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Changes in Samsung's Patent Strategy



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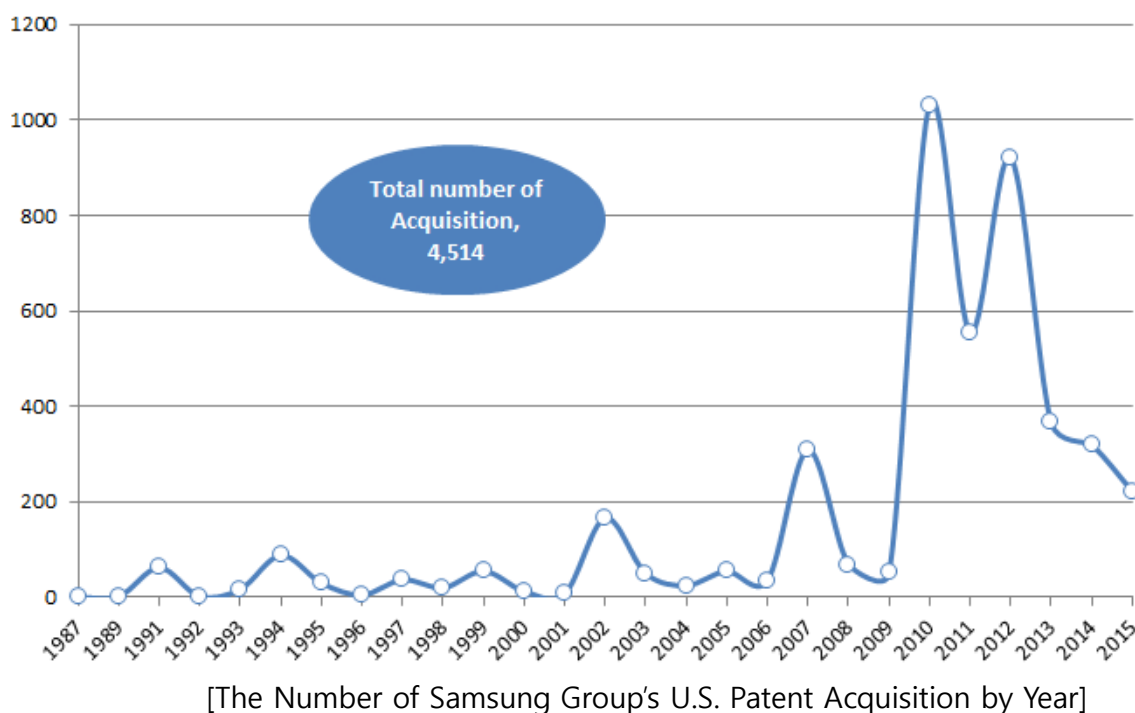
1. Analysis Background and Method

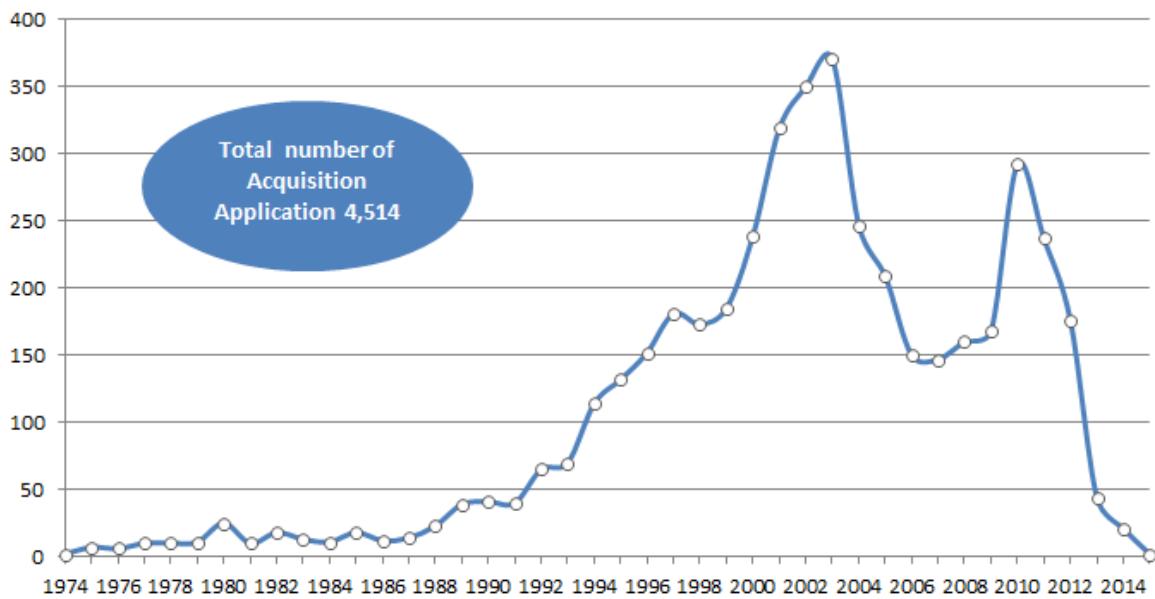
- ☐ There have been many aggressive M&A activities among Google, Facebook, Amazon, Apple, MS, and IBM in the recent years.
 - The main purpose of M&A is a business expansion through acquisition of technical skills and its rights.
 - Google has been taking over around 170 companies including YouTube and Motorola for the past 10 years, dominating 80% of mobile OS market by taking over Android, the mobile OS company, and obtaining 11% of their sales with YouTube sales after taking over YouTube.
- ☐ Due to the strong will of ownership by tradition, M&A is not as aggressive in Korea, but the record indicates a recent increase of M&A activity among major companies such as Samsung Electronics, Naver, Daum Communications, and SK Telecom.
 - Naver turned itself into a large portal in 2000 through M&A with Hangame, an online game service company, and in 2012, SK Telecom took over Hynix, the world's second ranking semiconductor company, reaching a turnaround in just 1 year.
 - The company that shows the most aggressive M&A activity is Samsung; the company has carried out various M&As related to semiconductors, health cares, and smart content services since 2007 to 2014, and is recently accelerating into M&A with foreign companies as well.
- ☐ For this technology trend, we will look into Korea's representative company, Samsung Group, and the changes in their patent strategy by examining their current patent acquisition status in U.S.
 - WIPS Global was used for the search DB, and the analysis was carried out by sorting out U.S patents whose final assignee is Samsung.

- Because there are many patents whose applicant names are recorded with the name of an inventor instead of a company due to the time when "first-to-invent" system was applied in U.S., the document goes through the process such as organizing applicant names by matching their priority rights and legal status.
- Based on Samsung's patent acquisitions, we examined their application trend, technology field, and patent assigners. Other than acquisition information, we also examined Samsung's M&A history to look into possible changes in their patent strategy.

2. Current Status of Samsung Group's U.S. Patent Acquisition

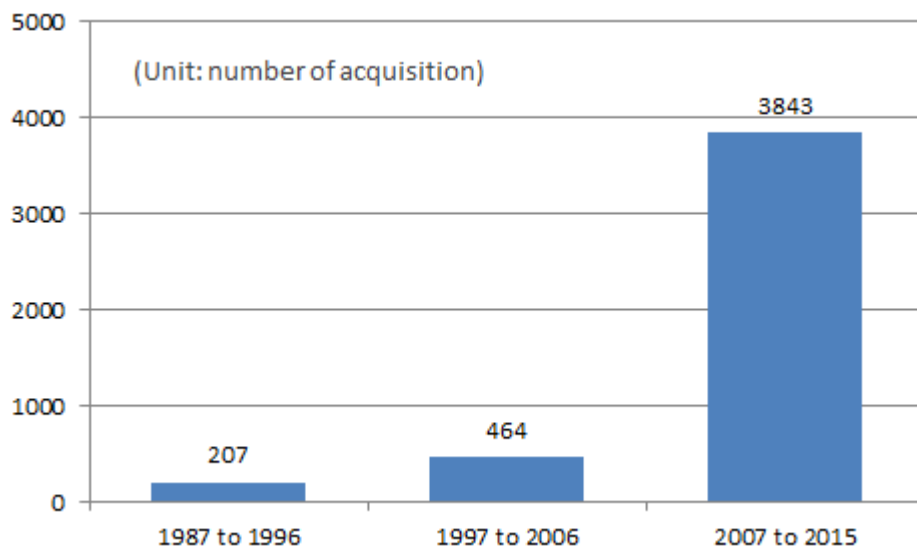
- The total number of Samsung's acquisition of U.S. patents was 4,514. The full-scale acquisitions were put into action beginning in the late 2000 and showed explosive increase in number after 2010.
 - Samsung only acquired annual average of 52 patents by 2009, but after 2010, they acquired annual average of 569, which is 100 times more in number, particularly showing a significant number of acquisitions between 2010 and 2012.
 - Among these, 3,132 cases were the acquisitions proceeded in the late 2000, which hold 69% of the entire patent. We also see that it shows a decline for the recent three years due to the time that is required for processing patent acquisitions from registration, acquisition, and to other administrative procedures.





[Samsung Group's U.S. Patent Acquisition Application Status by Year]

- Periods of acquisition were divided into three sections to examine the changes in Samsung's acquisition activities.
 - 207 patents were acquired during 1st period (1987~1996), 464 patents in 2nd period (1997~2006), a twofold increase, and 3,843 patents during 3rd period (2007~2015), 8.3 times more than the 2nd.

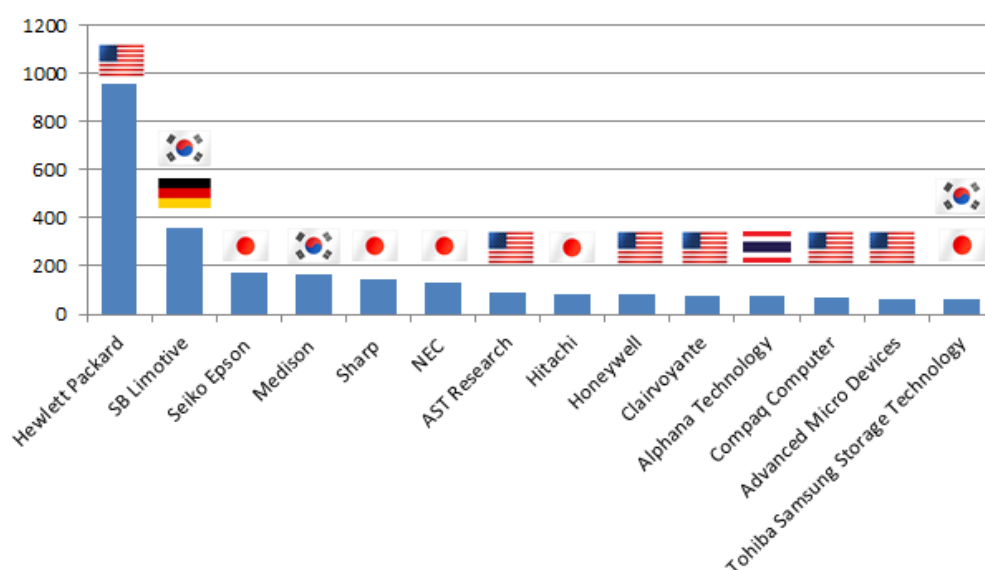


[Patent Acquisition Status by Periods]

- Looking into major applicants of patent acquisitions, Hewlett Packard, the company that established a joint-stock company with Samsung, took up 21%

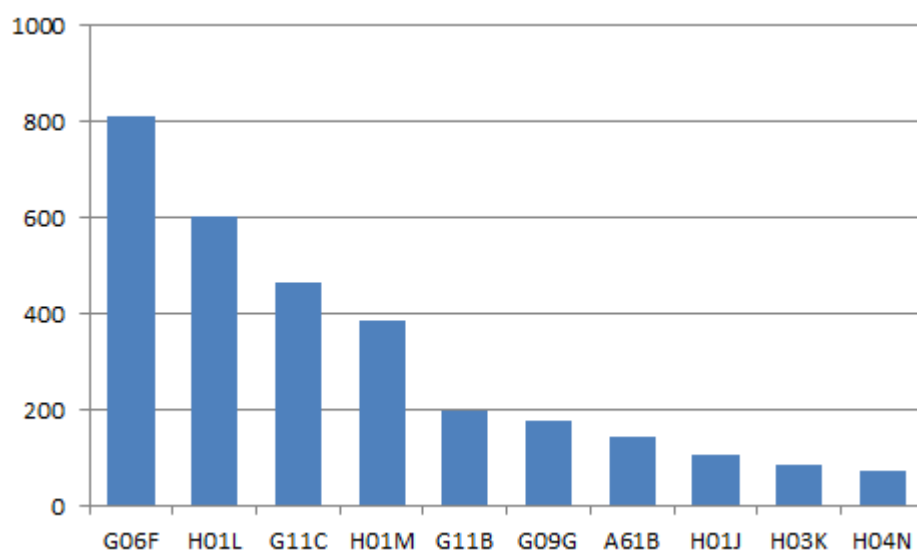
of the entire acquisition with 960 patents, followed by SB LiMotive (357 patents), Seiko Epson (172 patents), Medison (163 patents), and Sharp (143 patents).

- SB LiMotive is a joint-stock company established by Samsung SDI and BOSCH, which professionally develops and manufactures Lithium-ion batteries for electric cars. Medison is a venture company that develops and manufactures diagnostic ultrasound systems; it was established as a venture company in 1985 and taken over by Samsung in 2010.



[Major Applicants of Acquired Patents]

- The major technology field (IPC) of acquired patents were ELECTRICAL DIGITAL DATA PROCESSING (G06F), SEMICONDUCTOR DEVICES (H01L), STATIC STORES (G11C), and BATTERIES (H01M)
 - ELECTRICAL DIGITAL DATA PROCESSING take up 18% and SEMICONDUCTOR DEVICES take up 13% of the entire patent.

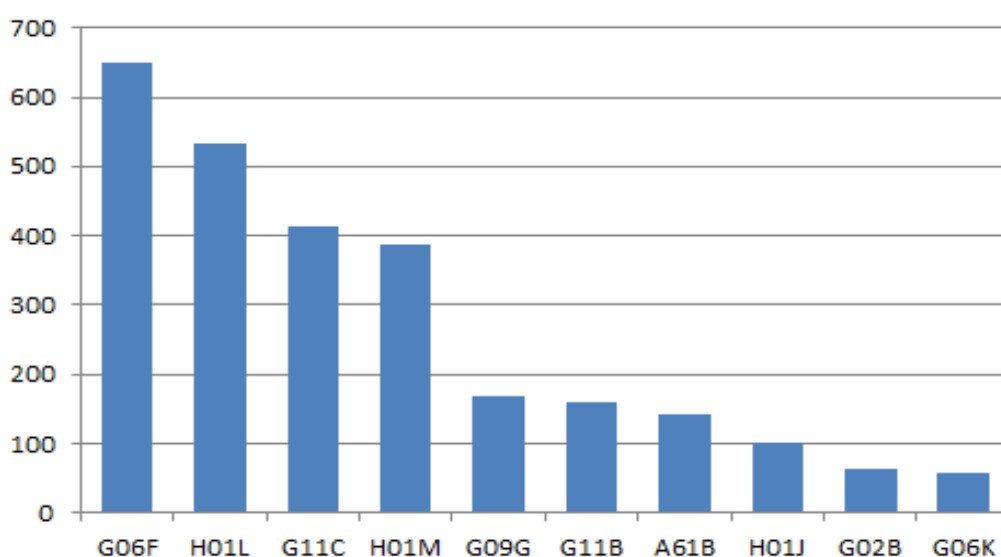


[Major Technology Field (IPC) of Samsung's Patent Acquisitions]

IPC	IPC Description	Number of Acq.	%
G06F	ELECTRICAL DIGITAL DATA PROCESSING	811	18%
H01L	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR	603	13%
G11C	STATIC STORES (information storage based on relative movement between record carrier and transducer, semiconductor devices for storage)	467	10%
H01M	PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTRICAL ENERGY	388	9%
G11B	INFORMATION STORAGE BASED ON RELATIVE MOVEMENT BETWEEN RECORD CARRIER AND TRANSDUCER	199	4%
G09G	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRESENT VARIABLE INFORMATION	177	4%
A61B	DIAGNOSIS; SURGERY; IDENTIFICATION (analysing biological material)	145	3%
H01J	ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS	107	2%
H03K	PULSE TECHNIQUE	87	2%
H04N	PICTORIAL COMMUNICATION, e.g. TELEVISION	72	2%

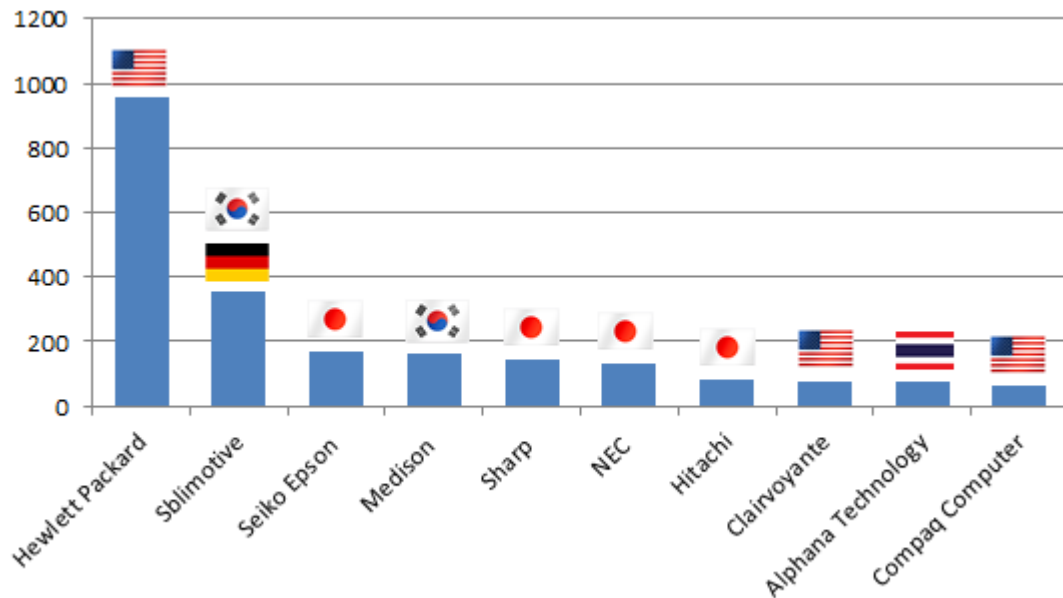
- ☐ Fields of technology were divided into three sections to examine the changes in Samsung's acquisition activities

- Up until 1st period (1987~1996) and 2nd period (1997~2006), majority of acquisitions were related to the field of ELECTRICAL DIGITAL DATA PROCESSING (G06F), INFORMATION STORAGE (G11B), STATIC STORES (G11C), and PULSE TECHNIQUE (H03K).
- During 3rd period (2007~2015), the number of acquisitions related to the field of SEMICONDUCTOR DEVICES increased 24 times, with 532 cases, along with technologies related to BATTERIES (H01M), DIAGNOSIS; SURGERY; IDENTIFICATION (A61B), and OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS (G02B).
- ✓ Samsung's DIAGNOSIS; SURGERY; IDENTIFICATION (A61B) related patents were all acquired from Medison company; the company occupies 33% of domestic and 7% of world's medical equipment market on the technical strength of developing world's first three-dimensional ultrasound machine.
- ✓ Samsung acquired 40.49%, the entire share of Medison's major shareholder, Consus Asset Management, in 2010, and this served as a momentum for Samsung to seriously get involved in healthcare business.



[Major Technology Field (IPC) of Acquired Patents during the 3rd Period (2007~2015)]

- The major applicants of the 3rd period which showed the highest number of acquisitions were in the order of Hewlett Packard, SB LiMotive, Seiko Epson, and Medison; it is especially characterized with the active acquisition of Japanese companies such as Seiko Epson, Sharp, NEC, and Hitachi.



[Major Applicants of Acquired Patents during the 3rd Period (2007~2015)]

3. Current M&A Status of Samsung Group

- Growing as a global company, Samsung has gone through many M&As, but their scale and direction have been changing according to the company's management policy or technical needs.
- During 1960~1980, Samsung desired to strengthen their basis for the business by establishing joint-stock companies with foreign companies and proceeding M&As with domestic companies or to stand in the equal place with competing companies.
 - Pursuing for advanced technologies, Samsung actively promoted joint investments with Japanese companies that possess cutting-edge technologies.
 - ✓ To stand against Goldstar, the company that was dominating the electronics market, Samsung established joint-stock company with a Japanese company, Sanyo, which provided Samsung with patents, technical resource, manufacturing facilities, resources, raw materials, technology information, and know-hows; The following year, Samsung established a joint-stock company with NEC Corporation, setting up Samsung SDI Company and start producing cathode-ray tubes.
- From 1990, as a strategy for becoming a global company, Samsung began aggressive M&A activities targeting overseas companies in U.S./Europe/Japan.
 - Companies acquired during this period include German cathode-ray tube company, FG; U.S. compound semiconductor manufacturing company, HMS; electronic communication service company, DMS; asynchronous circuit chipset design company, IGT; Japanese audio industry, LUX; German advanced camera equipment company, Rollei optical, and etc.
- In 1995, Samsung failed to produce business results after taking over AST and kept out of action for a while, but with the announcement of their 5 new business plans and 20 trillion-won investment plans, their M&A activity regained its aggression.

- After 2010, Samsung invested 1 trillion won for the M&A of Medical Equipment Companies like Medison and NeuroLogica, which was followed by Samsung SDS's acquisition of overseas companies to secure the software capacity and to launch fourth party logistics (4PL) business.
 - The company also established Global Innovation Center (GIC) and Samsung Strategy and Innovation Center (SSIC) in Silicon Valley, U.S. and began pursuing for future technology research and development as well as the acquisition of startup companies; recently, GIC discovered IoT companies, SmartThings and LoopPay, and took the lead in investments.
- Especially, as Lee Jae-Yong, the vice president of Samsung Electronics, stepped out at the forefront of overall business management in 2015, the company enforced more aggressive M&A activities, resulting in the M&A of 11 companies (8 by Samsung Electronics) in 1.5 years from 2014.

<Samsung's M&A status after 2007>

Company	Country	Year	M&A purpose, acquisition scale, and expected effectiveness
TransChip	Israel	2007.01	Strengthen the competitiveness of Non-Memory Chip (CIS) Took over an Israeli non-memory chip developer
Amica	Poland	2009.12	Secure European Appliances Manufacturing Supplies Acquisition of Poland Appliances Manufacturing Company
Ray	South Korea	2010.02	Secure X-Ray technology Acquisition of dental CT company
Nexus	U.S.	2011.11	Strengthen Healthcare Field Acquisition of 100% stake in U.S. heart disease diagnosis solution company
Medison	South Korea	2011.04	Strengthen Medical Equipment Business Hold 43.5% stake in Medison and 100% stake in Prosonic

Grandis	U.S.	2011.07	Acquisition of 100% stake in next-generation semiconductor MRAM R&D development company
Nvelo	U.S.	2012.12	Strengthen the competitiveness of Solid State Drive (SSD) Solution Acquire 100% stake in U.S. SSD software company
mSpot	U.S.	2012.05	Strengthen mobile entertainment services Acquisition of U.S. Cloud Content Services company
Nanoradio	Sweden	2012.06	Possess wireless connectivity technology for feature phones. Acquisition of Sweden's wireless LAN chip company
CSR (Cambridge Silicon Radio)	UK	2012.07	Secure mobile Wi-Fi connectivity technology Acquisition of UK CSR company's mobile sector
ASML	Netherlands	2012.08	Development of next- generation semiconductor R&D investment in Netherlands semiconductor equipment manufacturer
Neurologica	U.S.	2013.01	Early on security of competitiveness in medical equipment business Acquisition of U.S. portable CT device specialist company
Wacom	Japan	2013.01	On strengthening cooperation level with the touch pen solution company Investment of 5% stake
Sharp	Japan	2013.03	secure stable LCD panel-supply base and components and diversifying supply sources Acquisition of 3% stake in Sharp's newly issued stock
MOVL	U.S.	2013.04	Strengthen multiscreen ecosystem Acquisition of U.S. multiscreen platform company
Pantech	South	2013.06	Protect major subcontractors for the field of

	Korea		parts. Secure key sources Hold 10.03% stake
BOXEE	U.S.	2013.07	Strengthen smart contents Acquisition of human resources of U.S. video streaming services company
Novaled	Germany	2013.09	Hold numerous core OLED charging layer material technologies and patents Equity investment of Germany-based materials specialist
SELBY	U.S.	2014.05	Strengthen the competitiveness of App services. Acquisition of human resources of U.S. app services development company
SmartThings	U.S.	2014.08	Strengthen the competitiveness in the Internet of Things (IoT) field. Acquisition of U.S. open source IoT platform company
Quietside	U.S.	2014.08	Target North American HVAC products market and promote new businesses like smart home. US HVAC Products distribution businesses such as air conditioning system
PrinterOn	Canada	2014.09	Canada Mobile Cloud Solution
Proxymal Data	U.S.	2014.10	Server Solid State Drives (SSD)
Cimpress	Brazil	2015.01	Brazil Output management system
LoopPay	U.S.	2015.02	US Mobile payments
YESCO Electronics	U.S.	2015.03	US Industrial display

Resource: 「Yonhap News」, Samsung Electronics, makes a winning move through M&A Acquiring 10 companies since last year, 2014.08

「Hanguk Ilbo」, Lee, Jae-Yong's Samsung, M&A New Strategy is 'B2B2C', 2015.03

4. Summary

- The total number of patents Samsung acquired from U.S. is 4,514 cases, acquiring annual average of 52 patents until 2009 and 569 patents from late 2000, showing aggressive patent acquisition activities.
 - Among acquired patents, there were total number of 3,312 patents from late 2000, which amounts to 69% of the entire patents.
 - The periods of application were divided into three sections to examine the changes in technical developments, and the period from 2007~2015 showed 8.3 times more activities, with 3,843 cases, than the preceding periods.
- The major applicants for patent acquisitions were Hewlett Packard, SB LiMotive, Seiko Epson, Medison, and Sharp, which most of them were acquired after 2007.
 - Acquired HP patents appear to have resulted from the establishment of a joint-stock company with Samsung, and SB LiMotive, a joint-stock company between SDI and BOSCH, is a company that develops and manufactures lithium-ion battery for electric cars.
 - Medison company is a manufacturer of diagnostic ultrasound systems that was established as a venture company in 1985; and as Samsung takes over 40.49% stake in Medison's major shareholder, Consus Asset Management, it served as a momentum for Samsung to seriously get involved in healthcare business.
 - Other than that, it is especially characterized with the active acquisition of Japanese companies such as Seiko Epson, Sharp, NEC, and Hitachi.
- The application status examined through IPC by technical fields is shown in order of ELECTRICAL DIGITAL DATA PROCESSING (G06F), SEMICONDUCTOR DEVICES (H01L), STATIC STORES (G11C), and BATTERIES (H01M)

- ELECTRICAL DIGITAL DATA PROCESSING take up 18% and SEMICONDUCTOR DEVICES take up 13% of the entire patent.
 - The application status examined through IPC by technical fields after 2007, which records the highest number of acquisitions, shows that the number of acquisitions related to the field of SEMICONDUCTOR DEVICES increased 24 times, with 532 cases, along with active acquisitions in technologies related to BATTERIES (H01M), DIAGNOSIS; SURGERY; IDENTIFICATION (A61B), and OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS (G02B).
- Samsung mostly strengthened existing business capacity in the form of joint-stock companies or by pursuing new business fields; Unlike Google, Apple, or other major IT companies, Samsung appears to have been producing tangible outcomes through the acquisition of small businesses rather than big deals.
- In the early stages of M&A, the company pursued to strengthen their basis through the M&A of domestic companies and the establishment of joint-stock companies with Japan and other overseas companies, or chase after advanced technologies to stand in the equal position with competitors.
 - Recently, Samsung began the acquisition of small companies such as startup companies and small future technology R&D industries, holding a prominent position in the prior occupation of IoT and mobile payment platform market by securing specific technology rights through M&A on the basis of their technical skills.