IBM Self Checkout System Overview
IBM Self Checkout System Overview
Second Edition (May 2005)

This edition applies to IBM Self Checkout System machine type 4845, Models 110, 130, 150, 170, C40, and W5x.

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Preface

This is an overview of the IBM® Self Checkout System 4845 Models 110, 130 Express, 150 Express Plus, 170 Full-Lane, 140/C40, and W51, W52, and W55 Remote Attendant Podium.

Who Should Read This Guide

This guide is intended for retail hardware and software purchasing decision-makers, technical support personnel, store personnel, sales attendants, and anyone interested in an overview of the IBM Self Checkout System.

Related Publications

- IBM Self Checkout System 4845 Parts Manual, S131-0205
- IBM Self Checkout System 4845 Service Guide, GY27-0419
- IBM Self Checkout System 4845 Installation Guide, GA27-4346
- IBM 4610 SureMark Printers Hardware Service Manual, GY27-0355
- IBM 4610 SureMark Printers User Guide, GA27-4151
- IBM 4820 SurePoint Solution Planning, Installation and Service Guide, GA27-4231
- IBM 4800 SurePOS 720, 740, and 780 Hardware Service Guide, SA27-4329
- IBM 4694 Point-of-Sale Terminal Hardware Service Manual, SY27-0364
- IBM Safety and Regulatory Information - Read This First, GA27-4004

Where to Find More Information

Current versions of Retail Store Solutions documentation are available on the IBM Retail Store Solutions Web site at: www.ibm.com/solutions/retail/store/support. Click Publications and locate the Self Checkout documentation.

Publications Accessibility

The softcopy version of this document is accessibility-enabled for the IBM Home Page Reader.

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After you have filled out the form, return it by mail, by fax, or by giving it to an IBM representative. If applicable, include a reference to the specific location of the text on which you are commenting. For instance, include the page or table number.

Between major revisions of this manual we may make minor technical updates. The latest softcopy version of this manual is available under Publications on the IBM Retail Store Solutions Web site.

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**End of life disposal**

IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of programs and services to assist equipment owners in recycling their IT products. Information about these product recycling offerings can be found on IBM’s internet site at the following URL.


**Taiwanese battery recycling statement**

Waste batteries, please recycle.

廃電池請回收
Chapter 1. Overview

The IBM Self Checkout System offers a cost-effective solution for retailers and an easy-to-use alternative for consumers who want faster checkout services.

The IBM Self Checkout System allows customers to scan their orders of any size and select a payment option to complete the purchase. The IBM Self Checkout System offers an alternative self-serve solution for conventional checkout lanes.

The IBM Self Checkout System can consist of a cash module, a security module, conveyors, and bagging areas. Retailers can use a standalone cash module or combine it with other modules to fit their needs. The IBM Self Checkout System offers multiple security options to fit your specific store requirements, such as authorization software, bar code scanner scales, security curtains that measure item dimensions, and bagging area scales that verify scanned items when they are packaged.

The design is user-friendly, versatile, and compatible with any store layout. The front-end of each self-checkout lane is connected to a central BOSS server with access to a database that maintains all item and security data. In the self-checkout lane, the scanned items are verified against the data in the database.

The user interface and touch screen monitor allow customers to interact with the lane to submit information and payment. Payment options include credit cards, cash, and product coupons. Receipts are printed and dispensed to the customer. The customer is given operation instructions with voice and screen messages. A transaction awareness light notifies sales attendants of problems on the lane. Authorized sales attendants can assist customers and use lane diagnostics to correct lane problems, if necessary. Selected functions of the lane can be controlled through a wireless Mobile Terminal. The Mobile Terminal gives sales attendants the flexibility to provide assistance to self-checkout customers without being physically present at that lane.

This book provides a description of how the IBM Self Checkout System operates and integrates with the store’s Point Of Sale (POS) using standard and wireless networking applications.

Figure 1 on page 2 represents a typical POS configuration including the IBM Self Checkout System.
Table 1 provides a list of self-checkout components that are available in the IBM Self Checkout System line of products. The X indicates components that are available for that model.

**Table 1. Self-Checkout Components Comparison List**

<table>
<thead>
<tr>
<th>Components</th>
<th>Model 110</th>
<th>Model 130</th>
<th>Model 150</th>
<th>Model 170</th>
<th>Model 140/C40</th>
<th>Model W5x</th>
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<td>Bagging Module, 2-bag side-by-side</td>
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</tr>
<tr>
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Table 1. Self-Checkout Components Comparison List (continued)

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<tr>
<th>Components</th>
<th>Model 110</th>
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<th>Model 140/C40</th>
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<td>Customer Display</td>
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<td>X</td>
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</tr>
<tr>
<td>Security Sensors</td>
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<td>X</td>
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<tr>
<td>Signature Capture</td>
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<td>Touch Screen Monitor with MSR</td>
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<td>X (W55 only)</td>
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<td>Transaction Awareness Light</td>
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<td>X</td>
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<td>Uninterruptible Power Supply</td>
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<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>

System Components

The system components of an IBM Self Checkout System are organized into an overall software and hardware design, or architecture, that includes the store front end and back office. The lane configuration can be composed of a combination of conventional lanes, self-checkout lanes, and paystations. Your store requirements and other considerations, such as physical space and staffing, will determine which lane configuration best suits your needs. The following list describes the architectural building blocks and system components of the IBM Self Checkout System.

Store Front End

The store front end is the area where items are purchased. It is comprised of conventional lanes and IBM Self Checkout System lanes with an IBM Self Checkout System paystation. You can use an unlimited number of checkout lanes in your store front end.
Conventional Lanes
Conventional lanes require operation by a sales attendant. Most conventional lanes use an input conveyor to transport items to a sales attendant who scans the bar code, tabulates and processes payments, processes coupons and receipts, and packages purchased items for the customer. Conventional lanes communicate over a network with the main store controller to access and store data.

IBM Self Checkout System Lanes
The IBM Self Checkout System lanes allow customers to purchase items without a sales attendant. The self-checkout system includes all the features a customer needs to complete transactions, such as:
• scanning and bagging items
• item security verification
• age verification
• interacting with the touch screen monitor to enter items sold by weight, such as produce
• entering coupons
• using cash and credit card payment options

IBM Self Checkout System lanes communicate with the store’s Point Of Sales (POS) controller and system in the same way as conventional lanes, through network communication.

IBM Self Checkout System Paystation
The IBM Self Checkout System paystation operates like a conventional lane without a conveyor or bagging area. A sales attendant uses a standard or handheld scanner to assist self-checkout customers who choose a payment option not offered at the self-checkout lane. The sales attendant can also resolve transactions that are suspended at the self-checkout lane. A paystation can be independent from the IBM Self Checkout System lane, or integrated as a section of the IBM Self Checkout System bagging area. Conventional registers can be designated to function as IBM Self Checkout System paystations.

Back Office
The back office is the central point of communication for the store’s information processes and the control area for most store lane operations. It typically consists of:
• POS controllers
• A network server
• A networking device, such as a switch or hub
• The IBM Self Checkout System Back Office System Server (BOSS)
• Other equipment, as required

POS Controller
The POS controller contains store POS data. POS data includes item pricing, order information, cost, and sales tracking. Most store locations have two POS controllers. Controller number one is used for normal operation. Controller number two is a mirror copy of number one and is used as a backup for Controller number one. Both controllers contain information about every item offered for sale by the retailer. Each IBM Self Checkout System lane appears as a conventional lane to the POS controller.
Server and Networking Device

A server is a centralized computer that is linked to other computers on a network. A network is the connection of two or more computers. Network devices, such as hubs or switches, can be used as a connection point to join the network cables together to communicate with the server. IBM Self Checkout System installations use Ethernet connections and can be readily connected to existing Ethernet infrastructures.

Back Office System Server (BOSS)

The BOSS shares information among all the IBM Self Checkout System lanes installed in a store. It maintains the master security database that contains system operation and configuration information, such as shopper-assistant card privileges. It also records operating information and produces system reports. The BOSS serves as the client-server application for the Mobile Terminal.

IBM can remotely connect to the BOSS computer to update IBM Self Checkout System software, troubleshoot and correct reported IBM Self Checkout System problems, gather critical error log files (extracts), and store IBM Self Checkout System performance information.

Mobile Terminal

The Mobile Terminal is a handheld device that you can configure to allow store personnel to monitor the operation of the self-checkout lane that is assigned to that Mobile Terminal from a remote location. IBM can configure the Mobile Terminal to work with the IBM Self Checkout System. Contact your IBM representative for detailed information.

You can assign the Mobile Terminal to monitor multiple self-checkout lanes. You can also define an authorized sales attendant for each Mobile Terminal to resolve issues requiring store intervention without being present at the lane.

The Mobile Terminal offers wireless connectivity to the assigned lanes using a Direct Sequence Spread Spectrum (DSSS 802.11b) format.


The IBM Self Checkout System does not supply a handheld mobile terminal device. You can obtain the device from the manufacturer, Symbol Technologies, Inc. (http://www.symbol.com). IBM provides software, troubleshooting procedures, and Web site links to assist you in using a Mobile Terminal with IBM Self Checkout System lanes.

Key functions include:

- Uses wireless communication with the IBM Self Checkout System lanes.
- Provides individual security that allows only authorized users to sign on to a Mobile Terminal.
- Displays all relevant status information (for example, system summary) for connected IBM Self Checkout System lanes that are assigned to that Mobile Terminal.
- Requires the user to acknowledge various informational messages pertaining to specific IBM Self Checkout System lanes.
• Allows the shopper assistant to use the bar code scanner integrated with the Mobile Terminal to add single or multiple items to a new or open transaction on assigned IBM Self Checkout System lanes.

The Mobile Terminal can add items to an order with the built-in scanner before the order has been suspended in the lane or before the order has been completed using any of the pay-at-the-lane options. To add items to an order, the order must be open on the IBM Self Checkout System lane. Items cannot be added to orders with the Mobile Terminal after the order has been retrieved at the paystation.

Access Points
Access points are networking devices that are used to connect wireless components to a wired network. An access point must have a wired or wireless connection to a local area network (LAN) for successful communication. You use access points in your store to receive and transmit data to and from wireless components. You are required to use a standard Ethernet cable to connect an access point to the network.

To establish a wireless connection to the IBM Self Checkout System BOSS, it is recommended that you set up the access point to accept an 11 Mbps Direct Sequencing Spread Spectrum format. Contact your access point provider for assistance in troubleshooting access point issues.

Scale Management System
The scale management system contains pricing data for Type 2 items (sold by weight) and other items sold as price per weight. When the price changes for an item, the change is made in the scale management system. The system then automatically updates all store scales connected to the network. Typically, an item with a Type 2 bar code or scale lookup (SLU) is found in the meat, deli, or bakery department. Items using a price lookup (PLU) are found in the produce department. The IBM Self Checkout System can interface with your scale management system, but IBM does not provide support for the scale management system.

Note: The scale management system used with the IBM Self Checkout System is not an IBM product.
Figure 2. Example of a Scale Management System
Chapter 2. The IBM Self Checkout System Solution

The IBM Self Checkout System can be one or a combination of the following systems:

- **IBM Self Checkout System lanes**
  - IBM Self Checkout System Model 110 (credit card only)
  - IBM Self Checkout System Model 130 Express (checkout only)
  - IBM Self Checkout System Model 150 Express Plus (weight-based security only)
  - IBM Self Checkout System Model 170 Full-Lane (height- and weight-based security)
  - IBM Self Checkout System Model 140/C40 (dual cash modules)
  - IBM Self Checkout System Model W51, W52, W55 (lane and paystation)
- **IBM Self Checkout System BOSS**
- **IBM Self Checkout System Mobile Terminal Software**
- **IBM Self Checkout System Paystation**

The IBM Self Checkout System lane and the BOSS work together to create a self-checkout solution. The Mobile Terminal and the paystation can be added to a self-checkout system to create a customized retail environment tailored to each store’s requirements.

The IBM Self Checkout System Lanes

An IBM Self Checkout System lane can be installed using several different configurations based on store requirements. Using the IBM Self Checkout System, you can combine modules to create different store front end footprints. Lane types are available in both left- and right-hand configurations. The sections that follow describe the modules that are available in the IBM Self Checkout System.

Cash Module

The Cash Module performs multiple functions and is a core module for all IBM Self Checkout System configurations, except the Model 110. At the Cash Module, customers scan and weigh items, process coupons, submit payment for orders using cash or credit cards for payment, and receive customer notifications.
Model 110

The Model 110 is an efficient self-checkout lane that allows credit card or Smart Card payment only. The bagging area provides item weight security. Using the convertibility mode, the scanner and touch screen monitor can be rotated to allow a sales attendant to use the lane as a conventional lane. The Model 110 does not include a cash module or security conveyors.
130 Express
The IBM Self Checkout System 130 Express offers a compact self-checkout solution that is ideal for small orders. You add different bagging modules, such as a bagging rack, to the Cash Module to convert it to an IBM Self Checkout System 130 Express. The IBM Self Checkout System 130 Express can process any item in the store but it does not provide weight and height security checking.

IBM Self Checkout System 130 Express has two configurations:
• 130 Express with a single bagger module.
• 130 Express with a two-tiered bagger module.

150 Express Plus
IBM Self Checkout System 150 Express Plus offers two options:
• 150 Express Plus with a two-tiered bagger module.
• 150 Express Plus with a side-by-side three bagger module.

The IBM Self Checkout System 150 Express Plus with a two-tiered bagger module offers the customer a total payment solution with the benefit of weight security. Weight security is the comparison of the item weight from the scale to the item weight listed in the master security database. The Model 150 asks customers to
remove an item from their bag if the weight parameters do not match the actual weight. To purchase items not meeting the weight parameters the customer will need assistance from store personnel.

The IBM Self Checkout System 150 Express Plus with a side-by-side three bagger module provides additional room for customers to bag items.

The Cash Module functionality is the same as in IBM Self Checkout System 130 Express applications. The addition of the two-tiered bagger and side-by-side three-bagger area, allows you to use the bagging module storage space to store the lane PC, security controller, uninterruptible power supply, and other system hardware that operates the lane.

170 Full-Lane

The IBM Self Checkout System 170 Full-Lane is the largest and most secure lane configuration of the IBM Self Checkout System.

You configure this lane by attaching the Security Module to the Cash Module, and the bagging area to the Security Module to provide self-checkout customers with:
- complete payment options
- bar code item database for price and security parameters
- height and weight security
- transport conveyor systems
- several bagging module options, such as a carousel bagger or integrated paystation

Figure 7. IBM Self Checkout System 150 Express Plus with a two-tiered bagger

Figure 8. IBM Self Checkout System 150 Express Plus with three bagger option
The Security Module is where the security parameters of scanned items that are stored in the master security database are verified. Security curtains in the Security Module take height measurements and load cell assemblies take weight measurements. If the security parameters are met, a conveyor system moves the item through the security section into the bagging area. It reverses or rejects an item when the security parameters are not met.

The bagging area can range from 1.0 meter (40 inches) to 2.4 meters (97 inches) in length. You can add options to the bagging area, such as an integrated paystation or carousel bagger, to enhance IBM Self Checkout System 170 Full-Lane capabilities.

Figure 9. Model 170 Bagging Area Options

**Model 140/C40**

The IBM Self Checkout System Model 140/C40 provides a unique self-checkout solution that consists of two self-checkout lanes that are attached in the center. Each lane operates independently and includes standard IBM Self Checkout System scanning and cash components without the security curtain and item conveyors. Both self-checkout lane cash modules use the same bill dispenser for easy lane maintenance.

Model 140/C40 offers the convertibility mode option that allows you to define the lane to be either a self-checkout lane or a conventional lane managed by a sales attendant using a hand scanner and cash drawers located in the rear of the cabinet.
Model W51/Model W52/Model W55 Remote Attendant Podium

The IBM Self Checkout System Model W51 features the scan-and-bag item security technology that allows customers to unload items directly on the input conveyor belt and automatically move items to the scanning area. The input conveyor is not a security conveyor. Model W51 consists of a cash module, a security module, an input conveyor, and a bagging area. Models W51 and W52 can be ordered for either right- or left-hand lanes.

Model W52 is the same as the Model W51 configuration without an input conveyor.

Model W55 is a remote attendant podium that provides a sales attendant with direct communication to each of the self-checkout lanes. The remote attendant podium is equipped with a touch screen monitor that allows the sales attendant to perform such tasks as age verification and security overrides from a remote location over the self-checkout network. Model W55 includes a cash drawer and storage area.
Chapter 3. IBM Self Checkout System Software

This chapter describes the software applications that you use to operate the IBM Self Checkout System.

Configuration Files

The configuration files are located in a directory in each lane’s PC.

IBM Self Checkout System Lane Applications

All IBM Self Checkout System lane applications reside in one directory after installation. See Figure 12 for an example.

BOSS

The IBM Self Checkout System BOSS computer is typically located in the store’s back office and is connected to each lane using an Ethernet network connection. The BOSS contains the following system information:
- Security database
- History database
- Log database
- Scale file

Databases

The BOSS is the keeper of the master databases comprised of the security database, history database, and log database. Information packages are used to send information to the BOSS for every item sold on the lane.
Security Database

The security database maintains a file of every item that is stocked in the store called a security record. The security record consists of attributes that identify a particular item.

Every bar code in the store has at least one security record. Although the attributes and values can change, the information recorded in this file is the same. This helps determine the way the item is to be handled at the lane and the security parameters for the item.

The retailer or authorized user can use the security database maintenance program to manually change or maintain these records. Figure 13 illustrates this program.

![Security Database Maintenance Panel](image)

*Figure 13. IBM Self Checkout System Security Database Maintenance Panel*

The attributes listed in the security record from Figure 13 are identical to the fields shown in the security database maintenance program. On this example panel, the Item ID/SLU is the PLU or bar code, the description is PEACHES, and the height and weight values are identical.
Every field that is shown in the security database maintenance program matches an attribute that can be found in the security record for that item.

A copy of the security database is distributed to each IBM Self Checkout System lane computer. When an item is scanned at the lane, the lane reads the database and compares the measured attributes with the record ones to determine if the item being processed is valid. Every time an item is scanned, an item information packet is created and sent to the BOSS. When the BOSS receives this packet, it checks if the new item, security override, or the old security record flags are selected. If so, it retrieves the item’s security record and updates it with the new information. The updated record is then sent to the security database record on each lane. It is important to remember that the only time that an item’s security record is modified is when one of these flags is sent in the item information packet.

**History Database**

The history database collects the history of each item that has been scanned at the lane. The first time an item is scanned, the item’s bar code is recorded in the history database along with the measured height and weight. It also records the item handling attributes, such as:

- Item type, for example, age restriction
- Items where the wrapper is secured and the excess wrapper fans out like a tail. For example, bread wrappers, plastic cups, paper plates, and plastic tableware.
- Long items that break both security curtains at the same time because of their length

Dimensional security information is gathered for every item that is scanned at the IBM Self Checkout System lanes. The reason for collecting this information is to allow the history analyzer program to maintain security records. The program compares all the recorded records for an item, determines security settings to be placed on the item, and updates the item’s security record based on recorded attributes in the history database.

Understanding what information is collected each time someone scans an item at the lane is essential to understanding the operation parameters of the IBM Self Checkout System.

Item information packets are processed at the BOSS to:

1. Log information for reporting
2. Log item history (weight, height, and so on)
3. Perform overrides, security learning, and security record maintenance

The lane cannot modify or create item security records. Therefore, the Lane.exe program must send the item packets to the BOSS where the data is processed. The Lane.exe program never writes to the security database located at the lane. Lane.exe mirrors item information so it can be validated at the BOSS.

The item is placed on the security conveyor where load cells take a weight measurement and compare it to the weight measurement from the security record for item validation. Next, the item travels through the lane’s security system where attributes are collected and compared with the lanes security records. The information about each scan is also sent to the BOSS in the form of an item information packet.
Log Database

The log database records all the events that take place at the lane and BOSS-supplying system-reporting information. This information can range from item rejections to the number of times a shopper-assistant card is used at each lane to sale information. All reports are generated from information contained in the log database. The log database uses information from the item information packet to record how many times an item is rejected and the nature of the rejection.

Scale File

The scale file can be explained using the following example. Last week, 1 lb. of ground beef cost $1.00 per pound. This week, the price has increased to $1.25 per pound. To update the entire store system, your corporate office can change the price in the corporate system to $1.25 per pound and distribute this change to each store’s scale system and to the BOSS, which in turn updates Type 2 item security.

Scale file processing, also called automated pricing, is used primarily with pre-labeled Type 2 items such as meat or deli items.

The scale file is critical for successful IBM Self Checkout System operations. When a scale file is received at the BOSS, the BOSS Manager program processes it. BOSS Manager looks in the file for the item’s bar code. It then opens the security record and sets the attributes to reflect the information listed in the scale file. After this is done, it distributes this information to all the IBM Self Checkout System lanes.

An incorrect scale file causes Type 2 items to be rejected at the IBM Self Checkout System lanes because the scale file uses the item price divided by the item’s weight from the load cells to calculate the unit price. This calculated unit price must match the unit price recorded in the security database or the lane rejects the item due to an invalid weight.

Type 2 Validation formula: \( \frac{\text{Item price}}{\text{Item weight}} = \text{Unit price} \)

Example: The item price on a 1 lb. package of ground beef is $1.00. When the item is scanned at the IBM Self Checkout System lane, the lane gets a weight of 1 lb. and divides the item price of $1.00 and determines that the unit price is $1.00. The calculated unit price is then compared to the unit price from the security database. In this example, the scale file was incorrect and the unit price is $1.25 for ground beef. This causes the item to be rejected when the two unit prices are compared because the calculated unit price ($1.00) is lower than the security record unit price ($1.25).
Chapter 4. IBM Self Checkout System Integration with the POS System

The store’s POS system provides item pricing and descriptions, whereas the IBM Self Checkout System equipment and software provide item security and payment capabilities. The two systems work together, making it easier to manage the front end of the store while ensuring integrity of the items being purchased.

The system also provides an assortment of reports from its back-office system, giving store personnel the ability to monitor and enhance the system’s performance.

IBM Self Checkout System Lane and IBM POS applications

IBM Self Checkout System is designed to be an automated self-checkout system requiring minimal manual intervention. With the IBM Self Checkout System, the entire process required for handling a customer’s checkout transaction can be completed without the need for operator assistance. Exceptions to this process include the authorization for shoppers to purchase age-restricted items. Visual verification of a shopper’s ID by a qualified sales attendant is required to complete a transaction that includes restricted items. This is the same process required by a conventional lane transaction. Recognizing the need to minimize shopper inconvenience, user exits have been coded that optimize handling of this and other similar requirements.

IBM Self Checkout System provides user exit code for the following functions in the IBM Supermarket Application (SA). These same functions are provided through selectable options within the IBM ACE application.

- Open-suspended transaction reports that can be displayed, printed, or both. These reports show all currently suspended transactions.
- Age-restriction handling.
- Bar code functionality – receipts printed at the lane for suspended transactions can be retrieved at the paystation. The bar code allows for quick retrieval of suspended transactions.
- Force total functionality that ensures accurate on-screen running totals are displayed to the customer at the touch screen monitor.

User Exit Option Functionality

This section describes the user exit functionality provided by the IBM Self Checkout System for the IBM Supermarket Application (IBM SurePOS™ ACE) and the options available in the IBM Supermarket application for self checkout.

Open Suspended Transaction Report Display

The open suspended transaction report is designed for a full-screen terminal sales video display. The report supports the following screen resolutions:

- 12 X 20
- 16 X 60
- 16 X 80
- 25 X 80
If the full-screen video display is not configured for one of these resolutions, the open transaction report is not displayed.

If a video display is not configured, it can be configured to receive the report upon the entrance of a 100-key log-on sequence.

For ACE, the open suspended transaction report consists of several user exit functions. The implementation of each function requires that actions be performed in distinct user exits of the IBM Supermarket Terminal Sales application.

The action for a specific, open suspended transaction report function in a specific terminal-sales user exit is invoked by placing a call to the appropriate function inside the user exit.

The function calls are inserted into the terminal-sales user exits by using \include statements placed in the body of the user exit routine. This effectively places the appropriate call in the user exit when the user exit module is compiled.

For ACE, the Open Transaction Report option should be activated to enable use of this report.

**Age-restricted Item Handling**

**Note:** The age-restriction information shown here is for the United States of America only.

The IBM Self Checkout System supports age-restricted handling from the POS. For the shopper who chooses to pay the cashier, age verification is done at the paystation after the order is suspended using the customer’s age-restricted processing. For the shopper who chooses to pay at the lane, a shopper assistant performs age verification at the lane. When age verification is performed at the lane, a dialog box appears and gives the sales attendant the option to enter the shopper’s birth date, press an over-21 button (if the shopper is over the age of 21), or press an over-18 button (if the shopper is over the age of 18).

The age-restricted item handling process begins when the shopper scans an age-restricted item. The lane processes the item and then flashes the lane light to summon a sales attendant.

User exit code is provided for the sales attendant to allow the system to progress until the end of the transaction without requiring an age to be entered. This same function is provided in ACE when the Terminal Function option for a specific terminal is set to self-checkout. The customer continues scanning each item until the sales attendant arrives. The sales attendant can verify and approve age-restricted items at any time during the customer’s transaction (card permissions are user-defined). The sales attendant scans his or her shopper-assistant card. The system then prompts the sales attendant to verify the customer’s age in a manner consistent with the age-validation procedure used at conventional registers.

If an age-restricted item is processed at the lane and a sales attendant does not arrive to verify the ID by the time the customer reaches the choose/confirm a payment method panel, the customer cannot proceed past this point until age verification is completed. At this time, a panel appears and offers the customer the option to wait for assistance or pay the cashier.
Bar Code Function

The bar code specifications describe the technical methods used to scan the bar code from a receipt of an IBM Self Checkout System lane suspended transaction. The purpose of the scan is to retrieve the order for tender. Transactions are suspended using standard IBM POS suspend or retrieve functions. The bar code gets printed on the customer receipt when the transaction is suspended. The customer takes the receipt to a paystation for tender. Then, a sales attendant scans the bar code to retrieve the order. The data is used to identify the suspended transaction, the terminal ID, and the transaction number of the order suspended.

User Exit code is provided to enable printing and reading of a bar code for suspending and retrieving transactions. For ACE, the Use Suspend/Retrieve Barcode option needs to be enabled.

Force Total Function

The force total function provides on-screen running totals to the lane. The SA user exits or the designating of a terminal as a self-checkout terminal in ACE, causes a total to be provided when one is requested by the lane. This ensures the accuracy of running totals by removing the requirement to simulate or calculate the running total manually from the display or print lines. The function is also used by the IBM Self Checkout System lanes to force a balance-due line to be printed when the operator presses Total, even if the total has not changed since the last total request.
Chapter 5. BOSS-to-Lane Communication

This chapter describes the communication and item processing for the IBM Self Checkout System lanes.

Network Connection

Communication between the BOSS and each lane is accomplished through the use of Transmission Control Protocol/Internet Protocol (TCP/IP). In most cases, the Ethernet cable is connected to a computer on one end and a network device on the other. To use this type of communication, there must be:

- A network interface card (NIC) at each computer
- A crossover cable connecting the two NICs
- An Ethernet cable
- A series of numbers that distinguish one computer from another (IP address)

The network connection requires several configuration settings but these are the basic elements of network communication (see Figure 14).

![Figure 14. TCP/IP Network Connection](image)

BOSS Manager

The BOSS Manager is the controller of all BOSS-to-lane communication. While running, the BOSS Manager program is in constant communication with each IBM Self Checkout System lane using TCP/IP through the BOSS port.

When the BOSS Manager program starts up, it determines how many lanes are installed at the location and what the assigned IP port is for each lane.

Three types of information are transmitted from the BOSS:

- **Transaction Information** - Every time an item is scanned, an item record is created and sent to the BOSS and an information packet is created. The item record is sent to both the history and security databases for updating.

- **System Messaging** - System messaging includes various types of error messages and cash system errors. It also includes system diagnostic information that is collected at the lane at any time.
• **Configuration Information** - Configuration information includes system setup data, for example, user names and permissions or changes to the shopper-assistant cards and quick lookup screens. In the event that the socket connection is broken, the lane stores this information locally in a *pending* file. When the lane is brought to a closed state, it synchronizes with the BOSS and sends the pending information. Synchronization ensures that information on the BOSS and all the lanes is identical.
Chapter 6. Item Processing

Item processing includes all the functions that are required to complete self-checkout lane transactions. The use and application of the lane functions, lane software, POS, and security processing described in this section are based on the operation of the IBM Self Checkout System 170 Full-Lane security lane.

To process an item, first scan an item’s bar code using the scanner/scale. The lane reads the identify.txt table to determine what type of bar code has been scanned. The security database is then queried for the item’s security record. After the record is retrieved, the lane uses the item type entry in the security record to determine how to continue processing the item.

Bar Code Item Processing

After an item bar code is scanned, the bar code is sent to the POS system to obtain the price and description for the item. At the same time, the security conveyor begins moving forward and the consumer is asked by the lane to place the item on the belt. As the item travels down the security conveyor toward the front security tower, the lane’s load cells take a weight measurement for the item. This measurement is compared against the minimum and maximum weight ranges in the security record. If the measured weight falls within the range, the item’s weight is validated.

While weight validation is taking place, the lane has received the item’s price and description message sent from the POS. The lane receives the message and filters it to determine how to process the message information. It matches the message information to the price and description entries, and the response is added to the price and description on the electronic and printed receipts.

After the price and description are received and the weight of the item is validated, the item is allowed to pass through the front tower. When the item first enters the front tower, it interrupts the beams from a series of light emitting diodes (LED), which are made up of an emitter on one side of the tower and a detector on the other. The emitter sends an infrared beam across the security area that is received by the detector. The lane interprets this condition as an UNBREAK, meaning the infrared beam between the emitter and detector is not broken. When the detectors do not detect the infrared beam from the emitter, the lane interprets this condition as a BREAK. As the item enters the security area, it BREAKS the beams from LEDs in the front tower. As it leaves the tower area, the LEDs that were in the BREAK condition then toggle back to the UNBREAK condition. The lane takes a height measurement from the highest LED that toggled from BREAK to UNBREAK and compares this measurement with the minimum and maximum heights that are recorded in the security record. If the measured height matches a recorded height in the database, the item’s height is validated.

If the item’s height is valid, the item continues to travel down the security conveyor toward the rear security tower area. As it passes through the rear tower area, the BREAK - UNBREAK condition is recreated for the rear tower. When the lane receives a BREAK message from the rear tower area, the rear conveyor is started and the item is transported to the bagging area and becomes a purchased item.
Keys to Item Processing

The following is required for the item to be processed:

- Bar code
- Price and description from the POS
- Security record
- Valid weight
- Valid height

The lane always checks the security record to determine how to handle an item. If the item is new or does not have a security record, the lane assumes the item is normal unless identified by the POS as a weight- or quantity-required item. The height measurement is taken when the item leaves the front tower area. Rear conveyor movement is activated when the item breaks the rear tower security curtain LEDs. When the lane processes an item, it creates an item information packet and sends it to the BOSS after the item is purchased.
Chapter 7. Mobile Terminal

Attention: The IBM Self Checkout System does not supply a handheld mobile terminal device. You can obtain the device from the manufacturer, Symbol Technologies, Inc. (http://www.symbol.com). IBM provides software for a Mobile Terminal configured to be used with IBM Self Checkout System lanes.

The Mobile Terminal is a handheld wireless device that you can use to monitor and control selected functions of the self-checkout lanes. Transaction status information is displayed in real-time on the Mobile Terminal as the customer’s order is processing. An authorized sales attendant can monitor each self-checkout lane from anywhere in the store that is within the range of the wireless network. Additionally, the Mobile Terminal allows the sales attendant to assist multiple customers without having to travel from lane to lane, thus reducing customer wait time.

You can assign sales attendants varying authorization levels that allow them to perform a predefined range of tasks. For example, you can grant store supervisory staff permissions that allow them greater access to system options than those granted to entry-level sales attendants.

The Mobile Terminal cannot perform all self-checkout lane diagnostic or repair functions. It is intended to be a notification device that alerts store personnel remotely that customers need assistance. Some lane diagnostic or repair functions can be performed from the Mobile Terminal to correct lane malfunctions.

The Mobile Terminal notification signal is a distinctive audio tone and visual display icon that appears in the Lane Status display. The notification is sent to all connected Mobile Terminals, but only assigned Mobile Terminals receive the notification.

The IBM Self Checkout System currently supports the Symbol PPT 8800 series using Windows Mobile 2003. The Mobile Terminal can only be used with Direct Sequence Spread Spectrum (DSSS), also referred to as 802.11b.
Mobile Terminal Application Server Setup

**Note:** This application is intended for use by IT, technical support personnel, and store personnel who are responsible for the overall operation of the IBM Self Checkout System.

The Mobile Terminal application server component consists of an application that is to be executed on the BOSS PC. The Mobile Terminal server application runs in the system tray. The operating system will automatically launch this application during startup. To access this application, double-click the icon in the system tray or click a quick-launch button on the BOSS application bar.

You use this application to:
- Install, update, and configure the Mobile Terminal client software on the Mobile Terminal.
- Assign the number and identification (ID) of each Mobile Terminal used in the IBM Self Checkout System.
- Assign specific lanes to be monitored by specific Mobile Terminal clients.
- Define how Mobile Terminal clients handle various lane events.

Mobile Terminal Client

**Note:** The Mobile Terminal client is intended for use by the sales attendant who monitors and controls the operation of the IBM Self Checkout System lane assigned to the Mobile Terminal client.

The Mobile Terminal client is the application that runs on the Mobile Terminal device. The Mobile Terminal device must communicate with an 802.11b (DSSS) Wi-Fi wireless LAN (WLAN) using a Windows Mobile 2003 operating system.

**Note:** The retailer is responsible for the overall security of the WLAN, including electronic eavesdropping safeguards.
In order to add items to a transaction on an assigned IBM Self Checkout System, the Mobile Terminal must have an integrated or attached bar code scanner. IBM currently supports the Symbol 8846 for this Mobile Terminal application.

The Mobile Terminal client:

- Uses the WLAN adapter installed on the Mobile Terminal to connect and communicate with the IBM Self Checkout System mobile terminal agents executing on all assigned IBM Self Checkout Systems.
- Uses a wireless TCP/IP network protocol to communicate with the IBM Self Checkout System BOSS.
- Allows only authorized users to access the functions of the Mobile Terminal client application and defines the authorized functions available to the sales attendant who signs on to a given mobile terminal client.
- Displays status information for all connected IBM Self Checkout System lanes.
- Allows the sales attendant to acknowledge messages and resolve issues.
- Allows the user to add items to a new or open transaction on an assigned IBM Self Checkout System, using a bar code scanner that is connected to the Mobile Terminal.
- Allows the authorized sales attendant to close an IBM Self Checkout System lane.
Appendix. Notices

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**Australia / New Zealand**

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**Electrostatic Discharge (ESD)**

**Attention:** ESD damage can occur when there is a difference in charge between the part, the product, and the service person. No damage will occur if the service person and the part being installed are at the same charge level.

**ESD Damage Prevention**

Anytime a service action involves physical contact with logic cards, modules, back-panel pins, or other ESD sensitive (ESDS) parts, the service person must be connected to an ESD common ground point on the product through the ESD wrist strap and cord.

The ESD ground clip can be attached to any frame ground, ground braid, green wire ground, or the round ground prong on the AC power plug. Coax or connector outside shells can also be used.

**Handling Removed Cards**
Logic cards removed from a product should be placed in ESD protective containers. No other object should be allowed inside the ESD container with the logic card. Attach tags or reports that must accompany the card to the outside of the container.

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Glossary

10 BASE T. A standard for transmitting Ethernet over Thicknet (1/2 inch round, 50 ohm coaxial) cable.

access point. A device used in wireless networks, which receives and transmits RF signals to and from wireless devices and delivers the data to the network through a standard Ethernet connection.

active hub. A network hub that amplifies transmission signals and sends them to all the computers connected to it. This type of hub is often called a multi-port repeater.

age-restricted items. Items, such as alcohol and tobacco, require the purchaser to be a minimum age.

analog data. Data that has an infinite number of possible states, rather than the simple 1s and 0s of a digital signal. Audio, video, and voiced telephone signals, for example, can all be represented using analog signals.

back office. The central point of communication for the store’s information process, usually consisting of POS controllers, network server, back office system server (BOSS), and other equipment as required.

bagging area. On the IBM Self Checkout System, this area refers to the security scale platen, enclosed security module, platen, and bag racks.

beaconing. The process on a token ring network by which a device, in the event of a cable fault, determines the state of the network and the location of the fault.

bill dispenser. A device in the cash module used for dispensing paper currency. It can be configured to dispense up to 3 different denominations.

BIOS. Basic Input/Output System of desktop computers. The BIOS contains the buffers for sending information from a program to the actual hardware device the information should go to.

bits per second (BPS). Amount of data transferred in a second.

BOSS. The back office system server. It maintains the master security database for system operation and system configuration in an IBM Self Checkout System.

buffer. In communications, an area of memory used as temporary storage for data being sent or received. Can refer to any area of memory in a computer.

byte. The unit of data storage and communication in computers. In PC systems, a byte is usually 8 bits or an 8-digit binary number. A single byte can represent numbers between 0 and 255.

calibration potentiometer. Located on the lower right corner of the security controller, this device allows you to calibrate the security scale. Sometimes referred to as the calibration pot.

carrier sense multiple access with collision detection (CSMA/CD). The protocol by which Ethernet devices share access to a Ethernet network.

cash module. The section of the self-checkout lane that consists of all the cash components.

cautions. A warning about actions that can cause damage to equipment.

CCA. Circuit card assembly. The computer circuit board that operates the cash components.

CFI. Custom File Installer. Installs programs used to load the lane- and store-specific data, such as security databases, QLD screens, audio, and department codes.

check cart item. A large item, such as a fifty-pound bag of pet food, that is typically placed under the shopping cart. Upon system entry, this type of item will generate a "Check Cart" message on the lane receipt.

client/server architecture. A network architecture in which clients request data, programs, and services from servers. The servers then provide the data, programs, and services to the clients. Applications written for the client/server architecture have different components for the server and the client. Client/server architecture allows clients to exploit the processing power of the server.

client/server network. A server-centric network in which some network resources are stored on a file server while processing power is distributed among workstations and the file server.

coaxial cable. One type of cable used in network wiring. Typical coaxial types include RG-58 and RG-62. The 10 BASE 2 system of Ethernet networking uses coaxial cable. Coaxial cable is usually shielded. The Thicknet system uses a thicker coaxial cable.

collision. Occurs when two signals are transmitted at the same time and through the same channel, causing the data to be destroyed.

congestion. Occurs when the network transmission is exceeds its data traffic capabilities and network performance declines.
crosswalk. Interference or noise that is created on a network transmission medium by another physically adjacent medium that causes data to be corrupted.

curtains. Assemblies that are mounted inside the right and left side of the front and rear security arches. The right side assemblies contain the LED emitters and the left sides contain the LED detectors. Use for Item height measurement.

danger. A warning about actions that can cause injury or death.

decoding. The process of translating a message from a transmittable standard form to the native form of the recipient.

dedicated line. A transmission medium that is used exclusively between two locations; also known as leased or private lines.

dedicated server. A computer that is used solely as a server, not as a workstation or client.

digital data. Data that uses 1s and 0s to store information.

domain. A network of computers that share the same security and logon authentication database.

EIA-232. Also known as RS-232. The most common serial communications system in use.

electromagnetic interference (EMI). A type of low-voltage, low-current, high frequency signal that interferes with normal network transmission. EMI is often caused by improper insulation or insufficient grounding.

electrostatic discharge (ESD). An electric shock created by a buildup of static electricity. ESD can damage computer components.

Ethernet. The most used network specification. Uses a transfer rate of 10Mbps. Ethernet uses a bus topology and thick or thin coaxial, fiber optic, or twisted-pair cabling.

extension point. A wireless device used in wireless networks that extends the range of an Access Point by receiving then retransmitting RF signals to and from remote devices. Extension Points have no physical connection to the network.

extract. File containing diagnostic information gathered while processing each item in an order. The extract file is stored at the BOSS until an IBM Self Checkout System engineer retrieves it for analysis and resolution.

fiber distributed data interface (FDDI). A network specification that defines the transmission of information packets using light produced by a laser or light-emitting diode (LED). FDDI uses fiber optic cable and equipment to transmit data packets. It has a data rate of up to 100Mbps and allows very long cable distances.

fiber optics. A medium type used for network communications. Fiber optics transmit data by sending a light signal through a tiny glass or plastic fiber.

file transfer protocol (FTP). A TCP/IP protocol that permits the transfer of files between computer systems.

frequency hopping spread spectrum (FHSS). A narrowband carrier that changes frequency in a pattern known to both transmitter and receiver.

front end. The area of a store comprising conventional lanes and IBM Self Checkout System lanes with a paystation.

gateway. A network interconnectivity device that translates communications protocols.

HASP. ISS 45 key. Small piece of hardware used as a security measure for the POS to communicate with outside sources.

hop. A server or router that is counted in a hop count.

hop count. The number of routers a message must pass through to reach its destination. A hop counts is used to determine the most efficient network route.

hub. A network connectivity device that brings media segments together in a central location. The hub is the central controlling device in some star networks. The two main types are active hubs and passive hubs.

IBM Self Checkout System Mobile Terminal Agent. Software application located on the IBM Self Checkout System Lane.

IBM Self Checkout System Mobile Terminal Client. Software application located on the Mobile Terminal.

IBM Self Checkout System Mobile Terminal Server. Software application located on the BOSS server.

.INI. The file extension "INI" indicates that the file is an initialization file and required for proper operation. For example, Lanecfg.ini or Bosscfg.ini are initialization files and must be installed prior to operating a self-checkout lane.

input conveyor. On the IBM Self Checkout System, the input conveyor refers to the conveyor start sensor, input conveyor belt, conveyor stop sensors, remote sensor board.

intelligent hub. A hub that provides network management and intelligent path selection in addition to signal regeneration.
interconnectivity device. Connects independent networks, including routers, gateways, and CSUs/DSUs.

interrupts. Inputs to the CPU in a PC that allow devices to get its attention – to interrupt it – if it is performing another task. Interrupts are also called IRQs (for interrupt requests).

ISDN modem. An interconnectivity device that connects a computer to an ISDN line.

lane diagnostics. Diagnostics performed on the components of the input conveyor module.

LAN. Local area network. Computers linked together physically using network cables and devices, such as hubs and routers.

MDB (master database). When the file extension .MDB follows a file name, the file is used as the Master Security Database which contains all security of all items. For example, BossSec.mdb or LaneSec.mdb are master database files.

media cassettes. Cassette that hold media or coupons for the bill dispenser.

Mobile Terminal. A handheld device that uses wireless communication to interact with the IBM Self Checkout System lanes. It is assigned to a sales attendant and can perform a variety of security functions. The Mobile Terminal is not an IBM product.

MT Server. Proprietary software running on the BOSS computer and used as the server program for the Mobile Terminal.

multi-break items. IBM Self Checkout System term used to identify an item in which the shape decreases then increases again (for example, a loaf of bread with a twist-tie tail) causing the IBM Self Checkout System to ”see” two items instead of one. Examples are vacuum-packed toys, some clear liquids, and some cooking utensils.

network. A group of computers and peripheral devices, such as printers, that are joined together on a common network transmission medium.

network address. A unique address that identifies a particular node or device on the network. The network address for a computer is often hard coded in the network card for that computer.

node. A network device, such as a server, workstation, or router, that can communicate across a network.

not-for-sale items. Grocery items, such as seasonal items or federally recalled items, that have been pulled from the shelves and are not for sale at the current time.

not-on-file (NOF) items. Grocery items that have not been added to the point-of-sale (POS) system.

packet. The basic division of data sent over a network. Each packet contains a set amount of data along with a header containing information about the type of packet and the network address to which it is being sent. The size and format of a packet depends on the protocol and frame types used.

packet switching. A type of data transmission in which data is divided into packets, each of which has a destination address. Each packet is then routed optimally across a network. An addressed packet may travel a different route than packets related to it. Packet sequence numbers are used at the destination node to reassemble related packets.

pass around item. Large item, such as a 50 pound bag of dog food, typically placed under the shopping cart. Once entered into the system, an item of this type will generate a Check Cart message on the lane receipt.

passive hubs. A hub that simply combines the signals of network segments with no signal processing or regeneration.

PLU (Price Look Up). A four digit code used in the POS (Point of Sale) to identify an item and its price when bar codes cannot be used.

POS. Commonly known as the Point of Sale for Retail. Gives retail headquarters the ability to update item prices on continuous bases. Holds a database of all bar code prices. The POS calculates prices when items that are sold by quantity or weight are being purchased. The POS also calculates taxes and totals all sales.

proprietary. Describes a system that is defined by one vendor and typically not supported by others.

protocols. The specifications that define procedures used by computers when they transmit and receive data.

.QLD. When the file extension "QLD" or "qld" follows a file name, the file is marked a file used in the Quick Lookup Definition program.

.QLI. Quick Lookup Information. These files serve the same purpose as .QLD.

quantity-required items. Grocery items sold by the number of items purchased (for example, cucumbers, lemons, peaches, etc.).

random weight (type 2) items. Prepackaged items sold by price per kilogram or pound. These items are marked by a type 2 bar code and include most meat products.

redirector. Software that is loaded onto a workstation that can forward or redirect requests away from the
local bus of the computer onto a network. These requests are then handled by a server. This type of software is often called a shell, requester, or client.

**repeater.** A network connectivity device that amplifies network signals to extend the distance they can travel.

**retrieving orders.** Process of bringing up suspended self checkout orders. The system suspends orders so customers can pay at the Paystation. Retrieving orders allows Shopper Assistants to process the customer’s order like any regular order.

**routers.** Intelligent network connection devices that use logical and physical addressing to connect two or more logically separate networks. Routers use algorithms to determine the best path by which to send a packet.

**RS-232.** The most commonly-used serial communications system.

**sales attendant.** Person designated to assist shoppers on the lanes whenever a difficulty is encountered. This assistance might require the use of the shopper-assistant card.

**security controller.** The hardware component that allows centralized software control of cash module, security module, and other lane components.

**security module.** The section of the self-checkout lane that consists of all the security components.

**shopper-assistant card.** Programmable scan card that allows the cardholder to perform a range of functions to assist the shopper and troubleshoot the lane.

**spooler.** A software program that stores documents until they can be printed and controls the order of printing.

**TCP/IP.** Transmission Control Protocols/Internet Protocols is a network protocol that provides communication across interconnected networks, between computers with diverse hardware architectures and various operating systems.

**terminator.** The device that terminates a local area network bus configuration.

**time-restricted items.** Grocery items that are not sold during certain times or on certain days (for example, alcohol on Sunday).

**transport methods.** Method for transporting items from the self checkout lanes to the bagging areas. Some items must pass through the security arches, some items may optionally pass through the security arches, and other items must not pass through the security arches.

**UPC (universal product code).** Bar code printed on grocery items.

**USB.** Universal Serial Bus.

**value or bonus packaged items.** Grocery items that are specially packaged to promote a particular item or to serve as an enticement to shoppers (i.e., 10% more free, buy two for the price of one, etc.).

**weight required items.** Grocery items that are sold by weight, such as produce (for example, bananas, beans) and bulk foods (for example, trail mix).

**Windows® CE.** Software operating system designed by Microsoft® used on handheld computer devices.

**Windows 2000.** Software operating system designed by Microsoft used on a handheld, laptop, and desktop computer devices.

**wireless local area network (WLAN).** A wireless local area network (LAN) is a flexible data communications system implemented as an extension to, or as an alternative for, a wired LAN. Using radio frequency (RF) technology, wireless LANs transmit and receive data over the air, minimizing the need for wired connections. Thus, wireless LANs combine data connectivity with user mobility.
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IBM Self Checkout System Overview

Publication No. GA27-4340-01

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