive endpoint risk management (PERM) solutions, which according to the IDC definition, are used to automate or semi-automate the enforcement of security policy and configuration management on endpoints. Among Israeli companies catering to this market is **Promisec**, a provider of endpoint security as well as endpoint management solutions based on an agentless architecture that requires no client-side software, enabling a reduction in the cost of managing and controlling endpoints while optimizing existing solutions and processes. The company has been successful in the U.S. government market, signing the State of Texas in 2010 and State of Alabama in 2011 as customers.

ForeScout is a provider of solutions that enable real-time visibility into devices connected to the corporate network, measures compliance with security policies, blocks network threats, and remediates endpoint security violations when they occur. **Trustware** has developed a virtualization technology that "buffers" each PC within the corporate environment from Internet activities and external devices to protect against malicious attacks by known and unknown viruses and other types of malware.

Israeli endpoint security related companies were also a target for acquisitions in recent years. This includes **Insightix**, a provider of network discovery and network access control (NAC) solutions that was acquired by **McAfee** in 2012; and **Safend**, a provider of data protection solutions that was acquired by **Wave System**s in 2011 for $12.8 million.

Physical Security

Physical security information management (PSIM) refers to solutions that link data from multiple surveillance systems with doors, environmental systems, fire, and public safety systems. To a large extent, the growth of the PSIM market in recent years is driven by technology advances that have made solutions in this space more sophisticated, simple to use and less costly. As a result, PSIM is extending from the critical infrastructure protection market niche into the corporate market.

Israeli companies are a major force in the PSIM market. **Verint** and **NICE** are market leaders in the security intelligence field, providing surveillance, video recording, monitoring and other solutions that address needs in areas such as public safety, law enforcement, public transportation, and so forth. Other players in the video

surveillance space include **BriefCam**, which has developed an image processing technology that summarizes hours of video surveillance recordings into a short brief, and eases the burden of browsing massive quantities of video footage. **Agent Video Intelligence** is a developer of video analytics software deployed in various security, safety and business intelligence applications, enabling real-time video analysis and alerts, forensic search and post-event analysis. **Mango DSP** provides video surveillance devices based on DVR and IP camera technology, powering various OEM solutions in the Homeland Security, defense, retail, mobile and transportation markets.

Also in the physical security field is **Attenti**, which was recently acquired by **3M** for $230 million. The company develops monitoring systems that gather and transfer real-time data from body-born devices incorporating various types of sensors. Attenti's solutions are typically used for monitoring people awaiting trial or on probation, as well as for monitoring patients in elderly-care facilities.

Another physical security related market category is asset tracking and monitoring. This includes **AeroScout**, a provider of wireless asset tracking and monitoring solutions utilizing Wi-Fi-based active RFID and other technologies. AeroScout was recently acquired by U.S. mechanical and electrical equipment giant Stanley Black & Decker, for $240 million. Another major Israeli player in this field is **Ituran**, a provider of location-based solutions and services for stolen vehicle recovery and tracking, as well as cargo and personal security, homeland security applications, and others. **Hi-G-Tek** also uses active RFID for real-time monitoring and control of critical physical assets.

Another prominent physical security vendor is **Visonic**, which provides electronic security systems and components, including alarm systems and intrusion detectors. The company was acquired by **Tyco International** in 2011 for $99.4 million. Start-up company **eVigilo** is developing a mass alert platform for governments, homeland security, rescue forces, etc., which provides real-time, location-based alerts to the public, allowing specific information to be sent to specific groups, or to specific geographical areas. Another Israeli company catering to the physical security market is **Camero**, a developer of Ultra-Wideband (UWB) based technology that generates intuitive images of objects concealed by solid barriers such as walls. Camero was acquired in 2011 by Korea-based **SK Group**.

TABLE 3

Acquisitions of Israeli Security Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2012	Idesia assets	Intel	N/A	Identity and access management
June 2012	Seeker Security	Quotium Technologies	10	Security and vulnerability management
February 2012	Insightix	Intel (McAfee)	5 (estimated)	Endpoint security
January 2012	Controp	Rafael	N/A (50%)	Physical security information management
October 2011	Dynasec	Check Point	35 (estimated)	Governance, risk management and compliance
October 2011	DVTel	Suspect Detection Systems	N/A	Physical security information management
September 2011	Safend	Wave Systems Corp	12.8	Information protection and control
September 2011	Visonic	Tyco International	99.4	Physical security information management
August 2011	Navajo Systems	Salesforce.com	30 (estimated)	Information protection and control
March 2011	Rontal Applications	Verint Systems	N/A	Physical security information management
March 2011	Sentrigo	Intel (McAfee)	50 (estimated)	Information protection and control
January 2011	NeoAccel	VMware	N/A	Network security
December 2010	Altor Networks	Juniper	95	Network security
November 2010	DroidSecurity	AVG	9.4	Mobile security
July 2010	Narus Inc.	Boeing Network & Space Systems	70	Network security
June 2010	Breach Security	Trustwave	N/A	Network security
March 2010	ControlGuard	Cryptzone	N/A	Information protection and control
November 2009	Guardium	IBM	225	Information protection and control
November 2009	Finjan	M86 Security	40	Web security
January 2009	Aladdin Knowledge Systems	Vector Capital	160	Identity and access management, network security
November 2008	Eurekify	CA	30	Identity and access management
October 2008	IDFocus	CA	N/A	Identity and access management
June 2007	Actimize	NICE Systems	282	Anti-fraud, GRC
March 2007	View Links Euclipse	Verint	5	Anti-fraud
January 2008	FraudSciences	Paypal	169	Anti-fraud
January 2007	Secured Dimensions	Microsoft	5	Application security

Sources: IDC, IVC Research Center, 2012

Semiconductors and Components

Semiconductor revenues worldwide will grow 4.6% in 2012 to $315 billion according to the mid- 2012 update of IDC's Semiconductor Applications Forecaster (SAF). The SAF also forecasts that semiconductor revenues will grow 6.2% to $335 billion in 2013 and grow at a CAGR of 4.8% from 2011-2016, reaching $380 billion in 2016. IDC expects that after reaching a bottom in the second quarter of 2012, semiconductor market growth will resume in the fourth quarter of 2012 and extend into the first quarter of 2013. This next wave of semiconductor demand will be spurred by the launch of Windows 8 for tablets, increased enterprise IT spending, and next-generation smartphones, tablets, and gaming platforms, as well as the anticipation of improved global macroeconomic conditions. The recovery will accelerate into the second half of 2013 and beyond.

As the largest hub of fabless companies outside the U.S., the Israeli semiconductor industry is well set to benefit from this growth. For example, Israeli companies are at the forefront of the memory chip sector. Notable developments include the USB flash drive, which was initially developed by **M-Systems** (acquired by **SanDisk**) and **Saifun**'s (acquired by **Sapnsion**) non-volatile memory that enables various types of devices (e.g. mobile phones, cameras, PDA, and set-top boxes, to name just a few) to retain stored information even without a power source.

Memory remains a strong area for Israeli semiconductor companies. Marking its largest hardware acquisition ever, and its first in Israel, **Apple** bought flash memory chip designer **Anobit** in January 2012 for an estimated $400 million. Since its inception in 2006, Anobit raised $72 million from top tier VCs and is estimated to have pulled in over $40 million in 2011. The company developed a technology that improves the performance and endurance of NAND flash memory chips by streamlining the memory reading process, while optimizing the chip power consumption – a major challenge when dealing with today's high-end mobile electronics.

NAND memory chips are also being increasingly used in solid state drive (SSD) based enterprise storage systems. Israeli semiconductor companies are also highly active on this front. In May 2012, it was announced that EMC is buying Israeli **XtremIO**, a provider of SSD storage systems, for $430 million. The company developed a storage array that was designed to use only flash for enhanced scalability, efficiency, ease-of-use, and data management capabilities. The acquisition price tag represents a phenomenal exit for the young start-up, which was founded in 2009 and raised a total of approximately $25 million. One of XtremIO's main competitors is another Israeli company, **Kaminario**, which developed a scale-out storage architecture based on off-the-shelf blade servers, SSD media, and a proprietary Storage Operating System. In June 2012 the company completed a $25 million funding round, bringing its total amount raised to approximately $60 million. Another prominent Israeli company catering to this market is **DensBits**, a provider of IP and controller technology for NAND flash-based storage systems, which maximizes the number of bits/cell that can be stored within the flash, thus minimizing costs.

By acquiring one of most prominent Israeli semiconductor start-ups and turning it into its R&D center, Apple will now be able to leverage the local talent pool in this field. It will be joining other multinational semiconductor companies with Israeli plants and R&D centers. For example, **Intel**'s 3 local plants have been behind the development

of the Pentium 3, Pentium 4, Centrino chipset, the Core 2 duo series, and others. Other notable global players with Israeli plants and R&D centers include **Applied Materials**, **Broadcom**, **Freescale**, **Marvel**, **PMC-Sierra**, **KLA-Tencor**, **SanDisk**, **Texas Instruments**, and **Vishay**. As shown in Table 4, many of these R&D centers were established based on the acquisition of local companies.

One of the fastest growing Israeli technology companies in recent years is NASDAQ-traded **Mellanox**, a provider of connectivity solutions for servers and storage. The company has been one of the pioneers of InfiniBand, an industry standard architecture that provides specifications for high-performance interconnects. In 2010, Mellanox acquired **Voltaire**, also an Israeli InfiniBand pioneer developing scale-out computing fabrics for data centers, high performance computing and cloud environments, in a $218 million deal. The combined company generated approximately $260 million in revenue in 2011, up from $154.6 million in 2010. Mellanox' success has been boosted through its broad network of OEM partners, among them some of the largest hardware and software vendors; Oracle, HP, IBM, Dell, Fujitso, and most recently Intel, to name a few.

Beyond that, dozens of Israeli companies are developing semiconductors and components for different types of systems in the areas of mobile, telecom, storage, medical devices, defense, automotive, home networking, RFID, and others. Among them is **Tower semiconductor**, a provider of customized solutions in various complementary metal oxide semiconductor (CMOS) technologies, including digital CMOS, mixed-signal and radio frequency CMOS, and CMOS image sensors and power management devices. The company generated $611 million in revenue in 2011.

Multimedia and Entertainment

Multimedia and entertainment is one of the major areas of expertise for Israeli semiconductor companies. A notable player in this space is **Zoran**, a developer of digital signal processing (DSP) based solutions for the digital entertainment and digital imaging consumer electronics markets. In 2011, Zoran merged with United Kingdom–based wireless connectivity and location technology company **CSR** in a $484 million transaction. The merger was mainly aimed at providing the companies with more scale to compete in their respective markets. In addition, it enabled new market opportunities to be pursued in growth areas such as home entertainment and auto infotainment by combining CSR's location and connectivity technologies with Zoran's imaging and video technologies.

CEVA is a developer of programmable DSP cores, DSP-based subsystems, application-specific platforms, and various software components primarily for the handset, mobile multimedia, and home entertainment markets. **Siano** provides silicon receiver chips for the mobile digital TV and terrestrial TV (DTT) markets, targeting mobile handsets, data cards, PMP/PND/MP-4 devices, PC applications, set-top-boxes/HDTV, and automotive infotainment devices. **SURF Communication** develops high-density, multimedia DSP resource processing boards for telecommunication infrastructure and computer telephony integration (CTI) applications, providing a platform for video transcoding, conferencing, and streaming.

Israeli semiconductor companies are increasingly prominent in the development of advanced interfacing technologies across a broad range of areas. In particular, local companies have been pioneering ground breaking technologies in the field of motion sensing and gesture recognition. Among emerging players in this space is **Prime**

Sense, which develops a 3D motion-sensing device that tracks and reacts to user movements outside the computer. The company's solution empowers **Microsoft**'s Kinect device, a sensing device that is plugged into the Xbox 360 and allows games to be played through body motions and by speaking commands.

Other Israeli companies are developing embedded user interface (UI)-related software for semiconductors and electronic devices, including gesture-based UIs for mobile phones, tablets, laptops digital signage and TVs. **Eyesight** utilizes image processing and machine vision algorithms to track a user's hand gestures and convert them into commands to control the functions and applications of the device. Designed for embedded platforms, the company's solutions can be integrated at the chipset level, operating system, as part of the camera module or integrated at the application level. **XTR3D** provides a software-based interface, which liaises between XTR3D-enabled games/applications and camera-equipped consumer electronic devices to enrich games and applications with motion for a gesture control user experience. **Omek Interactive** provides middleware and tools to add gesture recognition and tracking interfaces to various applications, running on a wide range of processors, from Intel- and AMD-based PCs, to embedded systems from Intel, Texas Instruments, and AMD. **ZRRO**'s solutions enable television control using hand motion. The company's remote control detects human fingers when touched or hovered over and transmits the data to software in the media device, which generates a virtual hand on top of the original image. **PointGrab** is a developer of hand gesture recognition software for use with standard 2D cameras.

Other Israeli semiconductor companies developing interfacing technologies include **EPOS**, a developer of multidimensional digital positioning technologies for various products targeted at OEMs and ODMs in the consumer electronics, mobile and gaming markets. **N-trig** developed a touch screen software- and hardware-based technology that allows several input forms, including pen, touch, and multitouch, in a single integrated solution.

Intuitive User Interfaces is a developer of technology for mobile phones that is based on understanding and predicting which actions users want to perform in various situations, and enabling those actions instantaneously via one touch experience. **Intuitive** is developing a chip that enables recognition and analysis of facial features such as pupil motion and shape, for use in tablets and laptops. Catering to the gaming industry, **eMotion Technologies** is developing a system that measures the player’s biofeedback parameters, analyzes the player’s emotional state (in real time) and sends the game a current report of the player’s immersion level.

Amimon, the company behind the WHDI high-speed wireless standard, provides wireless uncompressed high-definition video for universal connectivity among consumer electronics video devices. **Advasense** provides CMOS image sensor solutions for the camera phone market. **Genoa**'s chips enable electronics companies to enhance image quality and viewing experience for various displays. **Lucid** is a developer of universal multi-GPU solutions for graphics-enabled platforms such as PCs, notebooks and gaming consoles. **Valens** provides uncompressed HD multimedia content distribution solutions. Another Israeli company in this category, **Arcos Technologies**, provides a SoC transmission platform for digital multimedia, and was recently acquired by **ATX Networks**, a provider of solutions to the cable television industry.

In the audio space, **Waves** uses psycho-acoustics technology to provide custom semiconductor and DSP licensing solutions to consumer audio manufacturers

worldwide, including **Microsoft**, **Samsung**, **Sony**, **JVC**, **Sanyo** and others. **bTendo** is a provider of personal projection solutions that utilize Micro Electro Mechanical Systems (MEMS) and laser-scanning display technologies to enable mobile users to share multimedia content from a PDA, multimedia player, mobile phone, or other handheld device. The company recently sold its intellectual property to Swiss semiconductors company **STMicroelectronics**.

Communications

Telecom and mobile semiconductors are one of the main areas of activity for Israeli semiconductor companies. A particular field of expertise in this space is digital signal processing (DSP), wherein local players have been among those offering commercial solutions. Many of these players are publicly traded on NASDAQ. Among established Israeli DSP players is **DSP Group (DSPG)**, a pioneer in the field of wireless chipset solutions for converged communications at homes. The company's spin-off **DSP Communications**, which developed software and integrated circuits based on DSP technology and proprietary ASICs for the wireless market, was acquired by Intel in 1999 for $1.6 billion.

The introduction of the first LTE networks worldwide has led to massive investments in all related products, including infrastructure, devices, applications, and services. The mixture of LTE's increased spectrum effectiveness, flexibility, and greater capacity, streamlines the network architecture and leads to lower operating expenditures for the carrier, and improved user experience and lower cost of ownership for the subscriber. The processing power needed to deal with 4G signals is greater than the equivalent 3G, posing a significant challenge for baseband chip designers. **Altair**, a developer of 4G chips for LTE and WiMAX, is one of the Israeli vendors who have been tackling this issue with its propriety processor. The company also offers baseband processors, multi-band RF transceivers for both FDD (frequency division duplexing) and TDD (time division duplexing) bands and a range of reference hardware and product level protocol stack software.

Comsys, which was acquired by Intel for $30 million in May 2010, specializes in WiMAX semiconductors, and will help the chipset giant to further push for WiMAX-related developments. Another company, **Asocs**, is offering processors that provide mobile users with seamless connectivity over diverse wireless networks. Other companies, such as **DesignArt**, are focused on the backhaul parts of the network, supplying SoC platforms pre-loaded with software for performance solutions. The company was recently acquired by semiconductor giant Qualcomm in a deal estimated at around $140 million.

The Femtocell domain has not been neglected by local companies; **Precello**, a fabless semiconductor company, offers integrated and low-cost digital baseband processors for WCDMA and LTE Femtocells, addressing the residential and enterprise markets. The company was sold to **Broadcom** for around $100 million in October 2010.

Israeli fabless semiconductor companies also focus their efforts on the home networking market. Consumers are becoming increasingly aware of the benefits to be derived from networked multimedia applications, such as networked gaming, networked video streaming, and VoIP. **Wilocity** and **Celeno** are all offering solutions that will enable super-high-speed connectivity for wireless networking functions.

In the networking space, **BroadLight** is a fabless semiconductor company providing fiber access products including embedded multi-core processors and fiber access GPON (gigabit passive optical network) processors. The company was recently acquired by **Broadcom** for $205 million. **EZchip Technologies** provides Ethernet network processors that integrate packet processing, classification search engines, traffic management and OAM (operation, management and administration) offload in a single chip. The company's solutions are aimed at the carrier's edge, metro, and access networks, as well as at enterprise datacenters. **ColorChip** is a developer of optical transceivers to the datacom/telecom markets and passive optical splitters to the fiber to the x (FTTx) markets. **Siverge Networks** develops application on chip devices for the global optical networking and mobile backhaul spaces. **Tehuti** develops SoC for accelerating 10Gb Ethernet network traffic.

Semiconductor Testing

Israeli companies are also prominent in providing solutions for testing, and process control surrounding the design, engineering and manufacturing of semiconductors and components. **Orbotech** is one of the leading vendors in the field of inspection and imaging systems for the electronics industry. The company, which had $565 million in revenue in 2011, provides automated optical inspection, production and process control systems for printed circuit boards (PCBs), and automated optical inspection (AOI), test and repair systems for flat panel displays. It also provides computer-aided manufacturing (CAM) and engineering solutions for PCB production. Throughout the years Orbotech has been expanding into various other areas for imaging technologies, including automatic check reading solutions to banks and other financial institutions, and specialized products for application in medical nuclear imaging.

Among other Israeli players in this space is **QualiTau**, a provider of reliability testing equipment and services for the semiconductor industry that forecasts failure rates and performance degradation in integrated circuit devices. **Nova Measuring Instruments** provides metrology systems for process control that are integrated into process equipment tools, or used as stand-alone metrology platforms for the global semiconductor manufacturing industry. Another Israeli metrology and instrumentation company, **Ophir Optronics**, was acquired in 2011 by **Newport** for $230 million. **Jordan Valley** develops X-Ray based semiconductor metrology solutions for metal and dielectric thin films. **CI Semi** provides process monitoring and control systems for the semiconductor market.

Others Semiconductor Companies

Driven by strong global demand for automobiles and increased semiconductor/electronics content in autos, semiconductor revenues for the automotive industry segment are expected to grow 9.7% year over year in 2012 with 7.2% CAGR between 2011 and 2016. Semiconductor content in cars continues to increase, especially for applications such as in-vehicle infotainment, automobile body electronics, driver safety systems, engine control, and others. In particular, infotainment systems are experiencing strong demand for advanced processing capabilities in areas such as voice recognition systems and audio codecs.

An increasing number of Israeli companies are catering to the growing market opportunity in automotive semiconductors. **Ocean Technologies** is developing a wireless vehicle to vehicle communications solution that provides drivers with alerts of potential hazards caused by on-coming and other vehicles on the road that may be in

a collision path. **VisIC** is developing a gallium nitride transistor that functions as a high voltage power switch for electric power conversion systems that can be used in electric vehicles as well as solar systems and wind turbines. **EV Chip** is developing solutions for power consumption aimed at the automotive industry. **Autotalks** is a fabless semiconductor company developing unique VLSI solution for vehicle-to-vehicle and vehicle-to-infrastructure communication.

Among emerging Israeli semiconductor companies are **Multiphy**, a provider of digital signal processing (DSP) based integrated circuits for high speed optical communications. **Annapurna Labs** plays in the field of ARM-based communication controllers. The company was founded by Avigdor Willenz, formerly the co-founder of **Galileo Technology**, an Israeli provider of system-on-chip networking components, which was acquired by **Marvell Technology** in 2000 for $2.7 billion. **TangoTec** is developing residential, multi-dwelling units and enterprise networking solutions aimed at the distribution of broadband IP "Triple Play" services. **Plurality** develops silicon intellectual property, chips and acceleration boards for many-core processing. **CompuLab** provides energy efficient computers, ranging from board level products to complete systems, embedded in digital signage, telecommunication systems, automotive devices, gaming systems, medical devices, aerospace, marine systems, and others. Several Israeli companies have emerged over the past few years to cater to the renewable energy market. Among them is **SolChip**, which integrates solar energy sources (Photovoltaic-PV), with low power electronic devices (VLSI) to eliminate the need for an expanded solar panel area and additional accessories.

TABLE 4

Acquisitions of Israeli Semiconductors and Components Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
March 2012	ATX Networks	Arcos Technologies	26	Telecom semiconductors
March 2012	Eurocontrol Technics	XwinSys	1	Testing equipment
February 2012	Broadcom	BroadLight	205	Telecom semiconductors
December 2011	Apple	Anobit	400 (estimated)	Mobile semiconductors
December 2011	DSP Group	BoneTone Communications	12	Mobile semiconductors
July 2011	GE Lighting	Lightech	20	LED drivers
July 2011	Newport	Ophir Optronics	230	Metrology
June 2011	Pixim	Advasense	NA	Imaging, audio and video semiconductors
May 2011	Broadcom	SC Square	41.9	Security chips
March 2011	Broadcom	Provigent	313	Mobile semiconductors
February 2011	CSR	Zoran	484 (merger)	Imaging, audio and video semiconductors
November 2010	Mellanox	Voltaire	218	Network processors
November 2010	Sightic Vista	Broadcom	15	Image and video processors
October 2010	Percello	Broadcom	86	Mobile semiconductors
October 2010	Wintegra	PMC Sierra	240	Network processors
May 2010	Comsys	Intel	30	Mobile semiconductors
February 2010	Pegasus	Yifang	60	Image processors
December 2009	Dune Networks	Broadcom	178	Network processors
November 2009	ChipX	GigOptix	12.25	ASIC
October 2009	CopperGate	Sigma Designs	185	Home networking
September 2009	SELA	Camtek	9.5	Fabrication and testing
August 2008	Pixer Technology	Carl Zeiss SMT	70	Manufacturing equipment and EDA
July 2008	Ezchip	Lanopotics	NA (merger)	Network processors
May 2008	Tevet	Nanometrics	5	Manufacturing equipment and EDA
March 2008	InnerSense	Ricor	2.5	Manufacturing equipment and EDA
January 2008	Resolute Networks	BATM	2	Wireline and home networking
October 2007	Saifun Semiconductors	Spansion	250.5	Memory and storage
October 2007	TransChip	Samsung	70	Image processors
July 2007	Eyesquad	Tessera	20	Image processors
May 2007	Otalica	Broadcom	31	Wireline and home networking
January 2007	Xignal	National Semiconductor	NA	Network processors

TABLE 4

Acquisitions of Israeli Semiconductors and Components Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
January 2007	Silverback	Brocade	NA	Network processors

Sources: IDC, IVC Research Center, 2012

Enterprise IT Infrastructure

The enterprise IT infrastructure category refers to a broad range of technologies, from the hardware level to the various software solutions used by organizations to monitor, manage and optimize their system, network, storage and other components of their IT and telecommunication infrastructure. IT infrastructure has been one of the major areas of expertise for Israeli companies. In accordance, many of the major global market leaders have established local R&D offices – in many cases following the acquisitions of Israeli companies.

HP, for example, has vast IT management R&D activity in Israel due to the acquisition of **Mercury Interactive**. **IBM** is engaged in developing infrastructure technologies across various areas. IBM's Israel Systems and Technology Group (STG) Lab is involved in high-end disk storage technology, compression, and de-duplication software to help manage enterprise storage. These activities are largely based on IBM's acquisitions of Israeli storage companies **XIV**, **Diligent** and **Storwize**. Other IT infrastructure related R&D activities are performed under IBM Israel Software Group, including data integration and information governance, application security, data protection and recovery, and enterprise mobility.

Microsoft Israel's R&D center, one of the company's three strategic R&D centers outside the U.S., is also active in developing IT infrastructure solutions, mainly in the areas of security, telecom infrastructure, cloud computing and others. The center also incubates new products and leads Microsoft's business and outreach activities with Israeli start-ups, ISVs, and VCs. **EMC**'s local IT infrastructure R&D activity is based on the acquisitions of software companies **Kashya** and **Illuminator** (data protection), **nLayers** (system and network management), and **ProAactivity** (business process management). EMC's subsidiary **VMware** is also active in the local market, developing data center infrastructure products based on the acquisition of virtual appliance company **B-Hive**. **CA**, one of the leading vendors in the worldwide software market, has been one of the most active acquirers of Israeli companies. The company's local R&D center is engaged in the development of system and network management solutions, including cloud and virtualization management. Another vendor with significant R&D activity is **BMC**, which made several acquisitions of Israeli companies since 1999 including, **New Dimension**, **OptiSystems Solutions** and **Identify Software**). **Dell**'s Israeli R&D center designs clustered network attached storage (NAS) systems based on the acquisition of **Exanet**.

Storage

Israeli companies have been operating in practically all of the different layers of the enterprise IT infrastructure field. Storage, for example, has been a strong domain of expertise for Israeli companies. As shown in Table 3, Israeli storage companies have been an attractive target for IT giants (especially **IBM**, which has made 4 acquisitions in this space in the last 3 years, totaling $685 million).

Beyond storage software, which has been a traditional area of expertise for Israeli companies, an increasing number of Israeli companies have been looking to develop storage systems over the last years. As demonstrated by **XIV** (which was acquired by IBM for $300 million), despite the difficulties in entering the storage systems space, which is dominated by IT giants, Israeli companies can establish a foothold in this market. Among emerging players in this space is **Axxana**. The company developed a "black box" that was designed to provide similar functionality as the black box flight

data recorders that are used in aircrafts to record and preserve critical flight data before a disaster. It contains a solid state disk, six-hour battery backup, and a protected cellular transmitter with multiple, redundant antennas. The vault is fully sealed, wrapped with thermal protection, and installed in a cabinet, allowing it to withstand a wide range of extreme conditions, including direct fire, prolonged heat, floods, punctures, and crushing. Another early stage storage system start-up is **Infinidat**, which combines a permanent storage subsystem with internal cache memory, a storage control unit, and a volatile cache memory.

Also in the storage space, Israeli companies have been highly active in the area of data protection and recovery. **Continuity Software** develops solutions that detect replication infrastructure gaps and configuration vulnerabilities between primary production and disaster recovery sites. **Sepaton** is a provider of disk-based data protection solutions including virtual tape library and deduplication technology for data-intensive organizations.

A number of Israeli storage companies have emerged over the last years in the cloud storage space. **CTERA Networks** is a provider of cloud storage gateways that integrate on-premise storage appliances and endpoint software agents with cloud services to combine the performance of a local network solution with the flexibility, manageability, and scalability of cloud services. **Zerto** provides data replication solutions for virtualized data centers and cloud environments, introducing hypervisor-based replication technology as an alternative to traditional array-based disaster recovery solutions. Early stage **Tonian** is developing solutions that enable the integration of different types of storage, including cloud storage, into a virtualized environment.

Several Israeli companies are offering storage virtualization related solutions. **SANRAD** is a provider of iSCSI SAN solutions for managing storage across standard Ethernet environments. The company was acquired by OCZ Technology Group at the beginning of 2012. Early stage **Scaleio** is developing solutions that turn application servers' local storage into an elastic, high-performance, low-cost SAN. **ScaleMP**'s solutions create a single virtual shared-memory multiprocessor system across multiple server systems, providing a platform for high-performance computing (HPC) applications.

IT Management

The system and network management (i.e. IT management) field is going through fundamental changes as traditional methods become less and less applicable to managing modern IT environments that consist of dynamic, distributed and multi-tier applications. Israeli IT management companies are taking a key role in this move. Following the legacy of **Mercury Interactive**, which has become one of the leading vendors in this space and was acquired by **HP** for $4.5 billion, Israeli companies have been pioneering new solutions that aim to address the operational challenges surrounding modern IT environments.

A particular field of expertise for Israeli IT management companies is application performance management (APM). Driven by the increasing adoption of virtualization, cloud, Web and mobile applications, which are introducing new levels of complexity, organizations increasingly require more dynamic IT management. This, in turn, is fueling the demand for a new type of APM that uses automated analytics capabilities to analyze large amounts of log data, correlate application-level data with the underlying infrastructure layers, detect performance issues and service degradation

trends and gain insight into their root causes to tackle them before they escalate to major problems.

Furthermore, there is a need for more granular APM to address the challenge of controlling and gaining visibility into the multiple hops that a single transaction may take across the different elements in complex IT environments. Israeli companies were among the first to introduce transaction-level APM (also known as business transaction management or BTM) solutions. **Optier** is one of the most notable and ambitious Israeli start-ups with approximately $112 million in funding from top tier local and foreign VCs. The company utilizes business transaction management (BTM) technology and analytics capabilities to gain insight into the application environment, contextual cross-silo "Big Transaction Data". Another major Israeli company in this space is **Precise Software**, one of the pioneers of the APM field. Founded in 1990, the company completed a successful IPO in 2000 and was acquired by IT management vendor **Veritas** for $609 million in 2002. Veritas was later acquired by **Symantec**. In 2008, Precise completed its spin-out from Symantec and became a stand-alone company focused on transaction performance management. **Correlsense** is also providing transaction-based APM solutions for managing the performance and availability of complex applications. Among other Israeli APM companies is **Aternity**, a provider of real end-user experience solutions that measure desktop performance and preemptively detect and isolate system, application, and productivity problems and identify their probable cause.

In addition to APM, the unique characteristics of dynamic cloud environments are driving demand for other IT management capabilities. For example, cloud management technologies are required for bridging private and public clouds while addressing security, performance, and availability issues. On top of this, there is a need for sophisticated policy engines to automate and control the movement of workloads between private and public clouds based on predefined rules. Other cloud management requirements include "cloud brokering" for automatically migrating applications to a new cloud (e.g., to capture better performance or pricing), deploying applications over multiple cloud platforms (i.e., aggregation), migrating existing applications to cloud environments, deployment and configuration management in dynamic cloud environments, and so forth.

Many start-up companies have emerged over the past few years to provide dedicated cloud management solutions, and Israeli companies have been part of this trend. This includes **CloudShare**, a provider of cloud platform for development and testing, virtual IT training, sales demos, and proof of concept. The company also offers prepackaged cloud environments combining software, virtual appliances, and hardware if required, including interconnected VMs, multi-tiered networking, and pre-installed operating systems and desktop applications. **EverCloud Systems** is a cloud services broker, offering enterprises the ability to dynamically expand on-premise enterprise applications to public clouds by providing virtual hosting on public clouds. **Neebula** offers a business service management (BSM) solution that automatically models and maps business services to their related applications, servers, network and storage devices, including in dynamic virtualized environments. Another Israeli company offering similar BSM capabilities is **VNT**. In addition, **Ayehu** is offering solutions that automate a range of repetitive daily IT tasks within data centers, cloud and virtualized environments.

Other emerging start-up companies are utilizing virtualization technologies for cloud management: **Intigua** extends virtualization to systems management to eliminate agent management challenges and costs plaguing corporate IT and facilitate the

management of mission-critical applications in the cloud; and **Ravello Systems** is developing virtualization-based solutions to facilitate organizations' move to cloud environments by adding a layer of abstraction between hardware and software.

Other Israeli companies are using cloud infrastructure to offer SaaS-based IT management solutions. This includes **SAManage**, a provider of IT asset management and IT service management solutions; and **SysAid**, which offers IT help desk and management software. In addition, **Digital Fuel**, a provider of SaaS-based IT costing, budgeting, chargeback, and cost optimization, as well as service levels agreements (SLA), key performance indicators (KPI), and vendor management solutions, was acquired by **VMware** in 2011 for $120 million. **Oblicore**, another company offering SLA-related solutions for cloud vendor management and assuring cloud service quality, was acquired by **CA** in 2010 for $25 million.

Another cluster of Israeli IT management companies is in database performance management and optimization. **MORE IT Resources** offers database performance products, providing real-time monitoring, deep dive historical performance analysis, resource management and database performance acceleration. **dbMaestro** provides database change management and deployment automation solutions that enable enforcement of best practices while eliminating risks and automating change deployment across the development life cycle. **DBSophic** is a provider of performance management products for SQL Server based applications that optimize the application-to-database workload. Other companies aiming to boost performance of databases include **SQream Technologies**; and **Zettapoint**, which was acquired by EMC in 2011.

The emerging category of database virtualization is strongly related to cloud computing. Technologies such as database virtualization and clustering can be used to enable traditional databases (as well as other database types) to address the unique requirements of cloud computing. For example, in a dynamically changing environment such as cloud where data is distributed across multiple nodes, traditional relational databases may experience significant scalability problems. In addition, traditional databases lack such features as elasticity and self-manageability that are highly important for cloud environments.

Among the companies that look to address this challenge is Israeli **Xeround**, a provider of a database-as-a-service solution for MySQL applications, which enables automatic MySQL scalability and high availability. Additional players in this area are **OffScale**, which offers clustering and virtualization solutions for existing database deployments, enabling customers to consolidate separate data silos and grow their existing databases; **ScaleDB**, provides a clustered, shared-data storage engine for MySQL that enables multiple nodes to share the same physical data; and **ScaleBase**, which offers an abstraction layer with a unified point of management for a distributed database environment to address availability and scalability challenges. In addition, **Garantia Data** offers an automated in-memory, cloud-based NoSQL database platform for developers to host their Redis and Memcached datasets.

Desktop and Application Virtualization

Virtualization has gradually become a mainstream datacenter technology. Originally aimed at server environments, virtualization solutions have been expanding over the last years into more and more domains, including storage, applications, desktop, databases, and others. Among these areas, desktop virtualization is a particular field of expertise for Israeli companies. IDC defines desktop virtualization management

software as purpose-built software tools that specifically provide lifecycle management functions to deploy, update, maintain and retire/re-provision centralized virtual desktops (also known as virtual desktop infrastructure or VDI), virtual user session software, and distributed virtual desktops. These solutions have emerged over the past few years to address the increasing challenge of effectively managing and securing corporate desktops.

As shown in table 5, over the last years there were several acquisitions of Israeli desktop virtualization companies, including **Neocleus**, **Qumranet**, and **Kidaro**. In a more recent deal, **VMware** acquired **Wanova**, a provider of a cloud-based, centralized and endpoint management recovery solution, for an estimated $80 million. Wanova aims to address the traditional shortcomings of the two desktop virtualization approaches: While VDI enables centralized management and control, it typically provides limited performance, mobility and offline capabilities. On the other hand, while distributed desktop virtualization tackles those issues, it is in a trade-off with the centralized control and management capabilities of the centralized method. Wanova's solutions address this problem as they can be deployed without hypervisors and additional management tools, and without adding the storage and computing infrastructure in the datacenter that is usually associated with VDI, thus reducing costs, while providing centralized management and control.

Among other Israeli companies providing desktop and application virtualization solutions is **Ericom**, a provider of access, virtualization and remote desktop protocol (RDP) acceleration solutions for secure, centrally managed access to applications, desktops and data, running on Microsoft RDS/Terminal Services, VDI, cloud platforms, and other systems, from various devices. **CloudOn** is a cloud-based service for delivering a secure mobile workspace to tablets and other mobile devices, enabling customers to access desktop and enterprise applications, while providing on-line synced personalized storage and collaboration capabilities.

Jetro Platforms is a provider of secure application virtualization solutions to deploy and manage remote applications to any device running a standard RDP client and to any location. **InstallFree** offers a cloud-based platform that enables real-time access to applications using pure HTML 4/5, and connects them to cloud-based storage services. **Ceedo**'s solutions allow IT departments to deploy customized applications and user data from an organizational and departmental level, independent of the underlying OS, for both distributed PC and stateless virtual desktop environments.

Other IT infrastructure Companies

Israeli companies are playing in various middleware and integration markets. As shown in table 5, quite a few of them have been acquired over the last years by market leaders such as **IBM, SAP** and **Informatica**. Among current Israeli vendors in this space is **Attunity**, which provides real-time data integration and event capture solutions that enable access and delivery of data across heterogeneous sources and applications. In 2011, Attunity acquired Israel-based **RepliWeb**, a provider of enterprise file replication and file transfer technologies. Another notable middleware company is **PNMSoft**, a provider of business process management (BPM) and workflow solutions that create, manage and monitor business processes in a Web environment. In the business-to-business (B2B) middleware space, **Nipendo** provides an integration platform that enables companies to connect with trading partners, regardless of their ERP system, integration methods, data format, data structure, private content or their specific business processes.

Content delivery networks (CDN) solutions are experiencing strong market demand, driven by the need to maintain real-time control over the ever-increasing volumes of Web and mobile video, application and other content. Recently, there have been several acquisitions of Israeli companies in this space. Most notably, in December 2011, **Akamai** acquired **Cotendo**, a provider of CDN solutions that accelerate websites and Web applications, as well as mobile sites and mobile apps, for $268 million. Earlier in the same year, **Limelight Networks** acquired **AcceloWeb**, a provider of technology that helps speed up the presentation of websites and applications, for an estimated $30 million. **F5 Networks** has been particularly active in acquisitions of Israeli CDN-related companies. In 2011, it acquired the intellectual property assets of Israel-based **Crescendo Networks**, a provider of solutions for accelerating and optimizing the delivery of Web applications. This year, it acquired **Traffix Systems**, a provider of mobile signaling solutions to enable mobile internet traffic, and related policy and enforcement aspects to be addressed, for $135 million. In another recent deal, **Riverbed Technology** acquired **Expand Networks**, a provider of WAN optimization solutions.

TABLE 5

Acquisitions of Israeli Enterprise Infrastructure Companies, 2007-2012

Date	Company	Acquirer	Deal Value (US$M)	Field
June 2012	Quotium Technologies	Seeker Security	10	Security
May 2012	VMware	Wanova	80 (estimated)	Desktop virtualization
May 2012	EMC	XtremIO	450	Storage
March 2012	Tripp Lite	Minicom	8	Remote access services software
February 2012	Intel (McAfee)	Insightix	5 (estimated)	Security
January 2012	OCZ Technology	SANRAD	15	Storage
January 2012	Riverbed	Expand Networks	10	Enterprise network infrastructure
October 2011	Akamai	Cotendo	268	Hosting infrastructure
October 2011	NIDAM Communications	Chip PC Technologies	0.55	Desktop virtualization
October 2011	Check Point	Dynasec	35 (estimated)	Security
October 2011	Informatica	WisdomForce	NA	Middleware
October 2011	EMC	ZettaPoint	10	Storage
Septmber 2011	Wave Systems Corp	Safend	12.8	Security
Septmber 2011	Attunity	RepliWeb	7.8	Middleware
August 2011	Salesforce.com	Navajo Systems	30 (estimated)	Security
August 2011	F5 Networks	Cresendo's assets	NA	Enterprise network infrastructure
June 2011	VMware	Digital Fuel	120	System and network management
May 2011	Limelight Networks	AcceloWeb	30	Hosting infrastructure
March 2011	Intel (McAfee)	Sentrigo	50 (estimated)	Security
January 2011	VMware	NeoAccel	NA	Security
September 2010	Neocleus	Intel	1	Virtualization
July 2010	Storewize	IBM	140	Storage
April 2010	Future-IT	Genie	0.2	Database management tools
February 2010	Exanet	Dell	12	Storage
January 2010	Oblicore	CA	25	IT management
January 2010	Cloverleaf	Dot Hill Systems	12	Storage
December 2009	Dune Networks	Broadcom	178	IT management (cloud)
September 2009	HyperRoll	Oracle	N/A	Storage
January 2009	Monosphere	Quest Software	N/A	Storage
September 2008	Qumranet	Red Hat	107	Virtualization
July 2008	AppSwing	ndl-metascybe	N/A	Integration

TABLE 5

Acquisitions of Israeli Enterprise Infrastructure Companies, 2007-2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2008	Zoomix	Microsoft	30	Integration
May 2008	NetManage	Micro Focus	73.3	Integration
May 2008	B-Hive Networks	VMware	67	IT management/Virtualization
April 2008	Diligent	IBM	165	Storage
April 2008	Appstream	Symantec	55	Virtualization
April 2008	FilesX	IBM	80	Storage
March 2008	BeInSync	Phoenix Technologies	22.1	Storage (cloud)
March 2008	Kidaro	Microsoft	100	Virtualization
February 2008	Jetro Platforms	RDT Group	7.5	Virtualization
January 2008	Onaro	Network Appliance	120	Storage
December 2007	Jacada	Software AG	26	Integration
December 2007	XIV	IBM	300	Storage
December 2006	LeanWay	AIL Billing Systems	10	Database management tools
October 2007	Federation Software	Cordys	10	Integration
September 2007	Sphera	SWsoft	N/A	IT management (cloud)
July 2007	Xosoft	CA	100	Storage
March 2007	SPL Software	Software AG	62	Integration

Sources: IDC, IVC Research Center, 2012

Application Life-cycle Management

Application life-cycle management (ALM) is a broad market category consisting of various tools and solutions, ranging from requirements through to deployment and software quality, management and coordination. This includes automated software quality (ASQ), software configuration management (SCM), IT project and portfolio management (IT PPM), requirements visualization, definition and management, cloud testing and ASQ SaaS, software quality analysis and measurement, and IT PPM SaaS.

Automated Software Quality

Founded in 1989, Israeli **Mercury Interactive** was one of the pioneers in the automated software quality (ASQ) market, which includes tools that support software unit testing, system testing, or both; as well as software quality assurance. After expanding its solution portfolio to broader application development and deployment and IT management domains, the company became one of the largest software vendors in the world. In 2006 it was acquired by **HP** for $4.5 billion – the highest acquisition of an Israeli software company ever.

Building on the legacy of Mercury, many Israeli companies are currently playing in the ASQ market. A notable player in this space is **Panaya**, a provider of ERP upgrades and test automation SaaS solutions. The company enables customers of SAP or Oracle to reduce their upgrade and testing risk and effort by simulating the upcoming upgrade, automatically pinpointing which custom programs will break as a result of the upgrade, and automatically fixing most of these problems, as an alternative to manual test script maintenance.

RadView is a provider of performance and load testing solutions for Web applications. Other companies in this field include **QualiSystems**, which provides a test automation software framework for hardware, devices and embedded systems. The company's president is Aryeh Finegold, Mercury's co-founder. **OptimalTest** provides test management and optimization software solutions for the semiconductor industry. Also in this space is **Shunra**, whose solutions emulate the performance of distributed applications for remote users over different network topologies.

An emerging category wherein several Israeli ASQ companies are currently playing is Testing as a Service (TaaS). Again, the TaaS market has a considerable legacy due to Mercury's decision many years ago to host and license testing tools as a service. Among emerging Israeli TaaS companies is **uTest**, a provider of testing services based on the crowdsourcing model, which spans the entire software development life-cycle – including functionality, security, load, localization and usability testing. The company’s community of 60,000+ professional testers from 190 countries put Web, mobile and desktop applications through their paces by testing on real devices under real-world conditions. Other Israeli TaaS companies include **PractiTest**, a provider of solutions for managing requirements, tests, issues and reporting; and test management suite provider **Testuff**.

In the mobile testing space, **Perfecto Mobile** allows developers to use more than 500 devices, install apps, browse, call, and send messages, as well as run automated test procedures via the Web. Another Israeli company offering mobile testing solutions is **Experitest**, which aims to extend existing test automation frameworks to cover mobile applications. The company's solutions require no programming and work on

the user interface layer. uTest is also expanding its mobile testing capabilities. Most recently, the company acquired U.S.-based **Apphance**, a mobile app quality tool that enables mobile developers to know how their apps are working across a wide range of devices, carriers, OS versions and more.

Application Development and Deployment

Another domain wherein Israeli IT infrastructure companies have excelled is application development and deployment. One of the most significant trends in the application development and deployment market in recent years is the emergence of Platform as a Service (PaaS). Included in this category are various types of cloud-based application development and deployment tools and technologies. A prominent Israeli player in this field is **Magic Software**, a provider of cloud and on-premise application platform solutions – including Web (HTML5), rich internet applications (RIA), mobile and SaaS modes – and business and process integration solutions. Also in this area is **GigaSpaces**, which provides PaaS and scaling solutions for distributed, mission-critical application environments, and cloud enabling technologies.

Other notable application development and deployment companies include **Zend Technologies**, a pioneer in the area of PHP, one of the most popular Web scripting languages today. The company provides various products and services for developing, deploying and managing PHP applications, covering the entire application lifecycle. **Gizmox** is a provider of tools and services to extend enterprise data-driven desktop applications to secured-by-design HTML5 Web, cloud and mobile. **BluePhoenix** provides modernization solutions for legacy information systems, ranging from IT asset assessment and impact analysis to automated database and application migration, re-hosting, and renewal. Among emerging companies in this field is **WhiteSource**, a provider of cloud-based solutions for managing the lifecycle of open source software – from adoption through tracking, auditing and reporting. **CrowdSource Technologies** is a provider of tools that facilitate the building of SaaS applications. **JFrog**'s repository management product enables software developers to gain control over build artifacts and third-party dependencies.

Boosted by the increasing adoption of mobile applications in the workplace, the mobile enterprise application platform (MEAP) market is coming of age with solutions increasingly utilizing cloud-based development and deployment models and HTML5 to tackle cost and complexity inhibitors. A notable Israeli company in this field is **Worklight**, which enables the development of cross-platform content, suitable for mobile phones, tablets, and Web widgets. The company's solutions enable secure application integration and scalable delivery, providing control over the entire deployment from a single Web-based console. Worklight was acquired by **IBM** at the beginning of 2012 for $70 million.

A notable recent trend within ALM revolves around the need to create better alignment between development and operational processes, commonly referred to as "DevOps". DevOps solutions have emerged in recent years in response to the rapid adoption of modern applications, which are characterized by short development, release, and deployment cycles. As a result, there is a growing need for more integrated application life-cycle management that covers all stages from development, QA, and functional testing to ongoing performance testing and monitoring. Aimed at bridging the traditional gap between operations and development and aligning both of them with business goals, DevOps solutions

typically operate by offering a combination of monitoring and testing functionalities. Initially, solutions in this space have focused on Web and cloud applications, but more recently, there has been a move to provide a similar set of integrated capabilities for mobile applications. This appears to be a natural development of the DevOps movement as the Web and mobile worlds are increasingly merging and many mobile applications today are developed based on Web technologies.

Several Israeli companies are catering to the emerging DevOps market. Among them is **Nolio**, which has introduced the concept of application service automation. Nolio is providing solutions aimed at automating deployment and other operational service tasks essential for releasing and managing the production of distributed, multi-tier datacenter applications. Also in this space is **Evolven**, a provider of configuration management solutions for the data center and cloud, which validate changes and releases.

Enterprise Applications

A variety of Israeli software companies are playing in almost every major segment of the enterprise application market, ranging from traditional areas such as CRM, ERP, collaborative applications, and others, to emerging types of enterprise Web and SaaS applications.

The leaders of the worldwide enterprise applications market are all maintaining significant R&D activities in Israel. **Microsoft Israel R&D Center** is one of Microsoft's three strategic R&D centers outside the U.S. It is comprised of product groups in the areas of security, telecom, Internet and others. Some of the local R&D activities are based on acquisitions of Israeli enterprise applications companies, among them **WebAppoint** (online scheduling), **Maximal** (business intelligence), **Gteko** (support automation), **YaDaTa** (data mining), **Zoomix** (master data management), **Panorama**'s OLAP technology, and others. In addition, most recently, Microsoft opened the local Windows Azure Accelerator, which is aimed at helping out early stage start-ups in the areas of cloud, Internet, and mobile.

Oracle's local enterprise applications related R&D activity is based on the acquisitions of **Demantra** (supply chain management and analytics), **HyperRoll** (business intelligence), as well as **Primavera** (a U.S. company that previously acquired Israeli portfolio management provider **Prosight**). Oracle is also an investor in Israeli companies across a broad range of enterprise applications as well as IT infrastructure, Internet, mobile and telecom areas.

SAP acquired several Israeli enterprise applications companies, the most significant of which was **TopTier**, a developer of enterprise portal solutions that was acquired in 2001 for $440 million. TopTier's CEO and co-founder, Shai Agassi, was later appointed as president of the Products and Technology Group at SAP and a member of the SAP Executive Board. SAP Labs Israel is one of the company's 10 R&D centers around the world, focused on four areas of strategic development – SAP Enterprise Portal, SAP Business One, Supply chain execution, and SAP Master Data Management.

CRM

Israeli companies are providing a broad range of CRM applications, both for the local and international market. A particular area of expertise is contact center applications. Solutions in this space have been evolving over the last years to enable organizations

to respond in a more agile fashion to customers improving customer retention, avoiding churn, and so forth. As depicted above, Israeli companies have been excelling in developing innovative customer management solutions to service providers. In accordance, there are also quite a few notable Israeli companies that provide similar capabilities to the enterprise market, and more specifically to contact and service centers.

NICE and **Verint**, two of Israel's largest software companies (publicly traded on NASDAQ), are key players in the contact center applications field and have consistently been among the market share leaders. The companies offer a similar product mix, consisting mainly of voice recording and analysis for various uses in the civilian, government, and defense sectors, and are also similarly expanding their enterprise business, focusing on contact center applications, workforce management, operational performance management, risk and compliance management, and other areas. Over the past few years, the two companies have been pursuing acquisitions to support their expansion. In 2011, NICE acquired **Fizzback**, which sends consumers requests for feedback relating to a specific interaction or transaction via mobile, Web, or social media (for $80 million); **CyberTech**, a provider of voice logging and compliance recording solutions ($60 million); and Israeli **Composia Software**, a provider of solutions that monitor and analyze actual service processes and CSR workflow behavior ($3 million). NICE also acquired **Merced Systems**, a provider of service and sales performance management solutions ($150 million). Verint made similar moves in 2011 with the acquisitions of **Vovici**, a provider of online survey management and enterprise feedback solutions ($76.4 million), and **Global Management Technologies**, a provider of workforce optimization solutions ($42 million). In 2012, it added Israeli **Focalinfo**, a provider of Web data analysis solutions.

Another Israeli player in the contact center applications space is **Jacada**, which after selling its legacy application integration business to **Software AG**, is now focused on providing agent desktop and process optimization software solutions for the customer service and support market. Among other emerging local players are **Wandy**, a provider of SaaS-based contact center solutions.

Among other Israeli CRM players, **Pursway**'s solutions enable the identification of purchase influencers by crunching customer transaction datasets. **Insightera** provides a real-time inbound marketing platform that accelerates B2B customer acquisition. **LogNet** offers a multiple-play solution for CRM and billing, which enables multiple types of communication services and/or multiple utilities to be managed from the same platform. **ActivePath**'s marketing applications enable users to watch videos, navigate menus, read live updates, share, comment, make purchases, fill out forms, chat with customer service, interact with rich ad formats and other actions, inside the email itself.

Vertical Applications

One of the most significant trends in the enterprise software market in recent years is the growing diversification of enterprise applications. To a large extent, this trend has been driven by the cloud and SaaS revolution that facilitates the ability to offer dedicated solutions to specific vertical industries and market segments that were traditionally "neglected" by the large enterprise application suites. As depicted below, a large number of Israeli companies are catering to the needs of vertical industries such as telecom, financial services, healthcare and others by utilizing the SaaS model.

Telecom

The most notable Israeli enterprise application vendor is **Amdocs**. The company provides a broad range of business and operational-support (OSS/BSS) solutions, including billing, customer service applications, sales and marketing automation, analytics, and others for telecom service providers. With $3.13 billion in revenue in 2011, Amdocs is considered a market leader in these areas.

Amdocs is highly active in various initiatives to foster collaboration with start-up companies. Its "Open Innovation" program consists of several business development and investment activities, including Amdocs Venture, the company's corporate venture arm; Amdocs Engage, which promotes joint business opportunities between Amdocs, start-up companies and leading service providers; and Amdocs Ascend, which creates joint offerings between start-up solutions and Amdocs' internal solutions.

The ongoing success of Amdocs as well as other major Israeli telecom players such as Comverse has fueled the establishment of a thriving industry of local companies specializing in telecom applications. In the global OSS/billing market, for example, wherein Amdocs and Comverse are considered market leaders, there are additional Israeli players, most notably **MIND CTI**, a provider of convergent prepaid and postpaid billing and customer care solutions for VoIP, mobile, wireline and quad-play carriers; **FTS**, a provider of BSS solutions for the telecom and content industries including policy control and online charging, convergent billing, and more; and OSS vendor **Team Telecom International (TTI)**, which was acquired by **TEOCO** in 2010.

Other notable Israeli telecom application players include **cVidya**, which provides revenue assurance, fraud and risk management, dealer management, margin analytics, and clearinghouse services to telecom, media and entertainment service providers. The company has recently moved to provide OSS/BSS cloud-based solutions. **Pontis** and **Mintigo** also aim to help service providers (both mobile and fixed line operators) increase customer acquisition, reduce churn, improve customer experience, and other related issues. **Red Bend** helps mobile phone manufacturers and network operators accelerate the adoption of new services and features, respond rapidly to customer problems and reduce support costs through firmware over the air (FOTA) updates. **Gryphonet**'s solutions provide continuous monitoring of the smartphone user experience, enabling mobile carriers to make informed marketing decisions based on actual customer activities and preferences, identify problems before they impact customer satisfaction, and optimize their customer support services.

Healthcare

The healthcare IT market opportunity is vast, as this industry is one of the least automated and remains far behind other vertical industries in this regard. Because of the relatively limited use of software, hardware, and networking technologies in healthcare organizations, vertical-specific solutions such as electronic medical/health records (EMR/HER) is typically difficult to implement in small, budget-conscious, and multi-location healthcare organizations. Given that, the healthcare applications market has been experiencing strong growth recently. This growth is highly driven by the healthcare reform in the US and the American Recovery and Reinvestment Act's (ARRA) Health Information Technology for Electronic and Clinical Health (HITECH) provisions that offer billions of dollars of incentives for using EMRs/EHRs.

A relatively large number of Israeli companies are playing in the Healthcare IT market. In particular, telemedicine is an area wherein Israeli companies have been able to establish positions as prominent global players. Among them is **SHL Telemedicine**, which provides telemedicine services and devices to subscribers. The company's solutions enable individuals to transmit a complete ECG to SHL's medical monitoring center where it is instantly evaluated for heart-related problems. **LifeWatch** is a provider of monitoring services that help physicians detect and analyze symptoms before they become major health problems. The company's services include remote heart monitoring and home sleep testing for the diagnosis of obstructive sleep apnea. **Aerotel** offers patient monitoring systems that consist of medical call center software as well as trans-telephonic and digital monitoring devices that transfer vital medical or lifestyle data over the telephone, the Internet or wireless networks. Israeli telemedicine players also include **iMER, Home Medicine, Second-Opinion**, **Medic4All**, and others. In addition, **McKesson**, one of the world's largest healthcare IT vendors, has a local R&D center that is based on the acquisition of telemedicine vendor **Medcon**, a provider of cardiac image and information management solutions that enable cardiologists to access images and information over local or remote networks.

Israeli companies are playing in various other healthcare IT-related fields, especially in the EMR/EHR and personal health records (PHR) fields. Among them is **dbMotion**, which makes patient information accessible, available at the point of care, and actionable by clinicians within their workflow. Among other notable EMR companies is **iMDsoft,** which provides graphical clinical patient information systems for hospital intensive-care environments that automatically collect data, make calculations, generate reports, track costs, and provide analysis and querying tools. The company was recently acquired by U.S. private equity firm **TPG Growth** for $80 million. **Roshtov** develops integrated EMR systems to healthcare providers, providing administrative, financial, and medical management capabilities. **MediViz**'s solutions improve performance efficiency in acute-care medical centers by optimizing case flow. **eWave MD** offers SaaS-based EHR as well as electronic diagnostic and monitoring devices, patient portal and a disease management system. Another SaaS company is **LifeOnKey**, which provides EHR and PHR solutions that are adaptable to various types of audiences. Other companies providing EMR/EHR/PHR related technologies include **MedCPU**, whose solutions empower clinicians to capture the full clinical picture of a patient by reading and analyzing both free-text and structured notes provided by clinicians; and **PeriGen**, which provides an automated clinical decision support system that enables clinicians to spot signs of fetal distress.

A recent trend within the healthcare IT market revolves around providing consumers with information and tools for healthier living. For example, health and wellness management solutions have emerged over the past few years to address the increasing demand for solutions that support more proactive healthcare by encouraging consumers to adopt healthier behaviors. The rapid adoption of smartphones and social network has changed the game by enabling consumers to be more engaged in health and wellness programs. Catering to this market opportunity, **Healarium** is a provider of solutions for managing wellness and at-risk/chronic conditions, which can be branded and integrated into the service models and portfolios of wellness, health promotion and disease management service providers to extend their reach to more employees, increase engagement, offer expanded services and positively influence them to improve their health. **Wellness Layers** is a provider of branded Web and mobile portal ecosystems for health and wellness companies, which enable them to establish their own nutrition, fitness and health Web

services, cultivating long-term relationships with their customers, employees, patients and partners. **Treato** offers a new source of medical information based solely on real life experiences of patients, analyzed from discussions on social networks. Other patient-oriented Israeli healthcare IT companies include **Eon Medical**, which offers a mobile-health solution that enables consumers to perform their own physical examination and obtain remote diagnosis.

Financial Services and Insurance

The financial services and insurance industries are among the largest consumers of ICT solutions. Over the past few years, organizations in these fields have been making substantial investments to modernize their IT infrastructure. In accordance, a growing number of Israeli companies, both established players and start-up companies, are looking to capitalize on this market opportunity.

One of Israel's most prominent providers of vertical-specific applications for financial services companies is **Fundtech**, a provider of cash management, payments, settlements and financial messaging solutions for financial institutions. In 2011, Fundtech was acquired by US-based private equity firm **GTCR**, and was merged with **BankServ**, a provider of SaaS-based banking and payments solutions and another GTCR portfolio company, in a $388 million deal, creating one of the largest global payments and banking technology providers.

A rising area of expertise for Israeli software companies catering to the financial services market is trading platforms and applications. A prominent company in this group is **Traiana**, which offers a platform for electronically processing over-the-counter foreign exchange (FX), exchange traded derivatives, contract for difference (CFD) and cash equities trades. The company was acquired by electronic interdealer broker **ICAP** in 2007 for $247 million. **SuperDerivatives** is offering various multi-asset derivatives pricing, revaluation and management tools along with online trade execution tools, workflow automation, customized reports, risk management solutions, and others. **Surecomp** is a provider of global trade solutions for the financial services community, including trade finance solutions, and treasury confirmation matching solutions that ensure the accuracy of trade deals, supporting the reconciliation and investigation of SWIFT and non-SWIFT confirmations. **FMR Computers and Software** is a provider of front, middle and back office systems for stock exchange members in Israel. The company's solutions include trading tools, and pre- and post-trade risk management. **Financial Algorithms** provides traders with software tools that enable users to view prices, bids, asks and volume together on the same chart while showing the relation between market powers as they change during the trading session. **Strategy Runner** has developed a server-based technology for algorithmic trading solutions that integrate the needs of buy- and sell sides to access, automate, distribute, and execute trading algorithms over multiple assets, accounts and clearing firms. **TradAir** is a provider of OTC trading solutions for emerging markets.

Several other Israeli companies are focused solely on the FX trading market. Among them is **TraderTools,** a provider of an FX trading platform for banks and brokerages that integrates liquidity aggregation and management capabilities with pricing engine, white labeling and order management to support real-time pricing decision-making. **Tradonomi** is the developer and operator of the **eToro** social trading platform, which is aimed at educating inexperienced investors on the trading of financial instruments, while facilitating engagement with other traders, by connecting them with brokers such as RetailFx and IFX markets. **ForexManage** provides portfolio risk

management, FX online trading platform, real-time risk management platform for interest rate derivatives, options pricing engine for FX and interest rates options, and other solutions. **Ava FX** provides online trading platform that enables retail and institutional traders to trade in FX through live streaming prices. **Finotec** is a FX broker providing an online trading platform that utilizes a multi-institutional connectivity trading network that links banks and liquidity providers to financial institutions and other related solutions.

Other financial services related Israeli software companies include **Earnix**, which provides pricing and revenue optimization solutions for financial services, banks and insurance companies; and **Personetics**, which uses analytics technologies to capture information from customer interactions along with data from back-office systems and databases to anticipate customers banking needs, enabling financial services companies to offer customers personalized solutions based on current and historical account information. A prominent Israeli company in the insurance industry is **Sapiens**, which develops a rules-based application development suite for insurance companies. In August 2011, the company made a significant move to bolster its position as a global provider of solutions for the insurance industry, acquiring **FIS Software** and **IDIT**, two notable Israeli providers of software solutions for the insurance industry, for a combined $75 million. Additional Israeli players in this space include **SeaPass**, which enables insurance carriers and agents to transmit and receive data in real-time by leveraging existing systems to interact automatically.

Other Vertical Applications

In addition to the abovementioned fields, many Israeli enterprise application vendors provide vertical-specific solutions for various industries. Among them is **Retalix**. Founded in 1982, the company is a major player in the retail applications market, providing solutions that automate retail, distribution, and supply chain operations for the food, fuel, and consumer goods industries.

Paradigm Geophysical is an industry leader in the oil and gas exploration field. The Israeli/U.S. vendor is developing solutions that enable companies in this field to locate new oil and natural gas reservoirs, optimize production, and create digital models of the Earth's subsurface. Most recently, the company was acquired by private equity firms Apax Partners and JMI Equity for $1 billion. **Ex Libris** is targeting the library automation space. The company provides various solutions in the areas of discovery, management, and distribution of print, electronic, and digital materials for academic, research, and national libraries. **Vizrt** provides broadcast graphics software, digital asset management and other content production solutions for the digital media industry.

Other notable vertical applications vendors include **Olive Software**, a provider of digital edition and digital archiving solutions for the publishing industry.

Business Intelligence

Founded in 1993, **Panorama** was one of the early entrants into the online analytical processing (OLAP) space. The company sold its OLAP technology to **Microsoft** in 1996. Today, it is focused on providing on-premise and SaaS-based analytics, reporting, dashboarding, scorecarding and visualization solutions designed to work on top of various data sources (e.g. OLAP, relational database, spreadsheets or in-memory database).

Among emerging Israeli BI is **Verix**, a provider of SaaS solutions that integrate internal and external data with a company's business logic, and analyze data relationships to identify changes in trends, gain insight into underlying drivers and provide proactive alerts. **SiSense** has developed a BI platform that creates and manages interactive reports, dashboards, and analytic applications using visual drag-and-drop tools, without having to set up data warehouse systems, OLAP cubes, or programming. **TrendIT**'s population analytics solutions utilize real-time location logs, external data sources and internal, stored information to monitor and analyze demographic trends, catering to the Homeland Security, retail, municipalities, advertising agencies and cellular operators markets. **JethroData** is developing an analytic database technology that enables instant analytics in real time on large scale data sets.

An emerging category within BI is SaaS analytics, which refers to solutions aimed at providing SaaS companies with actionable data on their operations. Israeli start-ups in this space include **Totango**, a provider of a customer engagement platform that combines Big Data analytics with segmentation and engagement tools to allow SaaS companies and online services to deliver more value and and engage users. **Applango**'s analytics solution enables IT managers to gain insight into actual SaaS application usage, optimize SaaS spending, manage access to applications according to company policies, and other capabilities.

Another related category where emerging Israeli companies are increasingly present concerns the usage of IT resources, and particularly cloud resources. **Newvem** utilizes data analytics and crowdsourcing knowledge and expertise to track and analyze cloud resources usage, identifying sub-optimal and vulnerable use of cloud resources with regards to security, availability, utilization, cost effectiveness and more. **ITAnalyzer**'s solution gathers and analyzes information from IT Infrastructure objects and layers (physical, virtual and cloud) to help IT managers maximize investment, improve IT infrastructure stability, enhance operational activities, and reduce operational and maintenance costs. **CloudRows** offers a spending management dashboard that monitors Amazon Web Services accounts to avoid IT budget exceptions.

Israeli BI-related companies are also active in the customer experience analytics field. The ability to understand and analyze the path taken by users can have profound significance on a website's revenue stream and business model. This is why publishers from all across the Internet sectors relentlessly seek to gain better insights into visitors' online behavior.. In January 2010, **LivePerson** acquired **NuConomy**, who is also active in this field, for $3 million. Other Israeli companies in this space include **ClickTale** and **Kampyle**.

Human capital management

In the human capital management (HCM) market, Israeli companies are prominent in the workforce management segment, and especially mobile workforce management. Among them is **ClickSoftware**, an established provider of mobile workforce management and service optimization solutions, including shift scheduling, tactical resource planning, capacity planning, customer demand forecasting, analytic and reporting tools, and others. **ViryaNet**'s mobile workforce management platform is aimed at optimizing field service work, including scheduling and dispatching resources and enabling mobile field communication. **TOA Technologies** is offering a solution for customer-care focused mobile workforce management, providing a modular platform for enhanced service and goods delivery. In addition,

NowForce offers a command and control solution aimed at mobile workforces of emergency response organizations of all sizes, enabling them to remain accessible when they leave their vehicles or are off-duty.

Other Israeli workforce management companies are focused on time and attendance tracking and other related issues. **Synerion** is a provider of employee time and attendance management, shift scheduling, activity-based costing as well as employee recruitment solutions. **Synel** provides data collection systems and solutions for workforce management, time and attendance, access control and job costing applications. **Timest** looks to optimize human resources and IT asset management by providing a monetary indication of the value of a worker's time and activity, and the value generated as a result of the company's IT assets.

Several Israeli start-ups are playing in the online recruitment space. **RealMatch** is building a recruitment advertising network that connects employers and job seekers across multiple websites, blogs, and social networks, via targeting and optimization algorithms. **Zao** offers social recruiting solutions, enabling companies to offer referral rewards to their professional and personal networks for referral hires, in addition to their employees. **LuGo** is an online recruitment service that balances candidate management and technical skill testing to optimize the recruitment and selection process. **GooodJob** enables companies to reward employees' referral efforts and leverage their social media networks to reach top talent.

In the human capital training field, **XTeam Training** develops virtual training games that combine task-oriented group simulations and post-game debrief sessions, providing human resources professionals a cost-effective way to train teams.

Product Lifecycle Management

Product lifecycle management (PLM) refers to solutions that bring together a number of activities required to develop, model, track, manage, and control products and to manufacture, sell, maintain and, finally, retire these products. According to IDC research, the market leaders are **Dassault Systems** and **Autodesk**. Both companies are present in Israel following acquisitions of local computer aided-design/manufacturing (CAD/CAM) companies.

Dassault has been active in Israel since the acquisition of **SmarTeam** in 1999, which continued to develop the V5 ENOVIA SmarTeam PLM product for SMBs. In 2009, Dassault decided to consolidate the development of V6 into its French and US R&D centers. Following this move, Dassult subcontracted the development and support of the ENOVIA SmarTeam V5 technology to Israel **Artizone**, a spin-off from the local R&D center. In addition, Artizone is independently developing an online specialty food shopping community that enables shoppers to purchase their products from preferred stores.

In 2009, Autodesk acquired **PlanPlatform**, a provider of SaaS-based collaboration platform for users of design software, which now serves as its Israeli R&D center. **Siemens** also has a local PLM R&D activity following its acquisition of **USG**, which acquired **Technomatix**, an Israeli developer of digital manufacturing process planning and optimization, in 2005.

Another PLM-related category is electronic design automation (EDA) software, which is utilized for designing and producing electronic systems such as printed circuit boards (PCBs) and integrated circuits (see also under semiconductors and

components). **Cadence**, one of the market leaders in EDA, has been present in Israel since 2005 following the acquisition of **Verisity**, a provider of process automation solutions that verify the design of electronic systems and complex integrated circuits. Another major international EDA vendor with significant local presence is **Mentor Graphics**, which has acquired 3 Israeli companies since 2006 (**Summit Design**, **Expert Dynamics** and **Valor**).

Among Israeli independent CAD/CAM players is **Cimatron**, a provider of solutions for various sectors of the manufacturing industry. Other companies include **OptiTex** , a provider of 2D and 3D CAD/CAM and virtual prototyping solutions for the fashion, transportation, and furniture industries; and **SolidCAM**, which provides manufacturing customers with a suite of CAM software modules.

Collaborative applications

Another innovative Israeli SaaS company is **Clarizen**, which provides collaborative work management solutions that facilitate the management of projects and resources in a single environment. Connecting the planning and the execution stages of a project, the company's solutions are aimed at ensuring that team members have the information and tools they need to complete their tasks. Other companies in this space include **Gigantt**, which develops a collaborative project planning SaaS solution that enables users to visualize complex work plans using an infinite-zoom graphics engine; and **Accept Software**, a provider of collaborative product planning solution, which enables users to collect, organize, and mange product requirements, ideas, product strategies and portfolios.

Another Israeli provider of collaborative applications is **OffiSync**, which provides a software extension that adds to the core functionality MS Office co-authoring capabilities as well as providing the ability to save and manage files on the cloud through Google Apps and other collaboration platforms. OffiSync was acquired by enterprise collaboration company **Jive Software** in 2011.

Other Enterprise Applications Companies

Several Israeli companies are offering solutions to facilitate remote support services. This includes **SupportSpace**, which operates a cloud-based platform that enables hardware and software vendors, retailers and ISPs to offer remote tech support services to consumers through a virtual workforce of certified, independent technology consultants; and **NextNine**, which aims to improve the performance of service organizations via automated, proactive, remote product service that enables them to proactively monitor and service their products at the customer site and automate the discovery, diagnosis and resolution of technical issues.

Capitalizing on the rapid adoption of cloud by small and midsize businesses (SMB) applications, Israeli start-up companies are developing various SaaS applications aimed at this target audience. **SohoOS** offers a unified platform for SMBs and small office and home office (SOHO) businesses to address their management, communications, and networking needs. **Zazma** provides an online loan service for SMBs. **POSE** is a cloud-based cash register and point-of-sale system (POS) for small businesses (e.g. retail companies, cafes and services) that allows business owners to manage inventory, clients, receipts and orders. Another early stage Israeli company providing cloud-based POS solutions for SMBs is **MindPOS**.

In the content management space, **ComQi**, which was founded in 2011 following the merger between U.S.-based EnQii Holdings and Israeli Minicom Digital Signage,

offers a platform for managing in-venue digital signage, mobile and social media, combining a content and campaign management system with extension and distribution solutions.

TABLE 6

Acquisitions of Israeli Enterprise Applications Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2012	Correlix assets	TS-Associates	N/A	Vertical applications (finance)
June 2012	BluePhoenix assets	Aman Group	N/A	CRM
June 2012	iMDsoft	TPG Growth	80	Vertical applications (healthcare)
May 2012	Amadesa assets	LivePerson	N/A	Business intelligence
March 2012	RADvision	Avaya (backed by TPG Capital and Silver Lake Partners)	227	Collaborative applications
January 2012	VCON Video Conferencing	ClearOne Communications	4.5	Collaborative applications
January 2012	Focalinfo	Verint Systems	10	Business intelligence
December 2011	Camero	SK Group	10 (estimated)	Vertical applications (government)
November 2011	Transportation Management Control	Pointer Telocation (Shagrir Systems)	0.7 (51%)	Vertical applications (transportation)
November 2011	Composia Software	NICE Systems	3	CRM
October 2011	C-nario	YCD Multimedia	N/A	Content management
October 2011	DVTel	Suspect Detection Systems	N/A	Security
October 2011	Strategy Runner Trading	MF Global Holdings	3.75	Vertical applications (finance)
September 2011	Visonic	Tyco International	99.4	Security
September 2011	Fundtech	GTCR	388	Vertical applications (finance)
June 2011	Voyant Health	Brainlab	N/A	Vertical applications (healthcare)
June 2011	Clockwork Solutions	Teakwood Capital	7.65	Supply chain management
May 2011	OffiSync	Jive Software	30	Collaborative applications
April 2011	ActionBase	Top Group	1.45	Collaborative applications
March 2011	Rontal Applications	Verint Systems	N/A	Security
March 2011	FIS Software and IDIT I.D.I. Technologies	Sapiens	75	Vertical applications (insurance)
October 2010	Graphic Remedy	AMD	5	Electronic design automation
August 2010	CDP Medical Developments	Philips Healthcare	11.75	Vertical applications (healthcare)
July 2010	Net-POS Retail	Switch Communications	N/A	Vertical applications (retail)
June 2010	TTI	TEOCO	58	Telecom applications
June 2010	eGlue	NICE	29	Contact center applications
May 2010	Press-Sense	Bitstream	6.5	Vertical applications (printing)
May 2010	Olista	Connectiva Systems	N/A	Telecom applications

TABLE 6

Acquisitions of Israeli Enterprise Applications Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
April 2010	KMI Software Systems	Optimum Group	N/A	Enterprise content management
January 2010	ioimage	DVTel	80	Video analytics
December 2009	VisualTAO	Autodesk	25	CAD/CAM
December 2009	STARLIMS	Abbott Laboratories	123	Healthcare IT
December 2009	MATE Intelligent Video	MangoDSP	N/A	Video analytics
November 2009	Impactia Technologies	eWave	N/A	Marketing applications
November 2009	ImageID	Zetes Industries	N/A	Supply chain management
November 2009	Orsus	NICE	22	Other
October 2009	Valor Computerized Systems	Mentor Graphics	82	Electronic design automation
October 2009	ECtel	cVidya	20.5	Telecom applications
October 2009	AiPoint	ClickSoftware	1.5	Human capital management
October 2009	Expert Dynamics	Mentor Graphics	2.5	Electronic design automation
July 2009	Proficiency	ITI TranscenData	0.5	CAD/CAM
July 2009	AST Solutions Group	ClickSoftware	1.8	CRM
July 2009	BVR Systems	Elbit Systems	34	Vertical applications (government/defense)
December 2008	Natural Speech Communication	AudioCodes	N/A	Telecom applications
December 2008	Personeta	Smart Call	0.7	Telecom applications
December 2008	Unipier Mobile	Flash Networks	10	Telecom applications
November 2008	Leonardo Media	VFM Interactive	N/A	Vertical applications (travel)
July 2008	AC (Gazit) Applications	VeriFone Holdings	15	Vertical applications (retail)
July 2008	Vigilant Technology	BATM Advanced Communications	2	Video analytics
July 2008	Zoomix	Microsoft	30	Integration
April 2008	Compwise	ECtel	1.3	Telecom applications
March 2008	Internet Finance Products	TradeNetworks	N/A	Vertical applications (finance)
February 2008	YaData	Microsoft	25	Marketing applications
December 2007	Negev Software Industries	BATM Advanced Communications	N/A	Telecom applications
December 2007	Informative	Satmetrix Systems	N/A	Marketing applications
October 2007	Traiana	ICAP	247	Vertical applications (finance)
October 2007	SapirTech	Malam	5	Human capital management
October 2007	Interwise	AT&T	121	Collaborative applications
October 2007	ApproxiMATCH	Amdocs	N/A	Data integration and access
August 2007	Peldec	Harland Financial Solutions	30	Vertical applications (finance)

TABLE 6

Acquisitions of Israeli Enterprise Applications Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2007	Risk Modules	Teldor Wires & Cables	1.7	Vertical applications (finance)
June 2007	CableMatrix	Sandvine	4.5	Telecom applications
June 2007	HumaNet	Lavi TimeTech	0.5	Human capital management
May 2007	Trendum BuzzMetrics	The Nielsen Company	100	Marketing applications
April 2007	ClearForest	Reuters	25	Business Intelligence
April 2007	Aluna	Matrix IT	N/A	Collaborative content workspace
March 2007	IFN Systems	Live Linx Extensible Solutions	N/A (merger)	Enterprise content management
January 2007	AppCell	Teleclal Group	6	Telecom applications
January 2007	SigValue Technologies	Amdocs	54	Telecom applications

Sources: IDC, IVC Research Center, 2012

Internet

With approximately 2.3 billion Internet users in 2011, the world keeps getting smaller and more connected. By 2013, the number of Internet users will amount to 34% of the worldwide population and Web access will be ubiquitous, especially from mobile devices. Internet newcomers will emerge mainly from China, India and other emerging territories. Internet usage experience will continue to evolve, backed by innovative start-ups and industry bellwethers, and will become more social and personal. New Web trends are constantly emerging and a complete ecosystem is quickly being built to support it, with numerous business opportunities.

Practically every major Internet player had established a local presence and has been enjoying Israeli innovation in developing Internet solutions. One of the first leading Internet players to realize the local potential is **Microsoft**, which in the past decade acquired several Israeli companies playing in various Internet segments. **Google Israel** was founded in 2007 and has since spawned numerous products. Google Autocomplete (AKA Suggest), Google Trends, and Google Insights for Search were all developed in Israel, as was the creation of YouTube annotations. Other major Internet players with local R&D centers include **Yahoo!**, **eBay** (following its $634 million acquisition of **Shopping.com**) and **LivePerson** (based on 5 acquisitions made since 2000).

The Israeli Internet scene has been thriving since the mid-1990s, when local companies rose to online dominance in various sectors that established the foundations for the modern day Internet experience. One of best examples of this is **Mirabilis**'s Instant Messaging client, ICQ. Launched in late 1996, ICQ quickly became one of the most popular IM clients in the world, accruing millions of users. Two years after the initial release of ICQ, Mirabilis was taken over by **AOL** for $407 million. In 2010, AOL sold ICQ to Russian investment group **DST**.

In the local online advertising arena, many senior executives and developers who are involved in promising start-ups were previously with **Hotbar**, a company that developed toolbars and email tools. In 2006, the company merged with **180Solutions**. **888 Holdings** and **Playtech** were both founded in the late 1990s and have since become active players in the online gambling industry. They have also produced a line of seasoned professionals in the online ads arena.

Some of the world's leading Web powers have snapped up Israeli Internet companies. Google acquired two firms in 2010, **Labpixies** and **MentorWave**, while AOL acquired four companies in the past few years – **5MIN**, **YEDAA**, **Quigo** and **Relegence** – for a total of $500 million. Microsoft picked up Israeli-related **Farecast** for $110 million, and **VideoSurf** for $70 million; and **Yahoo!** bought **Dapper** and **Foxytunes** for $55 million and $30 million, respectively. Since 2011, there were several other big ticket deals involving tech leaders and local firms. **ValueClick** paid $295 million for **Dotomi**, **eBay** acquired **Magento** for $95 million, and ad agency services firm **DG** acquired online/offline media buying tool **MediaMind**. Social network giant **Facebook** has also made a local acquisition, picking up facial recognition vendor **Face.com** for a reported $80 million.

eCommerce

In recent years, online commerce has become an indispensible part of the shopping experience worldwide. Online retailers, whether purely virtual or an extension of a

brick-and-mortar businesses, keep acquiring a greater share of overall sales and revenues, a trend that should continue in the coming years. IDC projects B2B and B2C ecommerce spending will be pushed up by several factors and will reach $16 trillion in 2013, a 17.5% CAGR from 2010. The growing adoption of Internet usage around the world, specifically in emerging markets, along with mobile commerce, social commerce, group-buying and the growing usage of virtual goods will be the main forces supporting growth rates. Other recent trends in the eCommerce sector include the introduction of virtual models and augmented reality to enable better clothes fitting, in-store commerce and a growing number of private sales sites.

Since the mid-90s, Israeli companies have dealt with the different aspects of managing eCommerce sites, such as operations and online payments, and are currently well poised to deal with the upcoming challenges this massive market has to offer. **Shoppnig.com** was one of first successful online ventures in Israel, which gained global recognition. Founded in 1998 (under the name DealTime), the company first engaged in price comparison. In 2004, after it became one of the most popular eCommerce websites in the U.S., Shopping.com went public. A year later it was acquired by eBay for $620 million.

Dolphin Software is the company behind **MySupermarket**, an eCommerce destination site which has gained vast popularity in the U.K. A grocery shopping and comparison site, MySupermarket allows its customers to compare and shop from four supermarkets in one central place. At the backend, the company enables manufacturers and retailers to keep track of prices and promotions in real-time. Another popular destination site is **Fiverr**, which developed a platform where people can share the things they are willing to do for $5, enabling users to monetize their talents, skills or digital valuables. **PlumWillow** is the company that powers **Sparkrebel,** a collaborative fashion and shopping inspiration destination where products, blogs, pictures and content are added, shared and discovered.

Myriad eCommerce sites at a click of a button provide potential customers with significant leverage when coming to decide on a place to make a purchase. As price is usually the most important factor in the buying process, online retailers are in constant need for pricing intelligence tools to optimize their sales strategy. **Upstream Commerce**'s SaaS platform provides users with near real-time information on pricing positioning compared with their competitors. The company's solutions can handle hundreds of thousands of products and dozens of competitors, allowing users to slice and dice their data to generate reports most relevant to their business. **FeedVisor**'s cloud-based solution provides retailers with the ability to automatically adjust their inventory prices based on pricing offered by competitors. As online stores typically offer a wide range of products, retailers have a hard time maintaining the correct data for each of them. **WebCollage** enables manufacturers to maintain accurate and updated product information across all their associated channels, as well as to market and advertise on retail sites.

Looking into the buying process, consumers usually look for products based on some pre-defined features. **Celebros** allows users to get relevant in-site search results, provides them with tailored offers and manages landing pages – all of which lead to higher conversion rates. As part of every smart buying process, consumers tend to compare prices across various websites. **Winbuyer** enables online retailers to integrate comparison components into their product pages. When a consumer finally makes a decision and clicks "checkout", the online retailer faces challenges when dealing with different types of currencies. **Fiftyone** supports cross-border eCommerce and facilitates online retailers with international payment processing,

landed cost calculation and logistics. The company is considered a world leader in fulfillment solutions. A recent deal in this segment centered on the acquisition of Israeli-based **Plimus** (now **BlueSnap**) by private equity firm **Great Hill Partners** for $115 million. Plimus focuses on digital goods sales support, taking care of the online paying process. By using Plimus' platform, eCommerce businesses can offer their shoppers a whole range of payment methods and let them choose their preferred method of payment.

Israeli companies are also responsible for different forms of ePayment innovations. **Payoneer** is an international payout provider, streamlining corporate payout processes by replacing traditional payment vehicles. The company issues branded prepaid debit cards to contractors worldwide, allowing alternative access to cash payments where local bank' processes and fees are cumbersome. **Cellarix** is yet another vendor that centers on digital wallet solutions. **Supersonic Ads** provides monetization solutions for online games, virtual worlds and social networks. The company's payment platform gives consumers the opportunity to earn virtual currency for free by completing targeted offers, watching video branded ads, and engaging with leading brands.

The social commerce arena has seen a major boost in recent years, driven by social sharing tools and new business models. **eBay** signaled its intentions in this arena with the $20 million acquisition of Israeli company **The Gifts Project**, a social commerce platform that enables several friends to pitch in and contribute towards an item for a birthday or other event.

Online Advertising

Online advertisement is the main fuel the powers numerous consumer websites, blogs and social media ventures. IDC forecasts worldwide spending on Internet advertising will grow from $87.4 billion in 2011 to $144.8 billion in 2016 at a compound annual growth rate (CAGR) of 10.6%. Furthermore, in both the U.S. and Western Europe, we see a fairly steep drop in search ads market share caused by significant growth in mobile ads, while display advertising sees slight market share gains, largely due to strong growth in video advertising. Publishers and advertisers alike constantly seek to increase ROI and conversion rates by using a wide array of advertising solutions. With different types of ads, various marketing approaches and numerous technological issues, vendors in this area are facing a hefty challenge.

The management of ads over multiple websites, featuring a huge amount of content and connecting myriad buyers and sellers, requires strong data processing and analytical capabilities, areas that Israeli entrepreneurs are well known for. **Mediamind** (formerly Eyeblaster) was one of the few online advertising companies to join the NASDAQ in 2010 raising $57.0 million at a valuation of $206.0 million. The company's ads campaign management platform enables advertisers and ad agencies to measure ROI and increase effectiveness. Less than a year after its IPO, the company was acquired by TV ad services firm **DG FastChannel** for $517.0 million. DG, which focuses on advertising on cable and satellite TV stations, now leverages MediaMind's technological expertise and strong customer base to provide a converged offer for both TV and online presence. **Matomy Media Group** (formerly Adsmarket) is one of the leading Israeli all-around players in the online advertising industry. The company's offering is evolving with industry trends, and includes mobile advertising, video advertising and a proprietary solution for brand advertisers to be launched in the near future.

There are different views on what is the best way to reach a company's target audience, with each approach relying on a different technique. Advertisers and agencies usually utilize verification tools to ensure that every ad impression is a quality impression, every impression is compliant, and every ad was served and displayed exactly as intended. **DoubleVerify** makes sure that ads are not running on content that is deemed inappropriate (e.g. adult and illegal content) by both the media plan and guidelines received from the agency and advertiser. The company also deals with other factors such as geo-targeting and competitive separation. Another company that deals with brand protection, as well as semantic advertising, is **Peer39**, which was recently bought by DG for $15.5 million. Utilizing a similar technology concept, **Kontera** delivers in-text advertising by performing a real-time semantic analysis of a Web page's content and transforming key words into linkable ads. The company also extends brands' social assets and social communities to content outside of fans' newsfeeds and amplifies word-of-mouth social sharing.

Israeli firms are also active in the fields of search engine marketing (SEM) and behavioral targeting. **Kenshoo** has established a reference standard for improving SEM results, while **eXelate** has developed an exchange platform for behavioral targeting data, offering ad networks access to qualified targeting events generated by millions of unique users in the U.S. each month. In the direct response online marketing segment, **MediaBoost** offers a customer acquisition and retention funnel platform, enabling advertisers to measure ROI on different marketing campaigns across different sites.

The market share of display ads in the U.S. has been growing consistently since mid 2008, amounting to $7.3 billion in 2011 (accounting for approximately 20% of the entire U.S. online advertising market). As opposed to Google's dominance in the search segment, the display sector is more fragmented and has given rise to numerous tech oriented companies. Israeli companies are also active in this market and some of them were acquired in the past couple of years. **Dapper**, which is dealing with dynamic display ad creation and optimization, was acquired in October 2010 by Yahoo for $55 million. **Dotomi** developed a personalized real-time display advertising solution and was bought by **ValueClick** for $295 million. Another promising Israeli vendor in this space is **MyThings**, which provides personalized retargeting services for online retailers and e-businesses.

Another emerging trend in the display segment revolves around optimizing real-time bidding (RTB) efforts. RTB operators and users are constantly in the process of evaluating the price of ad impressions, as they represent different values for different advertisers. Given that, it is essential for advertisers and players that support their marketing efforts to gain as much insight as possible on each impression. **Contextin** developed a display pricing algorithm that enables advertisers to increase ROI and scale of an online advertising campaign. By taking the initial media buying costs, analyzing myriad impressions daily and working closely with advertisers, Contextin is able to benefit from arbitrage opportunities.

Online video ads are an emerging format that will play a significant role in the online ads domain in the coming years. IDC believes that as the number of videos watched online increases, spending on video ads will follow, growing from $1 billion in 2009 to $5.4 billion in 2014 (a 41% CAGR) in the U.S., with its market share expanding from 3.7% to 9.7%. **Innovid**, **Taboola**, **Adap.tv** and **Hiro Media** are all engaged in this emerging market segment. Innovid has developed iRoll, a technology that enables the creation of interactive customized preroll video ads. Taboola is a personalized video recommendation platform, while Hiro Media has developed an online ad serving

platform, and Adap.tv allows publishers and advertisers to monetize in-video advertising.

Another growing segment in the industry is in-game ads deployment. The growing popularity of casual games and their potential to attract different demographics led **TicTacTi** to develop a monetization solution that enables publishers and advertisers to increase revenue from casual flash games by displaying in-game ads that integrate with content and are triggered by predetermined events. **Double Fusion** deals with PC and console games and offers advertisers creative and patented technological support to embed in-game advertising. The company has teamed up with **Sony** to insert ads into games for the Playstation 3.

The significant increase of time spent on **Facebook** has reinforced its dominance as the leading social network, which has led ad agencies and brand owners alike to invest vast funds in managing their social media presence. However, there is still an ongoing learning process on how brands should interact and promote themselves on Facebook and development of business models is ongoing. Catering to this market need, **Tracx** offers a SaaS solution for social media marketing that is specifically designed to answer marketers' basic burning question — how to measure a social media campaign's ROI? This is achieved by providing thorough insights and constant feedback to the user, backed by real-time event monitoring. **Taykey** rides the social media marketing wave as well, scouring different sources to identify, analyze and quantify trends. With almost half a billion users, **Gigya** allows website owners to connect their business to the popular social networks and enables customers to provide social sharing, registration and interactive features.

Consumer Internet

Traditionally, the world leaders in content-based and content-driven websites have been founded and operated in English-speaking countries, with the vast majority of them originating in the US. Most of these websites often first target American Internet users, banking on their familiarity with the nation's tastes and leading offline content providers (in some cases, the successful venture is an extension of an old-school offline entertainment). Nevertheless, Israel has produced a number of content-based websites dedicated to North American and European audiences despite its geographically challenging location.

Answers.com is a prominent Q&A website that relies on its community and trusted editorial sources. The company was acquired in early 2011 by **AFCV Holdings** for $127 million. **MyHeritage** is a family social network that enables its 63 million users to create their own family website, share pictures and videos, organize family events, create family trees and discover ancestors and long-lost relatives. Addressing parents and kids**, Tucoola** developed a platform that provides a service to monitor and enhance the development progress of children aged 2-8 by employing fun games in accordance with their age.

Several Israeli Internet companies are using the emerging crowdsourcing model, which enables users to interact and pool their knowledge and experiences. One of them is **Soluto**, which has developed a downloadable application that dives into the Windows core and uses collective data to tell PC users which applications are causing problems and how to fix them. Also in the PC space is **FixYa**, which provides user-generated tech support and offers consumers the ability to learn from the experience of other users on how to operate and fix different products. Other Israeli companies that use the crowdsourcing model include **Waze** (see in Mobile

Applications), and **uTest** (see in Automated Software Quality). **Aniboom** helps animators from all over the world to connect with interested parties, such as production companies, movie studios and advertising agencies. Another destination website is **Seeking Alpha**, which aggregates financial news and articles.

5Min, a contender in the video domain, was acquired in September 2010 by **AOL** for a reported $65 million. The company has established partnerships with major content producers of instructional and lifestyle videos and utilizes its syndication platform to publish their videos across a large network of subscribed websites. Also in the video space is **Magisto**, a provider of automatic video editing solutions that makes it easy for users to create and share professional looking movies, complete with effects and transitions. **TriPlay** is a provider of cloud services that enable users to access, manage and share their music, photos and videos across any computer, mobile phone, tablet or Web-enabled television. **Come2Play** has developed a platform that allows casual game developers to easily create multiplayer Flash games and enables website and blog owners to create a social gaming network with channels, applications and games.

Internet Applications

When it comes to building and maintaining a website today, users have multiple easy-to-use applications that allow even non-tech savvy website owners to utilize tools that once belonged only to web professionals. Many Israeli companies are taking part in this revolution and offering solutions that fit a wide range of needs and technologies.

Starting from the basics of website deployment, **Wix** plays in the do-it-yourself website design and publishing market, providing users who have no programming skills with a drag-and-drop interface to create online identities. Currently there are more than 12 million users of Wix's platform. The company has recently launched a mobile device version of its product. **Outbrain** facilitates the uncluttering of the overflow of blogs, articles and news content being published daily. The company developed a widget that delivers recommendations on relevant content to its users, while helping to increase incoming segmented traffic to websites. Publishers who wish to constantly keep in touch with their users are able to do just that with **Conduit**, which develops custom toolbars. As of year-end 2011, the service recommendations were viewed 3.5 billion times per month, generating over 200 million monthly clicks and making Conduit one of Israel's most profitable start-ups with estimated revenue of $500 million in 2011.

Video has become a "must have" for many publishers and can be seen in different formats in content and ecommerce websites. However, incorporating video into a publisher's website in a way that supports its business goals, content outlines, and target audience can pose several technological challenges. **Kaltura** offers an open-source video player that enables group editing of videos. The company's offering includes out-of-the-box video management tools and applications but is also tailored to developers that want to build customized video applications. **SundaySky** enables its customers to automatically generate updated interactive video presentations from text and images. **Taboola** plays in the video recommendation and discovery market, enabling its customers to monetize their video catalogue by maximizing views.

Israeli companies are focused not only on the business and enterprise parts of the online demand side, but provide a wide set of applications aimed at consumers as well. **Perion Networks** (formerly **IncrediMail)** provides a tool to enrich email with emoticons and animations. **Babylon** developed a downloadable translation tool for

over 75 languages, which also provides access to dictionaries and glossaries. The company has reached a significant market cap in the Tel Aviv stock exchange, nearly $500 million as of August 2012. Driven by its success, the company stated that it is looking into going public in the U.S. Another local publicly traded company is **Netex,** which addresses users' online navigation needs. On the Facebook apps front, **Shaker** developed a virtual bar that brings the notion of life-like places online where people get together with their friends and other people like them.

Image Recognition and Processing

The advent of image recognition technologies is already affecting the way we communicate with machines and with each other. New solutions in this space are increasingly being implemented in areas such as UI, eCommerce, gaming, security, facial recognition, and others.

Israeli companies are part of this innovative domain. As depicted above, quite a few local companies are developing image and video recognition technologies for the physical security market. In addition, there is a relatively large cluster of Israeli companies in this space that cater to the Internet sector. **Face.com** developed a proprietary algorithm that enables users to find and automatically tag photos of themselves and their friends on **Facebook**. In June 2012, Facebook acquired the company for an estimated final value of $75-$100 million. Face.com has been able to overcome some of the technological challenges of facial recognition, as the growing popularity of its apps on Facebook enable a feedback loop that constantly fine tunes its engine. Another notable deal was the $70 million acquisition of **VideoSurf** by **Microsoft** in late 2011. Videosurf developed a visual search engine that analyzes the frames in videos, enabling the company to identify notable content and objects. Microsoft will use the newly acquired technology to bolster the Xbox 360 ecosystem with content search and discovery services, with the aim of position the system as an essential TV entertainment gateway, as well as supporting its other products and services.

Another visual search engine was developed by **Superfish**. Initially, the company offered a browser add-on that enables similar items from online stores and consumer Internet websites to be identified. Superfish's visual search can find visually similar items, allowing users to find items that are hard to describe in words. Another company, **Cortica**, automatically extracts the core concepts from images and video and maps these concepts to keywords and textual taxonomies. Also in this space is **Artimedia**, the Israeli media arm of Singapore-headquartered **Artivision**. Artimedia's video content analysis technology automatically analyzes various statistics, trends, viewer behavior and other data to optimize ad placements within video.

TABLE 7

Acquisitions of Israeli Internet Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
July 2012	Danidiv	Jobookit	N/A (64%; reverse merger)	Consumer Internet
June 2012	Face.com	Facebook	80 (estimated)	Web applications
June 2012	Metacafe	The Collective	1.15	Consumer Internet
May 2012	Photoccino	Shutterfly	15 (estimated)	Web applications
April 2012	Peer39	DG (MediaMind)	15.5	Online advertising
April 2012	BumpYard	eWave	0.1	Marketing applications
March 2012	Tavo	Zap Group	N/A	eCommerce
Janurary 2012	Kaninu	YouToo	N/A	eCommerce
Janurary 2012	Zing	YouToo	N/A	eCommerce
November 2011	VideoSurf	Microsoft	70 (estimated)	Search
November 2011	Yemama	Baligam	0.53	eCommerce
September 2011	The Gifts Project	eBay	25 (estimated)	eCommerce
August 2011	ImaLike.co.il	Baligam.co.il	0.85	eCommerce
August 2011	Plimus	Great Hill Partners	115	eCommerce
August 2011	DealHayom	Netex New Media	0.5	eCommerce
August 2011	Dotomi	ValueClick	295	Online advertising
June 2011	MediaMind	DG FastChannel	517	Online advertising
June 2011	Magento	eBay	95	eCommerce
May 2011	Visionize	AVG Technologies	15	Web applications
May 2011	Playtika	Harrah	85 (51%)	Consumer Internet
April 2011	PicScout	Getty Images	20	Web applications
April 2011	PicApp	Ybrant Technologies	15	Web applications
April 2011	Wibiya	Conduit	45	Web applications
Macrh 2011	Unisfair	InterCall	NA	Web applications
February 2011	Answers (previously GuruNet)	AFCV Holdings	127	Consumer Internet
Janurary 2011	Grouper	Groupon	8	eCommerce
October 2010	Dapper Inc.	Yahoo!	55	Online Advertising
October 2010	Tegrity Inc.	The McGraw-Hill Companies	30	E-Learning
September 2010	5min Ltd.	AOL	65	Video
September 2010	TimeBridge Inc.	MerchantCircle	N/A	Internet Applications
September 2010	MentorWave Technologies Ltd. (Quiksee)	Google	12	Internet Applications

TABLE 7

Acquisitions of Israeli Internet Companies, 2007–2012

Date	Company	Acquirer	Deal Value (US$M)	Field
August 2010	eMazeU	Zoran	N/A	Internet Applications
August 2010	MediaMind Technologies Inc. (formerly EyeBlaster)	IPO NASDAQ: MDMD	62.3	Online Advertising
June 2010	MyTopia Inc.	888 Holdings	18	Consumer Internet
May 2010	Netex (Net-Express) Ltd.	Third Public Offering	2.2	Internet Applications
April 2010	LabPixies Ltd.	Google	25	Consumer Internet
April 2010	Q Multimedia Ltd.	Lingo Media	5	E-Learning
February 2010	Restorun Ltd.	Geo-Media Marketing	N/A	Internet Applications
Janurary 2010	NuConomy Inc. (now LivePerson Nuconomy Israel)	Liveperson	3	Internet Applications
December 2009	Gizmoz	DAZ Productions	N/A (merger)	Internet Applications
September 2009	Tikatok Inc.	Barnes & Noble	N/A	E-Learning
September 2009	In-C2 Webcom	OneCall Contact Centers	N/A	Serach Engines
August 2009	Automoti Group	Hertz Global Holdings	N/A	eCommerce
August 2009	AlfaBetic Technologies	WhiteSmoke	N/A	Online Advertising
June 2009	TeneBit	Eshed	N/A	Internet Applications
April 2009	SportBuzz	Tixdaq	1	Social Networks
March 2009	Player2Players	Playtech	N/A	Consumer Internet
March 2009	Webby Casting	Box24 TV	N/A	Video
March 2009	Delver	Sears Holdings	N/A	Social Networks
January 2009	ViewScore	MyThings	0.5	Consumer Internet
January 2009	Wellsphere	HealthCentral Network	N/A	Consumer Internet
October 2008	eSnips	Logia	1.5	Internet Applications
October 2008	Mercado	Omniture	9	eCommerce
October 2009	Social Dynamics	SGN	N/A	Social Networks
October 2010	Targetpoint	Adsmarket	N/A	Online Advertising
September 2008	Mekorav	ALFY	N/A	Social Networks
July 2008	Neat Evaluation	Lotem	1.15	Internet Applications
July 2008	RichFX	ChannelAdvisor	3.1	Online Advertising
May 2008	StarNet Interactive	IAC	20	Consumer Internet
April 2008	Farecast	Microsoft	115	Serach Engines
February 2008	FoxyTunes	Yahoo!	30	Internet Applications
December 2007	Oridian	Ybrant	20	Online Advertising
December 2007	Informative	Satmetrix	N/A	Online Advertising
December 2007	Siftology	IDG Communications	N/A	Internet Applications

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Date	Company	Acquirer	Deal Value (US$M)	Field
Novemeber 2007	Yedda	AOL	12	Internet Applications
November 2007	Quigo Technologies	AOL	363	Online Advertising
October 2007	SmartShopper	Zango	9	eCommerce
September 2007	Cinabu	AKT Human Capital Solutions	N/A	E-Learning
August 2007	Sphera	Swsoft	N/A	eCommerce
June 2007	Kasamba	LivePerson	40	Serach Engines
April 2007	dPolls	Toluna	N/A	Internet Applications
March 2007	RawSugar	Suggestic	N/A	Internet Applications

Sources: IDC, IVC Research Center, 2012

FUTURE OUTLOOK

The high-tech industry is undergoing one of its most significant changes in decades, driven by the emergence of a new technology platform that paves the way for a new breed of solutions combining cloud, mobile, social, and Big Data elements. IDC believes that this new model of computing will drive global demand for breakthrough technologies in these areas in both the enterprise and consumer sectors.

Israeli ICT companies are prominent participants in this transformation. The local industry has been gradually evolving from its original focus on specific technology domains and vertical industries. Today, established vendors and emerging start-up companies are driving innovation across a broad range of fields, covering practically every layer of the technology stack – from the chip level all the way up to the application. Based on its capabilities and its track record as a global source of technology innovation, the Israeli ICT industry is well positioned to seize the opportunities arising from the emergence of new computing models.