Powering Retail Market Trends with Advanced POS Platforms

Executive Summary

Now, more than ever, retailers are focused on serving their customers. Retailers must run multiple software applications simultaneously at the point-of-service (POS) to collect customer information and build meaningful customer relationships. “Customer-centric retailing” has become the mantra of successful retailers with timely customer insight driving next-generation merchandising. At the same time, the pressures to reduce operating costs and increase employee productivity are relentless.

Advanced POS systems have the capabilities to power tomorrow’s customer-centric initiatives, increase associate productivity and reduce total cost of ownership. Next-generation POS systems can play a key role in helping retailers drive increased revenue while providing a powerful platform for store operations.

A leading example of these advanced POS platforms is the NCR RealPOS™ 80*XRT* with Intel® vPro™ processor technology. Its development facilitates the trend towards customer-centric retailing, and the resulting system provides unprecedented performance, scalability and systems manageability to protect the retailer’s investment. NCR’s benchmark testing shows that the NCR RealPOS 80*XRT* delivers remarkable performance gains over previous-generation POS systems for customer-facing point-of-service and back-office store operation functions.

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Retail Trends and Their Effect on POS Systems

Customer-centric Retailing

As competition in the retail industry grows, consumers are faced with increasing choices – across retailers, across product lines and across channels. To succeed in this environment, retailers must differentiate the shopping experience: customer interactions must become richer, more personalized and more interactive. Increasingly, industry leaders are focusing on "customer-centric retailing," an approach that examines and redesigns a broad range of retail business processes – from the parking lot to the store aisle to the back office to corporate headquarters – according to their impact on customers, their experiences and their relationships with the retailer.

Not surprisingly, retail IT departments share this focus. In a recent study of retail IT decision makers, a large number of retailers prioritized customer-centric initiatives in their top ten initiatives for the next 18 months (see Table 1).

The top five customer-facing retail initiatives involve technology-based customer interaction at the point of sale. According to Jeff Roster, Vice President, Global Retail for Gartner, "Now more than ever, IT strategy and execution are shaped by an intense desire to serve the customer."[1]

POS systems as a nexus of revenue growth

Customer-centric retailing affects every aspect of retail IT – strategy, architecture, infrastructure and processes – and each of the key initiatives above is impacted by POS capabilities. As POS functionality grows and improves, the role of POS systems is moving beyond simply improving efficiency and reducing cost. Advanced POS systems can play a key role in delighting the customer and driving new revenue by enabling or improving multiple functions:

- **Cross-selling and up-selling:** Follow-on offers can be based on products purchased, inventory status, known customer preferences or general promotional campaigns. These can be delivered on printed sales receipts or through loyalty programs.
- **Targeted promotions to loyal customers:** For known customers in a loyalty program, cross-selling and promotions become even more focused with the ability to leverage product preferences, purchase frequency and loyalty point programs.
- **Collection of customer information:** More accurate and targeted customer information from POS interactions allows better targeting of promotions.
- **Building interactive customer relationships:** As the store is able to leverage customer preferences and behavior data, retailers can build an interactive customer relationship that values customers and delivers what they want.

POS systems reduce retailer costs

Additionally, the POS system can save retailers money by improving operational efficiencies and reducing costs. Advanced POS systems can significantly impact costs by improving various functions:

- **Cost-efficient checkout:** Efficiency is king in many retail segments and speed improvements can have a significant impact on profitability. One 200-store regional grocer reports that for every one second improvement to the checkout process, they add $475,000 to the bottom line.[2] Some larger national retailers have estimated the impact at millions of dollars per second. Advanced POS systems enable faster checkout through faster processing, faster interaction with store servers, better access to product and inventory data, and better associate tools. Faster checkouts raise the number of customers served per hour and lower the labor cost per checkout.
- **Enhanced systems management:** New remote systems management tools reduce service costs by significantly driving down the need for expensive field service visits. Out-of-band management capabilities allow remote problem diagnosis, updates and repairs even when the operating system is not functioning or the POS system is powered off.

Table 1: Top five IT customer-facing retail initiatives over next 18 months[1]

IT initiative	Percentage of respondents identifying initiative in their top 10
Providing associates with better tools	43%
Targeted promotions	41%
Customer intelligence analysis	39%
Speed through checkout	35%
Advanced loyalty programs	29%

- **Multi-purpose hardware:** Using the POS terminal as a server in addition to a POS workstation eliminates the cost of a dedicated server in the back of the store. This reduces both the cost of hardware acquisition and also hardware maintenance.
- **Lifecycle management:** Selecting systems with long-term availability and consistency protects the retailer investment over time. Longer component availability and software support extend the system's lifespan, while fewer models in the infrastructure simplify maintenance and lower support costs.

Market-driven POS systems development at NCR

Industry analysts have noted that the increasing capabilities of POS systems have allowed retailers to transition from payment-focused cash registers to robust platforms that can manage store operation functions. These platforms are able to manage store operations such as fraud audit, inventory and order management, returns, labor management, Customer Relationship Management (CRM) and loyalty programs, and back office accounting.[3] And these functions are in addition to the checkout function, which has become increasingly complex, with dynamic price calculations based on multiple promotional variables and queries to Price Look-Up (PLU) databases.

Advanced POS platforms. In response to these retail market demands, NCR developed its next-generation POS workstation, the NCR RealPOS™ 80*XRT*. This advanced system leverages Intel® vPro™ processor technology to provide excellent performance, scalability, systems manageability and investment protection. The NCR RealPOS 80*XRT* provides the ideal platform to extend point-of-sale capabilities to include critical store operation functions and customer-centric applications that enhance the shopping experience.

The NCR RealPOS 80*XRT* is powered by the Intel® Core™2 Duo processor, featuring two execution cores and delivering up to 40% more performance and greater energy efficiency compared to previous-generation processors.[4] This performance is supported by high-speed Gigabit Ethernet, SATA hard drives and support for up to 8GB of DDR2 memory. By utilizing Intel® Active Management Technology† (Intel® AMT), the NCR RealPOS 80*XRT* includes built-in manageability to increase uptime and help drive down the total cost of ownership. Intel AMT enables remote management techniques that have previously only existed on servers, including out-of-band management capabilities that allow remote problem diagnosis, updates and repairs even when the operating system is not functioning or the POS system is turned off. Intel AMT is integrated with NCR Retail Systems Manager (RSM), a remote monitoring and management software solution for retail technology, to provide higher system availability while lowering the overall cost of support.

Market-driven applications. The NCR RealPOS 80*XRT* supports business innovation by enabling new applications to enhance the consumer experience, including graphics-intensive customer interaction, multimedia promotions, advertising, loyalty programs and CRM applications. It also enables new capabilities to empower employees and increase productivity, such as improved associate tools, multimedia training, real-time visibility to information, and the ability to manage multiple store operation applications without slowing down mission-critical transaction processing. The NCR RealPOS 80*XRT* provides performance and capability headroom for the future, easing the evolution of in-store systems and protecting system investment.

Retailer Benefits of Advanced POS Systems

The exceptional capabilities of the NCR RealPOS 80*XRT* deliver benefits across the retail enterprise, from the point of sale to the back office to the executive suite.

Increased performance in the current software environment. Naturally, the NCR RealPOS 80*XRT*'s performance means that current applications will run faster. But in recent years, retail application developers have increasingly favored software development speed over application performance. Additionally, modern applications are moving towards interpreted (vs. compiled) code, placing increased demands on the hosting POS system. The NCR RealPOS 80*XRT* allows both fast time-to-solution and fast application response by providing the performance horsepower to overcome relatively lower levels of application tuning and the demands of code interpretation.

Expanded POS capabilities. The NCR RealPOS 80*XRT* allows retailers to realize an expanded vision for point of service. According to AMR Research, advanced POS applications "empower store associates by putting tools and information at their fingertips and delight customers by creating an efficient and personalized service."[5] The NCR RealPOS 80*XRT* enables new applications that transform the impact of the POS platform:

- Customer intelligence and loyalty program delivery
- Cross-channel inventory visibility and customer order fulfillment
- Returns management
- Advanced payments
- Workforce and task management
- Sales auditing and loss prevention

Operating system and application headroom for the future. As competitive pressures grow and technology change accelerates, it is increasingly difficult for retailers to know what their technology requirements will be over a five- or ten-year window. But the time-honored trend towards more demanding applications is certain to continue. In the past, proprietary POS systems used unique operating systems and applications with very long replacement cycles. The advent of open operating systems (such as Microsoft Windows XP,* XPe,* WePOS,* Vista* and Linux*), while greatly increasing flexibility and lowering costs, has led to two challenges: first, operating system revisions affecting POS systems are released more often; and second, new operating system releases invariably require more hardware resources such as processor, memory and hard disk. The NCR RealPOS 80*XRT* has the computing headroom to meet the demands of new operating systems, as well as application advances that require additional processing power. In addition, the NCR RealPOS 80*XRT*'s open standards technology eases the transition from legacy operating systems to new operating systems.

Elimination of dedicated back-office servers and associated costs. In many retail environments, there is a dedicated back-office server which handles store operation functions. This architecture adds incremental hardware cost on a per store basis. The extra headroom of the NCR RealPOS 80*XRT* supports a workstation/server configuration with both the server and POS functionality running on the same box. When used as a workstation/server, NCR RealPOS 80*XRT* can replace a dedicated in-store server and reduce hardware acquisition and maintenance costs.

Real-world Scenarios

The ability of the NCR RealPOS 80*XRT* to positively impact retail operations is significant. The following real-world scenarios illustrate the benefits of the system's flexibility and performance.

Run multiple applications concurrently

As noted above, POS systems will increasingly serve as a store operations platform. But to fulfill this mission, the POS system must be able to run multiple store and enterprise applications at once. The NCR RealPOS 80*XRT* provides an open standards-based platform with the power to run CRM, workforce management and inventory applications – in addition to traditional point-of-service functions – without degradation. Intel vPro processor technology gives the NCR RealPOS 80*XRT* the fundamental capabilities needed to handle store platform-level workloads. As a result, retailers are less likely to place demands on their POS systems that the systems cannot handle soon after installation.

Quickly calculate complex multi-item pricing promotions

Retailers and product manufacturers continue to increase the complexity of pricing promotions by tying pricing to the number and type of items that customers purchase. Many promotional price calculations involve not only the most recent items scanned, but also many other items that have already been placed in the transaction or items yet to be scanned. The promotional prices can change multiple times based on many factors such as:

- Other items purchased
- Quantity of items purchased
- Total transaction amount
- Coupons
- Loyalty discounts
- Employee discounts

Additionally, multiple discounts may be applied to the same item. And finally, specific regional laws may require all item prices to correctly reflect the price of each item in the transaction.

All of this results in multiple lookups, calculations and recalculations. In the past, it was common for systems to wait until all items were scanned before calculating final sale prices due to insufficient processing power. With the advanced platform technologies and powerful processing capabilities of the NCR RealPOS 80*XRT*, these complex computations for multi-item pricing promotions can occur in real-time.

Migrate legacy applications without degrading POS performance

Increasingly, new POS solutions are being asked to support the migration of legacy systems utilized by retailers – for example, launching a VT100 emulation screen to access a host-based application while running a POS application. These migrations and emulations require additional processing power and application performance can suffer. The NCR RealPOS 80*XRT* delivers performance and headroom to support most legacy applications without degradation.

Process Global Tracking Identification Numbers

In the near future, all bar-coded items will be converting to Global Tracking Identification Numbers (GTIN), which can carry greater levels of information such as expiration date, batch number and manufacturer. GTIN will support the ability to perform additional actions on purchased items, such as recalls, expirations and discounts. For example, an item's GTIN may be scanned to determine if the item is under recall. The challenge for current POS solutions will be to perform the required searches within the 500 to 750 millisecond timeframe recommended (from scanning the item to displaying the completed transaction on the POS system). The speed of the NCR RealPOS 80*XRT* facilitates the ability to implement this new GTIN functionality without increasing checkout times.

Implement RFID scanning

Over the next decade, radio frequency identification (RFID) scanning will replace bar code (laser) scanning at checkout. Whereas bar code scanning is paced by the cashier, one item at a time, RFID scanning receives all of the checkout item information much more quickly, in one continuous stream. In addition, RFID tags can carry a much richer data set – such as logistics history, expiration date and ingredients – making more value-added events possible at the point of service. Both of these dynamics will require more processing power to avoid slowing the checkout process and add improved features to the customer's experience. Faster POS hardware like the NCR RealPOS 80*XRT* has the capability to implement these enhancements while preserving the retailer's POS investment.

Implement better line busting

Some retailers improve checkout efficiency by using a line-busting technique, where multiple checkout items are scanned using a handheld wireless device. The transaction is then "suspended" until it can be completed on the POS system where price, promotion and total calculations take place. There can be a significant difference between POS workstations in the time required to complete the resumed transaction. Higher-performance systems such as the NCR RealPOS 80*XRT* minimize total transaction and checkout times.

Benchmarking the NCR RealPOS™ 80*XRT*

Overview

In order to quantify the performance increase of the NCR RealPOS 80*XRT* next-generation technologies, benchmark testing was performed in the NCR Proving Lab with the following POS hardware platforms:

- Baseline system with the Intel® Pentium® 4 processor 2.4 GHz
- NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400[^] 2.13 GHz

The POS application was the NCR Advanced Store POS software solution. This application was not optimized for dual-core processing.

Benchmark tests were run for each platform using two different configurations:

- A POS workstation/server configuration
- A POS client configuration

A summary of the performance results follows.

Workstation/server test configuration

The NCR RealPOS 80*XRT* was tested in the workstation/server configuration as follows:

- The NCR Advanced Store application was installed on each platform as a combination POS workstation and server.
- The workstation/server ran a continuous loop of the Advanced Store POS application including:
  - Login verification
  - Six Stock Keeping Unit (SKU) lookups
  - Total
  - Tender exact cash
- Additional POS emulators were included within the LAN configuration to replicate a typical network and server load from a total of 260 POS clients.
- Each of the 260 POS client emulators sent typical retail interactive messages in a repeating loop. The messages included:
  - A login verification message
  - Six PLU messages based on items randomly selected from a file consisting of 670,000 PLU items
  - One Data Collect (DCOL) posting message
  - One Electronic Journal (EJRL) posting message

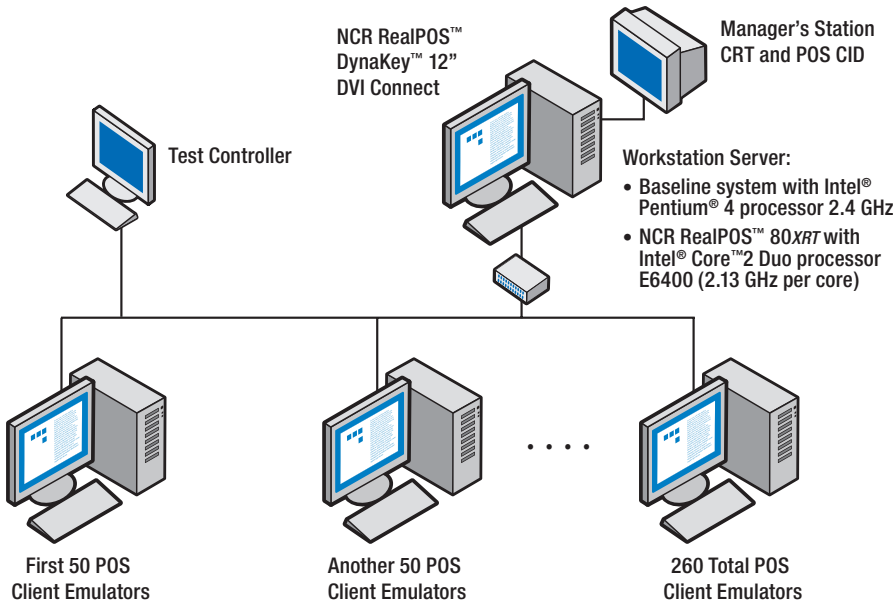

Figure 1: Workstation/server configuration

POS client test configuration

The NCR RealPOS 80*XRT* was tested in the client configuration as follows:

- The NCR Advanced Store application was installed on each platform and a separate NCR server.
- The server separated the POS client tasks executed on the client platforms from the server tasks.
- Each client platform ran an identical POS transaction that was constructed to be very interactive with the server and involving intricate discounting and rediscounting of items and totals. There was heavy network activity on the POS client and server during the transaction.

Benchmark results for the workstation/server configuration

Table 2, on page 10, shows the summary results of the benchmark tests for the two workstation/server configurations.

The test vectors were:

1. Retail messaging performance
    - Extensive login messaging is exchanged between server and client
    - PLU cycle with extensive messaging is executed by the server and the clients
2. Back-office performance
    - A data accumulation report involving 78,000 records (CPU- and disk-intensive)
    - An end-of-day closing process (CPU- and disk-intensive)

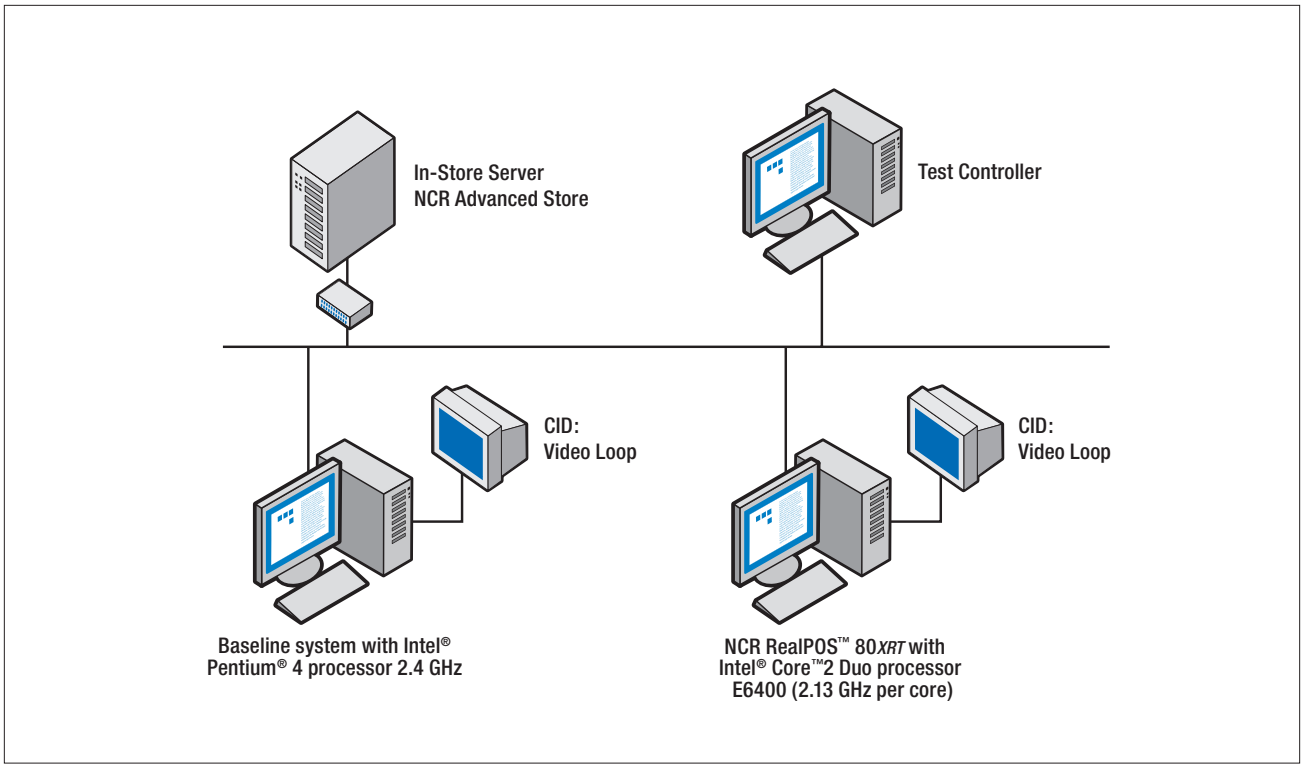

Figure 2: Client configuration

3. Item processing performance with complex promotions

   - A PLU request is sent from the POS application to the server, a response message is returned and processed, and the item information is processed and added to the electronic journal. From the user standpoint, this checkout process looks like:
     - Prompt to scan item
     - Scan item
     - Display item number
     - Display PLU
     - Repaint the user screen

4. CPU and disk utilization on POS workstation functioning as a server

Across all four vectors, the NCR RealPOS 80*XRT* with the Intel Core 2 Duo processor E6400 shows significant performance improvements over the baseline Intel Pentium 4 processor-based system.

1. In retail messaging performance, the NCR RealPOS 80*XRT* yields improvements between 37% and 98% faster than the baseline system during login, PLU, data collect and electronic journal activities.
2. For back-office performance, the improvements are 68% while running large transaction summary reports and end-of-day closing reports.
3. Item processing with complex promotions performance is 68% better than baseline. This means that from the time the cashier is prompted to scan an item (user input) until the time the screen repaints with item pricing information from the server, the POS system was 68% faster.
4. In addition, CPU and disk utilization on the POS workstation functioning as a server were 60% and 63% better respectively, indicating significant performance headroom beyond these test loads.

Table 2: Workstation/server configuration benchmark results

Performance area	Performance parameter	POS platform	Time	Percentage faster than baseline	Times faster than baseline
Retail messaging performance	Login	Baseline system with the Intel® Pentium® 4 processor 2.4 GHz	0.772 sec		
		NCR RealPOS™ 80*XRT* with Intel® vPro™ processor technology, including the Intel® Core™2 Duo processor E6400^Δ 2.13 GHz	0.018 sec	98%	43X
	PLU cycle	Baseline system with the Intel Pentium 4 processor 2.4 GHz	0.030 sec		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	0.019 sec	37%	1.6X
Back-office performance	Data accumulation (DCOL Report)	Baseline system with the Intel Pentium 4 processor 2.4 GHz	6:56 min/sec		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	2:10 min/sec	68%	3.2X
	EOD store close	Baseline system with the Intel Pentium 4 processor 2.4 GHz	9:21 min/sec		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	2:47 min/sec	69%	3.2X
Item processing with complex promotions		Baseline system with the Intel Pentium 4 processor 2.4 GHz	1.150 sec		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	0.370 sec	68%	3.1X
CPU utilization		Baseline system with the Intel Pentium 4 processor 2.4 GHz	67.5%		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	26.8%	60%	2.5X
Disk utilization		Baseline system with the Intel Pentium 4 processor 2.4 GHz	19.9%		
		NCR RealPOS 80*XRT* with Intel vPro processor technology, including the Intel Core 2 Duo processor E6400 2.13 GHz	7.4%	63%	2.6X

Table 3: Client configuration benchmark results

Parameter	POS platform	Time	Percentage faster than baseline	Times faster than baseline
Item processing with complex promotions	Baseline system with the Intel® Pentium® 4 processor 2.4 GHz	0.86 sec		
	NCR RealPOS™ 80*XRT* with Intel® vPro™ processor technology, including the Intel® Core™2 Duo processor E6400[Δ] 2.13 GHz	0.48 sec	44%	1.8X

Benchmark results for the client configuration

Table 3 shows the summary results of the benchmark tests for the client configurations.

For these configurations, the test vector was item processing performance with complex promotions, where the NCR RealPOS 80*XRT* yields a 44% improvement versus the baseline system. This means that from cashier input to screen repaint with item pricing information, the POS system was 44% faster.

Conclusion

As retail IT leaders consider their strategy going forward, the following factors should be a central part of strategy creation:

- For any given POS platform, what elements will extend or restrict the product lifecycle?
  - Does the platform have performance headroom for increased loads from both more-demanding applications and higher sales volumes?
  - Does the platform have the flexibility and adaptability to support major changes, such as an operating system change or improved network technology?
  - What are expected maintenance and support costs throughout the lifecycle?
  - What is the historic and projected reliability of the POS systems under consideration?
- What is known and unknown about IT requirements five years from now?
- What marketing strategies are likely to need support from the POS platform in the near and medium term, given the shift to customer-centric initiatives? Possibilities include:
  - New customer interfaces including customer-facing displays, customer-interactive touch screens, pin pads and other devices
  - Delivering general or targeted messages to customers
  - Providing graphics-rich media, advertising or full-motion video capabilities to the customer at the POS
  - Revenue-generation at the POS through cross-sell and up-sell
  - Multi-channel campaign management via Internet, catalog and in-store interaction across multiple store locations

Increased competition and rising customer expectations will continue to drive retailers towards more customer-centric models. In conjunction, the increasing capabilities of advanced POS platforms will allow the role of POS systems in store operations to grow. POS systems based on high-performance, open-standards technology – such as the NCR RealPOS 80*XRT* with Intel vPro processor technology – bring retailers the capabilities they need now to deploy customer-centric strategies, as well as the flexibility to meet their needs well into the future and protect their POS investment. The performance of the NCR RealPOS 80*XRT* raises workforce productivity and enables better customer experiences, while the remote manageability features reduce support costs throughout the POS lifecycle.

Company Information

NCR Corporation is a leading global technology company helping businesses build stronger relationships with their customers. NCR's Teradata® data warehouses, ATMs, retail systems, self-service solutions and IT services provide Relationship Technology™ that maximizes the value of customer interactions and helps organizations create a stronger competitive position. Based in Dayton, Ohio, NCR employs approximately 28,900 people worldwide.

NCR's Retail, Hospitality and Self-Service Solutions division is a leading provider of store automation and self-service solutions, including hardware and software, consulting and customer support services. With over 120 years of real world experience, NCR delivers real results to the bottom line for customers worldwide in food and drug, general merchandise, convenience store, health care, travel and hospitality market segments.

Intel, the world leader in silicon innovation, has continuously developed the technology, products, and initiatives that enable the computer and Internet revolution that is changing the world. Founded in 1968 to build semiconductor memory products, Intel today is the world's largest chip maker, and a leading manufacturer of computer, networking, and communications products.

For more information on the NCR RealPOS 80*XRT* and NCR Retail solutions, visit www.ncr.com.

[1] 2006 Retail Technology Study, RIS News and Gartner Group.

[2] RIS News and IHL Consulting Group, Store Systems Study 2007.

[3] See Forrester Research, Trends 2006: Retail IT, March 1, 2006.

[4] Performance measured Intel® Core™2 Duo desktop processors compared to Intel® Pentium® D Processor 805 on SPECint_base2000 and SPECint_rate_base2000(2 copies.) Actual performance may vary. See www.intel.com/performance for more information. SPECxx are trademarks of the Standard Performance Evaluation Corporation. See www.spec.org for more information.

[5] Advanced Point of Sale Report, AMR Research Inc.

† Intel® Active Management Technology requires the platform to have an Intel® AMT-enabled chipset, network hardware and software, connection with a power source and a network connection.

Δ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See www.intel.com/products/processor_number for details.

* Other names and brands may be claimed as the property of others.

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