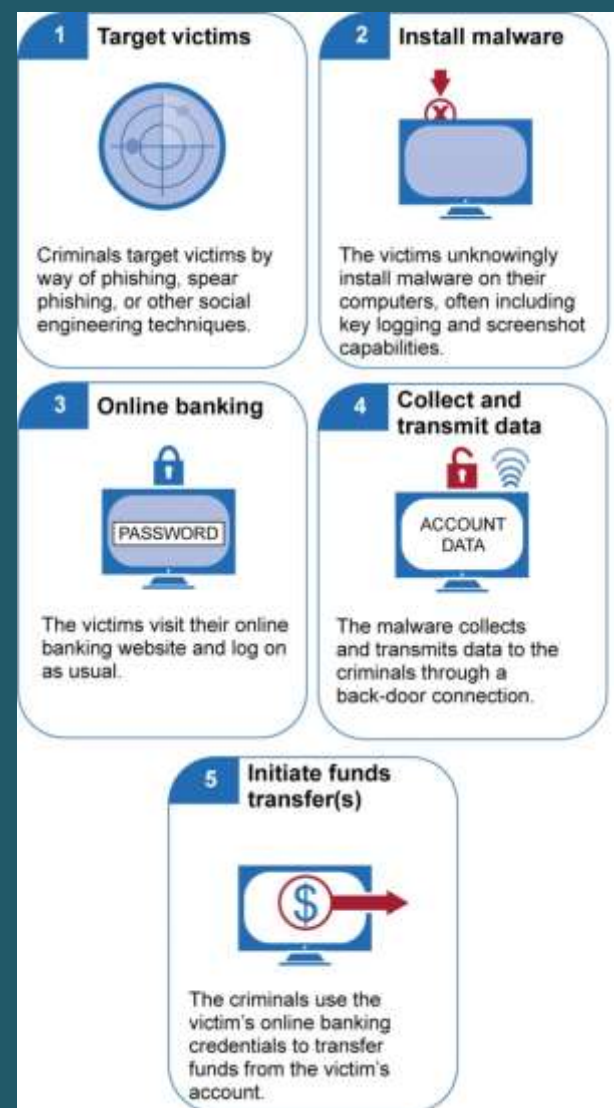


2015

# *U.S. Payment Card & Mobile Payment Providers & Retailers Cybersecurity*



(Source: U.S. Congress GAO July 2015)

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*August 2015*

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# 1 U.S. Payment Card & Mobile Payment Providers and Retailers Cybersecurity Submarket– 2016-2020

## 1.1 U.S. Payment Card Companies & Mobile Payment Providers industry Market Background

American Express, Discover, MasterCard, Visa consumer and other commercial credit, debit, and prepaid cards issued in the U.S. combined to generate \$4.077 trillion in spending at merchants in 2013, up 7.9% from 2012, according to the annual report on U.S. General Purpose Credit Cards, published by the Nilson Report. Some statistics on Payment Card usage in the U.S. are as follows:

- ❑ Average number of credit cards held by cardholders: 3.7
- ❑ For every consumer 18 years or older, there are 1.3 general-purpose credit cards in force and 0.7 card that was active (used at least once a month). For each business, there is 1 general-purpose Payment Card in force and 0.6 cards active.
- ❑ Percentage of consumers who have at least one Payment Card was 72.2%, compared with 77% who had at least one debit card and 32.3% with at least one prepaid card.
- ❑ Payment Card Of the 3.7 credit cards held by the average card holder: two cards earned rewards and 1.8 cards did not. (These numbers do not sum exactly to due to rounding error.)
- ❑ As of August 2014, 3-4% of payment cards issued in the U.S. had a Chip and PIN security smartcard. The rest are magnetic stripe based cards.

The layers of the Payment Card industry consist of the following three industries:

1. **Acquirer:** A merchant acquirer handles the merchant's customers' card authorizations, makes sure the money ends up in the correct account, sends a statement every month, and serves as intermediary should a customer have a dispute with a charge.
2. **Issuer:** The issuer is a financial institution that provides branded cards or other branded payment products to consumers and businesses.
3. **Processor:** Processing a Payment Card transaction involves two stages: authorization, where an electronic request is sent through various parties to either approve or decline the transaction; and clearing and settlement, where all parties settle their accounts and get paid.

**Table 1 - U.S. 45 Top Payment Card Acquirers: Links, Territory of Operation & Contact Info.**

Name	State	Contact Number
<a href="#">Applied Bank</a>	ALL	866-271-4056
<a href="#">Bank of Amercia Merchant Services (BAMS)</a>	ALL	866-538-3827
<a href="#">BancorpSouth Bank</a>	AL, AR, FL, LA, MO, MS, TN, TX	800-844-2477
<a href="#">Bank of Hawaii Merchant Services</a>	AZ, CA, DC, FL, HI, ID, IL, MA, MO, NC, NV, NY, SC, TX	800-279-4195
<a href="#">BB&amp;T</a>	AL, FL, GA, IN, KY, MD, NC, SC, TN, VA, WV	877-672-4228
<a href="#">BBVA Compass</a>	ALL	800-239-1220
<a href="#">Capital One Merchant Services</a>	ALL	866-698-9848
<a href="#">Charter One</a>	IL, MI, OH	866-456-4240
<a href="#">Chase Paymentech Payment Card Processing</a>	ALL	800-708-3740
<b>Citi Merchant Services</b>	ALL	888-232-5472
<a href="#">Columbia State Bank</a>	ID, OR, WA	800-900-1946
<a href="#">Comerica Bank</a>	ALL	888-341-6490
<a href="#">Commerce Bank</a>	ALL	800-828-1629
<a href="#">Elavon</a>	ALL	800-725-1243
<a href="#">First Citizens Bank and Trust Company, Inc.</a>	GA, SC	888-612-4444
<a href="#">First Hawaiian Bank</a>	HI	808-844-3174
<a href="#">First Merit Merchant Services</a>	OH, PA	800-572-6039
<a href="#">First National Bank</a>	ALL	800-228-2443
<a href="#">First Savings Bank</a>	ALL	800-782-1266
<b>Fulton Bank</b>	DE, MD, NJ, PA, VA	888-849-6012
<b>Heartland</b>	ALL	877-444-5148
<b>HSBC (FD)</b>	ALL	877-472-2249
<a href="#">Huntington National Bank</a>	ALL	888-330-4267
<b>KeyBank National Association</b>	ALL	216-689-5580
<b>M&amp;I</b>	ALL	800-552-5828

Name	State	Contact Number
<b>M&amp;T Bank</b>	ALL	800-724-7031
<b>Meridian Bank</b>	ALL	484-568-5000
<a href="#"><u>Merrick Bank</u></a>	ALL	800-267-2256
<a href="#"><u>Moneris</u></a>	ALL	866-666-3747
<a href="#"><u>People's United Bank</u></a>	CT, MA, ME, NH, NY, VT	800-334-5077
<b>PNC (FD)</b>	ALL	888-562-2300
<a href="#"><u>Simmons First National Bank</u></a>	AR	870-541-1280
<a href="#"><u>Sovereign Bank</u></a>	ALL	877-768-1145
<b>SunTrust (FD)</b>	ALL	800-786-8787
<b>Synovus</b>	ALL	706-649-5548
<a href="#"><u>TD Bank</u></a>	CT, DC, DE, FL, MA, MD, ME, NC, NH, NJ, NY, PA, RI, SC, VA, VT	800-348-4025 ext. 3590
<a href="#"><u>TIB – The Independent Bankers Bank</u></a>	ALL	800-288-4842
<a href="#"><u>TSYS Merchant Solutions</u></a>	ALL	800-354-3988
<a href="#"><u>U.S. Bank Payment Solutions</u></a>	ALL	800-432-9413
<a href="#"><u>Vantiv</u></a>	ALL	866-622-2833
<a href="#"><u>Wells Fargo (FD)</u></a>	ALL	866-380-9828
<a href="#"><u>Westamerica Bank</u></a>	CA	800-939-9942
<a href="#"><u>Woodforest National Bank</u></a>	ALL	877-525-5113
<b>WorldPay</b>	ALL	866-336-5965
<a href="#"><u>Zions Bankcorp</u></a>	AZ, CA, CO, ID, NV, OR, TX, UT, WA	800-524-4787

(Source: Visa)

Table 2 - U.S. 22 Top Payment Card & 22 Top Debit Cards Issuers Data

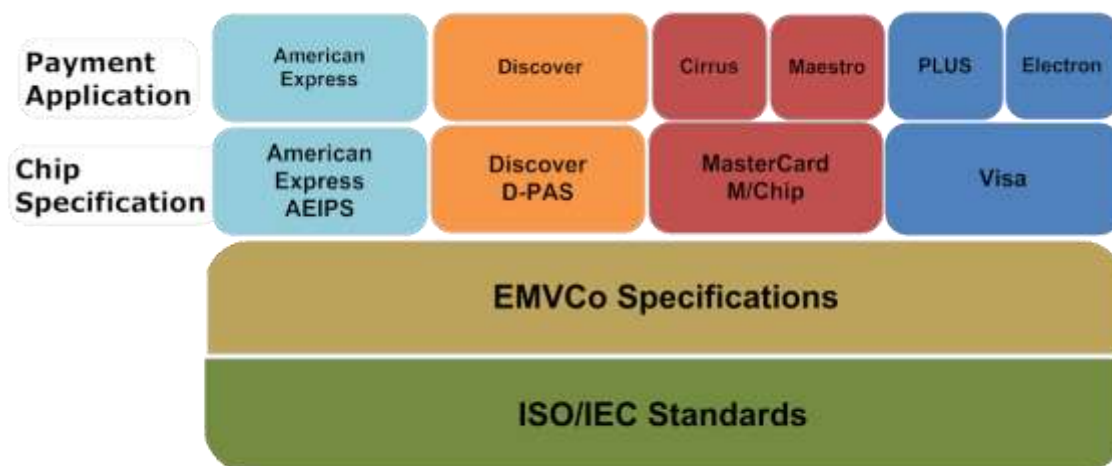
Credit Issuers					Debit Issuers						
Rank	Issuer	Consumer Purch. Vol. (bil.)	All Purch. Vol. (bil.)	Percent Consumer 2013	Basis Pt. Chg. vs. 2012	Rank	Issuer	Consumer Purch. Vol. (bil.)	All Purch. Vol. (bil.)	Percent Consumer 2013	Basis Pt. Chg. vs. 2012
1	JPMorgan Chase	\$364.66	\$457.53	79.70%	39	1	Bank of America	\$244.78	\$275.50	88.85%	-10
2	Bank of America	\$195.73	\$258.05	75.85%	-141	2	Wells Fargo	\$221.00	\$247.02	89.47%	-8
3	Citi	\$161.52	\$197.58	81.75%	40	3	JPMorgan Chase	\$164.76	\$182.51	90.27%	61
4	Capital One	\$134.57	\$159.50	84.37%	-23	4	PNC	\$49.52	\$54.21	91.35%	-31
5	U.S. Bank	\$50.95	\$94.14	54.12%	346	5	U.S. Bank	\$45.84	\$52.00	88.16%	64
6	Barclays	\$43.47	\$44.01	98.77%	24	6	USAA	\$39.37	\$39.37	100.00%	—
7	Wells Fargo	\$43.28	\$80.74	53.61%	-45	7	Regions Bank	\$28.92	\$31.26	92.51%	-47
8	USAA	\$32.58	\$32.58	100.00%	—	8	SunTrust	\$27.07	\$31.26	86.60%	-47
9	Cabela's WFB	\$18.07	\$18.07	100.00%	—	9	Capital One	\$25.05	\$26.11	95.97%	-14
10	GE Capital Retail Bank*	\$16.21	\$16.21	100.00%	—	10	The Bancorp Bank	\$24.49	\$40.27	60.83%	849
11	Navy FCU	\$10.68	\$10.74	99.49%	0	11	TD Bank	\$23.79	\$32.25	73.78%	-115
12	PNC	\$9.77	\$22.52	43.38%	-96	12	BB&T	\$22.84	\$26.26	86.97%	-75
13	First Nat'l Nebraska	\$8.01	\$11.59	69.05%	-65	13	Citi	\$22.80	\$29.03	78.51%	1
14	TD Bank	\$7.99	\$8.85	90.28%	2,777	14	Fifth Third	\$22.33	\$24.31	91.83%	-11
15	Nordstrom	\$6.49	\$6.66	97.48%	-14	15	Navy FCU	\$21.72	\$21.91	99.13%	-4
16	ICBA Bancard	\$5.11	\$5.11	100.00%	—	16	RBS Citizens	\$18.70	\$21.18	88.29%	-150
17	Fifth Third	\$4.55	\$9.08	50.07%	-97	17	ICBA Bancard	\$13.41	\$13.41	100.00%	—
18	BB&T	\$4.07	\$7.06	57.57%	12	18	Green Dot	\$13.39	\$13.39	100.00%	—
19	State Farm	\$3.52	\$3.82	92.02%	-41	19	M&T Bank	\$10.53	\$11.40	92.34%	-71
20	Pentagon FCU	\$2.94	\$2.94	100.00%	—	20	State Empl. CU N.C.	\$10.46	\$10.46	99.97%	-3
21	RBS Citizens	\$2.84	\$4.36	65.18%	-215	21	BBVA Compass	\$10.06	\$11.34	88.75%	-35
22	Credit One	\$2.74	\$2.74	100.00%	—	22	KeyBank	\$9.73	\$10.89	89.39%	-33

Debit card volume includes prepaid cards. \*GE Capital Retail Bank is now called Synchrony Financial. © 2014 The Nilson Report

- ❑ MasterCard, Visa, American Express, Discover, and several other entities provide financial applications that reside on a chip. Each of these entities has their own EMV specification for their chip-based financial applications: MasterCard's EMV specification is known as M/Chip, Visa's EMV specification is known as VSDC, American Express's contact EMV specification is known as AEIPS, etc. Although each individual specification must first conform to the very detailed EMVCo specifications, there are areas where these individual payment system specifications can be somewhat unique.

- ❑ The algorithms that are used for generating and verifying application cryptograms can be different from one ICC application specification to another.
- ❑ Many payment systems offer multiple products or programs. These products differ from each other in some way; some may be used for debit and others for credit; some may be used primarily at ATMs and others may be used primarily for POS, etc. Each product has its own brand name, e.g., Maestro, Cirrus, PLUS, etc. Rules and parameters that govern a Maestro product may not be the same as the rules and parameters that govern a Cirrus product.
- ❑ EMVCo members have worked jointly over the last few years to develop specifications that define a set of requirements to ensure worldwide interoperability and acceptance of secure payment transactions. This is accomplished by managing and evolving the EMV® Specifications and related testing processes. Today, there are EMV specifications based on contact chip, contactless chip, common payment application (CPA), card personalization, and tokenization. There are also EMV documents and materials concerning mobile payments.

**Figure 1 - Relationship between EMVCo Specifications, Payment System, & Payment System Products.**



(Source: Paragon Application Systems)

- ❑ An application identifier (AID) is used to identify an application that resides in the chip. An AID consists of two parts. The first part is a registered application provider identifier (RID), which is issued by the ISO/IEC 7816-5 registration authority. A card scheme such as Visa, MasterCard and others will use the same RID for all of their ICC applications. The RID is followed by a proprietary application identifier extension (PIX) which enables the application provider to differentiate between the different products they offer. The AID is printed on all EMV cardholder receipts.



- ❑ An application that resides on the chip is sometimes referred to as an ICC (integrated circuit card) application. Each ICC application contains a set of related fields, called EMV Tags. These Tags contain the parameters that are used during the interaction between the card and the terminal. They include information such as limits, counters, and actions that should be taken for specific events, such as risk management. The values in these EMV Tags can vary from one ICC application to another.
- ❑ A card issuer might produce separate cards for various purposes; for example, one card for a debit product, another card for a credit product, etc. Chip card technology offers issuers the opportunity to place multiple products on a single chip, thereby eliminating the need for separate cards. So a chip card that conforms to EMV specifications will contain one or more financial applications, each identified by a unique Application ID.
- ❑ Each chip-enabled payment device will also support one or more financial applications, identified by Application ID.
- ❑ As part of an acquirer's EMV migration project, ATMs must be configured to support AIDs that are appropriate for ATM transactions, and POS terminals must be configured to support AIDs that are appropriate for POS transactions.
- ❑ Per EMVCo specifications, when a chip card is used at a chip-enabled ATM or POS device, the card and the terminal must have at least one AID in common in order for the transaction to proceed. The process whereby the card and the terminal agree upon the AID to use for the transaction is known as Application Selection. This can be done automatically by the card and the terminal, with no cardholder action required, or (depending on how the terminal and the ICC application are configured), the cardholder can be prompted to select or confirm the application. Because most cardholders would find this extremely confusing, the application is usually automatically selected by the card and the terminal.
- ❑ The primary role of the AID is to identify the ICC application. The ICC application reflects the parameters appropriate to a particular card scheme product, e.g., Cirrus, Maestro, PLUS, etc. It is used during the card-terminal interaction at the beginning of a transaction.
- ❑ In rare cases, an entity that is not a card scheme, for example a network, will develop its own ICC application and obtain its own unique AID for that application. This should only be done if there is no existing combination of AID, product, and card profile that will produce the desired results during Application Selection. The Interac debit network in Canada developed its own ICC application and obtained its own AID in order to support existing network regulations related to transaction processing, routing, and interchange fees. The Interac AID also supports a proprietary EMV Tag that other AIDs do not use.

The credit and online payment industries have been most susceptible to cyber-attacks, resulting many times from fraud per the following statistics:

- ❑ Unauthorized general-purpose Payment Card transactions made up 0.037% of all card-present Payment Card transactions in 2012 (accounting for 0.092% of the value of those transactions), and 0.118% of all card-not-present transactions (representing 0.114% of the value of those transactions).
- ❑ Unauthorized general-purpose signature debit card transactions made up 0.028% of all card-present general-purpose signature debit card transactions in 2012 (accounting for 0.113% of the value of those transactions), and 0.095% of all card-not-present general-purpose signature debit card transactions (representing 0.114% of the value of those transactions).
- ❑ Unauthorized general-purpose PIN debit and ATM card transactions made up 0.008% of all such transactions in 2012 (accounting for 0.028% of the value of those transactions).
- ❑ Fraud rates across the Visa payment system: less than 6 cents for every \$100 in transactions.
- ❑ 68% of college students surveyed in spring 2012 had concerns about identity theft when it comes to having a credit card.
- ❑ The Consumer Sentinel Network (CSN), a database of consumer complaints received by law enforcement, received more than 1.8 million complaints in 2011: 55% were fraud complaints; 15% were identity theft complaints; and 30% other types of complaints.
- ❑ Identity theft was the number one complaint category in the CSN for 2011, comprising 15% of the overall complaints.
- ❑ A total of 990,242 CSN 2011 complaints were related to fraud.
- ❑ Consumers reported paying more than \$1.5 billion as a result of fraud in 2011; the median amount consumers paid fraudulently was \$537.
- ❑ Of the fraud-related complaints in 2011 where the method of initial contact was reported, 43% said email, 13% said an Internet site and 7% said mail as the initial point of contact.
- ❑ In 2011, Colorado had the highest per capita rate of reported fraud and other complaints followed by Delaware and Maryland.
- ❑ 14% of identity theft in 2011 involved Payment Card fraud. 27% involved government documents/benefits fraud; 13% involved phone or utilities fraud and 9% involved bank fraud.
- ❑ In 2011, Florida had the highest per capita rate of reported identity theft complaints, followed by Georgia and California.

- ❑ The top three threats most worrisome in the U.S. in 2012 were identity theft, bankcard fraud and national security as it relates to terrorism.
- ❑ 56% of Americans in 2012 were seriously concerned about someone obtaining and using their credit or debit card information.
- ❑ 39% of Americans in 2012 were seriously concerned about the security of shopping or banking online.
- ❑ In 2012, there were more than 250 million mobile payments made using a mobile wallet, and at least 205 million person-to-person or money transfer payments.
- ❑ In 2012, the total value of card-not-present payments reported by the payment networks was \$1.4 trillion. The Commerce Department estimated e-commerce sales at \$227 billion in 2012. Therefore, a substantial part of the value of card-not-present payments clearly included other transaction types, such as bill payments or purchases made over the phone.
- ❑ In 2010, 74% of cardholders with a mobile phone went online to their financial institution's site to complete transactions.
- ❑ In 2010, 59% of cardholders with a mobile phone used the Internet as their primary way to complete transactions.
- ❑ In 2010, 13% of cardholders with a mobile phone used a mobile application to complete transactions.
- ❑ Nearly two-thirds of online financial customers used bill pay across bank, Payment Card and third-party Web sites in 2011.
- ❑ 54% of rewards cardholders in 2012 rated the quality of the card issuer's website as above average or excellent.

Table 3 - Payment Card Technologies: Magnetic Stripe vs. Chip & PIN Cards

<b>Chip vs. Magnetic Stripe</b>	
	<ul style="list-style-type: none"> <li>&gt; Chip cards are inserted into chip-reading devices rather than being swiped</li> <li>&gt; If PIN is supported on the chip card, it will replace traditional signature</li> <li>&gt; In conjunction with PIN, chip cards verify the identify of cardholders</li> <li>&gt; Terminals will accept both magnetic stripe and chip cards for years to come</li> </ul>
<b>Cardholder Verification Methods (CVM)</b>	
<b>Chip &amp; Signature</b>	<ul style="list-style-type: none"> <li>&gt; The customer signs to validate identity</li> <li>&gt; Prevents the use of counterfeit cards</li> </ul>
<b>Chip &amp; Offline PIN</b>	<ul style="list-style-type: none"> <li>&gt; The chip card and the terminal validate the PIN with each other offline, before continuing for authorization</li> <li>&gt; Prevents the acceptance of counterfeit and stolen cards</li> </ul>
<b>Chip &amp; Online PIN</b>	<ul style="list-style-type: none"> <li>&gt; The customer's PIN is sent to the host for validation</li> <li>&gt; Prevents the acceptance of counterfeit and stolen cards</li> </ul>

## 1.2 The U.S. Chip and PIN Cards Transformation Program

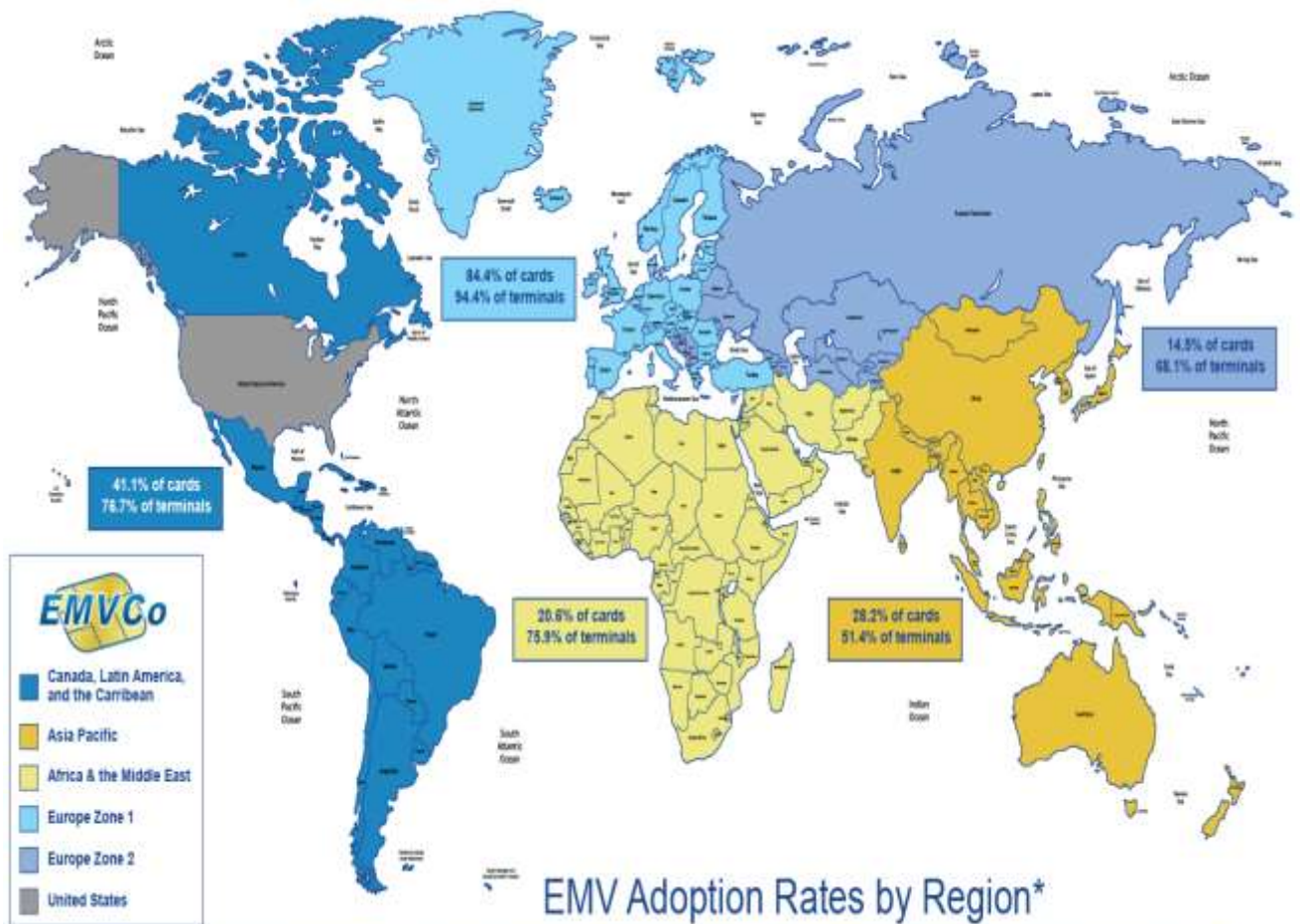
- ❑ Chip and PIN – also known as EMV (e.g., EuroPay) – is a payment system used already by 19 out of the G-20 countries in which cards contain an electronic chip and the user must enter a personal identification number when using their card. The PIN is merely a second factor of authentication, but the chip actually replaces the magnetic strips that currently store payment information on the credit and debit cards of many Americans. According to the administration's talking points, Chip and PIN has helped limit payment fraud considerably in other countries. This is in part because a user must know the PIN associated with a chip embedded on the Payment Card in order to use it.
- ❑ With that in mind, some private sector companies are already committed to installing Chip and PIN-compatible point of sale terminals at their retail locations. The Home Depot, Target, Walgreens and Walmart all plan on being Chip and PIN compatible by January 2015. The White House announced that American Express will start a new program to support small businesses upgrading the security of their point of sale terminals and Visa will launch a national public service campaign to educate consumers and merchants on Chip and PIN and other secure technologies.

Figure 2 - Chip and PIN Card and Point of Sale Reader



- ❑ By October 17, 2004 President Barack Obama signed an Executive Order that will force the Federal government to adopt Chip and PIN technology for government payment cards and to outfit retail point of sale terminals at federal facilities – like national parks and post offices – with the capacity to accept Chip and PIN-enabled cards.
- ❑ The move is part of broader “BuySecure” initiative, and the president hopes that the American public and private companies will follow the government’s example in transitioning to the more secure form of payment.

**Figure 3 - Global Adoption Rate of EMV (Chip and PIN) Cards by Region-Country**



\*Figures reported as of Q4 2011 and represent the latest statistics from American Express, JCB, MasterCard, and Visa, as reported by their member financial institutions globally. Figures do not include data from the United States.

(Source : EMV Co)

- ❑ Payment Card The administration is also using the September 2014 Executive Order to help prevent identity theft, increase credit score transparency and to announce a White House consumer cybersecurity summit.

Figure 4 - Chip and PIN Card Processing



(Source: Siemens)

- ❑ Specifically, the president’s executive office will support the Federal Trade Commission’s continued development of IdentityTheft.gov, a website designed to streamline the process of reporting identity theft. The plan to curb identity theft – like every other piece of security-related executive guidance from this administration – will involve expanded information sharing rules requiring law enforcement to regularly report evidence of stolen financial and other information to companies whose customers are directly affected. In the end, the administration says that its goal is to cut in half the average amount of time it takes to remedy cases of identity theft.
- ❑ Ultimately, the administration and the Consumer Financial Protection Bureau want every citizen to have easy access to their credit score, not just to maintain good credit health but also because credit score changes are often one of the first indicators of identity theft. Citi and the credit score provider, FICO, will be making free credit scores available online to Citi customers. They will join Discover, Barclaycard, Pentagon Federal Credit Union and First National Bank of Omaha, each of whom currently provide similar services to some 70 million U.S. citizens.
- ❑ “The goal is not just to ensure the security of doing retail business with the government, but also, through this increased demand, to help drive the market towards swifter adoption of stronger security standards,” the administration says. “Institutions like the United States Postal Service

have already made this transition across tens of thousands of retail facilities across the country.”

- ❑ The White House is also calling on Congress to pass data breach legislation designed to clarify the expectations consumers should have when their data has been breached along with steps that companies must take to notify their customers of risks after such security breaches. The order goes onto to call for further legislation intended to help the government better protect federal networks while appropriately balancing the need for greater information sharing and strong privacy and civil liberty protections.
- ❑ According to a president Obama statement: *“The 2004 UK compulsory conversion to Chip and PIN cards reduced the in store credit crime rate by 70%.”*
- ❑ The U.S. payment cards industry committed to replace magnetic stripe based cards with Chip and PIN cards.
- ❑ We forecast that this mass conversion plan which involves the replacement of hundreds of millions of cards, and 1.2 million points of sale card readers will cost more than \$6 billion and will be reach a 70% penetration by 2018.
- ❑ The cost of a single Chip and PIN card is \$3 and the upgrade of a point of sale cost hovers at \$170 to \$450, depending on the individual POS technology, smart card transaction software license fee and cost of installation.

**More information can be found at:**

**[U.S. Financial Services: Cybersecurity Systems & Services Market - 2016-2020](#)**