Active Notifications
White Paper

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Abstract
Active Notifications is a feature for mobile PCs that uses with Windows® SideShow™ technology and wireless networking technologies to provide mobile information workers (iWorkers) with real-time notifications and access to their e-mail and calendar information, even while their mobile PCs are asleep.

This paper provides an overview of the feature’s functionality and operational modes and then a brief description of the software and technologies that support it. The end of the paper provides links to further resources and information for implementing the Active Notifications feature in mobile PCs running Windows Vista™.

Technologies described in this paper:
• Active Notifications software
• Windows® SideShow™
• Microsoft® Exchange AirSync protocol
• Microsoft® Exchange Active Notification protocol
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Introduction to Active Notifications

Information workers (iWorkers) are increasingly mobile throughout the day. Current mobile PCs allow them to remain productive wherever they go, but limited battery life and long stretches between recharges often means they need to conserve power by putting their PCs to sleep whenever possible. When it's asleep, however, the PC has limited value to the typical iWorker who needs constant access to vital information like e-mail and calendar.

Active Notifications uses Windows® SideShow™ technology to show notifications for e-mail messages and calendar reminders on a compatible secondary display, even after the PC is put to sleep. The secondary display shown here is a small, one-line display built into the edge of a notebook PC so it can still be seen when the lid is closed. Three hardware buttons beside the screen allow the user to turn notifications on and off and to scroll through recent e-mail notifications and the next day of calendar events.

Active Notifications has two operational modes while the PC is asleep, one that periodically wakes the PC in order to sync the inbox and calendar, and another that doesn’t need to wake the PC and provides real-time notifications as items arrive in the inbox. Either mode provides iWorkers with a low-power way to get constant access to e-mail and calendar.

Away from the office

Active Notifications simplifies life for an iWorker who travels out of town. Inbox and calendar synchronization occurs automatically, audible and visual notifications indicate activity, and unread e-mail and meeting details queue up for easy review. Whether standing in line at the airport, meeting at the job site, or on the way to the hotel, a user can focus on the work at hand and still keep an eye on the office.

Even while traveling shorter distances—the 40-minute drive into the office, the two-hour trip to meet with a customer, the afternoon at the soccer field—meeting
arrangements can change and new information can enter the pipeline anytime. Active Notifications keeps the information fresh and schedules on track.

**Around the office**

An iWorker caught up in a series of back-to-back meetings faces a two-fold dilemma. First, her Inbox is filling up while she attends each meeting. She is forced to either ignore incoming messages or divert her attention from the meeting while she opens the lid of her PC.

Second, with a day full of meetings, it can be difficult to remember all the times and locations, especially if meeting updates arrive after the last time she checked her calendar. Active Notifications keeps her in sync and shows the up-to-date time and location of the next meeting on her PC’s secondary display.

**In a meeting**

An open notebook PC lid can be a barrier to discussion in meetings. With Active Notifications, the user can silence the audible notifications and still see the sender and subject of incoming messages on the secondary display. If visual notices are too distracting or the situation calls for more privacy, she can turn off all notifications to the secondary display with the press of one button.

**Active Notifications system**

An end-to-end Active Notifications system includes the following components:

- Exchange Server or any other mail server
- A connection to a wireless local area network (WLAN), a wireless wide area network (WWAN), or both
- A mobile PC with:
  - A Windows SideShow-compatible device (secondary display)
  - Active Notifications software
  - A wireless networking module (WLAN, WWAN, or both)
  - Microsoft Outlook® 2003 (or later) or Windows Mail software

As the following illustration shows, Active Notifications was designed to operate across many networking and e-mail standards. It incorporates well-understood hardware and software components to enhance the value and usefulness of a mobile PC.
The remainder of this white paper describes the various components and operational modes of a mobile PC running Active Notifications software with a Windows SideShow-compatible device. For more information about Windows SideShow-compatible devices, see http://www.microsoft.com/windowsvista/features/foreveryone/sideshow.mspx.
Secondary Display

Active Notifications displays notifications for new e-mail messages and calendar events on the PC’s secondary display. Notifications can be accompanied by an audible alert and will appear even while the PC remains asleep.

This section provides examples of the kinds of status and notifications information that could be displayed on a one-line edge display with buttons for viewing e-mail and calendar notification queues and for turning notifications on and off.

Status

Status information appears on the secondary display in the absence of incoming notifications or meeting reminders. Icons and text in the following examples represent current time of day, remaining battery power, strength of the network connection, the current notifications mode, and more.

Status screen: notifications off
The following display shows time, battery status, and WWAN signal strength. In this case, the user has elected to turn off notifications.

![Status screen: notifications off](image)

Status screen: notifications on
The presence of e-mail and calendar status icons indicates that notifications are turned on. The unread e-mail count (24) will increase as new messages arrive. The calendar icon shows the time of the next meeting at 1:00 p.m.

![Status screen: notifications on](image)

Notifications

Active Notifications provides notifications for new e-mail messages or an upcoming meeting with a sound, a flashing icon with text, or a combination of the two.

Audible
The audible notifications for incoming e-mail messages and calendar events can be disabled using the PC’s system volume controls.

Visual
The visual notification details appear for a few moments before the Active Notifications software reverts to displaying status information. The user can review e-mail and calendar notification details by navigating through the notifications queues.
E-mail notifications
An e-mail notification consists of the e-mail icon, the sender’s name, and the subject. The sender’s name and the subject line may be truncated in order to fit on the display.

![E-mail notification example]

Calendar notifications
A calendar notification consists of the calendar icon, the meeting time, the subject of the meeting, and the meeting location. The subject of the meeting and the location may be truncated in order to fit on the display.

![Calendar notification example]

Secondary display control buttons
A secondary display for use with Active Notifications can include hardware buttons to provide controls for viewing the notification queues and for turning notifications on and off. The secondary display shown in the previous examples includes the following three buttons.

- **Alert mode button**: turns notifications on and off.
- **E-mail queue button**: scrolls through the e-mail notification queue from the most recent notification to the oldest.
- **Calendar queue button**: scrolls through the calendar notification queue from the next meeting start time to the farthest start time in the future.

Alert lock and security
Users can enable a lock mode so that whenever they lock Windows Vista, their secondary displays cannot be turned on and viewed by anyone else. Users can enable this mode in device options for the display in Control Panel in Windows Vista. Once enabled, if the user turns notifications off and then locks Windows Vista, Windows Vista must be unlocked before notifications can be turned back on.
**Active Notifications Software**

The Active Notifications host software comprises three basic components: 1.) Active Notifications manager, which manages the waking behavior; 2.) Active Notifications agent, which communicates with the e-mail client software; and 3.) Active Notifications Windows SideShow gadget, which provides a control panel for the user and communicates with the Windows SideShow platform.

The following illustration shows a high-level flow of host software. Microsoft Office Outlook, Windows Mail, and other e-mail programs can run with Active Notifications host software.

![Active Notifications Flow Diagram]

**Active Notifications manager**

The Active Notifications manager has the following main responsibilities:

- Monitors wake events, determines the source of the event and take appropriate action
- Interacts with the Active Notification agent (which launches a program or sends status details to the secondary display) and ensures all agent work is complete
- Implements the duty cycle algorithm that allows an Active Notifications PC to balance between the immediacy of e-mail and calendar notifications, battery life, and the thermal state of the PC. Original equipment manufacturers (OEMs) can modify the duty cycle to mitigate extremely unfavorable events such as thermal conditions.
- Sets appropriate timers for periodic notifications. During periodic notifications, the PC wakes periodically at a user-defined interval to update the secondary display with the latest notifications.
- Puts the PC back to sleep when the Active Notification agent is done.

**Active Notifications agent**

The Active Notifications manager launches the Active Notifications agent installed on the host. The agent is responsible for communicating with supported e-mail clients, triggering inbox and calendar synchronization, and passing policy-filtered inbox notifications or meeting reminders to the Active Notifications gadget.

The Active Notifications agent communicates directly with a policy evaluator to filter notifications before sending them to the secondary display. The filter mechanism allows a user to limit the notification volume as follows:
• By hours of operation with the following options:
  • All the time (24x7)
  • Daytime hours (8:00 am to 7:00 pm, Sunday-Sunday)
  • Work hours (8:00 am to 7:00 pm, Monday-Friday)
  • Extended work hours (8:00 am to 9:00 pm, Monday-Friday)
• Only high-priority messages
• Only when the user is listed in the To box
• By sender

A user can configure the filter policy in the Active Notifications gadget options in Control Panel in Windows Vista, as shown below.

Active Notifications Windows SideShow gadget

The gadget is user-facing software that sends data to the secondary display using the Windows SideShow platform. The gadget also provides a control panel where users can custom configure the behavior of the Active Notifications feature.
Operational Modes
This section describes the alternative modes of operation:

- Periodic notification and synchronization
- Immediate notification and synchronization

Periodic Notifications and Synchronization
This mode provides a flexible option for users with PCs that do not have a WWAN module or wireless data service but still want automatic synchronization of e-mail and calendar. The periodic notifications and synchronization mode allows the user to choose how often the PC wakes and synchronizes with their server. As shown here, the mobile PC generates the request for synchronization and then receives the messages and updates.

Periodic notifications and synchronization is a practical solution that operates in WLAN and WWAN environments. This mode will function with any e-mail server.

User-defined intervals
A mobile PC configured for periodic notifications and synchronization repeats the following sequence of actions:

1. Wakes the PC at the user-selected interval.
2. Connects to an e-mail server across any available network.
3. Synchronizes the user’s inbox and calendar.
4. Sends e-mail and calendar notifications to the secondary display and issues an audible notification.
5. Puts the PC to sleep.

Users configure the interval to meet their needs, using short intervals to keep close tabs on their inboxes and calendars, or using longer intervals to limit the number of
wake cycles to conserve battery power. Intervals can range from 15 minutes to 24 hours.

**WLAN configuration**
Periodic notifications and synchronization is available to a PC with a WLAN module and does not require a WWAN module. WLAN modules require no modification to use this feature.

**WWAN configuration**
To accommodate periodic notifications and synchronization functionality in a WWAN environment, the mobile PC requires an activated WWAN module and auto-dial software.

**Immediate Notifications and Synchronization**
Immediate notifications and synchronization is an alternative mode of operation available only for PCs with WWAN modems and wireless data service. This operational mode keeps a mobile PC connected to the Exchange server all the time, even while the PC sleeps.

As the following illustration shows, the mobile PC responds to incoming notifications while the PC remains asleep.

Immediate notifications and synchronization performs the following sequence of actions while the PC sleeps:

1. WWAN module monitors the network for an e-mail signal from the Exchange server (Exchange 2003 SP2 or later).
2. WWAN module wakes the PC when prompted by the Exchange server.
3. Host software synchronizes the user’s inbox and calendar.
4. Host software sends e-mail and calendar notifications to the secondary display.
5. Host software returns to sleep.
6. WWAN module starts monitoring for new notifications.
Timeliness of notifications in this mode is equivalent to handheld devices, such as Smart phones, which use the same WWAN infrastructure. Immediate notifications and synchronization automatically synchronizes the inbox and calendar on the host PC directly; no auto-forward operations or secondary servers are required.

**Notifications-only mode**
Immediate notifications and synchronization in notifications-only mode provides the same uninterrupted notification level, but omits the synchronization step. Instead, the WWAN module communicates directly with the secondary display to deliver notifications without waking the PC.

After viewing notification details, the user can decide the best time to synchronize the inbox and calendar. This approach can extend the battery life of the mobile PC by minimizing the number of sleep-wake cycles.

**WWAN module enabled for Active Notifications**
To obtain real-time notifications, the package must include WWAN module firmware capable of interacting with the Exchange server while the PC sleeps. The WWAN module manages the connection using the Exchange Active Notification protocol. The Exchange Active Notification protocol is a subset of the Exchange AirSync protocol supported by Exchange Server 2003 SP2 and later.

Active Notifications firmware enables the WWAN module to:
- Maintain a connection to the Exchange server and wake the system as required
- Receive configuration data from the host PC
- Securely store user credentials
- Receive, store, and execute filter policies
- Support I²C communications for direct access to the secondary display in notifications-only mode

To date, Active Notifications compatible WWAN modules adhere to the following architectures:
- HSDPA (GSM based) or beyond
- EV-DO (CDMA based) Rev A or beyond

**WWAN COM server**
An Active Notifications WWAN COM server facilitates communication between the WWAN module and the Active Notifications software, as this illustration shows. The COM-based API ensures that each brand of WWAN module has consistent behavior and functionality.

Always running in the background, the COM server:
- Confirms whether the WWAN module initiated the wake event
- Sends configuration instructions to the WWAN module
- Sends error codes that the Active Notifications software converts to end-user error messages, such as incorrect or expired credentials
**Call to Action**

Information workers are becoming increasingly mobile, and while mobile PCs allow them to remain productive wherever they go, limited battery life and long stretches between recharges means they need to conserve power by putting their PCs to sleep whenever possible. When it’s asleep, however, the PC has limited value to the typical iWorker who needs constant access to vital information like e-mail and calendar.

Positioning Active Notifications-equipped PCs into your product mix will allow you to meet the needs of this growing user segment. Active Notification delivers peak responsiveness and productivity to mobile iWorkers and creates a powerful value proposition to prospective buyers. Configuration options include:

- Immediate notifications and synchronization with Microsoft Exchange, WWAN real-time notifications and synchronization of e-mail and calendar events.
- Periodic notifications and synchronization with a WLAN and/or WWAN network connection for user-managed periodic coverage.

**Find out how Active Notifications can enhance and differentiate your products**

Identify product opportunities that will benefit from Active Notifications integration. Contact your account manager for more information and for access to the Active Notifications Microsoft Connect site [http://Connect.microsoft.com/](http://Connect.microsoft.com/)

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