

Mobile Internet Device Application User Interface Design Guide

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Note: This document is forward-looking and still under revision. It is provided as a preliminary guide for developers creating applications for Mobile Internet Devices.

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Revision History

Revision	Date	Author	Reason for Changes
0.1	5/01/07	BS	Initial Revision
0.2	5/15/07	BS	Worked sections 1-5
0.3	5/22/07	BS	Worked sections 6+ w/feedback from Waldo, Fenghua
0.5	5/24/07	BS	Reviewed with Waldo,Fenghua. Cleaned up.

Related Documents

Document / Link

Glossary

Term	Definition
MID	Mobile Internet Device.
Project builder	Name of tool used to create development environment, target environments, and ISO or USB images of the target environments.

1. Introduction to MID UI Style

Intel's Mobile Internet Device (MID) is a new category of low-power computing device which may be a hand-held tablet or a device placed in other embedded environments such as in a car. This document describes the UI guidelines for developing applications for the hand-held MID.

The MID application architecture will be based on the Hildon¹ application architecture and share many of the user interface and style characteristics. However, MID user interface, navigation, and user experience will be different in many ways from Nokia N-level hand held devices.

This guide provides guidelines and recommendations for developers creating new applications or porting existing applications to MIDs. It outlines the primary features of the MID user interface including user interaction, system and application look-and-feel, common controls location, and navigation. The goal of this guide is to provide a consistent and integrated experience for MID users. For general Hildon application UI style recommendations, please see the *Hildon UI Style Guide*².

2. MID Hardware Form Factor and Constraints

MID hand-held devices will be much smaller than laptops with most user input and system navigation done using the touchscreen or hardware buttons and controls on the device. Understanding this operating paradigm is important in designing applications.

2.1 Hardware Device

At this early stage, the exact hardware features are not known and may vary somewhat from device to device. The following minimum standards will be met and applications should be designed to work well on systems with these constraints.

2.1.1 Screen size

Minimum: 4.8" diagonal
Maximum: 7" diagonal

2.1.2 Screen resolution

Dimensions:
Width: 800 or 1024 in landscape mode.
Height: 480 or 600 in landscape mode.

Applications should not be tied to a fixed resolution or width/height ratio. For example, some devices may be 800x480 or 800x600. Application can subscribe for notifications on screen resolution and orientation change.

Color depth: **Minimum:** 16bit (65536 colors). **Default:** 24bit (16M colors)

DPI: 225

2.1.3 Input Mechanism

Touch screen: System can be operated by human touch.

Stylus: Some devices will feature a stylus (optional) for more accurate operation.

Hardware controls: Buttons and controls on the device.

Soft keyboard: An on-screen keyboard will provide a way for text/number input using a finger or stylus. User can configure this keyboard to auto launch when an edit field gets focus.

Hardware Keyboard (optional): Devices may or may not have a hardware keyboard.

2.1.4 Memory

Device specific. Minimum: 256 MB.

2.1.5 Storage

Device specific. Minimum: 1GB SSD. Maximum: Harddrive capacity (if present)

2.2 Hardware Controls

Aside from a power switch, no hardware controls are **required** for MID devices, including keyboard. The user interface shall be fully navigable with on-screen controls and applications should be fully usable using touchscreen input only. The hardware controls listed in the following section will simplify and speed common user tasks.

2.2.1 Recommended (Expected)

- Power button: press and hold for off/on, momentary press to go in and out of standby
- A slide lock device to preclude inadvertent input when the device is pocketed
- Hardware Thumbpad
- Full-screen toggle button
- “Jump-to-Home screen” button
- Camera shutter button next to lens on the backside
- Up/Dn/Left/Right arrows (capacitative on the display bezel)

2.2.2 Other Features

- Scrolling control (Up/Dn/Left/Right can cover this)
- Brightness control (device may have ambient light sensor)
- Volume control
- Screen rotation
- Menu key to show current application menu

2.3 Picture of Sample Device

The following is a conceptual design for a MID.



3. MID UI Goals

3.1 Small Screen UI on Hand-held Device

The user interface should be clear and fully usable when running on a 4.5” screen at a distance of 12-18” from the eye and operated by the hands alone. Things applications should consider:

- Ensure that the application layout looks correct at 800x480, 800x600, and 1024x600 resolutions. Generally applications should not be resolution dependent.
- Ensure that dialogs fit in the same screen dimensions (more on dialogs below)
- Ensure that the application works well when viewed in full-screen mode and operates cleanly when toggled back and forth repeatedly
- If possible, minimize the requirement for horizontal scroll bars
- When the software keyboard is activated the application will be reduced in size to accommodate the keyboard on screen. Some work may need to be done to ensure that the edit field retains focus and is still visible after resizing.

3.2 Readability and Text appearance

The user interface must be designed to work well on a small 4.5” screen. Choices regarding use of text are important to readability. Well-behaved applications will use the system defaults for the majority of their font selection, thus allowing users to control the size and other characteristics of the font. If applications choose to render text with custom characteristics, it is important to pay close attention to characteristics of text such as font size, font type, leading, and contrast.

3.3 Finger First, then Stylus, then Keyboard

MID UI should be fully navigable by providing input using the touchscreen. In addition, one of the objectives of the MID user interface is the emphasis on using the finger instead of the stylus for most common tasks. A general guide is for touchable controls to be 1cm² or larger (70x70 pixels at 800x480). Touch areas should be easily accessible, and layout should be oriented toward finger use.

3.3.1 Stylus

In some cases a stylus may be necessary and applications which are not 100% finger driven can still be considered MID-compliant. Using the stylus requires the user to remove it from the device and then hold it or put it back. This slows the user and should be considered in designing the interface. Some situations may require a stylus, however, such as navigating through content in the browser which is too small for accurate use of a finger.

3.3.2 Text entry

Applications should reduce the amount of text entry required. If it is possible to accomplish a task using finger tapping instead of text entry, this should be investigated. Text input is the nemesis of small mobile devices.

3.3.3 Right-click

Right-click is supported by touch-and-hold. It is awkward, slow, not obvious, and should be avoided if there are other ways to do the same thing.

3.4 Simplified UI

The overall use of the system should be simple. This starts at the Mobile Desktop UI which will be designed for quick access to a few key applications targeted at a certain type of experience. The system will support adding additional software and has no limit on the number of applications that can be added. However, the intent is not for it to be a standard desktop system with 100's of applications but to provide a core set of well-integrated applications that focus on mobile “on the go” tasks such as browsing the web, media consumption, and communication (chat/messenger).

Application design should consider how to implement the most important features in a very simple, finger-navigable way. More advanced features can still be available but typical use should be quickly understood.

3.4.1 Matchbox Window Manager

Matchbox window manager³ or equivalent will be used to provide simple, stack-based window management where each application runs full-screen. Modal dialogs can be displayed on top of the application window, but top-level windows can not be shown side-by-side. New windows will fill the screen and completely obscure the parent window.

3.4.2 Menus and Toolbars

Menus and toolbars should be reduced to the minimum number of items that accomplish the most common tasks. Other items should be placed in sub-menus, advanced options dialogs, or removed.

3.5 Dialogs

All dialogs must fit within the 800x480 dimensions. Controls should be large enough to navigate using the finger. Dialogs should not require scrolling, but should instead put advanced features in sub-dialogs if necessary.

3.6 Limited Resources

MID processors will not have the same performance or resources as a standard modern PC. Applications should avoid using large amounts of memory, opening many files, or doing extensive processing if possible..

3.7 Modes <TBD>

<TBD> MID shall be able to switch to different usage modes per users request (and perhaps dynamically for in-car use). Each usage mode shall modify application and user interface according to the mode's expected usage. Applications can subscribe for notifications for mode change. The following modes are supported:

- Active: The device has the user's full attention. User may be using the stylus or keyboard. All application features activated. Smaller UI controls may be present.
- In-car: The device has limited user visual attention. Applications should provide simplified interaction. Example applications running: bluetooth+phone, car-navigation, media player.
- Hidden: Device is hidden from user's view. User may be hiking, jogging or have the device in a bag. Screen is off. Hardware controls are locked. Example applications running: bluetooth+phone, media player.
- Standby: System state is frozen and stored in memory. Very low power consumption. No applications running. Quick resume to active state.
- Hibernate: System is in hibernate mode. No power consumption.
- Off: System is fully powered off. Requires full boot to get to active state.

3.8 Orientation

MID shall support rotating the screen to the left 90degrees. This mode shall be accessible from a UI or hardware control. Applications must work well when toggled to portrait mode (landscape mode is the default). Applications can subscribe for notifications when the system switches to portrait mode.

4. Hardware Interaction

<TBD> This section will be completed when MID hardware devices are available.

5. UI Interaction

MID system navigation and user interaction can be done through the user interface with a finger (preferred), stylus, soft keyboard, hard keyboard (if present), or buttons/controls on the device.

5.1 Touch screen

- Single Tap: Most common action. Clicks buttons. Highlights list items.
- Highlight and activate: Double-touch where the first touch highlights an item in a list and the second touch selects/loads/starts it. Helps reduce confusion when navigating a list (e.g. picking a song to play from a list)
- Finger down and hold: Right-click equivalent. Touch screen and hold will show the context menu.
- Drag and drop: Touch screen and slide it across screen to move an object (or reorder an item in a list)
- Panning: Touch the screen and drag to move contents of view. Used in browser and documents to move the contents of the window around with the finger.
- Gestures: Sliding finger across the screen in a predefined pattern as a shortcut to start an action. Most common use may be for scrolling.
- Touch, move, up: Navigate through menus by touching the menu to show it, then sliding the finger to the desired item and lifting the finger up to select it. To prevent any menu item from being selected, the finger is dragged outside the menu area and the action is canceled..

5.2 Soft Keyboard

The user interface will have a touchable software keyboard built into the user interface. It will be possible to click on an edit field and have the keyboard automatically popup. The user will be able to configure some aspects of the keyboard. The keyboard will be able to be used by a finger or a stylus. When the soft keyboard is displayed on the screen, the application will be

obscured or resized. The currently active edit control will be moved to be visible above the keyboard.

5.3 Hard Keyboard

The hardware keyboard may be part of MIDs and could be in a number of form factors including sliding, expanding, detachable, or projection. Applications will not be able to detect the presence of a hardware keyboard.

6. MID User Interface Details

6.1 MID Desktop UI

The MID Desktop User Interface represents the whole graphical environment in which applications are run. It defines the overall layout of components which will dictate navigation of the system and user experience. It contains the following primary components:

- “Home Screen”: The primary screen displayed when the system starts and the place from which applications are launched.
- Navigation buttons, toolbars, or controls: All the features that allow the user to start applications and navigate around the system.
- Status bar: Location that contains the status icons for battery/power, network connectivity, volume, and other services.
- Configuration tools: All the configuration applications needed to configure system settings, including network, power, and supported user preferences.

The exact design and layout of the MID Desktop UI components listed above will vary by OSV and possibly further by ODMs shipping devices. Applications built upon the MID Standard Base with user interfaces designed according to the recommendations below should work elegantly within any MID Desktop UI.

Currently there are two known MID Desktop UI implementation efforts. Red Flag has created one as part of MIDINUX⁴ and another reference UI implementation is being created that may be used by any OSV. The Ubuntu community is currently defining their MID Desktop UI for the upcoming Ubuntu-mobile release.

6.1.1 Home Screen Examples

The following pictures show what the Home Screens of MID Desktop UIs may look like. These are not intended to represent final screenshots, but are included to set expectations regarding simplified user experience and finger-touch navigation.



Figure 1a: Reference UI Home Screen

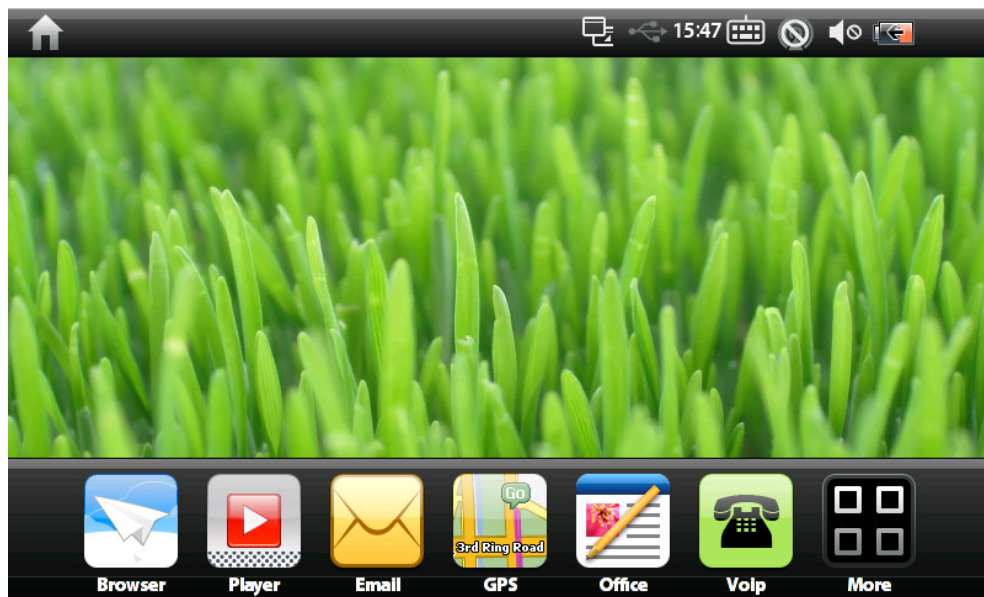


Figure 1b: Red Flag Home Screen

6.1.2 Application Launch / Activation

The Home Screen is the first screen shown when the system boots and has obvious indicators for the user to start applications, such as the large icons in the Home Screens shown above. When an application icon is clicked, the application is launched and fills the application area which is below the marquee described in the next section.

The user may access the home screen at any time by using the Task Switching controls to navigate back to the home screen, or by clicking a dedicated hardware “Home Screen” button.

6.2 Application UI Layout

There will be a lot of variety in the different MID Desktop UIs. All of them, however, if built using the Hildon application framework, will have an application layout similar to the one shown below containing a panel at the top (marquee) and an application area.

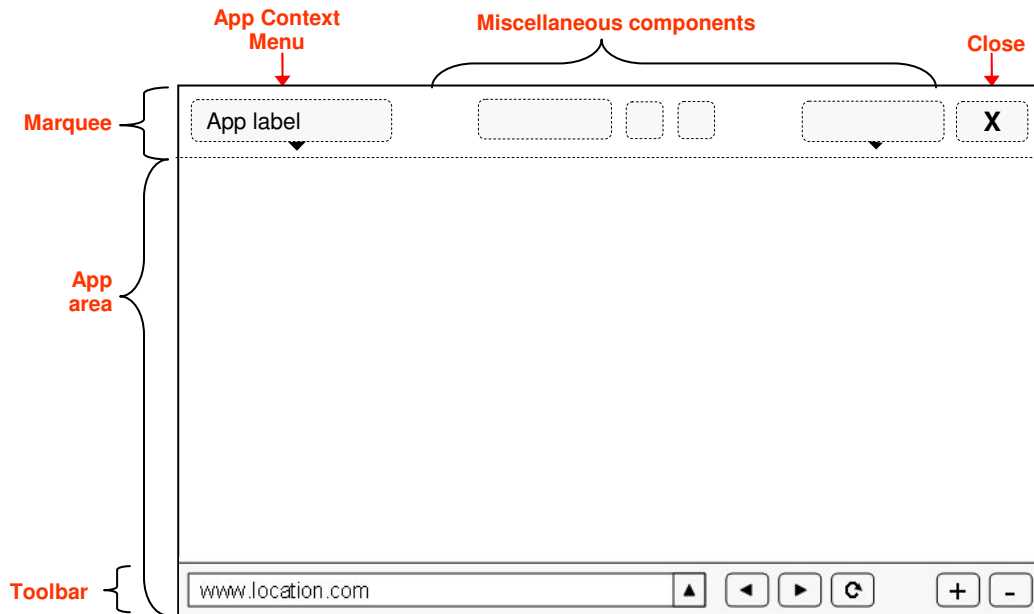


Figure 2: Application UI Layout

6.2.1 Marquee

A sample marquee from the Reference MID Desktop UI is shown below:



The marquee may contain multiple components, including buttons to navigate and system status indicators. (A detailed description of the components in the reference marquee are in Appendix 1). The marquee may be hidden by toggling to full screen mode.

6.2.1.1 Application Menu

An application menu will be visible on the marquee. The application menu will have a label that is the name of the application running. Here are sample application menus from the reference UI and Red Flag marquee's:



This menu is usually in the top-left corner, but may be elsewhere on the marquee. The contents of this menu are application specific and loaded by the application when it is launched. Each application porting effort should identify what the most important menu items are for the mobile environment to reduce the size of this menu as much as possible.

A user accesses the menu by touching the application menu title. The menu drops down and the user can select the desired menu item.

6.2.1.2 Close/Minimize buttons

Other common, but not required, elements of the marquee are minimize and close buttons. These are usually in the top-right corner. These will close or hide the currently running application.

6.2.2 Application Area

In normal mode, the application area is all the screen real estate below the marquee. In full-screen mode, the marquee is hidden and the application window fills the whole screen area.

6.2.2.1 Toolbar

Within the application area are the application toolbars. These should contain the minimum features possible to allow the user to accomplish the most common tasks in the easiest way. The toolbar should be designed for finger touch navigation. When using the Hildon framework, toolbars are placed at the bottom of the screen.

6.2.3 Scrolling

MID applications should have the same scrolling mechanism. This includes a finger-sized partially-transparent scrolling thumb that can be dragged up/down on the right side of the screen. If a device has a hardware scrolling control, such as a scroll wheel, the user can use this to scroll vertically. If applications custom-draw their own scroll bars and visual scrolling controls, they should be very similar in look/feel to the standard MID scrolling controls.

6.2.4 Application Navigation

Navigation within an application is application specific and is not dictated in this guide. Navigation to other applications will be determined by the MID Desktop UI, and custom for each OSV. An application may automatically launch another application on the MID. For example, if a user clicks an online radio link inside the browser, the media viewer application will be launched with this URL. If a user includes a link to a URL in a chat application, the user can click this link and auto-launch the browser.

How to accomplish these tasks is covered in section <TBD> of the MID Application Development Guide⁵

6.3 Hildon UI Style Recommendations

The *Hildon User Interface Style Guide*² contains recommendations for developing Hildon-based applications. Chapters 8-14 contain many concepts which apply for MID applications and are recommended reading. These chapters are titled:

- Chapter 8: How to Structure Menus
- Chapter 9: Context Sensitive Menu
- Chapter 10: How to Use Toolbars
- Chapter 11: Input Methods
- Chapter 12: Drag and Drop
- Chapter 13: Dialogs
- Chapter 14: Notifications

7. Porting Applications to MID

The process of porting an existing application to MIDs is two-fold. One step is to get the application to build and run on the MID embedded software stack which is based on GNOME Mobile. The details of accomplishing this task are provided in the MID Application Developers Guide.⁵

The other step is to modify the user interface and interaction to be consistent with this MID UI style guide (see section 3). Without the second step, an application can still launch and run on MIDs but look out of place, be difficult to use, and not meet users' expectations.

8. Appendix 1 – Reference MID Desktop UI



Figure 3: Reference UI Home Screen

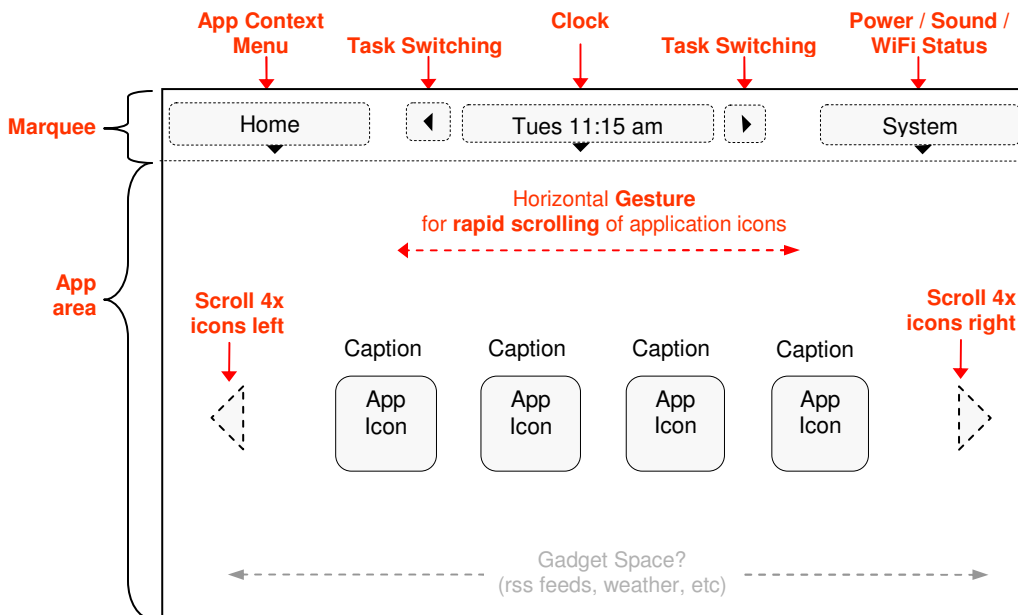


Figure 4: Reference UI Home Screen Components

8.1.1 Navigating to Home Screen

The Home Screen is the first screen shown when the system boots. The user may access the home screen at any time by using the Task Switching controls to navigate back to the home screen, or by clicking a dedicated hardware “Home Screen” button.

8.1.2 Marquee

The Marquee contains applications-specific menus, navigation controls, clock (or other?), status bar icons, and access to the control panel. The respective controls are described below.

(TBD) Configurable: Controls can be added, removed, or reordered based on a configuration file. A number of controls are not on the default marquee. A user may create custom controls for the marquee that execute specific pre-defined tasks, run scripts, or launch applications. An OEM may choose to disable this feature by not allowing the user to edit the configuration file

8.1.3 Application Context Menu



The application label sits on top of the Application Context Menu. The user can click this to show a home-screen related menu. Applications will use this same area for their application-specific menu items when they are active.

8.1.4 Application Switching

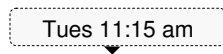


The left/right arrows on the marquee navigate serially through the running applications / home screen.



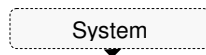
Application List (optional--not shown): A menu of all running applications can be added to the marquee for quick navigation if serial navigation is not acceptable.

8.1.5 Clock



The clock displays the time. (tbd: area may be used for other tasks)

8.1.6 System (Power/Sound/WiFi Status)



The System area shows the icons for the status bar including network, battery, volume, etc. The user can configure these by clicking on the System label and accessing the appropriate menu item.

OEM's will be able to disable configuring specific control panel settings via configuration files.

8.1.7 Application Area

The application area contains all application-specific content. The components of the home screen are described below.

8.1.8 Application Launch Area

The applications available are shown in the application launch area. Applications can be started by clicking on their respective icon. This is the usual method for starting an application.

(Note: Applications may also be automatically started from another application due to a user's action. For example, if the user is browsing the web and clicks on an internet radio station, the media player is automatically launched and begins playing the media stream.)

8.1.9 User-customize

Background: The background image can be modified by the user in the system configuration tool (via the System menu (top-right))

Application order: Application order can be configured by the user. User may also drag-drop the applications to reorder them on the home screen

8.1.10 Gesture Area

The gesture area allows the user to quickly scroll through the available applications (if there are many) by throwing the list to the right or left (similar to UMPC video)

8.1.11 Scroll

The user can scroll the list of available applications right or left, one screen at a time.

¹ Hildon application framework developed by Nokia. More information at www.maemo.org

² Hildon UI Style Guide can be found at www.maemo.org

³ Matchbox Window Manager details at <http://matchbox-project.org/>

⁴ MIDINUX is the name of Red Flag's Linux distribution targeted for Mobile Internet Devices

⁵ MID Application Developers Guide (Document not yet available)