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Processing IP-Based, Electronic Payment Card Transactions

White Paper

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OVERVIEW

Early electronic payment card (EPC) transaction networks required a merchant cashier to write-up and manually enter each transaction. The cashier provided the majority of the transaction support. A customer's involvement was typically limited to presenting the card and then signing a receipt. At the end of the business day; the merchant processed their EPC transactions with the rest of their sales records.

As transaction networks evolved, merchants deployed point-of-sales (POS) terminals that integrated with their inventory systems, sales systems, and transaction processing networks. These terminals also allowed merchants to rebalance the level of involvement between a cashier and a customer. Now a customer swipes their card then enters a personal identification number (PIN), or writes an electronic signature, then approves the transaction. The merchant is also able to verify the credibility of the transaction at the time of sale instead of waiting for batch processing of sales records at the end of the day.

As transaction networks continue to evolve today, EPC businesses are realizing an expanded portfolio of services to offer customers. Examples include: processing "cash-back" requests with a purchase, bill payment, coupon redemption, warranty purchase, or ticket sales. Each of these services continues to give the customer an increased level of involvement in the transaction. Now a customer potentially uses a self-check-out station, selects coupon options, a seat location, or lottery number. These higher function networks also enable merchants to conduct real-time, business-to-business transactions.

All businesses merchants, merchant service providers, internet service providers, acquiring banks, card member networks, issuing banks, and third party processors (TPP) in the EPC industry continue to pursue an expanded services portfolio and an increased level of customer involvement. Network operators in the industry realize an increased need to implement applications with the sophistication to support this expanded portfolio of customer services and the increased level of customer involvement.

In addition to the requirement of an expanded service portfolio, industry businesses also need address new security requirements from regulatory agencies and card member networks.

One of the applications enabling network operators to achieve this sophistication combines IP-Based Point-of-Sale (POS) terminals, a secure IP protocol for example Secure Socket Layer (SSL), and IP-based transaction concentrators.

This network application includes technology evolutions at the front of the access network and at the end of the transport network. IP-based POS terminals provide security encryption and decryption on the access network, and transaction concentrators provide security decryption and encryption between the transport and processing networks.

Many IP-based POS terminals support the construction of transactions that carry more data than traditional EPC transactions. These larger sizes enable the transport of additional security information and additional transaction data needed to support an expanded service portfolio. Examples of additional security information include: pin numbers, account numbers, and passwords.

Secure IP protocols, for example SSL and HTTPS, help protect the interests of the customers and businesses involved in the transaction.

The IP-transaction concentrator combines secure IP protocol support with transaction aggregation, and transaction routing to provide the interface to the transaction processing network.

Before considering the specific challenges, technologies, and benefits associated with an IP-based transaction processing network application, consider where the market for this application exists.

Addressable Markets

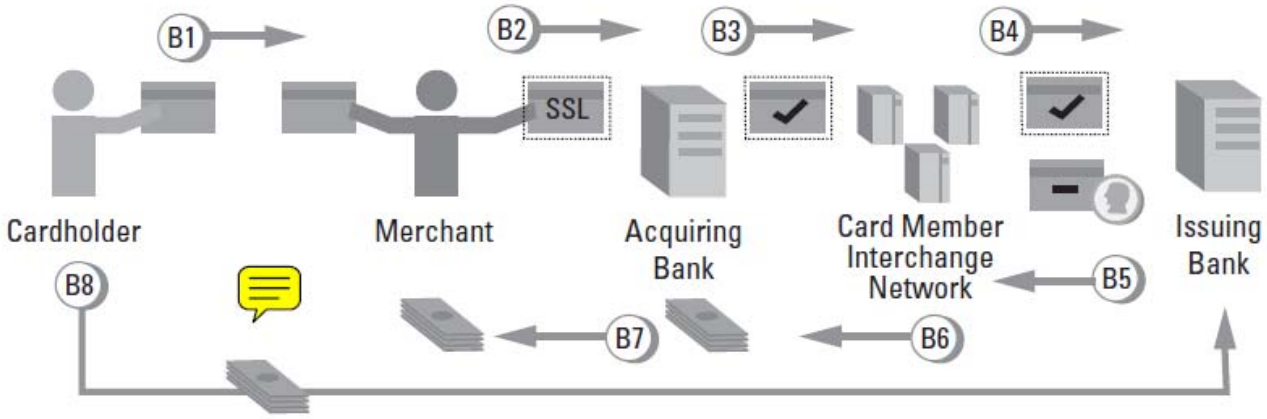

Figure 1

Reviewing the approval process in a typical electronic payment card (EPC) transaction can help define the market for this application.

Before any of these events occur, the issuing bank solicits and qualifies the cardholder.

Each circle represents an event in the EPC transaction approval process. Each of these eight events (B1 through B8) is required to complete the transaction approval. The:

B1) Cardholder initiates a purchase from a merchant.

B2) Merchant's IP-based point-of-sale (POS) terminal encrypts the transaction using a secure IP protocol. (Examples include: Secure Socket Layer (SSL) or Hypertext Transfer Protocol over Secure Socket Layer (HTTPS)). Then, it forwards an authorization request for the transaction to the merchant's acquiring bank.

B3) Merchant's acquiring bank forwards the transaction authorization request to the card's interchange network.

B4) Card's interchange network forwards the transaction authorization request to the issuing bank.

B5) Issuing bank evaluates the transaction authorization request and approves or declines the request.

B6) Card's interchange network returns the issuing bank's response to the acquiring bank.

B7) Acquiring bank returns the response to the merchant.

B8) Merchant receives the transaction authorization response from their acquiring bank and either completes or declines the EPC transaction.

After these events occur, each of the business entities involved settle the transaction funding. For example, the cardholder pays the issuing bank, the issuing bank settles with the acquiring bank, the acquiring bank settles with the merchant, and the card member network settles with the member banks.

While any of the business entities in the authorization process could deploy components of this application, the merchants and the acquiring banks make up its most prominent markets.

Each merchant and acquiring bank either owns their network or contracts with another company to provide a network for them. In the EPC industry, a company hired by another company to process a transaction or provide network services for a transaction is referred to as an agent or third party processor (TPP). Each agent or TPP also maps into the market for this application based on the services for which a merchant, acquiring bank, central bank, card member network, or issuing bank hires them.

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Application Challenges

Design, deploy, operate, and maintain a core network that:

1. Supports both traditional and newer more complex electronic payment card (EPC) transactions.
2. Achieves a level of transaction security at the protocol-level that was previously achieved using dedicated (“private”) networks. Meet the industry and regulatory requirements for the security of personal data.
3. Makes sense economically. More specifically, reduce operational costs.

The Application

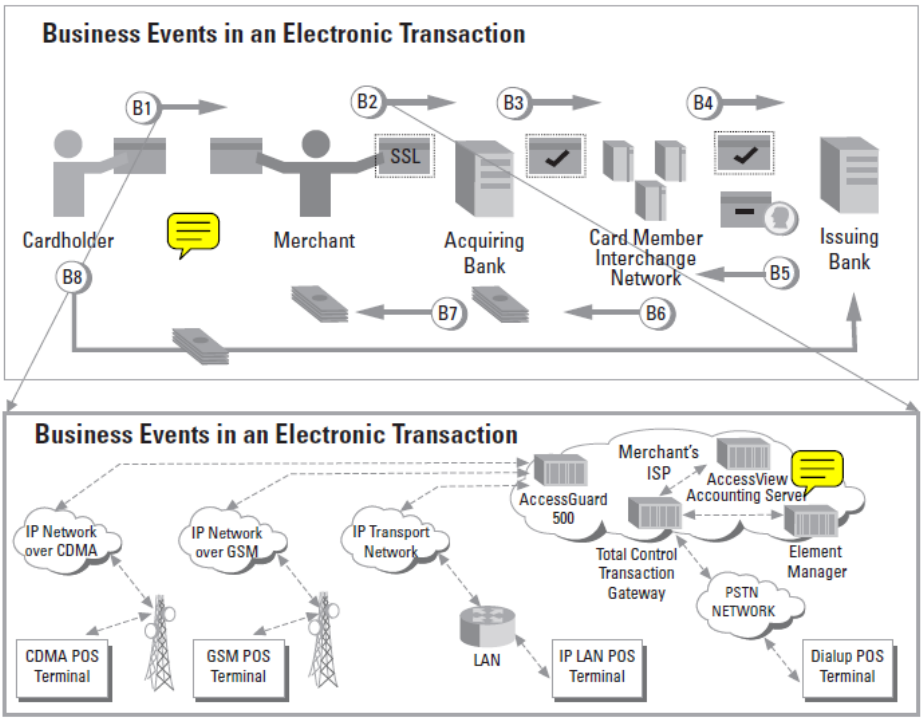
Having defined the approval process in a typical electronic payment card (EPC) transaction, consider some of the network components involved in the transaction.

Functionally, this application involves three distinct networks that interact with each other the:

1. Access Network (Typically a Merchant’s point-of-sale (POS) Network)
2. Transport Network (Typically a Merchant, Merchant Service Provider, and or Internet Service Provider (ISP))
3. Processing Network (Typically an Acquiring Bank, or their Third Party Processor (TPP)).

Merchant’s POS Network Example

Business Events in an Electronic Transaction Business Events in an Electronic Transaction



The access network includes the POS terminals, the local area network (LAN) associated with them, and potentially the local sales system with which they interact. In recent years, different technologies have enabled the proliferation of POS network form factors. Examples of these technologies include: tap-and-go cards and devices, integrated fingerprint identification, Global System for Mobile (GSM) communications and Code Division Multiple Access (CDMA) mobile terminals, and self-checkout stations.

Several of these newer form factors do support both traditional dialup communication protocols and IP-based communication protocols. However, most of the newer terminal functionality is optimized for IP-based communication protocols in the transport network.

Internet Service Providers Networks

Internet service providers (ISP) partner with, or are included in merchant service providers to provide the communication from the merchant POS terminals to either the public internet or to dedicated networks for the transport of the transaction.

In this example an ISP provides the IP transport network from the POS terminal to the acquiring bank. Depending on the business definition and the network design an ISP could be responsible for traffic only or could be responsible for some level of traffic and decryption.

Acquiring Bank's Example Network

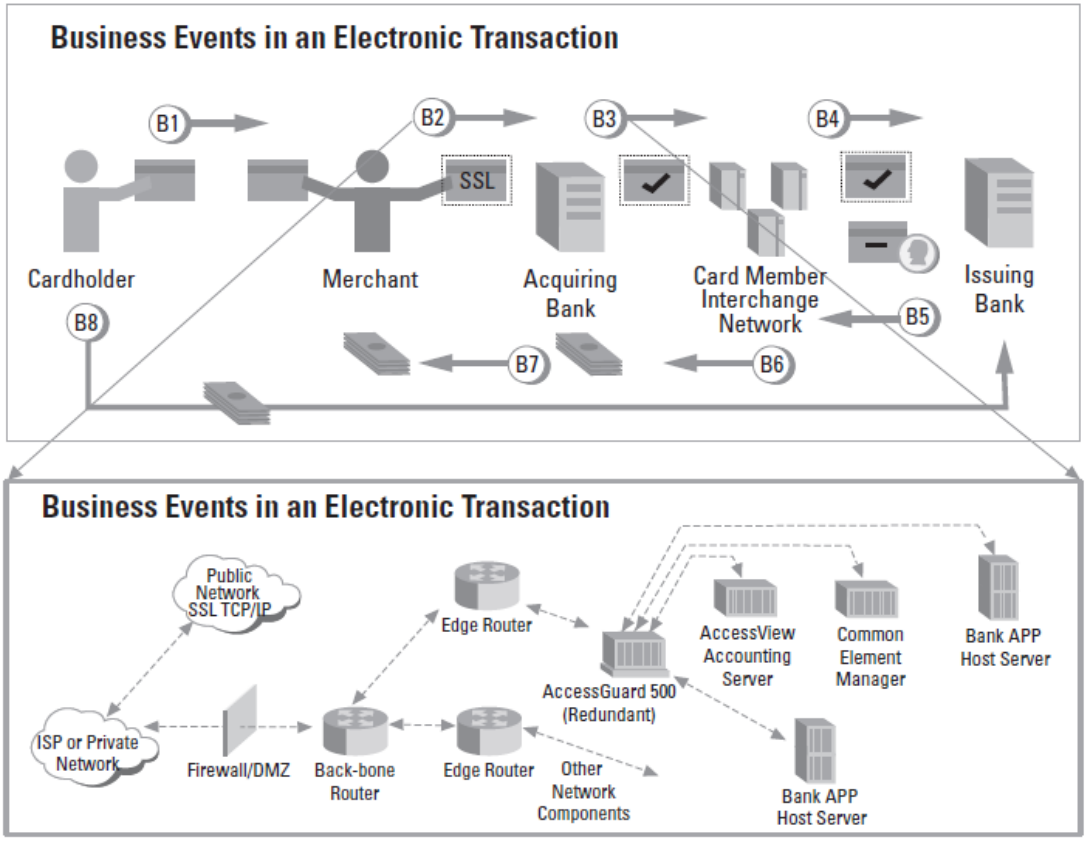


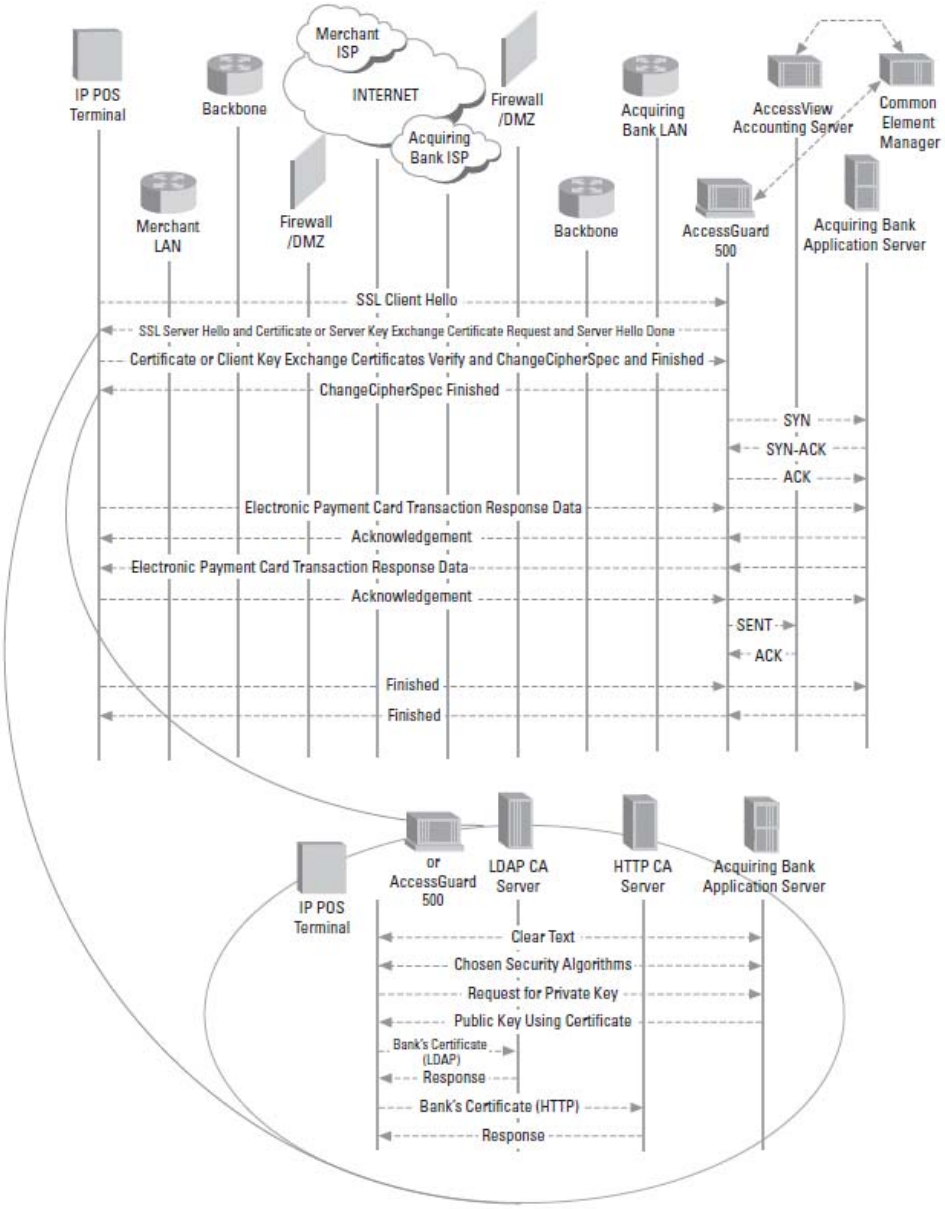
Figure 3

Acquiring banks either own their own network or hire a third party processor (TPP) or agent to provide the network and processing for the transaction. Depending on the business arrangement, the TPP could be responsible for transaction delivery or could be responsible for both transaction delivery and processing. Even when the TPP is tasked with both responsibilities, the acquiring bank is responsible for funding the transaction.

In the example drawn here, the acquiring bank is receiving transactions over the internet or a private network, decrypting the transaction, and routing it to the card's interchange network.

The access, transport, and processing layers of the IP-based EPC network interoperate to enable businesses to process the transactions associated with newer services offerings. Additionally, these components in an IP-based EPC network also interoperate with existing EPC networks allowing businesses to support their current offerings.

Technology



From a technology perspective, a secure transaction includes four components:

o Content

o Security

o Transport

o Processing

Transaction Content

Regarding the transaction content for a purchase, the IP-based point-of-sale (POS) terminal performs essentially the same functionality as a traditional dial terminal. It extracts the transaction content from interaction with electronic payment card (EPC) and with the merchant's sales system.

One of the fundamental differences between many of the newer IP-based terminals and traditional dial terminals is the number of data fields supported in the transaction's content and length of those data fields. This additional content can enable new services offered at the POS terminal, for example bill payments.

Transaction Security

Regarding transaction security, traditionally dialup POS terminals relied on a private network and dedicated lines to achieve an appropriate level of security.

IP-based POS terminals typically use a security protocol, for example Secure Socket Layer (SSL) to achieve an appropriate level of security. When using a secure protocol, two critical network areas are: the encryption point and decryption point.

In this network application, a secure IP protocol is added at the merchant's POS terminal and then is decrypted by a transaction concentrator for processing at the acquiring bank's application server.

Transaction Transportation

The transaction transportation from the POS terminal on the access network to the acquiring bank's application server on the processing network is another fundamental change included in this application. Where dialup POS terminals have historically required a private line or dedicated network, IP terminals with a security protocol can use a private or public network to transport the transaction. Using a general purpose network for transportation can reduce the network operational cost associated with the transaction.

Transaction Processing

This application allows existing processing networks and connections to remain in place. Because the IP transaction concentrator either routes transparently or supports routing protocols (for example, OSPF or RIP) application servers in processing layer of the network using these protocols can remain intact. They require a smaller amount of re-engineering to receive the transaction from the transport layer of the network.

The ability to leave existing processing applications in place obviously protects the current investment in this layer of the network.

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Benefits

Adding the ability to process IP-based electronic payment card transactions to a network obviously delivers a long list of benefits to the businesses involved. Here are a few of the key benefits:

o Increase revenue by expanding service offering to include newer electronic payment card services (for example bill pay)

o Integrate with the transactions associated with newer electronic payment card services with existing sales systems and networks

o Protect transactions with a highly secure network

o Reduce the operational cost of the transport layer of the network by replacing dedicated lines and networks with a general purpose IP network

o Protect current investments and design for future compatibility by deploying standards-based network components

o Faster time to market (designed to install in hours, highly scalable, upgrades via software updates).

Summary

As businesses in the electronic payment card (EPC) industry continue to expand their portfolio of services and continue to increase customer involvement in transactions, they require more sophisticated network applications.

This network application integrates IP-based POS terminals with secure protocol capabilities and IP transaction concentrators with existing network elements to enable businesses to process newer format EPC transactions. These new format IP-based transactions are more robust then the traditional transactions and support services beyond point of sale (POS) purchases. These additional services enable businesses to expand the portfolio of services they offer customers and increase their revenue.

Merchants, Merchant Service Providers (MSP), Internet Service Providers, Acquiring Banks, EPC networks, Issuing Banks, and third party processors can all share in the benefits of:

o An Expanded Service Offering

o Integration with Existing Networks and Systems

o A Highly Secure Network

o Reduced Operational Costs in the Transport Layer of the Network

o Protection of Current Investments in the Processing Layer of the Network

To request additional information on topics related to this application brief contact Traxcom Technologies Secure Transaction Processing product line or visit our web site at www.traxcomtech.com.

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About the Traxcom Technologies Secure Transaction Processing Product Line

Since filing its first patent more than 17 years ago, this Secure Transaction Processing product line has grown into a world leader in providing electronic payment card (EPC) transaction processing products.

Our team of highly-skilled and experienced professionals partners with financial enterprises to build a competitive advantage into each product we offer. Our agility, creativity, and capability translate into flexible solutions enabling customized EPC transaction applications and services designed to match your customer's unique requirements.

Our product offering combines with our "state-of-the-industry" customer support to make our presence "standard" in the networks of some of the largest EPC transaction processors in the world. As evidenced by the fact that each month our network equipment processes over 1 Billion transactions.

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*Some features may require additional development and may not be ready for immediate implementation.

ACKNOWLEDGEMENTS

References for the research involved in this publication include but are not limited to:

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