Institute for Information Industry

EUROPEAN CHAMBER OF COMMERCE TAIPEI
台北市歐洲商務協會

Taiwan's GNSS-related Industry and Development Strategy – from IC Design to End-user Devices

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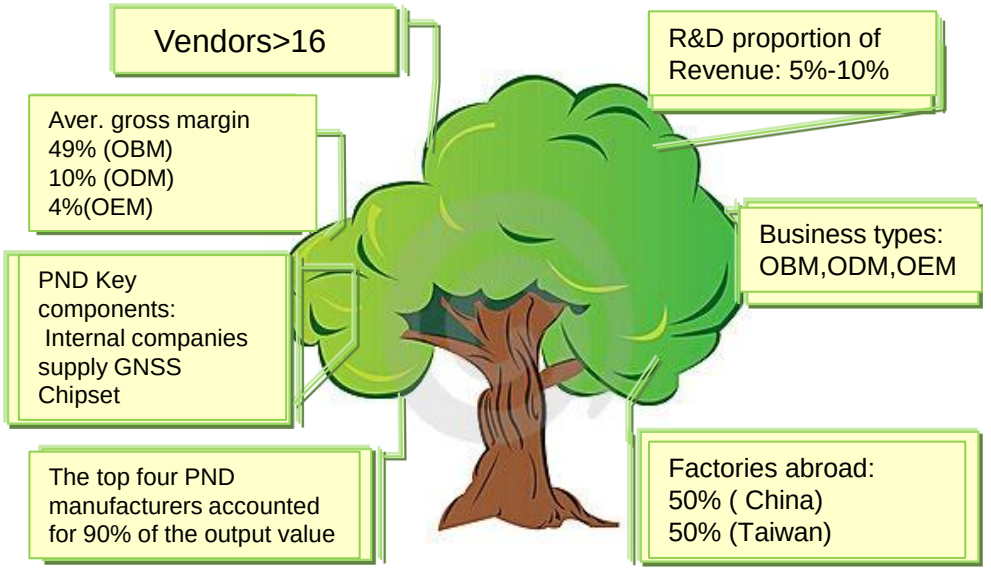
2012/11/6

Taiwan PND/GPS Industry



- PND/GPS vendors about 16 manufacturers of OBM and ODM business type.
- The world's top three PND brand chosen by the four manufacturers in Taiwan is mainly responsible for the production of this four PND vendors that master of approximately 90% of the output value.
- OBM manufacturers average gross margin of approximately 49%,
- ODM manufacturers gross margin of approximately 10%,
- OEM manufacturers, the gross profit margin of approximately 5%

Source：ITRI IEK(2012/03)

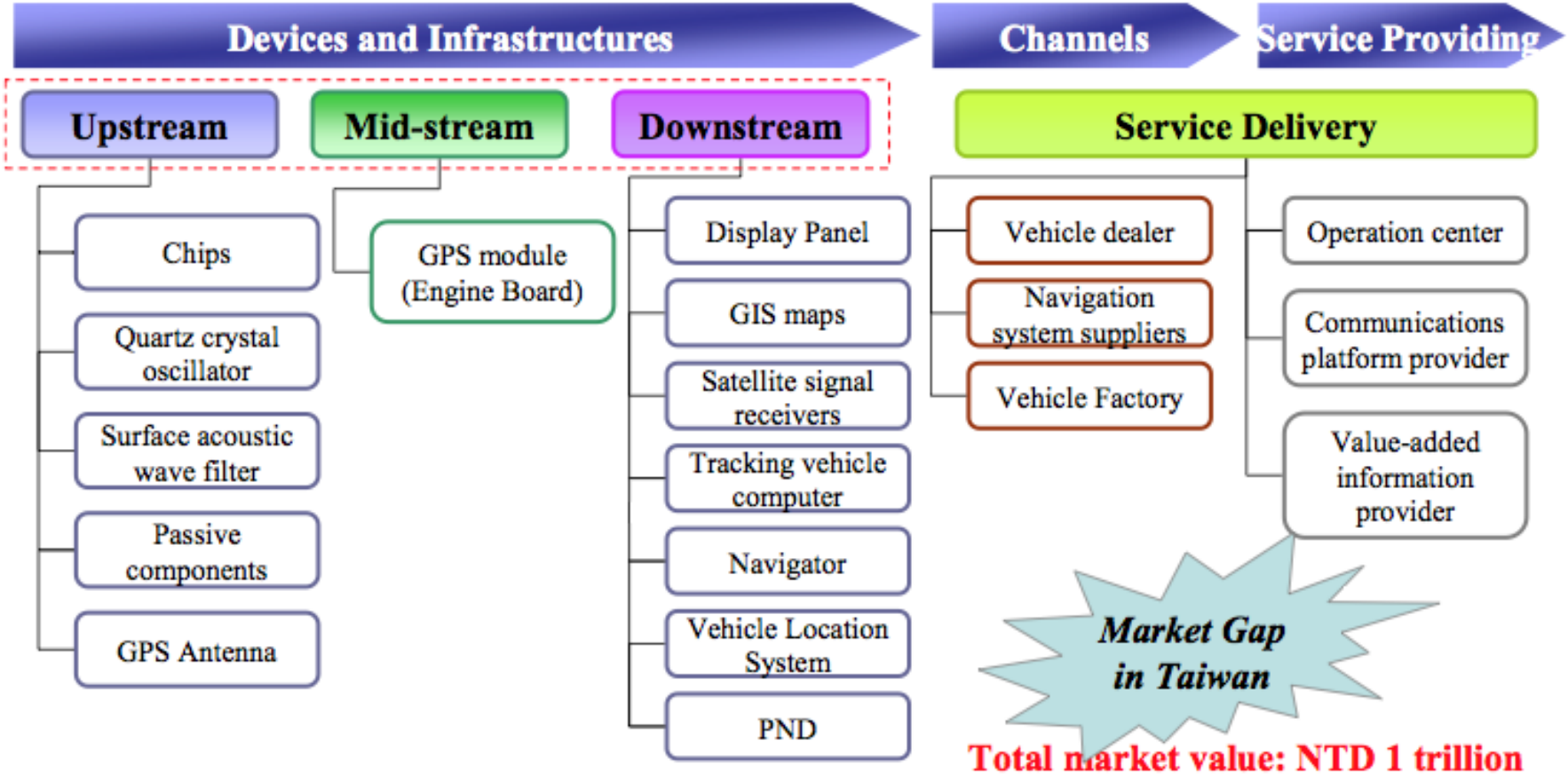
2012 Taiwan's Communication Products

Rank	Product	2011 Domestic Value (Million NT)	2012 Domestic Value (e) (Million NT)	2012年 Growth rate
1	Mobile Phone	333,749	236,295	-29.2%
2	GNSS/GPS	71,356	70,310	-1.5%
3	WLAN	3,009	4,815	60.0%
4	Ethernet LAN Switch	1,502	2,209	-19.4%
5	IP STB	1,213	1,258	47.1%
6	Bluetooth	2,318	947	-59.1%

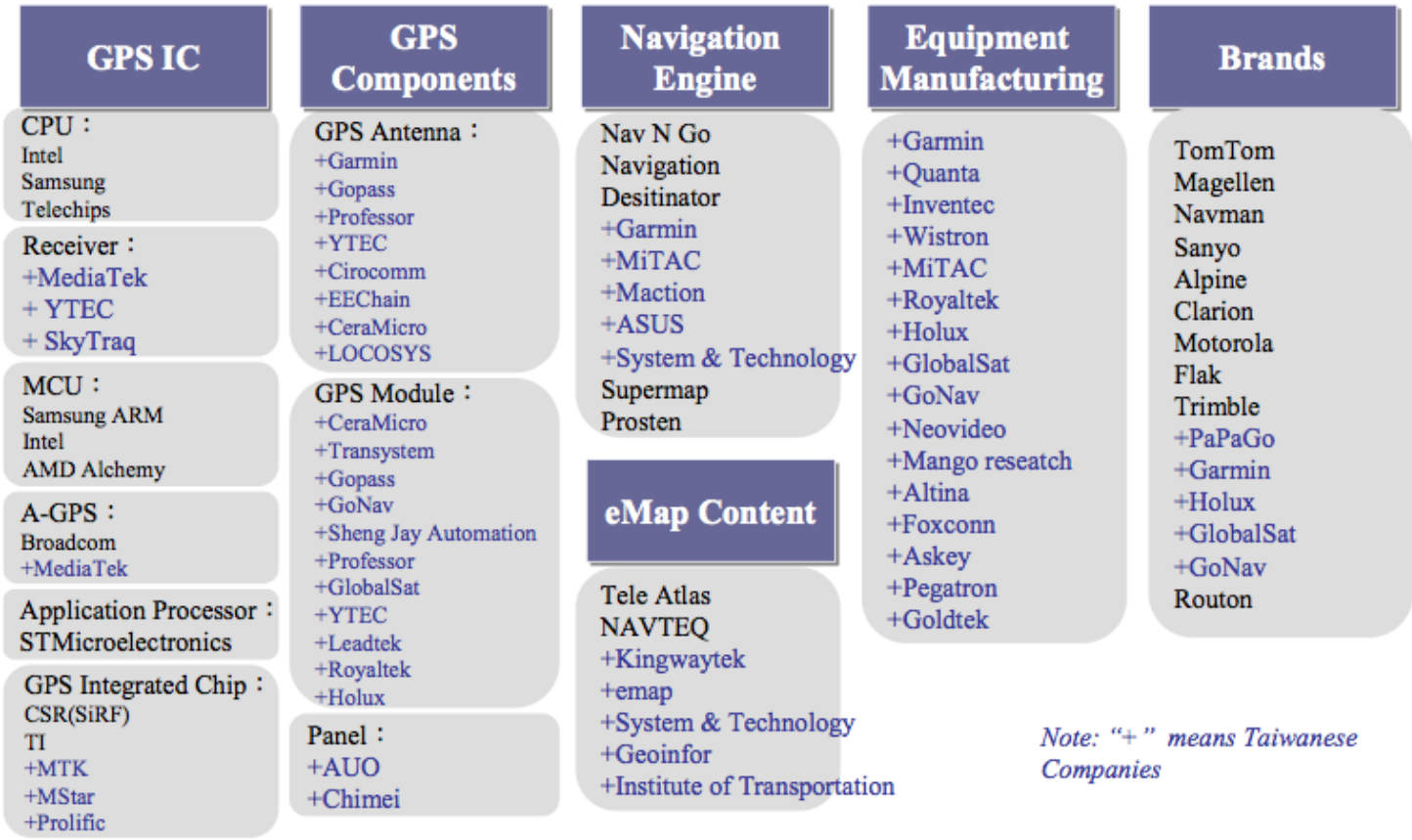
- **Phone, GPS, WLAN, Ethernet LAN Switch, Bluetooth, IP STB occupies 96% of the production value of the proportion of the overall communication products**

Source：ITRI IEK(2012/09)

Value Chain of GPS Industry in Taiwan



Taiwanese Companies in GPS Industry



In 2009, Mediatek became accredited as a supplier of GPS ICs for Garmin, while MStar supplies chips to a large number of Chinese "bandit" PND manufacturers

Source: IEK (2011/02)

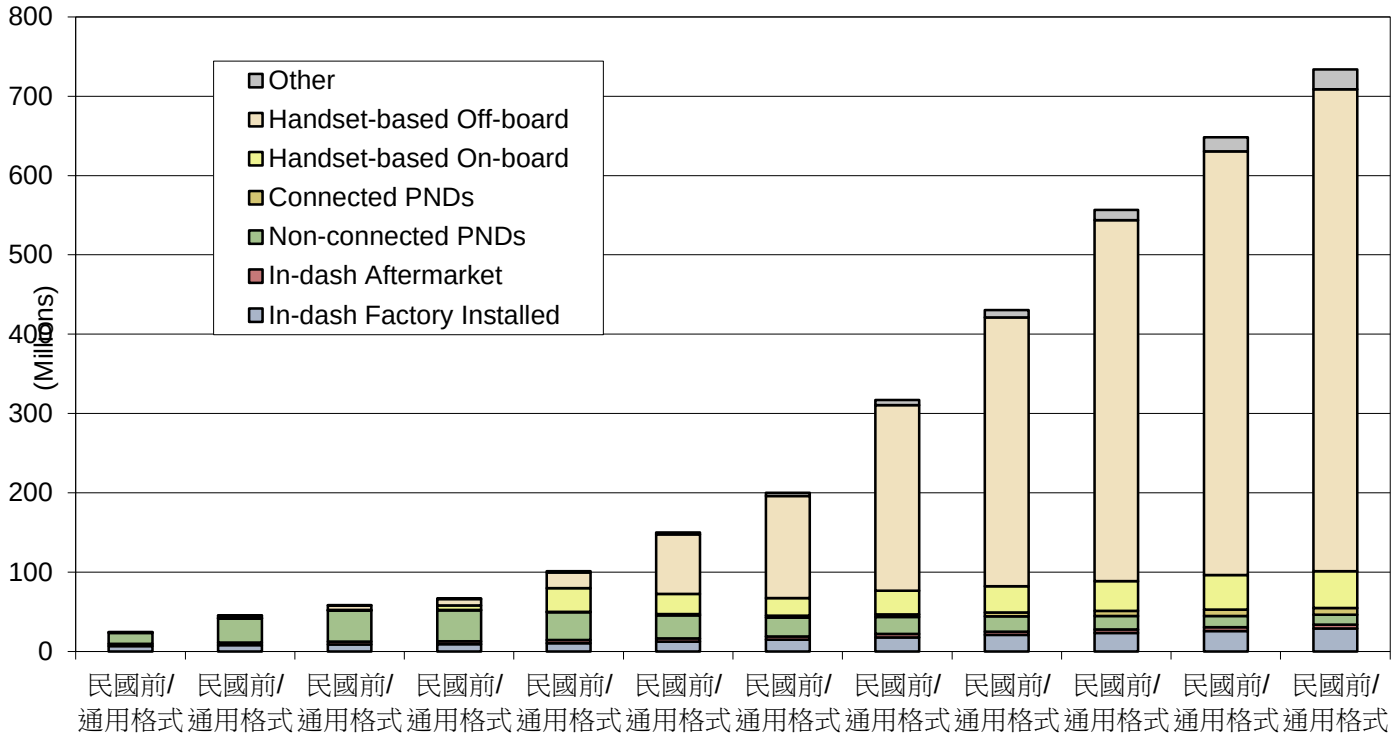
Taiwan's GPS Makers to See Global Market Share of Over 50% (2009)

- Taiwan's GPS industry started to take off in 2007. Taiwan is attracting major players to set up their production facilities in the country.
- After MiTAC bought Navman, MiTAC become the second biggest GPS company in Europe. Also, their sales of 800 million of PND has made them become the third largest GPS supplier in the world.
- TomTom and Garmin have expended their ordering to Taiwan OEM's from components to fabrication products.
- Garmin subsidiaries have designed, manufactured, marketed and sold navigation, communication and information devices and applications since 1989 in Taiwan.
- GPS is a revolutionary tool, growing use in automotive and consumer applications and mobile location technologies.

Company Name	MiTAC International Corporation		
Orientation	GPS Product manufacturing		
Capital	NTD 22,000,000,000	**Number of Employees**	12,000
Company Overview	MiTAC was established in May 2005 and is the manufacturer of handheld mobile communication device. Mio, the third largest brand in the global market, is the private band for its GPS products, including vehicle navigation system, and navigation PDA/mobile phones.		
Main Products/Services	• Vehicle Navigation System • GPS Mobile Phone • Mobile Internet Device		
Strength/Weakness Analysis	Mio, the private brand of MiTAC, is a strong leading brand in Taiwan market (over 50% of market share) in terms of PND, GPS PDA, and portable devices. Meanwhile, MiTAC is aggressive in merger and acquisition of European PND companies, Navman and Magellan, to reach the goal of moving on global market.		

Company Name	Garmin Corp.		
Orientation	GPS Product and branding		
Capital	NTD 7,400,000,000	**Number of Employees**	4,500 (Taiwan branch)
Company Overview	Garmin was established in 1990, dedicating in GPS product design and development. Mainly engaged in navigation and communication products development, manufacturing and sales, product line includes aviation, marine, automotive, mobile phone, OEM, hand-held leisure uses. Now Garmin is the world's No.1 hand-held GPS manufacturer. Garmin with the complete product line, and capability to develop IC chip and e-map. High-priced air products are manufacture from United States. Others are manufactured in Taiwan.		
Main Products/Services	Full technical capacity covering aviation, marine, automotive, and mobile applications, including GPS chip module, device development, e-map technology, wireless communications, navigations systems, and voice recognition, etc.		
Strength/Weakness Analysis	Garmin is the leader in the global GPS market, with 50% of U.S market share and 20% of the global one. The recent focus of development is GPS applications in leisure market, such as bicycles and pleasure craft.		

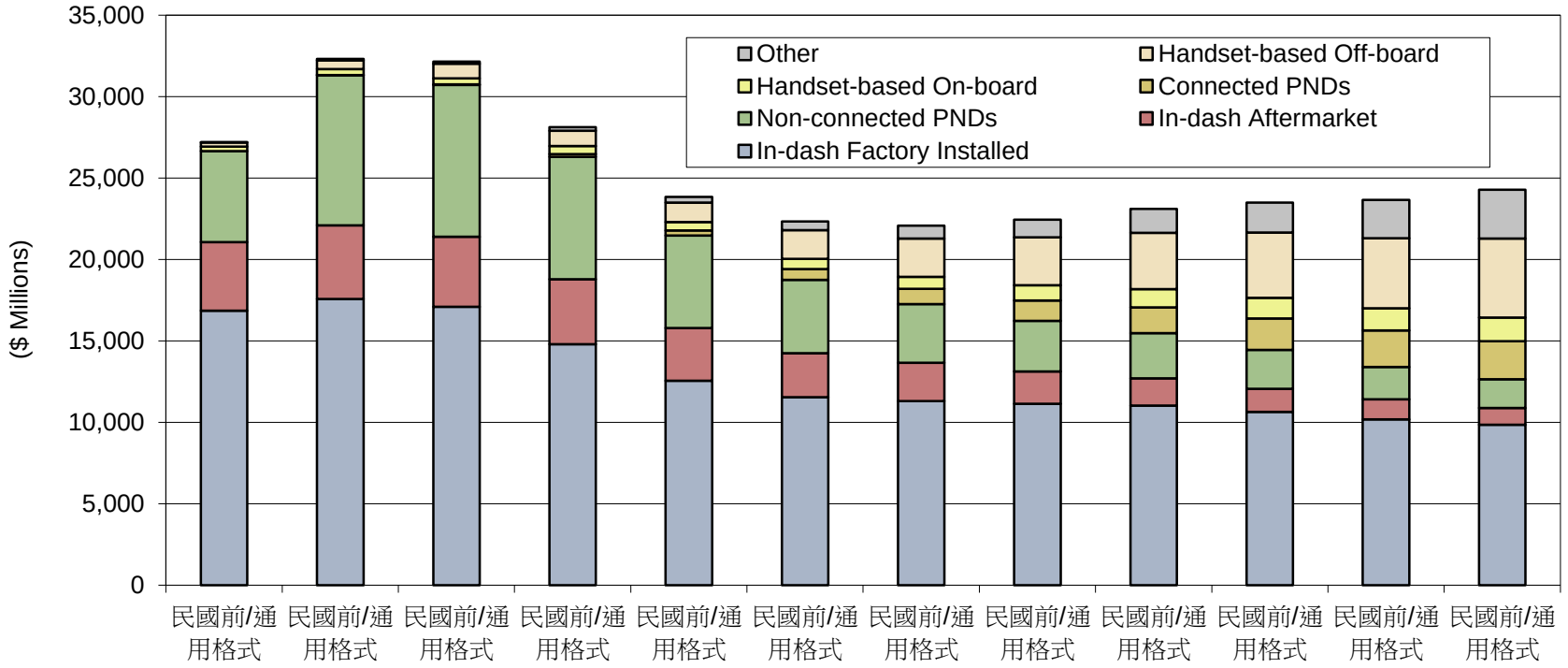
Navigation Devices and Systems Shipments by Type(2006-2017)



Type	Shipments	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	CAGR (12-17)
In-dash Factory Installed	(Millions)	6.9	7.9	8.8	9.2	10.6	12.5	15.0	17.8	20.8	23.4	25.9	28.8	13.9%
In-dash Aftermarket	(Millions)	2.8	3.3	3.5	3.6	3.8	3.9	4.0	4.2	4.3	4.5	4.6	4.8	3.7%
Non-connected PNDs	(Millions)	13.7	30.4	39.2	39.4	35.0	29.2	23.8	21.4	19.4	16.8	14.1	12.6	-12.0%
Connected PNDs	(Millions)	0.0	0.0	0.1	0.4	0.8	1.6	2.4	3.4	4.7	6.4	8.1	8.7	29.2%
Handset-based On-board	(Millions)	0.7	0.8	0.8	5.3	29.5	25.3	22.0	29.6	33.1	37.9	43.6	46.3	16.0%
Handset-based Off-board	(Millions)	0.0	2.5	5.7	8.1	20.0	75.2	128.9	234.4	338.9	455.0	534.3	607.6	36.4%
Other	(Millions)	0.0	0.3	0.5	0.8	1.4	2.4	4.0	6.2	9.1	12.6	17.6	25.0	44.3%
Total	**(Millions)**	**24.1**	**45.3**	**58.5**	**66.7**	**101.1**	**150.1**	**200.2**	**316.9**	**430.4**	**556.5**	**648.3**	**733.8**	**29.7%**

Source: ABI Research

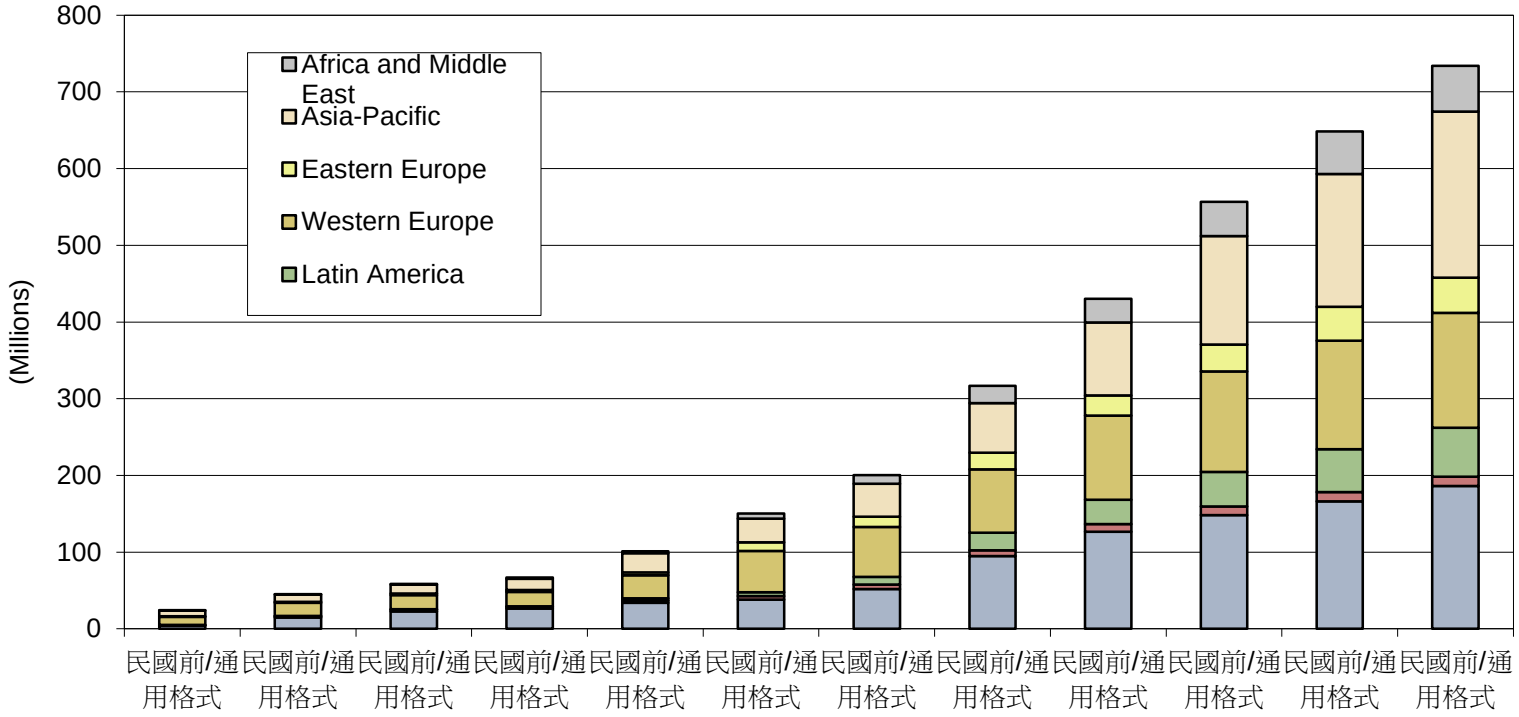
Navigation Devices and Systems Revenues by Type(2006-2017)



Type	Revenue	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	CAGR (12-17)
In-dash Factory Installed	($ Millions)	16,849.6	17,562.5	17,084.7	14,799.0	12,555.0	11,538.0	11,297.4	11,142.3	11,032.0	10,630.9	10,184.3	9,840.2	-2.7%
In-dash Aftermarket	($ Millions)	4,212.0	4,537.6	4,318.3	3,989.2	3,230.8	2,709.1	2,364.2	1,977.3	1,671.3	1,425.4	1,219.0	1,045.7	-15.1%
Non-connected PNDs	($ Millions)	5,588.0	9,216.8	9,317.9	7,520.3	5,678.1	4,509.3	3,589.2	3,117.6	2,766.9	2,387.1	1,995.7	1,758.7	-13.3%
Connected PNDs	($ Millions)	0.0	14.2	24.5	155.5	326.4	655.5	951.5	1,234.1	1,588.2	1,931.4	2,247.2	2,332.8	19.6%
Handset-based On-board	($ Millions)	275.5	355.4	374.6	493.5	506.0	626.1	738.2	938.4	1,120.2	1,266.4	1,362.2	1,453.0	14.5%
Handset-based Off-board	($ Millions)	263.3	543.4	898.7	951.1	1,203.1	1,761.0	2,343.6	2,944.4	3,455.6	4,008.3	4,301.4	4,857.0	15.7%
Other	($ Millions)	15.5	96.0	140.5	213.8	345.9	533.8	783.9	1,092.9	1,466.5	1,850.2	2,347.1	3,002.8	30.8%
Total	($ Millions)	27,204.0	32,325.8	32,159.1	28,122.3	23,845.2	22,332.8	22,068.1	22,447.1	23,100.8	23,499.7	23,656.9	24,290.2	1.9%

Source: ABI Research

Navigation Devices and Systems Shipments by Region(2006-2017)



Region	Shipments	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	CAGR (12-17)
United States	(Millions)	4.5	14.8	22.6	26.2	33.7	38.1	51.7	94.7	126.7	148.4	166.0	186.3	29.2%
Canada	(Millions)	0.4	1.6	2.1	2.2	3.2	4.5	6.2	7.6	10.0	11.3	12.1	12.0	14.1%
Latin America	(Millions)	0.3	0.5	0.8	1.1	2.7	5.3	10.0	22.8	31.8	45.0	56.0	63.9	44.9%
Brazil	(Millions)	0.2	0.3	0.4	0.6	1.4	2.5	4.7	10.5	14.3	19.8	24.6	0.0	-100.0%
Western Europe	(Millions)	10.6	17.2	18.7	18.7	29.9	53.5	64.8	82.7	109.3	130.8	141.6	149.8	18.2%
Eastern Europe	(Millions)	0.5	1.3	1.7	2.1	4.1	11.5	13.3	21.8	26.3	35.3	44.0	45.6	27.9%
Asia-Pacific	(Millions)	7.6	9.5	11.7	14.9	24.7	30.8	43.3	64.8	95.2	141.5	173.3	216.6	38.0%
China	(Millions)	0.1	0.2	0.4	0.6	1.2	3.1	6.5	13.0	23.8	42.5	52.0	0.0	-100.0%
India	(Millions)	0.2	0.4	0.7	1.2	2.5	4.0	6.9	12.3	20.9	35.4	43.3	0.0	-100.0%
Africa and Middle East	(Millions)	0.3	0.5	0.9	1.4	2.7	6.5	10.9	22.5	31.1	44.3	55.3	59.6	40.5%
Total	**(Millions)**	**24.1**	**45.3**	**58.5**	**66.7**	**101.1**	**150.1**	**200.2**	**316.9**	**430.4**	**556.5**	**648.3**	**733.8**	**29.7%**

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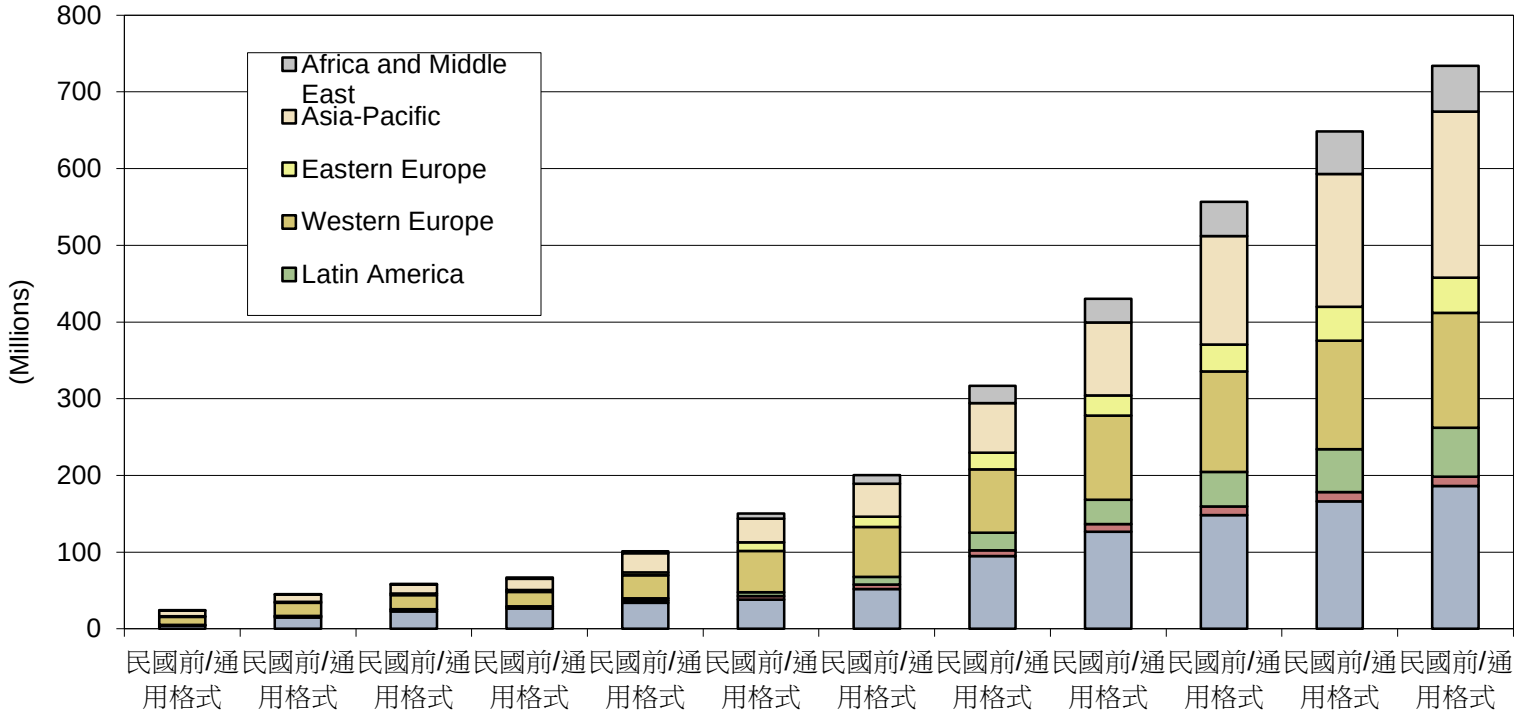

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Latin America	(Millions)	0.3	0.5	0.8	1.1	2.7	5.3	10.0	22.8	31.8	45.0	56.0	63.9	44.9%
Brazil	(Millions)	0.2	0.3	0.4	0.6	1.4	2.5	4.7	10.5	14.3	19.8	24.6	0.0	-100.0%
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Eastern Europe	(Millions)	0.5	1.3	1.7	2.1	4.1	11.5	13.3	21.8	26.3	35.3	44.0	45.6	27.9%
Asia-Pacific	(Millions)	7.6	9.5	11.7	14.9	24.7	30.8	43.3	64.8	95.2	141.5	173.3	216.6	38.0%
China	(Millions)	0.1	0.2	0.4	0.6	1.2	3.1	6.5	13.0	23.8	42.5	52.0	0.0	-100.0%
India	(Millions)	0.2	0.4	0.7	1.2	2.5	4.0	6.9	12.3	20.9	35.4	43.3	0.0	-100.0%
Africa and Middle East	(Millions)	0.3	0.5	0.9	1.4	2.7	6.5	10.9	22.5	31.1	44.3	55.3	59.6	40.5%
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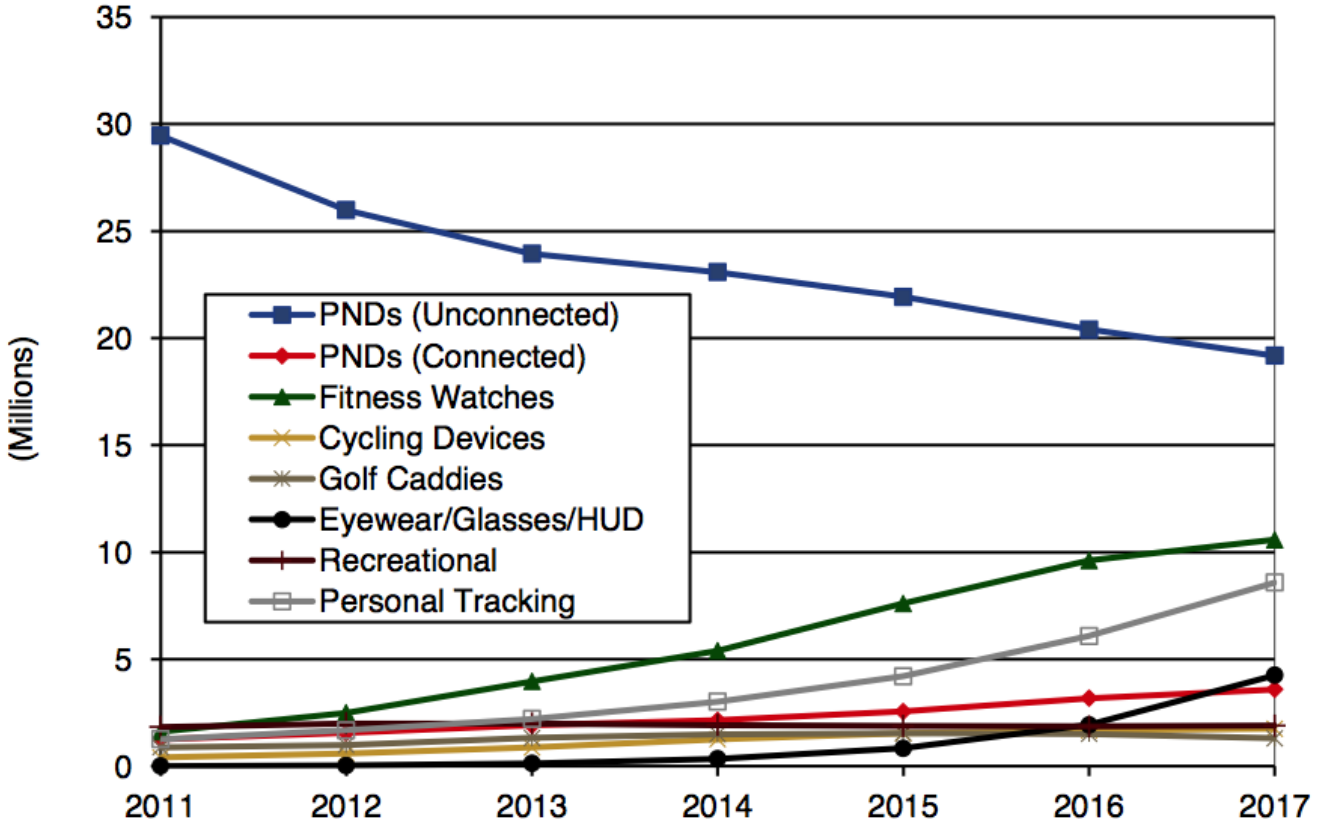
Source: ABI Research

Dedicated GPS Device Shipments World Market, Forecast: 2011 to 2017



Source: ABI Research

Dedicated GPS Device Revenues World Market, Forecast: 2011 to 2017

Segment	Shipments	2011	2012	2013	2014	2015	2016	2017	CAGR (12-17)
PNDs (Unconnected)	(US$ Millions)	4,617.6	3,978.5	3,555.0	3,345.9	3,128.8	2,874.0	2,655.6	-7.8%
PNDs (Connected)	(US$ Millions)	364.1	413.4	452.9	464.5	493.7	526.0	537.0	5.4%
Fitness Watches	(US$ Millions)	456.9	676.7	1,009.4	1,207.8	1,427.7	1,497.5	1,388.7	15.5%
Cycling Devices	(US$ Millions)	116.7	151.1	203.4	264.0	308.8	321.5	319.0	16.1%
Golf Caddies	(US$ Millions)	220.8	222.7	270.4	286.7	277.3	252.5	204.7	-1.7%
Eyewear/Glasses/HUD	(US$ Millions)	3.9	15.9	53.2	137.8	321.1	701.5	1,457.7	146.8%
Recreational	(US$ Millions)	544.9	605.5	600.3	561.4	530.8	507.7	499.2	-3.8%
Personal Tracking	(US$ Millions)	81.5	147.5	233.5	383.7	630.5	1,073.9	1,760.5	64.2%
Total	(US$ Millions)	6,406.3	6,211.3	6,378.0	6,651.7	7,118.8	7,754.6	8,822.4	7.3%

1.The total GPS device market will expand from $6.4 billion in 2011 to $8.8 billion in 2017

2.Despite the decline of PND devices, that market will remain strong, largely due to personal tracking device, fitness watches, and the emerging market of eyewear.

Total worldwide shipments will grow from 36.72 million in 2011 to 51.15 million in 2017.

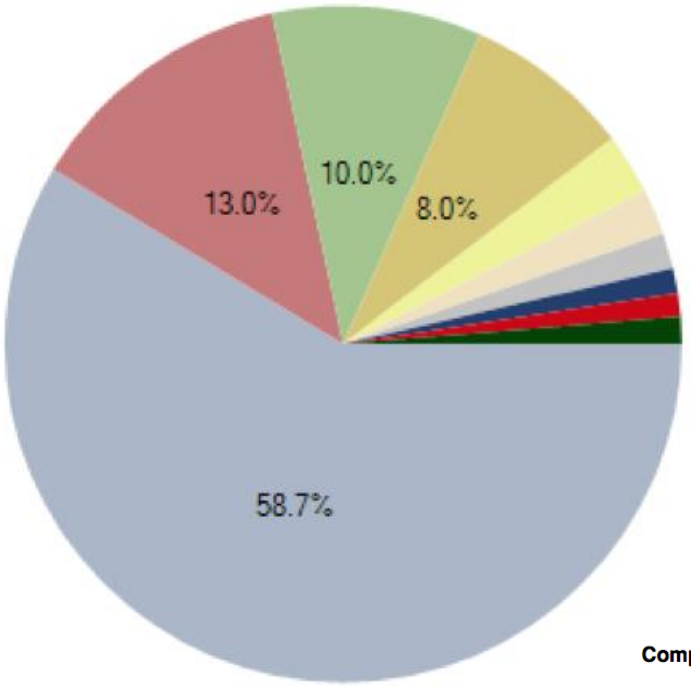
Source: ABI Research

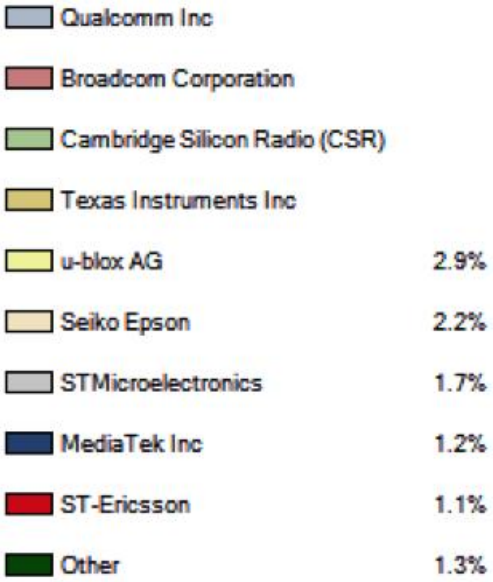
Competition Worldwide Market, 2012

Company	PNDs	Watches	Cycling	Golfing	Recreational	Tracking	Others
Garmin	X	X	X	X	X	X	X
TomTom	X	X					
Magellan/Mio	X	X	X		X		
deLorme					X		
Suunto		X	X	X	X		
Timex		X	X				
Polar		X	X				
Bia-Sport		X	X			X	
Nike		X					
Motorola		X	X	X			
cycleOps			X				
Bushnell				X			
SkyCaddie				X			
SkyGolf				X			
Calloway				X			
Qualcomm						X	
PocketFinder						X	
GTX Corp						X	
securatrac						X	
connexion 2						X	
Lok8u						X	

Source: ABI Research

Market Share: GNSS IC





Company	Overall Market Size (GPS ICs Shipped)	Share
Qualcomm Inc	396.5	58.7%
Broadcom Corporation	87.5	13%
Cambridge Silicon Radio (CSR)	67.3	10%
Texas Instruments Inc	53.9	8%
u-blox AG	19.7	2.9%
Seiko Epson	14.8	2.2%
STMicroelectronics	11.8	1.7%
MediaTek Inc	7.8	1.2%
ST-Ericsson	7.6	1.1%

Source: ABI Research

Taiwan GNSS IC Industry

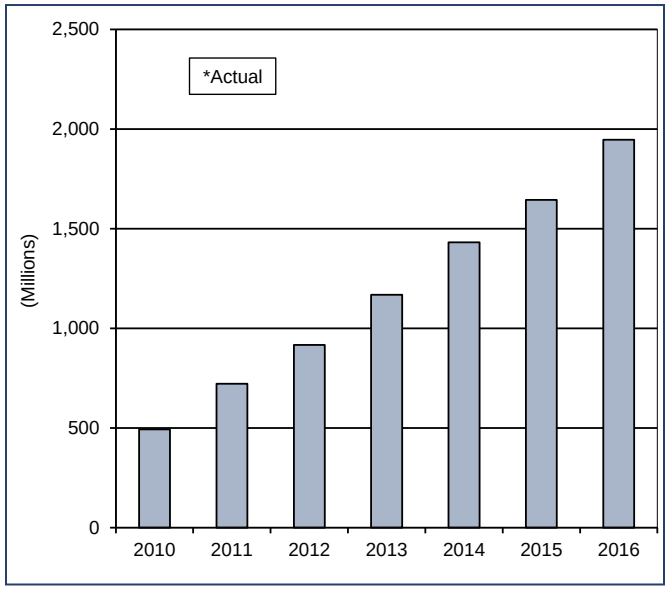
- MediaTek Inc.
  - MediaTek Inc. is a leading fabless semiconductor company for wireless communications and digital media solutions.
  - The company is a market leader and pioneer in cutting-edge SOC system solutions for wireless communications, high-definition digital TV, optical storage, and high definition DVD products.
  - Founded in 1997 and listed on Taiwan Stock Exchange under the code "2454",
  - MediaTek is headquartered in Taiwan and has sales and research subsidiaries in Mainland China, Singapore, India, U.S., Japan, Korea, Ireland, Denmark and England.
- Mstar Semiconductor
  - MStar Semiconductor, Inc. is a professional IC design house, and is dedicated in providing mixed-mode integrated circuit technologies.
  - By combining semiconductor design expertise and advanced proprietary technologies, MStar delivers a broad line of products: multimedia, wireless communications ICs, general-purpose mixed-mode ICs, and Intellectual Property (IP) development services.
  - Backed by a very experienced mixed-mode R&D team (members are with years of experiences of mixed-mode design and were the key members of the mixed-signal design groups from several prestigious hi-tech corporations), MStar is able to leverage its know-how in mixed-mode processing to deliver products, which facilitates our diversified range of semiconductor solutions.

Company Name	Prolific Technology Inc.		
Orientation	IC Design (GPS integration chip)		
Capital	NTD 870,000,000	**Number of Employees**	160
Company Overview	Prolific Technology Inc., a leading IC design house and ASIC design service provider. With the future towards 3C integration, the Company will devote more efforts in SOC development as well as integration of competitive multimedia (MPEG-4/JPEG/MP3) and GPS products.		
Main Products/Services	• Smart I/O • SOC(System-on-chip) • Multimedia chipset		
Strength/Weakness Analysis	Prolific Technology's main strength lies in its range of multi-function, integrated GPS IC products. All of Prolific Technology's GPS technologies and products are developed independently by the company's own in-house R&D team. Prolific Technology ranks alongside Mediatek and MStar as one of Taiwan's leading GPS IC suppliers; currently, most of its customers are small and medium-sized GPS module manufacturers.		

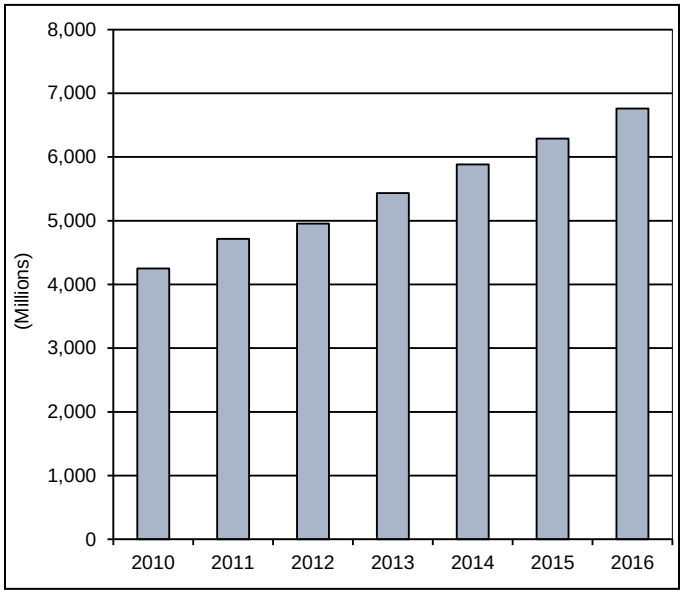
Company Name	YoungTek Electronics Corp.		
Orientation	GPS Receiver, GPS Module and Components		
Capital	NTD 970,000,000	**Number of Employees**	900
Company Overview	YoungTek Electronics Corp. was established in 1991 and has adopted a "contract manufacturing" service model that involves providing customers with comprehensive "turnkey" solutions. YoungTek has also been working to integrate wireless communication technologies with GPS product development, and has developed a range of products that include GPS receiver modules, wired and wireless Bluetooth GPS receivers, etc.		
Main Products/Services	• GPS Receiver (Wireless, Bluetooth) • GPS Antenna • GPS Module		
Strength/Weakness Analysis	Youngtek's GPS receiver, antenna and other product has been go into the "before market" in Japan. And are keeping growth in GPS vehicle market. However, the GPS Product aren't Youngtek's main business.		

GPS IC Markets

GPS IC Shipments
World Market, Forecast: 2010 to 2016



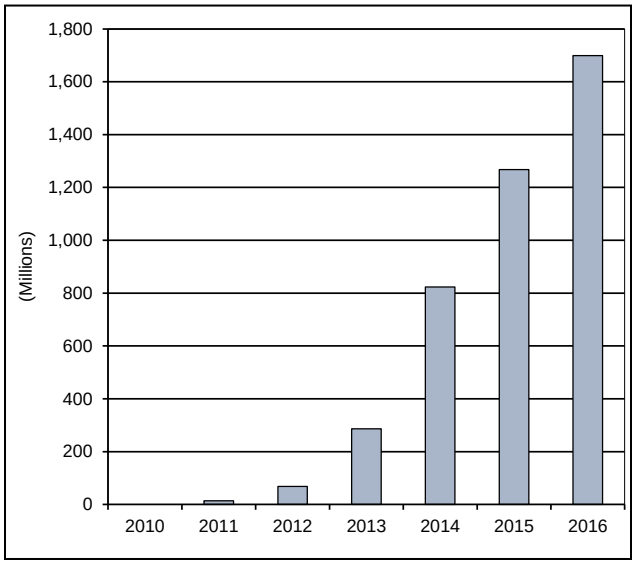
GPS IC Shipment Revenue
World Market, Forecast: 2010 to 2016



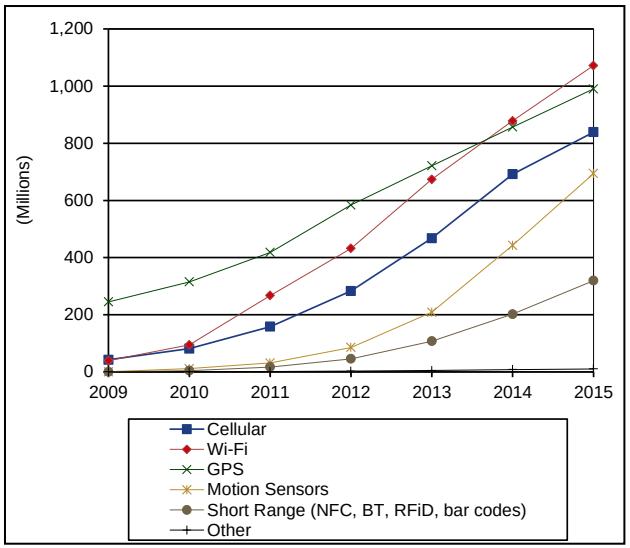
- Cellular will remain the dominant vertical market, while PNDs will become less and less important over the forecast period.
- Large volume markets are now emerging, including cameras, laptops, tablets and health/fitness.
- Despite declining ASPs revenues are forecast to increase over 50%.
- New feature trends include, Glonass, MEMs, alternative location.
- Embedded and combo-chip GPS will take an increasing portion of shipments over the period.

GLONASS IC Markets

GLONASS IC Shipments
World Market, Forecast: 2010 to 2016



Alternative Positioning Technologies Shipments by Type
World Market, Forecast: 2009 to 2015

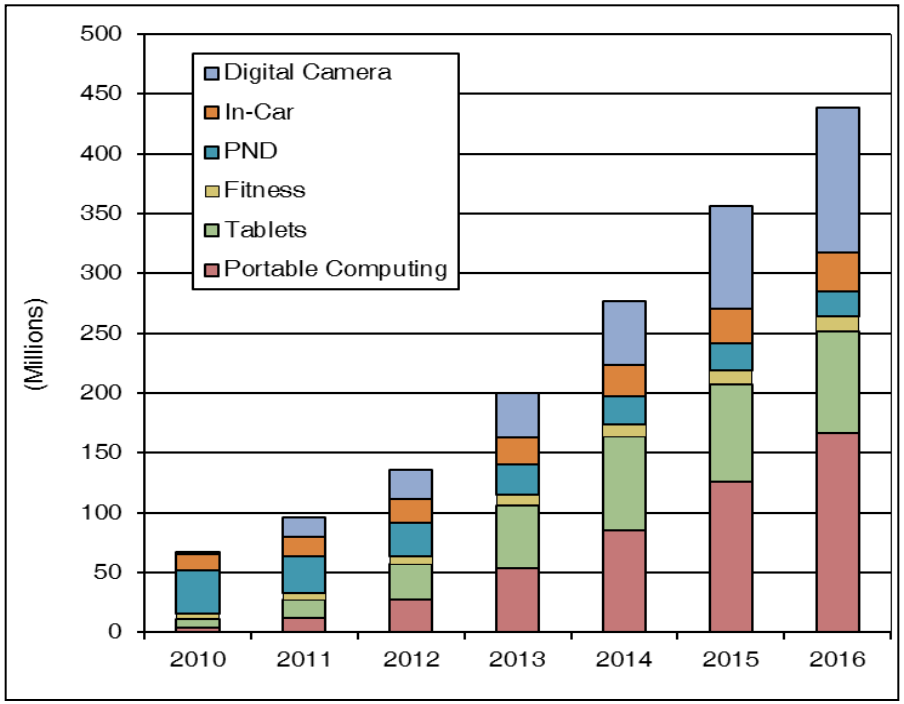


- Glonass is forecast to become a common feature on the majority of GPS chips by 2015. This will be **closely followed by Compass.**
- **Alternative location** will become an important additional feature to offer for GPS manufacturers and will become a clear differentiator over the next 2/3 years.
- As smartphones become more powerful and the GPS market moves into tablets, embedded GPS will become more prevalent. It is vital that companies form partnerships with processor OEMs, or develop in-house embedded solutions where possible.
- **Combo chip GPS** has not had a successful start, yet it is forecast to represent 35% or the market by 2016.

Source: ABI Research

Emerging Markets

Emerging GPS Vertical Markets
World Market, Forecast: 2010 to 2016



Cellular and Precision GPS market have been removed to highlight opportunities in new vertical markets.

- By 2016, these new emerging markets will be as big as the total GPS market in 2010.
- Each market will require a different flavor of GPS, GNSS and alternative location technologies.
- With the cellular market beginning to take shape, this represents a new gold rush for manufacturers.

Source: ABI Research

GPS Modular Providers

- Taiwanese companies are active in this modular business area, including Holux, RoyalTek, Globalsat, Rikeline, Emtac, and Leadtek.
- Terminal products include car navigation devices, as well as navigation equipment for maritime, aviation and personal use. The key features of these products include user-friendly software with a user interface that is straightforward to use. Taiwanese companies in this segment include MiTAC, Supa Technology, Altina, Maction, and GlobalSat.
- Branded vendors such as Garmin and Mio, there are a number of Taiwanese firms engaged in contract manufacturing of this category of GPS product; they include Inventec, Quanta, Wistron and MiTAC, all of which have secured orders to undertake ODM or OEM production for other brands.
- GPS brand TomTom outsources production of its devices to Taiwanese companies Quanta and Inventec,
- RoyalTek and Holux have succeeded in securing orders from Sanyo and Panasonic.
- Supa Technology undertook some contract manufacturing work for TomTom in 2006-2007, and has recently launched its own-brand “GoNav” products.

GPS Services Providers and Galileo Plan

- The Taiwanese government has for some years now been working to promote the growth of the in-car and consumer electronics segments of the GPS market, seeing significant growth potential for leisure, specialist and in-car navigation applications
- The government believes has strong growth potential include personal security monitoring, communications applications, and vehicle and goods tracking.
- In 2007, the government launched the Galileo Plan, the aim of which is to help Taiwanese companies to gain a foothold in this market as early as possible.
- Collaboration between research institutes and private-sector companies is being used to provide an indirect boost to Taiwanese firms' ability to secure key technology and intellectual property through international collaboration, hereby enhancing the overall competitiveness of Taiwan's satellite positioning technology.
- It is anticipated that this plan will provide stimulus for the launch of new satellite navigation products, including ICs, modules, systems, terminal products, etc., while also encouraging Taiwanese firms to develop new types of civilian application.
- The Galileo Plan has also helped Taiwanese companies such as Mediatek, MiTAC and Maction to develop opportunities for collaboration and exchange with European GPS companies, thereby establishing a solid foundation for the future development of the Taiwanese GPS industry.

Company Name	HOLUX Technology Inc.	HOLUX	
Orientation	GPS Receiver, Module and Handhold GPS Product		
Capital	NTD 430,000,000	**Number of Employees**	110
Company Overview	HOLUX Technology Inc. was established in 1994. Current products include Handheld GPS, GPS Receiver and GPS module.		
Main Products/Services	• Portable Vehicle Navigation Device • Mobile Tracker • GPS Satellite Receiver • Handheld/PDA GPS Device		
Strength/Weakness Analysis	HOLUX is focusing on developing the GPS in recent years and tries to improve the added value of its GPS products, such as new GPS product designed for outdoor activities in sport and leisure. At the same time, by utilizing the "Non-contact physiological sensing technology" from IEK, it develops a new product line of medical biotechnology to expand and differentiate the existing GPS products to be applied to measure the blood pressure, heartbeat, and body temperature.		

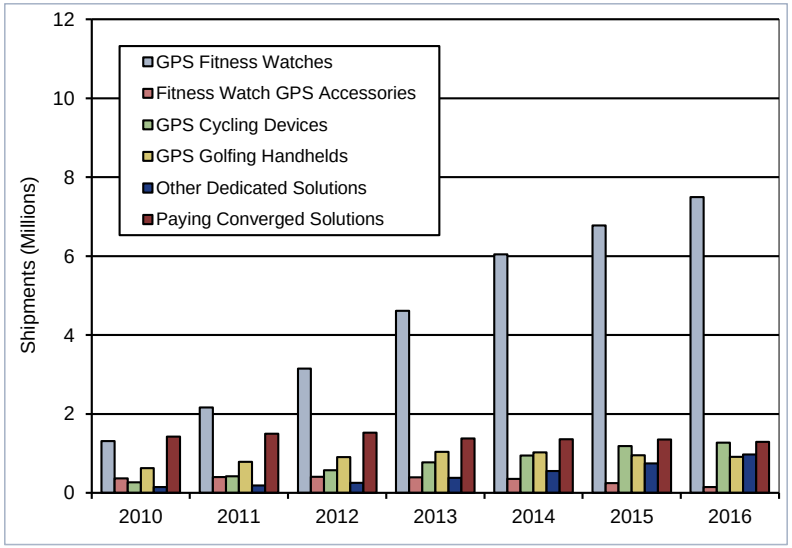
Company Name	SUPA Technology Co., Ltd.		
Orientation	GPS device manufacturing		
Capital	NTD 1,200,000,000	**Number of Employees**	85
Company Overview	SUPA Group was established in 1989. In the years since its setting up, SUPA has gained a solid reputation by bringing innovative car GPS system and other communication products, as well as OEM/ODM services to customers worldwide. GoNav is the brand to expand the global market.		
Main Products/Services	• Portable GPS Navigator • Bluetooth GPS Receiver • GPS Tracking Devices • Sports GPS • Connected PND		
Strength/Weakness Analysis	SUPA Technology is focusing on the development of GPS devices. Except for the private brands GoNav, its main business is as an OEM for many international brands, such as TomTom, to produce GPS products. However, after the globally crash crisis caused from using the chips of MStar Semiconductor for its private brand GPS product, SUPA needs to rebuild the confidence to earn its customers back.		

Company Name	Royaltek		
Orientation	GPS Receiver, Module and PND		
Capital	NTD 650,000,000	**Number of Employees**	150
Company Overview	Quanta Group affiliates, as the GPS high-tech product design, manufacturing and marketing company. RoyalTek designs, manufactures, and markets for worldwide PND OEM/ODM demands. We provide GPS Receiver , GPS Logger, GPS Engine Boards, GPS Modules, Bluetooth GPS, and Portable Navigation Devices(PND) for customers around the world. Led by major markets in Europe, Asia, Australia and other regions followed.		
Main Products/Services	• GPS receivers and modules • Portable Navigation Device		
Strength/Weakness Analysis	Royaltek has targeted its GPS products on the global market. Since the merger by Quanta Computer in 2006, Royaltek started to put more efforts on the development of micro-projectors.		

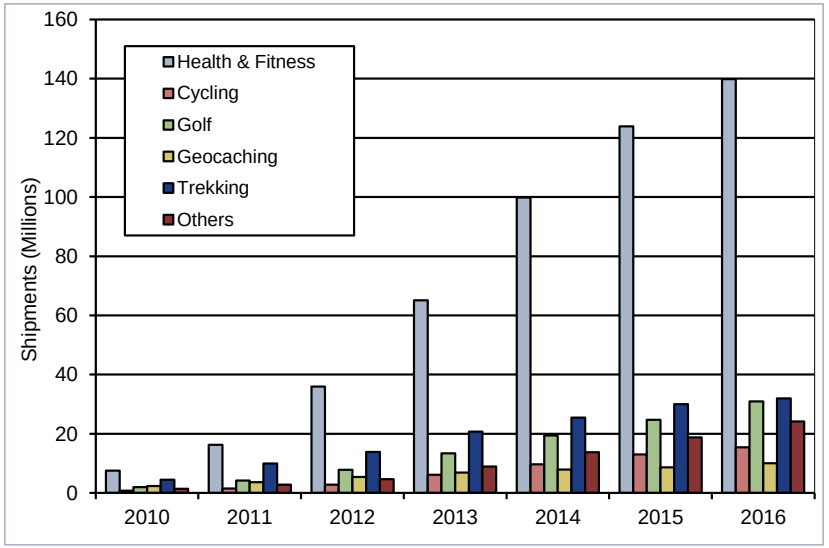
Company Name	GlobalSat Technology Corporation		
Orientation	GPS Receiver, Module, Product and Branding		
Capital	NTD 530,000,000	**Number of Employees**	200
Company Overview	GlobalSat Technology Corp. was established in 2000 and soon become a major manufacturer of GPS receivers and electronic communications in the world . GlobalSat has refined its core product lines to GPS applications, which consist of All-In-One Car Navigator, Bluetooth GPS, Cable GPS, SDIO/Compact Flash GPS, GPS Tracking System (GSM/GPRS/SMS communication with GPS/A-GPS), Wrist Type GPS Personal training Devices, GPS Engine Boards/Modules, and GPS System Integration.		
Main Products/Services	• GPS Antenna, GPS Receiver, Car Navigation, Handheld GPS • GPRS modules for mobile phone • Bluetooth devices		
Strength/Weakness Analysis	GlobalSat Technology has accumulated many years of experience in providing ODM/OEM services for overseas clients, and has established a branch office in Los Angeles to provide support for channel players and ODM/OEM customers in the U.S. Most of GlobalSat's GPS products are sold to end-users packaged with PDAs or smartphone devices. GlobalSat has also formed a strategic alliance with Formosa Television subsidiary FlyVision to launch Taiwan's first handheld navigation-capable TV, which is widely viewed as a potential killer application.		

Recreational, Outdoor, and Fitness GPS Solutions

GPS Sport & Fitness Solutions Shipments by Type
World Market, Forecast: 2010 to 2016



GPS Sport & Fitness Application Downloads by Type
World Market, Forecast: 2010 to 2016



- Both markets are forecast to show continued growth throughout the forecast period, illustrating the overall potential.
- Falling hardware prices and application downloads will catalyze hardware shipments, as mobile phone form factors are not suitable for regular exercise.
- GPS sports watches will be the key driver for hardware shipments, as outdoor & recreational, cycling, and golf devices are all impacted by the success of applications. A tranche of electronics, watch, and GPS manufacturers are forecast to launch new GPS watches and cycle computers over the next 2 years.
- All application categories are expected to show strong success, yet fitness will continue to dominate throughout, for both on-deck and off-deck markets.
- Carriers are forecast to increasingly support health & fitness applications, which will make them very relevant to future growth in the market.
- Off-deck direct download revenues are forecast to remain relatively small. Developers need to encourage new forms of revenue generation, such as advertising, hardware development, in-app sales, etc.

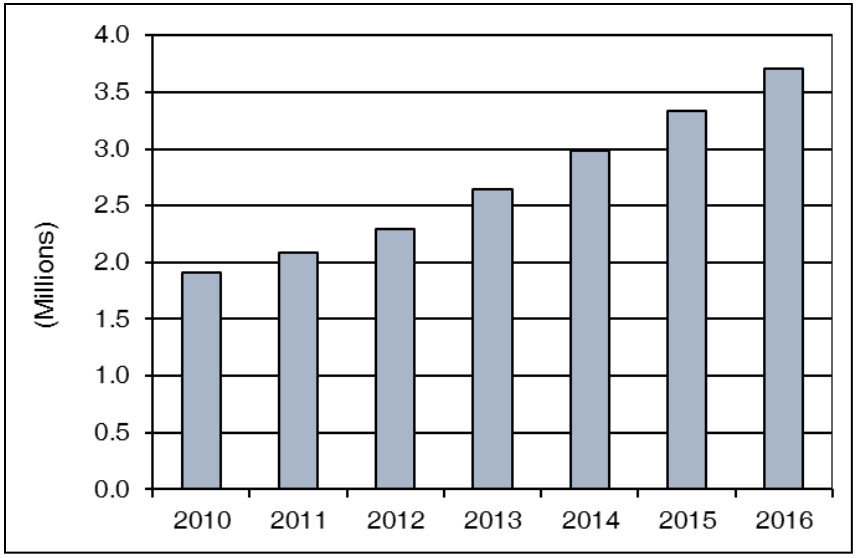
Source: ABI Research

Recreational, Outdoor, and Fitness GPS Solutions

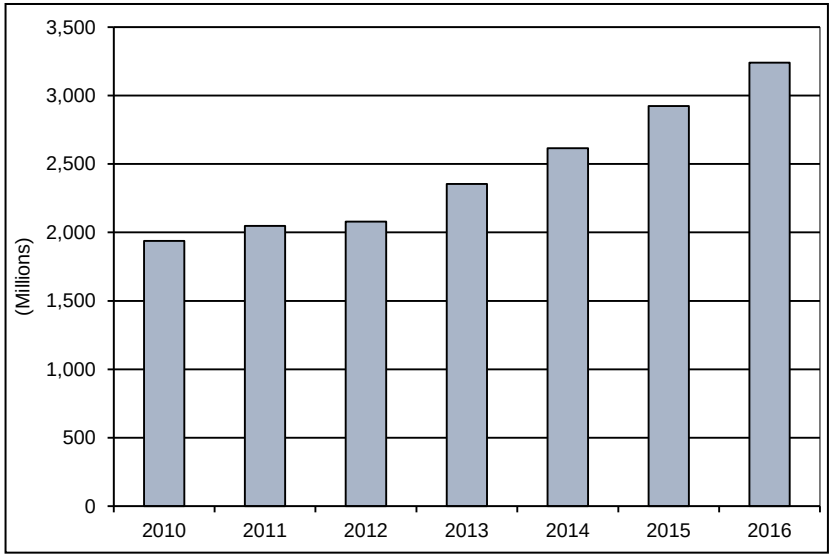
- **GPS performance**
- **Proprietary wireless connectivity protocols** – Most fitness accessories are based on proprietary protocols hindering compatibility and preventing price decreases.
- **High price of dedicated hardware fitness form factors** – The high prices of GPS fitness watches, cycling computers, and GPS golf rangefinders – varying between $100 and $500 – limit their market potential to professional or serious fitness enthusiasts.
- **Niche positioning** – Marketing and communication for dedicated fitness solutions remains largely limited to specialized fitness and sports outlets and magazines maintaining the niche positioning of GPS watches and other fitness and sports devices.
- **Lack of mobile connectivity** – Most dedicated fitness devices are unconnected, preventing features, such as A-GPS and real-time sharing of statistics, to be implemented.
- **Application discovery** – Increasingly, the market for fitness applications is being flooded by substandard offerings that offer a poor user experience and limit application discovery.

HIGH PRECISION GNSS MARKET AND SYSTEMS

GNSS Receiver Shipments
World Market, Forecast: 2010 to 2016



GNSS Receiver Shipment Revenue
World Market, Forecast: 2010 to 2016

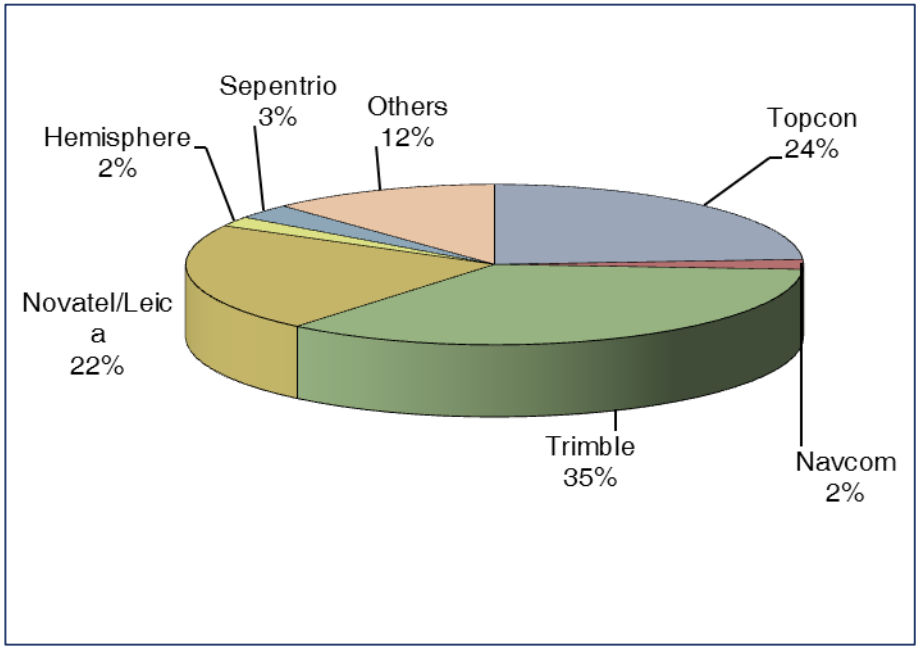


- Overall, the market is forecast to grow almost 100% , with general economic conditions the only major barrier to growth.
- Markets such as agriculture, construction, aviation, mapping, and military are all forecast to grow strongly, creating new opportunities.
- Receiver design is shifting towards flexible small, low powered receivers, enabling integration into a variety of small portable devices such as handhelds and rugged laptops.
- ASPs are not expected to decrease significantly despite the threat from new manufacturers as well as consumer GPS IC companies.

Source: ABI Research

HIGH PRECISION GNSS MARKETS AND SYSTEMS

Construction Precision GNSS Market Share, 2010



Following a series of acquisitions over the last five years, the market has stabilized. New entrants from emerging markets, such as CHC, will bring long term competition and may look to acquire in the future.

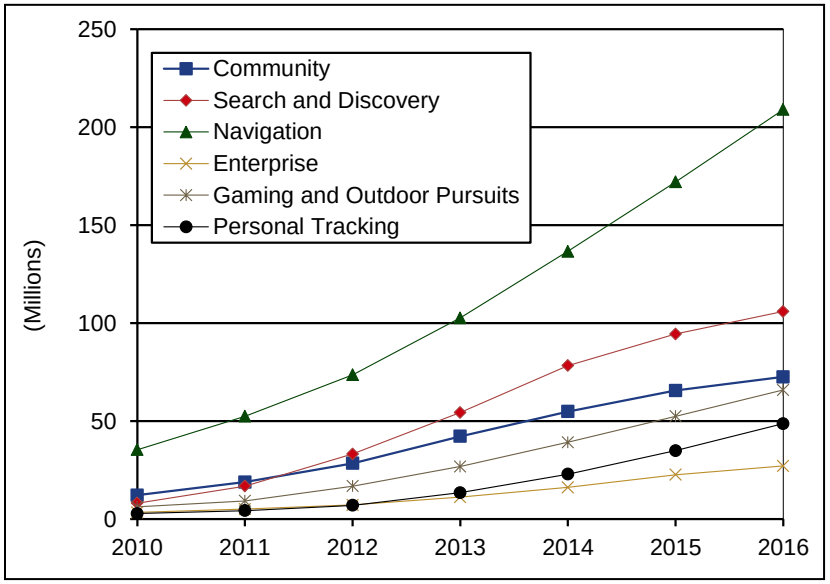
Consumer GPS IC vendors are expected to support the L2C and L5 signals. These companies will penetrate the precision market, but are unlikely to represent a significant threat.

ABI Research believes that market shares will shift in each vertical market as growth brings opportunity to innovative companies.

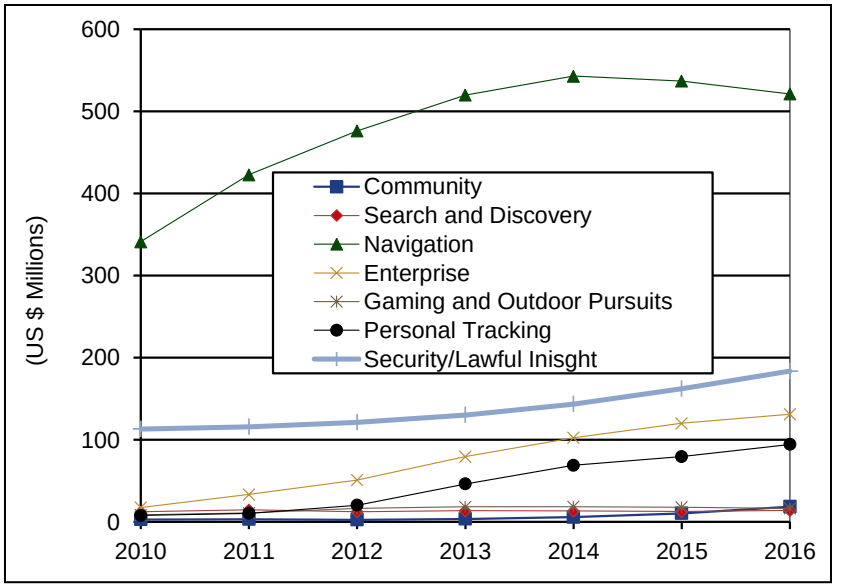
Source: ABI Research

LBS PLATFORMS MARKET

On-deck LBS Subscribers by Application, World Market, Forecast: 2010 to 2016



On-deck LBS Platform Revenue by Application, World Market, Forecast: 2010 to 2016



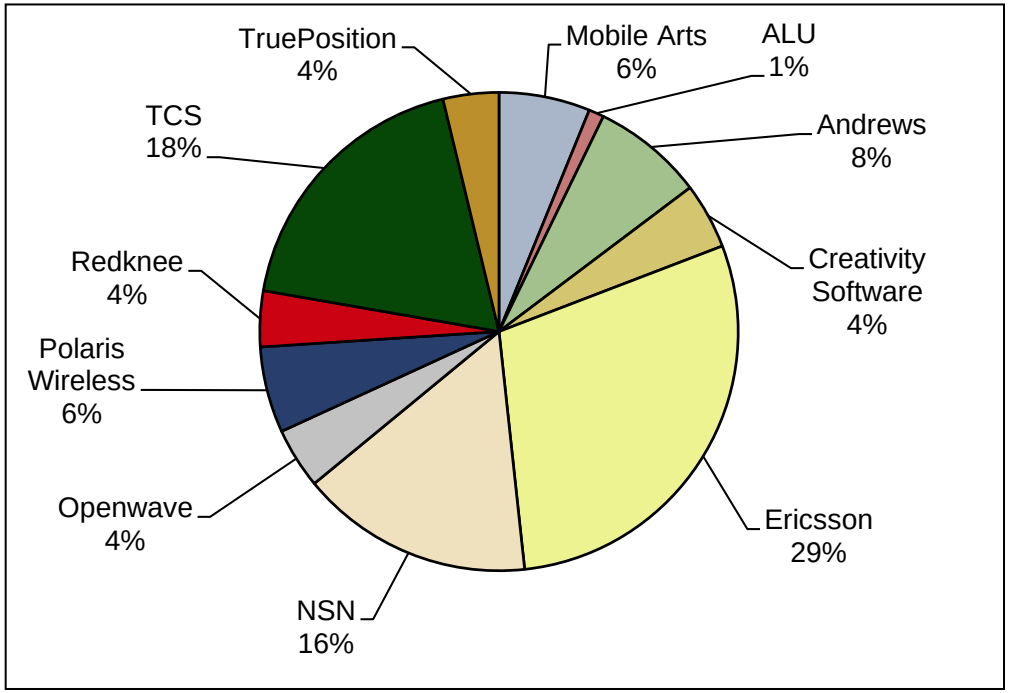
- The total market is forecast to reach $1 billion by 2016. The slow uptake of LBS services by carriers outside of North America has significantly impacted projected growth for the industry.
- Navigation will remain the dominant source of revenue, with strong growth expected in Latin America and Asia. The enterprise and personal tracking markets are also expected to show significant growth as carriers leverage their existing network-based location technologies to drive new revenue.
- Security and lawful intercept is emerging as an important market in regions where an E911 mandate is not in place, yet governments/blue light organizations want to pull location information.
- To continue to grow the business LBS platform, providers cannot rely on mandates in other regions in the short to medium term and must move up the value chain and begin developing their own applications.

Total spend in the LBS market in Taiwan to rise to $28.9 million in 2014

Source: ABI Research

LBS : Traffic Information Systems

MLC Deployments, Market Share by Vendor, World Market, Forecasts: 2009



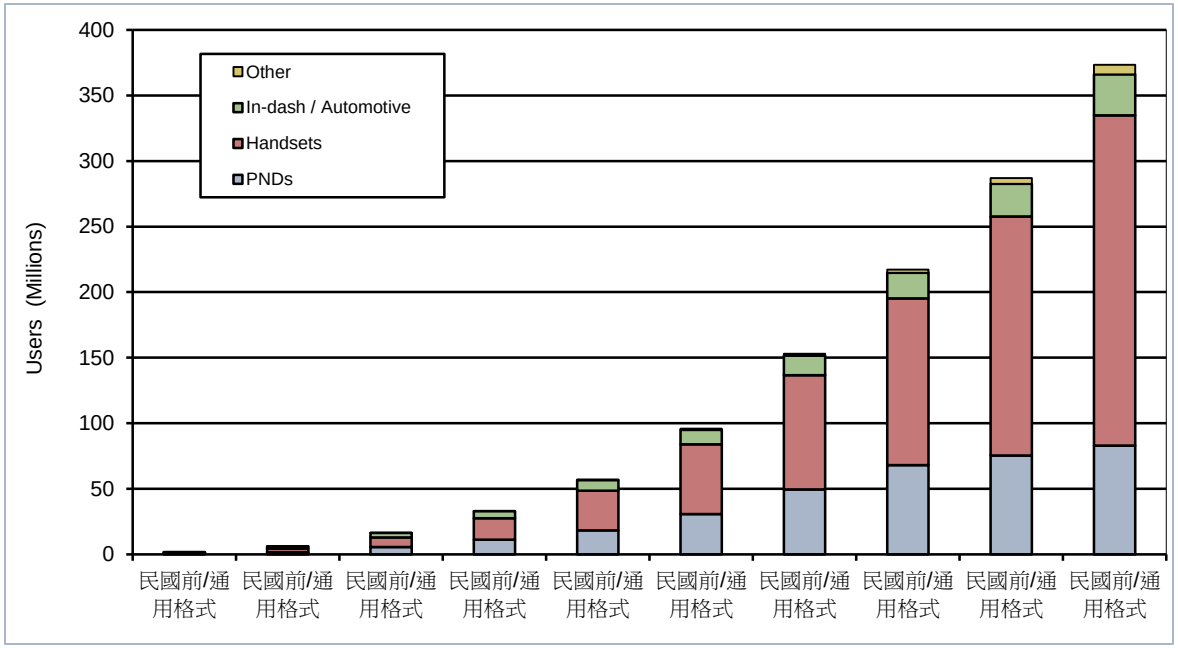
From commercial deployment data collected by ABI Research, the most important vendors globally in terms of total deployments are Ericsson, TCS (TeleCommunication Systems), and Nokia Siemens Networks (NSN). With the emergence of new opportunities in Eastern Europe, Africa, Asia, and South America, new players have emerged such as Mobile Arts and Creativity Software.

LBS platform vendors will need to adapt their existing business models to see success in these new regions where carriers have different needs.

Source: ABI Research

Traffic Users by Form Factor, World Market, Forecast: 2010 to 2015

Traffic Users by Form Factor, World Market, Forecast: 2010 to 2015



While handsets have become the leading form factor for traffic information, in-dash navigation will continue to represent the biggest revenue opportunity for traffic vendors. Despite saturating PND sales, traffic information is expected to become a standard feature by 2015. Other form factors such as tablets will see some uptake as they are well suited to display traffic maps.

Source: ABI Research

2017 ICT Vision In Taiwan：B.R.I.D.G.E




B.R.I.D.G.E. to 2017

Broadband	i-Region	Internet Everywhere	Digital LOHAS	Green ICT Services	E-readiness
(B4G+FTTH) 建設下一代寬頻基礎	(Smart City) 城市與區域發展智慧化	(IoT+Cloud) 無所不在的網路應用	(mHealth) 永續與健康的數位生活	(Energy) 節能環保的應用服務	(Education) 提升數位化教育與品質

Source：ITRI IEK/ III Find (2011/12)