

Patent Landscape Analysis



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EXECUTIVE SUMMARY

Cashless Payment will soon redefine the way people pay. The payment methods have evolved from a simple barter system to monetary exchange through magnetic stripe enabled credit & debit cards and further to digital wallets and online payment systems. The big feature of this evolution is the advancement of security methodologies and smart algorithms and the emergence of new hardware technologies. The next step forward is to have all payment methods in one single entity that is easily portable with total elimination of hard cash transactions. It is here that cashless contactless payment comes in the façade which require only a mobile phone to pay. But it also comes with some specific challenges like securing and encrypting the user data on the mobile phone, developing new types of payment terminals, establishing secure means of information exchange between the mobile and the payment terminal, etc.

In this report, we study the technological landscape of this fast growing technology from the perspective of Intellectual Property (Patents). We find that the majority of patenting activity has occurred in technologies related to 'Payment Architecture' and 'Access Security'. We also find that the patent distribution in this domain is fragmented with top patent filer, Mastercard, holding around 2.3% of the total patents. MasterCard is followed by Visa and Google with a significant number of patents in their portfolio. The US geography has seen the maximum patent filings and is closely followed by the big markets of Canada, China, Australia and Japan.

Using our proprietary patent analytics tool, LexScore™, we identify Visa as the leader in this technology domain with good patent portfolio quality as well as a good patent filing activity. III HOLDINGS 1 LLC also holds a large number of patents in this domain. Given the patent holding pattern and a high patent filing activity, we expect to see significant patent licensing activity in this technology domain. Using our proprietary Licensing Heat-map framework, we predict significant patent licensing activity in the 'Sensing Systems' technology segment.

In the following paragraph, we present our analysis of the Patent Landscape of this technology domain.

INTRODUCTION

With the advent of Smartphones, death of certain everyday commodities became inevitable. The alarm clocks, tape recorders, music players, all had their purpose challenged by smartphones. The time is not very distant when hard cash transactions will face extinction with the rise of cashless payment technologies. In developed economies, money has been digitizing for decades. Few in the West gets a 'paycheck' anymore, it's digitized payments. New technologies, including digital wallets, crypto currencies, and mobile peer-to-peer payments are fuelling this change. They're accelerating the drift from cash equally in both developing economies and developed economies where alternatives to banks and credit cards are well established. Which technologies and companies are likely to lead this transformation is one of the big questions this report would try to answer. A cashless payment require a smartphone that stores various card users, an interface between the smartphone and the payment terminal, the payment terminal and the banks, and the bank and the smartphone. The last two steps of the cashless payment process are same as the existing debit card and credit card payments. The challenge and opportunity of innovation lies in the first two steps that enable a smartphone to be a digital wallet. For example: Securing phone to store card information, technologies for secure wireless transmission of card data to the payment terminal and likewise. Even though the technology seems realistic, there are several factors that could derail this boom. Security concerns being the most important of them. Consulting firm Accenture recently surveyed 4,000 consumers in North America and found that while more people expect to use mobile payments, 57% of respondents were concerned about the security of such transactions. That's up from 45% two years ago¹. The security aspect of cashless payments is another aspect we concentrate on, in this report.

Many of the new cashless payment technologies are designed on top of presently established systems, making them faster, secure and easier to use. Mobile wallets Apple Pay and LoopPay, run on top of the existing payment networks owned and operated by banks and credit card companies. While a different group of technologies are designed to replace the established systems, fundamentally challenging the huge industry that process and handle payments. Ventures like Venmo, a person-to-person payment app and social network that processes \$3 billion of payments a year, and Dwolla that cuts the payment-processing revenue enjoyed by Visa and other networks are great examples of this type of technologies.

The concept of using a card for purchases was described in 1887 by Edward Bellamy in his utopian novel, *Looking Backward*.

Card payments increased by 17.8 billion, while non-card payments decreased by 3.1 billion, leading to a net increase in non-cash payments of 14.7 billion, between 2009 and 2012.

¹ "How Consumer Choice Will Shape the Future of Payments." Accenture. <<http://www.accenture.com/SiteCollectionDocuments/accenture-2014-north-america-consumer-payments-survey.pdf>>.

Boston Consulting Group predicts that the payments industry revenues could grow to more than \$2 trillion a year by 2023. Twice of what it was in the year 2013². A good share of this is fuelled by the smartphone revolution and e-commerce boom in developing countries. With such revenue explosion, it's only natural to expect the arrival of more disrupting technologies in this domain.

By all accounts, it's going to take years for mobile payment to catch on widely. But that doesn't make it any less inevitable. And, whoever is going to win this game, a preemptive IP strategy coupled with flawless implementation is going to hold the key.

The cashless payment sector is growing at a very steep rate. Many technology companies are coming up with innovative and simple means to make payment. Existing market players are trying to hold their competent position by acquiring new firms. Intuit, a software company providing financial software to other small and medium firms has acquired *Check* for \$360 million, registering the biggest mobile payment acquisition of 2014³. First Data has entered the \$100 billion gift card market by acquiring Gyft, which introduced the concept of mobile wallet in gift card market⁴. *Softcard*, a company born out of collaboration between AT&T, Verizon and T-mobile, is Google's prime target for resurrectoring its mobile payment⁵ services.

In this report, we have analyzed the cashless payment technology domain from intellectual property perspective. The payment sector is witnessing a transition from cash transactions to cashless payments. The transition is driven by the growth of the cashless payment infrastructure. The report links the improvement of the cashless payment sector with the underlying patent filing. The competition in this sector is immense with many well established companies entering the market. A comparative analysis of the top 15 assignees (patent filing wise) has been presented in this report. Some of the extremely critical sub-domains have also been identified which have recorded maximum participation of companies.

Google aims to resurrect mobile payments with *Softcard* purchase.

In the United Kingdom, about 17.8 billion transactions were reported from the cashless payment segment, making the UK Europe's leading member state in terms of cashless payment transactions.

² "Global Payments 2014: Capturing the Next Level of Value." www.bcgperspectives.com. Boston Consulting Group.

<https://www.bcgperspectives.com/content/articles/financial_institutions_pricing_global_payments_2014_capturing_next_level_value/>.

³ BENDER, HANNAH. "Mergers and Acquisitions in Payments Sector Boom in 2014." PropertyCasualty360.

<<http://www.propertycasualty360.com/2015/01/23/mergers-and-acquisitions-in-payments-sector-boom-i->>.

⁴ "First Data Announces Agreement to Acquire Gyft, the Leading Digital Platform That Enables Consumers to Buy, Send, Manage and Redeem Gift Cards Using Mobile Devices" First Data. <http://www.firstdata.com/en_us/about-first-data/media/press-releases/07_30_14_2.html>.

⁵ BARR, ALISTAIR, GREG BENSINGER, and ROLFE WINKLER. "Google Is in Talks to Buy Mobile-Payments Service Softcard."

<<http://blogs.wsj.com/digits/2015/01/16/google-in-talks-to-acquire-mobile-payments-service-softcard/>>.

TAXONOMY

Cashless Payment is an emerging technology which utilizes credit cards and debit cards, key fobs, smartcards or other devices that use radio-frequency identification and various online payment systems such as e-wallets for making secure payments. Processing Units, Security Systems, Communication Systems and Hardware Units are essential in order to establish a cashless payment system. The categorization of patents/patent applications, related to cashless payments, was done on the basis of the underlying components to avail the cashless payment services and the application areas of the same. The set considered for the analysis comprised of 6494 patents/patent applications. The level1 categories are hardware, communication, processing, security and application. The broad level1 categories are further subdivided into level2 and level3 sub-categories.

Please refer to Appendix for detailed definitions of the various Level3 categories.

In the Processing Category, the following two sub-categories are of interest: 'Data Processing' and 'Resource Management'. There are 572 patents/patent applications in 'Data Processing' ('General Purpose Processors', 'Specialized Processors'), and 158 in 'Resource Management' ('Memory and Data Management', 'Traffic and Power Management').

In the Hardware Category, the following four sub-categories are of interest: 'Data Handling', 'Currency Handling Equipment', 'Alerting Systems', and 'Control Systems'. There are 1087 patents/patent applications in 'Data Handling' ('Record Carriers', 'Sensing Systems', 'Interface'), 2272 in 'Currency Handling Equipment' ('Payment Architecture', 'Coin-freed Systems', 'Coin-Actuated Systems'), 368 in 'Alerting Systems' ('Cash Registers', 'Alarming Means'), and 606 in 'Control Systems' ('Traffic Control Systems', 'Control Unit / Programme Control', 'Measuring/Testing Devices').

In the Communication Category, the following two sub-categories are of interest: 'Infrastructure' with 989 patents/patent applications ('Circuits or Systems', 'Transmission Systems') and 'Techniques' with 2098 patents/patent applications ('Encryption', 'Protocols and Topologies', 'Wired Communication', 'Wireless Communication').

In the Security Category, 'Cryptographic techniques' are of interest, with 2225 patents/patent applications ('Access Security/User Authorization', 'Interlocks', 'Data encoding').

In the Applications Category, 'Platforms' are of interest, with 2166

According to Google, 93% of consumers who used mobile to research and check out products, only 17 % of consumers actually purchase directly on their mobile phone. Common barriers include smaller screen size and inconvenience to type in all of the billing and shipping information. Google wants to fix this using Google Wallet.

patents/patent applications ('e-commerce', 'Finance', 'Administration/Management', 'e-banking', 'Others').

Level 1	Level 2	Level 3	Patents/Patent Applications
Processing	Data Processing	General Purpose Processors	297
		Specialized Processors	338
	Resource Management	Memory and Data Management	117
		Traffic and Power Management	43
Hardware	Data Handling	Record Carriers	561
		Sensing Systems	384
		Interface	254
	Currency Handling Equipment	Payment Architecture	1711
		Coin-freed Systems	1034
	Alerting Systems	Cash Registers	322
		Alarming Means	51
	Control Systems	Traffic Control Systems	246
		Control Unit / Programme Control	124
		Measuring/Testing Devices	267
Communication	Infrastructure	Circuits or Systems	541
		Transmission Systems	519
	Techniques	Encryption	731
		Protocols and Topologies	320
		Wired Communication	432
		Wireless Communication	1055
Security	Cryptographic techniques	Access Security/User Authorization	1432
		Interlocks	42
		Data encoding	930
Applications	Platform	e-commerce	1365
		Finance	686
		Administration/Management	547
		e-banking	293
		Others	151

Table 1: Taxonomy

'Payment architecture' and 'User authorization' are very important elements of a cashless payment system. These two components provide access to the user for performing a cashless transaction after successful verification of the user.

'E-commerce' platforms enable the users to buy products online. Cashless payment means enables the customers to pay for these purchased products and services online. It has gained wide acceptance in the e-commerce sector because it eliminates the hassle of paying the exact cash amount on the delivery of the products and increases sellers' confidence in buyers as the payment has been made earlier.

'Interlocks' and 'Traffic and Power Management' cover the least number of patents/patent applications among various technology levels. 'Interlocks' helps

On September 26, 2013 *Braintree* was acquired by PayPal, an eBay subsidiary, in a deal worth \$800 million.

in monitoring the operation of various gates at toll posts to prevent any unauthorized entry of vehicles. 'Traffic and Power Management' refers to the mechanisms that help in optimizing power usage and network traffic in a cashless payment system.

The highest value transaction in 2014 was Bain Capital, Advent International and ATP Private Equity partners' acquisition of Nets Holding A/S, a provider of payments, information and digital identity solutions, a deal totaling \$3.14 billion.

TOP ASSIGNEES

Figure 1 depicts the top assignees having patents/patent applications related to cashless payment technology. MasterCard, Visa and Google are the top three assignees with 150, 149 and 92 patents/patent applications respectively. The numbers of patents/patent applications owned by these top assignees are only a meager fraction of the total patents/patent applications filed in the domain (considered in the analysis). The patent/patent applications holding in this domain is immensely fragmented as the patents/patent applications are distributed among a large number of assignees, comprising big companies like eBay, Sony Corp, LG Electronics, Nokia, Samsung etc. The lack of any major player coupled with the interest shown by big firms implies that the domain is highly competitive and a lot of licensing, cross-licensing, mergers and acquisition can be expected in future.

Most of the companies filing patents/patent applications are practicing entities like Visa, MasterCard, Blaze mobile etc. But, III HOLDINGS 1 LLC owns 40 patents/patent applications, providing a hint of possible licensing activity in future.

The top assignees have actively filed patents/patent applications in sub-domains such as 'Interface', 'Transmission Systems', 'Wireless Communication', 'Traffic and Power Management', 'Alarming Means and Traffic Control Systems' while they seem to have shown indifference towards 'e-banking', 'Sensing Systems', 'Control Unit / Programme Control', 'Administration/Management', 'Measuring/Testing Devices' and 'Interlocks'.

MasterCard expects to deploy a mobile app that lets people scan barcodes, charge to their bank-card account, present an electronic receipt proving their payment, and—in the ideal case—avoid waiting in a checkout line.

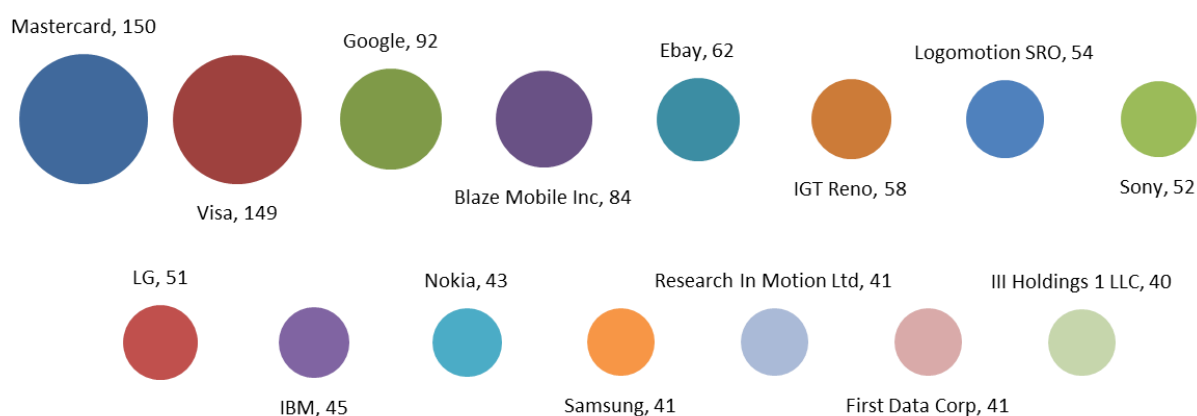


Figure 1: Top Assignees in Cashless Payment space

MasterCard, Visa, Google, Blaze Mobile, and eBay are among the assignees showing keen interest in this domain. A significant portion of their portfolio comprise of patents/patent applications that are filed in the past three years (2012-2014).

GEOGRAPHICAL COVERAGE

Figure 2 represents the geographical filing trend of patents/patent applications related to cashless payments. The United States has seen maximum number of patent filings in domain of Cashless Payment Systems. Canada, China and Australia have also seen good number of patent filings. The patent/patent applications filing trend is fairly distributed and covers most of the developed and developing nations. The targeted customer of companies offering cashless payment services primarily comprise of people in developed and developing countries, as they have higher spending capacity.

Promising to make your smartphone even smarter, Optus is the first Australian telecom to launch a mobile payments app known as 'Cash by Optus'

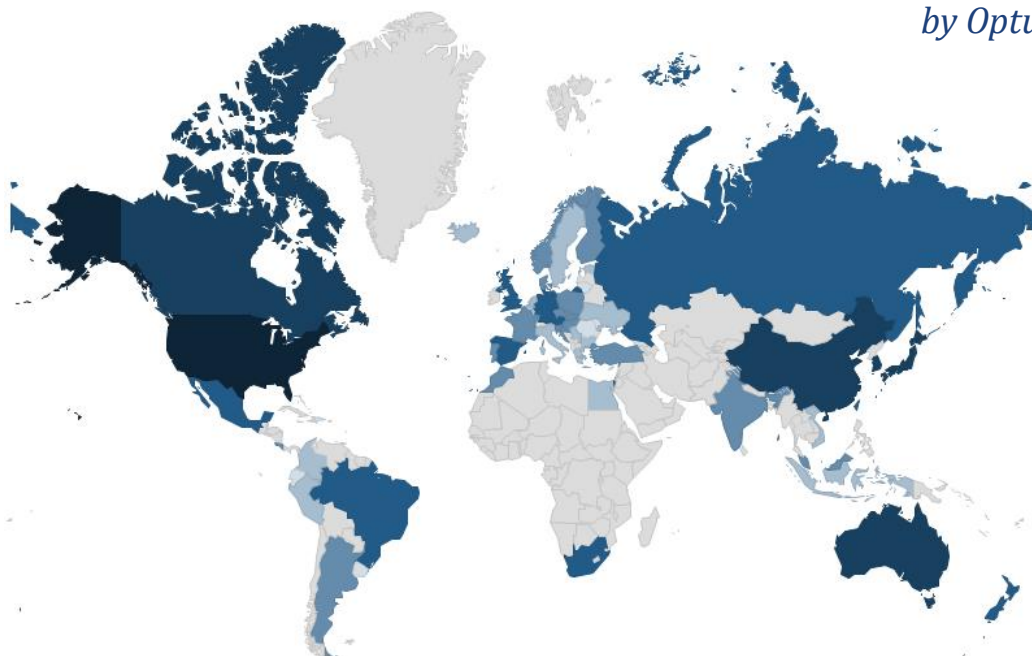


Figure 2: Geographical coverage of the patents/patent applications filed in Cashless Payment

Consumers are switching to cashless transactions owing to its simplicity. In South Korea, the government promoted cashless payment by providing tax incentives to the spending done through cashless means boosting customer acceptance of cashless payment. In Russia, the improvement in share of spending done through cashless means was driven by betterment of the payment infrastructure⁶.

In Countries like Belgium, France, Canada, the UK, Sweden, Australia and the Netherlands, the estimated value of consumer spent done through cashless means was more than 85%, which shows the good acceptance level of cashless

Shopping on credit and debit cards climbed to more than £0.5 trillion for the first time last year as consumers moved further away from cash.

⁶ "Top 10 Non-Cash Payments Markets." World Payments Report. <<https://www.worldpaymentsreport.com/Transactions-Volume-Top-10-Markets>>.

technology in these countries and well established infrastructure. The United States is not far behind these countries with 80% of consumer spending done through cashless means. Electronic payment is gaining government support in some countries like China, United Arab Emirates and South Korea as well. China registered the most rapid shift towards cashless payment between 2006 and 2011⁷.

Apple Pay gained a 1.7% market share within six weeks after its release.

⁷ "Cashless Volumes -The War on Cash Continues." *Payments Cards & Mobile*. <<http://www.paymentscardsandmobile.com/cashless-volumes-war-cash-continues-2/>>.

LexScore™

We use LexInnova's proprietary LexSore™ framework to identify leaders in the cashless payment domain, from the perspective of intellectual property. Figure 3 depicts the competitive positioning of top 15 assignees, in cashless payment domain. The assignees are compared on the basis of filing score and quality score. We use our proprietary algorithm (based on bibliographical information and claim characteristics of an invention) to calculate the quality of inventions.

The beige region comprises of assignees that have a big patent portfolio in terms of number of patents/patent applications but are lacking in patent quality. Our top 3 assignees i.e. MasterCard, Visa and Google lie in this region owing to mediocre quality of their patents, lacking severely in technology coverage and G/A ratio. MasterCard, Visa and Google have filed 43, 59 and 46 patent applications respectively in the last three years (i.e. 2012, 2013 and 2014), these applications are still in the prosecution phase and hence their grant to application ratio may not be very good at the moment. Once the prosecution of these patents are completed, these assignees may enter the green region. Blaze mobile the fourth assignee in terms of quantity of patents, lies on the beige – red region boundary with average patent portfolio in quality as well as in quantity terms. Blaze mobile has filed patents in the US only, hence its quality score will improve as it enhances its geographical distribution.

Surveying a dozen mobile payments companies, including PayPal and Visa, Forrester found that “the shift to mobile commerce was growing quickly.” Expectations are that the next five years “will be the tipping point bringing mobile payments into the mainstream.”

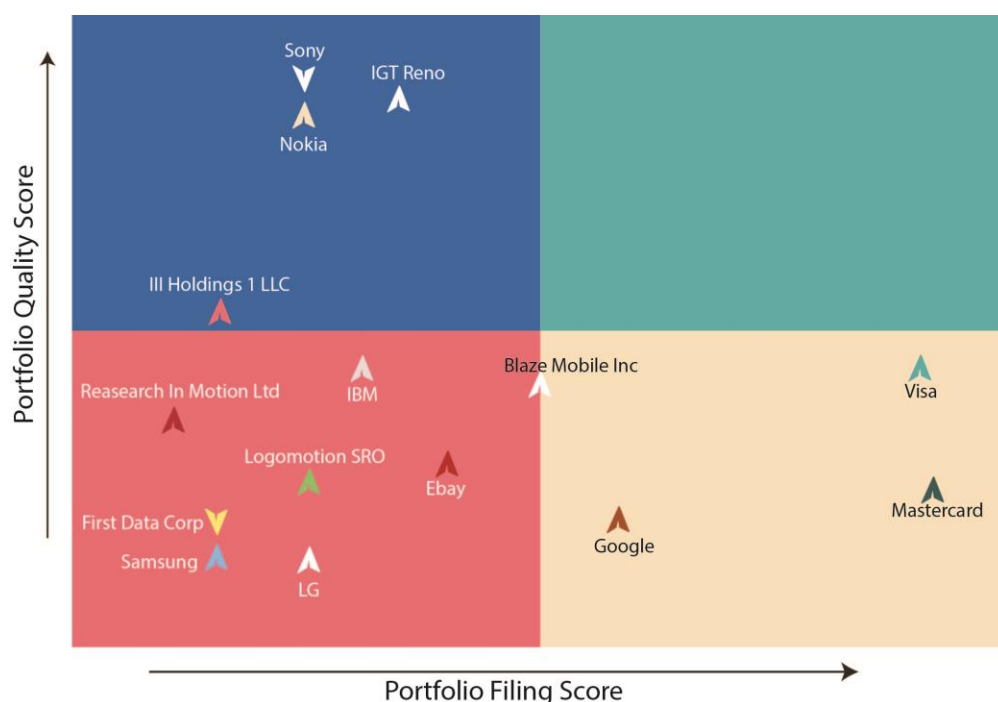


Figure 3: LexScore™

The blue region contains assignees that possess good quality patents but lack on the patent filing front. Sony, IGT Reno, Nokia and III Holdings 1 LLC lying in this region are promising companies in this domain but they lag due to their reduced patent filing in the previous five years and hence they lag on filing front.

Most of the assignees form a cluster in the red region with patent portfolio lacking on both patent quality and filing fronts. Samsung, Research in Motion, and eBay have filed most of their patents within past three years (2012-14), hence the patents quality of their patent portfolio may rise in future after successful prosecution of the patent.

Intellipay is the first cashless system to fully integrate with access control and social media RFID technology. By combining technologies, Intellitix enables a convenient, secure experience for the event goer that requires just a single RFID device such as a wristband.

LICENSING HEAT MAP

We use our Proprietary Licensing-Heat Map (Figure 4) framework to identify technology sub-domains in the field of cashless payment where licensing activity is expected to be higher. The size of the sections (representing different technology domains) in the Heat Map indicates the number of patents/patent applications filed in this domain which implies the relative importance of the technology sub-domain whereas the color here represents the chances of future licensing activity in this domain. We study the patent holding pattern to color code the technology sub-domain for future licensing activity.

Red color (and shades thereof) signifies a high chance of licensing activity in a certain technology sub-domain whereas the green color (and shades thereof) represents a low chance of licensing activity in the technology sub-domain. We follow 80-20 rule to decide the colors, yellow is assigned to the domains that lie on the average case (i.e. 20% assignees having 80% of the patents/patent applications). The color drifts towards shades of red if 20% assignees possess less than 80% of the patents/patent applications, while it drifts towards shades of green in the reverse case.

Visa is partnering with Samsung, whose phones will use NFC (near-field communication) to implement a tap-to-pay protocol that is compatible with many existing merchant terminals.

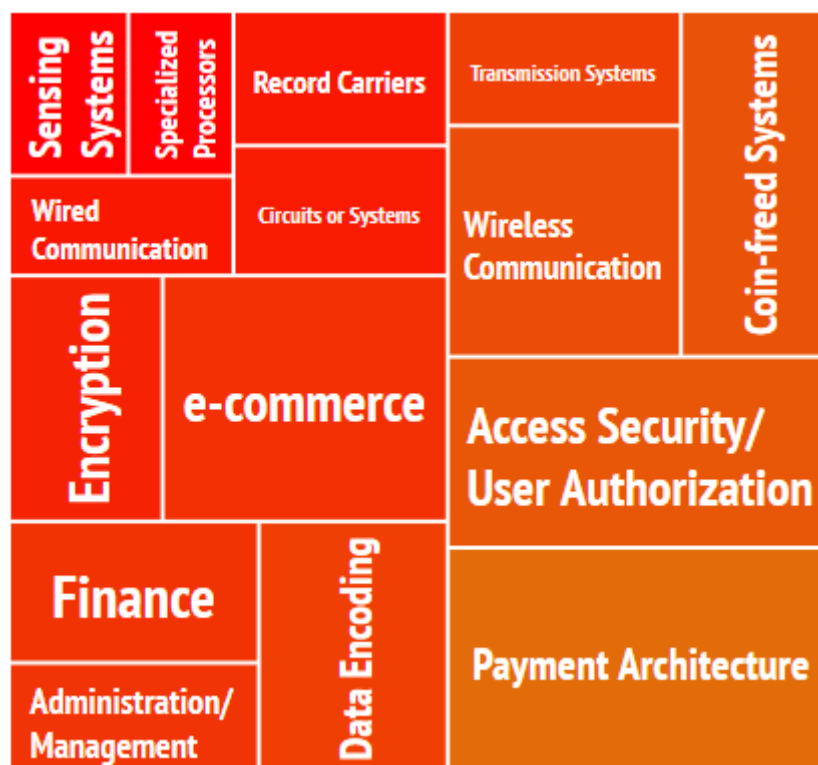


Figure 4: Licensing Heat Map

'Sensing systems' are a crucial hardware component that detect and identify the user's identity by sensing their record carriers such as their credit or debit cards etc. Visa, MasterCard, LG Electronics, Gemalto, III Holdings 1 LLC are some of the companies that hold patents/patent applications related to sensing systems. 'Specialized Processors' category covers dedicated processing units for performing separate computation, such as graphics or vector processing. Intertrust Tech Corp, IGT Reno Nev, Sony Corp are some prominent assignees in this domain.

'Payment architecture' provides a mechanism for electronic transaction between a bank and a user, including verification and authentication of entities involved. Logomotion SRO, Visa, MasterCard, Nokia Corp, IBM, eBay, Intertrust Tech Corp are the top assignees in this sub-domain.

Patent infringement cases have been filed against many practicing entities such as Visa, Amazon, Intuit, Apple, PayPal, Google, Samsung etc., which operate in this domain. Most of the plaintiffs are small or medium entities. All the sub-domains have witnessed litigation activity in the past justifying their appearance in the shades of red. The litigation activity is bound to increase in future, once cashless payment is widely accepted by the users and becomes primary mode of payment.

iKaaz partners DCB Bank to launch NFC-based tap & pay solution, which will allow customers to make cashless payments using iKaaz's mobile wallet.

APPENDIX

Level 3 Category	Definition
General Purpose Processors	The inventions belonging to this category cover a processor capable of performing many different functions under the direction of instructions.
Specialized Processors	The inventions belonging to this category cover dedicated processing units, each performing separate computation, namely graphics or vector processing.
Memory and Data Management	The inventions belonging to this category cover systems responsible for the management of data and system resources, such as memory.
Traffic and Power Management	The inventions belonging to this category cover a mechanism for optimizing the power usage and network traffic in cashless payment systems.
Record Carriers	The inventions belonging to this category cover a means such as card that is capable of holding information, which can be read by a sensing element by electrical contacting or non-contacting means.
Sensing Systems	The inventions belonging to this category cover crucial hardware components that detect the digital markings on user's record carriers and authenticate user's identity by sensing them.
Interface	The inventions belonging to this category cover components that exist between two components exchanging information related to payment transaction in a cashless payment system
Payment Architecture	The inventions belonging to this category cover a mechanism where an electronic payment transaction is performed between a bank and a user, which includes verification and authentication of entities involved.
Access Security/User Authorization	The inventions belonging to this category cover systems for authentication and verification of the user identity during an electronic payment transaction.
Protocols and Topologies	The inventions belonging to this category cover the arrangement of various elements of a network and the rules that are used to exchange data between computing devices.

Wired Communication	The inventions belonging to this category cover the communication systems that transmit data between devices over a wire-based communication technology.
Wireless Communication	The inventions belonging to this category cover the communication systems that transmit data between devices that are not connected by an electrical conductor.
Cash Registers	The inventions belonging to this category cover electrical and mechanical devices for registering and calculating cash transactions.
Alarming Means	The inventions belonging to this category cover systems that give an audible, visual or other form of alarm signal regarding an event of theft, burglary or some other problem.
Data encoding	The inventions belonging to this category cover conversion of information from a data source into symbols using publicly available schemes.
Encryption	The inventions belonging to this category cover mechanism which encodes information into suitable format such that only authorized party can access the information.
E-commerce	The inventions belonging to this category cover mechanism of selling or buying products or services over computer network such as the Internet.
E-banking	The inventions belonging to this category cover electronic payment systems that enable customers to perform financial transactions on any electronic medium such as a website or a mobile application.
Finance	The inventions belonging to this category cover methods that deal with the estimation of the price of assets based on the level of risk and the expected return.
Coin-freed Systems	The inventions belonging to this category cover systems that allow performing transactions with a point-on-sale device using a record carrier, which has all the required information stored in it to perform the transaction.
Coin-actuated Systems	The inventions belonging to this category cover devices that accept coins or paper cash in order to perform the transaction.
Control Unit / Program Control	The inventions belonging to this category cover a processing component that handles the instructions from a program such as fetch, add, subtract etc.
Administration/Management	The inventions belonging to this category cover functions that help in coordinating the efforts made by people in achieving certain goals and objectives.

Transmission Systems	The inventions belonging to this category cover systems comprising of radio transmitter and antenna system used for transmitting information wirelessly.
Circuits or Systems	The inventions belonging to this category cover systems composed of individual electronic components connected by conductive wires through which electric current can flow that allow simple and complex operations to be performed.
Interlocks	The inventions belonging to this category cover devices which are means for safeguarding that monitor the position of the guard or gate to prevent any vehicle from crossing without making the payment at tolls.
Measuring/Testing Devices	The inventions belonging to this category cover devices used for performing measurements or testing to ensure the correct operation of devices.
Traffic Control Systems	The inventions belonging to this category cover set of devices, which manages, commands, directs or regulates the behavior of other devices to effectively monitor the traffic in a network.
Others	The inventions belonging to this category cover equipment or a mechanism not covered in the above categories.

Table 2: Definitions of Level 3 Technology Heads in Taxonomy



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U.S.A (San Francisco)

1, Embarcadero Center, Suite 500,
San Francisco, California 94111
Tel: +1 415-623-2014

U.S.A (Houston)

Suite 530, 550 Westcott Street
Houston, Texas 77007
Tel: +1 713-893-0716

India (Gurgaon)

4th Floor, B - Block, Building No. 14
Cyber City
DLF City Phase - III, Gurgaon
Haryana 122002
Tel: +91 124-400-3400

Japan (Gifu)

Operasu - Konohana 2F,
6-12 Konohana-cho,
Gifu-shi, Gifu Prefecture,
Japan 500-8333
Tel: +81 582-137-855

