

MultiWindow

Programming Guide

Version 1.3.2

Table of Contents

1. OVERVIEW	3
1.1. ARCHITECTURE.....	3
1.2. CLASS DIAGRAM	4
1.3. SUPPORTED PLATFORMS.....	4
1.4. SUPPORTED FEATURES	5
1.5. COMPONENTS	5
1.6. IMPORTING LIBRARIES	5
2. HELLO MULTIWINDOW.....	6
3. USING THE SMULTIWINDOW CLASS	8
3.1. USING THE INITIALIZE() METHOD.....	8
3.2. HANDLING SSDKUNSUPPORTEDEXCEPTION	8
3.3. CHECKING THE AVAILABILITY OF MULTIWINDOW FEATURES	9
4. USING MULTIWINDOW	10
4.1. CONFIGURING YOUR APPLICATION FOR MULTIWINDOW.....	10
4.1.1. <i>Making Your Application a MultiWindow Application</i>	10
4.1.2. <i>Making Your Application a Multi-Instance Application</i>	10
4.1.3. <i>Configuring the Pen Window</i>	10
4.1.4. <i>Configuring your MultiWindow Style</i>	10
4.1.5. <i>Configuring your Traybar</i>	11
4.2. CHECKING FOR MULTIWINDOW SUPPORT ON A DEVICE.....	11
4.3. RUNNING MULTIWINDOW	12
4.3.1. <i>Checking MultiWindow Status Information</i>	13
4.3.2. <i>Listening to MultiWindow Status Change Events</i>	13
COPYRIGHT	15

1. Overview

MultiWindow allows you to run multiple resizable applications simultaneously.

MultiWindow consists of the MultiWindow UI and MultiWindow Framework. The MultiWindow UI has a MultiWindow launcher called Traybar. You can use it to manage MultiWindow applications. You can launch the Traybar by long-pressing the **Back** key and use it to run multiple applications. MultiWindow Framework is a system service connected to Activity Manager, Window Manager, and View System to configure applications in MultiWindow.

You can register your application as a MultiWindow application and add it to the Traybar by declaring it in your Android manifest file.

You can use MultiWindow to:

- check the status of your MultiWindow application
- change the status
- check the status change

1.1. Architecture

The following figure shows the MultiWindow architecture.

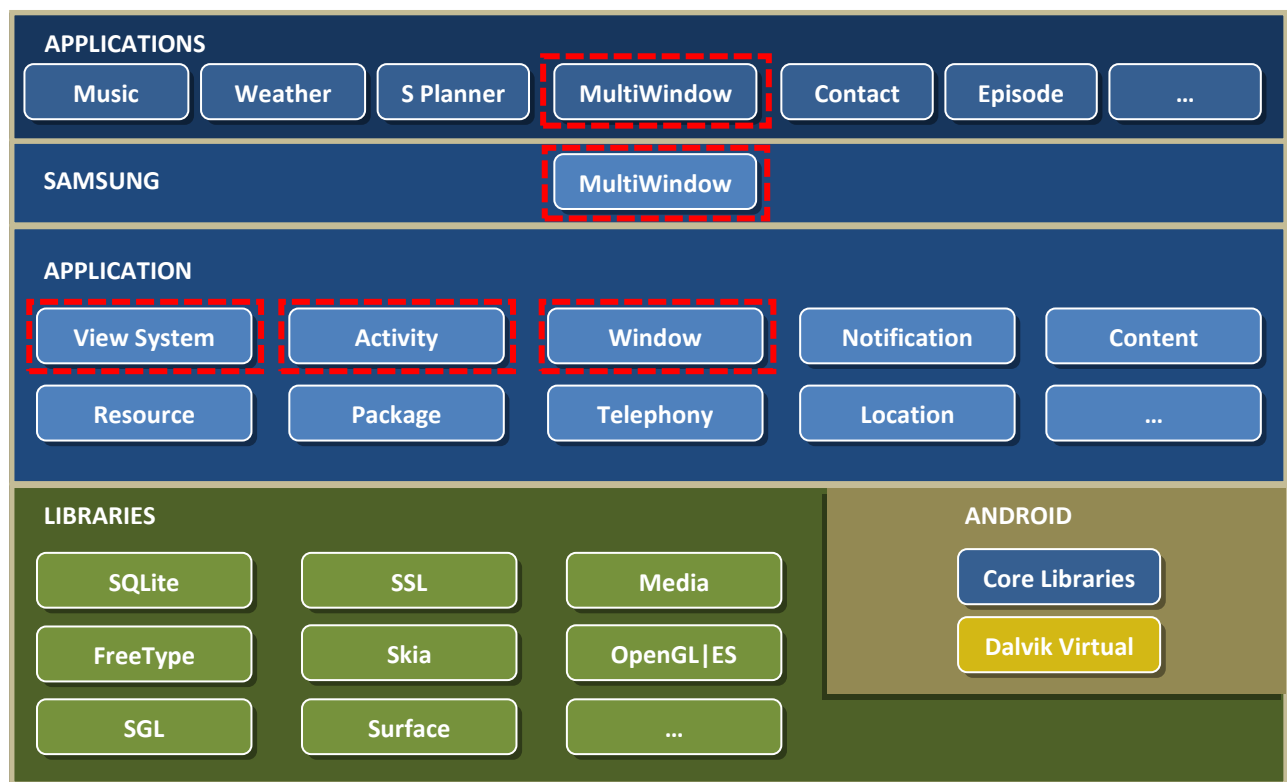


Figure 1: MultiWindow architecture

The architecture consists of:

- **MultiWindow UI:** UI to run MultiWindow applications. It consists of:
 - Traybar: UI component for managing and launching applications.
 - Centerbar window: UI component for separating and resizing applications when two MultiWindow applications are executed simultaneously.
 - Centerbar button: UI component for switching applications, changing the application position and size, or terminating applications.
- **MultiWindow Framework:** Activity Manager, Window Manager, and View System are interlinked with the MultiWindow Framework. The MultiWindow data structures and the system service for algorithm management are in the application framework layer.
- **MultiWindow package:** The system service for MultiWindowManagerService, which controls the MultiWindow data.

1.2. Class Diagram

The following figure shows the MultiWindow classes and interfaces that you can use in your application.

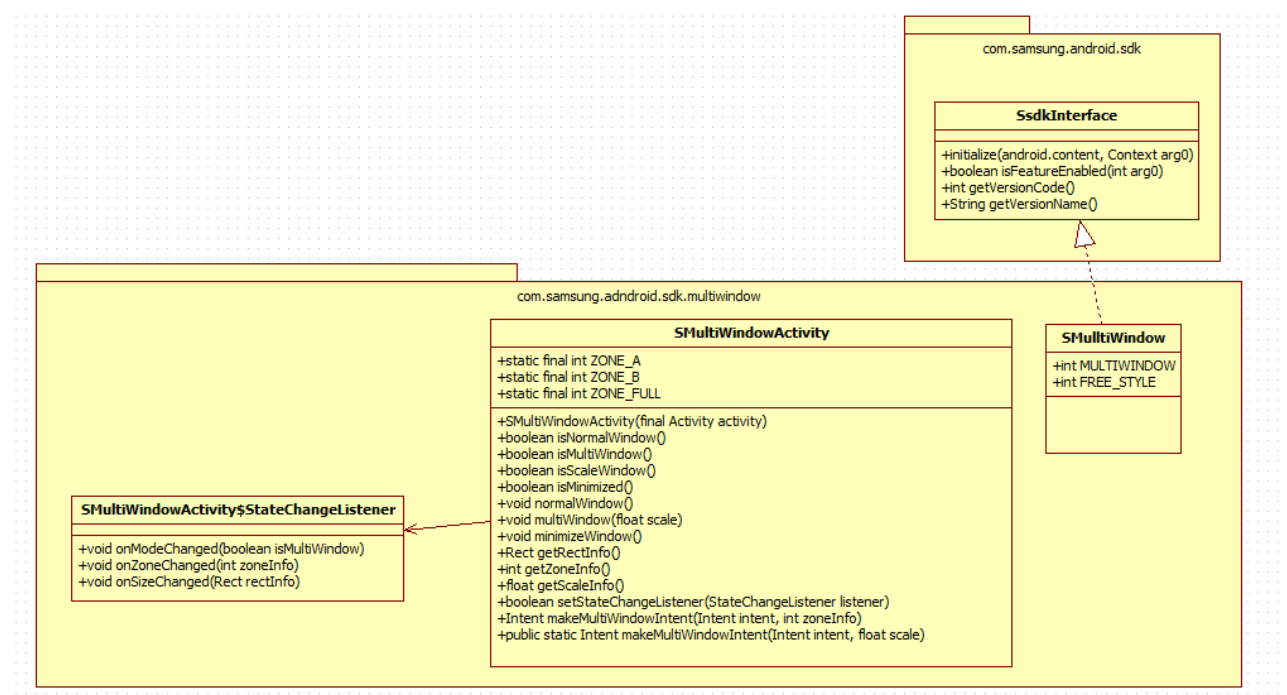


Figure 2: MultiWindow classes and interfaces

The MultiWindow classes and interfaces include:

- **SMultiWindowActivity:** Checks or changes the activity status of MultiWindow.
- **SMultiWindowActivity\$StateChangeListener:** Listens for MultiWindow status change events.

1.3. Supported Platforms

Android 4.1(Android API level 16) or above support MultiWindow.

1.4. Supported Features

MultiWindow supports the following features:

- Checking the support of MultiWindow
- Checking the status of MultiWindow
- Listener for MultiWindow status change events

1.5. Components

- Components
 - multiwindow-v1.3.2.jar
- Package to be imported:
 - com.samsung.android.sdk.multiwindow

1.6. Importing Libraries

To import the MultiWindow libraries to the application project:

1. Add the multiwindow-v1.3.2.jar and sdk-v1.0.0.jar files to the libs folder in Eclipse.

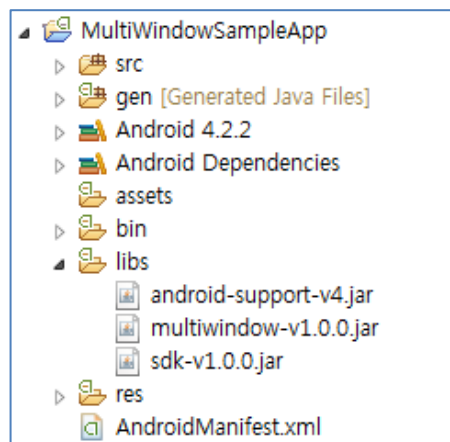


Figure 3: libs folder in Eclipse

The following permission has to be specified to provide logging feature in the AndroidManifest.xml file to initialize MultiWindow.

```
<uses-permission android:name=
"com.samsung.android.providers.context.permission.WRITE_USE_APP_FEATURE_SURVEY"/>
```

If you don't add the permission,

- Android 4.4.2 (KitKat) and above: SecurityException is thrown and your application doesn't work.
- Prior to Android 4.4.2 (KitKat): No exception. And the application works properly.

2. Hello MultiWindow

The following program changes the size of the screen using MultiWindow.

```
public class HelloMultiWindow extends ListActivity {
    private static final int MENU_MULTI_WINDOW = 0;
    private static final int MENU_NORMAL_WINDOW = 1;

    private SMultiWindow mMultiWindow = null;
    private SMultiWindowActivity mMultiWindowActivity = null;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        // create Creates list item's string. Each item is used for MultiWindow
        // test.
        String[] mStrings = new String[] { "1. Multi Window",
                                           "2. Normal Window" };

        setListAdapter(new
ArrayAdapter(this, android.R.layout.simple_list_item_1, mStrings));
        getListView().setTextFilterEnabled(true);

        // Creates the MultiWindow instance
        mMultiWindow = new SMultiWindow();

        try {
            mMultiWindow.initialize(this);
        } catch (SsdkUnsupportedException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
            // In this case, application should be stopped, because this
device can't support this feature.
        }

        mMultiWindowActivity = new SMultiWindowActivity(this);
    }

    @Override
    protected void onListItemClick(ListView l, View v, int position, long id) {
        switch (position) {
            case MENU_NORMAL_WINDOW:
                // Change: Multi -> Normal Window
                mMultiWindowActivity.normalWindow();
                break;
            case MENU_MULTI_WINDOW:
                {
                    // Change: Normal -> Multi Window
                    Intent intent = new Intent(Intent.ACTION_MAIN);
                    intent.setFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
                    intent.setComponent(new
ComponentName("com.sec.android.app.sbrowser",

                "com.sec.android.app.sbrowser.SBrowserMainActivity"));
                    SMultiWindowActivity.makeMultiWindowIntent(intent,
SMultiWindowActivity.ZONE_A);
                }
            }
        }
    }
}
```

```
        startActivity(intent);
    }
    break;
}
}
```

3. Using the SMultiWindow Class

The SMultiWindow class provides the following methods:

- `initialize()` initializes MultiWindow. You need to initialize MultiWindow before you can use it. If the device does not support MultiWindow, `SsdkUnsupportedException` is thrown.
- `getVersionCode()` gets the MultiWindow version number as an integer.
- `getVersionName()` gets the MultiWindow version name as a string.
- `isFeatureEnabled(int type)` checks if the MultiWindow feature is available on the device.

```
SMultiWindow mMultiWindow = new SMultiWindow();
try {
    mMultiWindow.initialize(this);
} catch (SsdkUnsupportedException e) {
    // TODO Auto-generated catch block
    e.printStackTrace();
}
```

3.1. Using the initialize() Method

The `SMultiWindow.initialize()` method:

- initializes MultiWindow
- checks if the device is a Samsung device
- checks if the device supports MultiWindow
- checks if the MultiWindow libraries are installed on the device

```
void initialize(Context context) throws SsdkUnsupportedException
```

If MultiWindow fails to initialize, the `initialize()` method throws an `SsdkUnsupportedException` exception. To find out the reason for the exception, check the exception message.

3.2. Handling SsdkUnsupportedException

If an `SsdkUnsupportedException` exception is thrown, check the exception message type using `SsdkUnsupportedException.getType()`.

The following two types of exception messages are defined in the SMultiWindow class:

- **VENDOR_NOT_SUPPORTED:** The device is not a Samsung device.
- **DEVICE_NOT_SUPPORTED:** The device does not support MultiWindow.

3.3. Checking the Availability of MultiWindow Features

You can check if a MultiWindow feature is supported on the device with the `isFeatureEnabled()` method. The feature types are defined in the `SMultiWindow` class. Pass the feature type as a parameter when calling the `isFeatureEnabled()` method. The method returns a Boolean value that indicates the support for the feature on the device.

```
boolean isFeatureEnabled(int type);
```

4. Using MultiWindow

4.1. Configuring Your Application for MultiWindow

4.1.1. Making Your Application a MultiWindow Application

To include your application in the MultiWindow UI Traybar, add the following meta-data to your Android manifest file below the application tag.

```
<meta-data android:name="com.samsung.android.sdk.multiwindow.enable"
            android:value="true" />
```

4.1.2. Making Your Application a Multi-Instance Application

To run multiple instances of your application:

- do not declare `launchMode` for an activity component in the launcher category to be single task and single instance
- do not use static member variables in your code except for member variables that share data structures between instances
- add the following meta-data to your Android manifest file below the application tag
- meta-data to declare just will not work, it only works over the tray bar to launch(since note3)
- maximum instances are 2

```
<meta-data android:name="com.samsung.android.sdk.multiwindow.multiinstance.enable"
            android:value="true" />
```

The maximum number of instances allowed for an application is two (2).

4.1.3. Configuring the Pen Window

To enable the Pen Window UI for your application, add the following meta-data to your Android manifest file.

```
<meta-data android:name="com.samsung.android.sdk.multiwindow.penwindow.enable"
            android:value="true" />
```

4.1.4. Configuring your MultiWindow Style

To configure a MultiWindow style for your application, add the following meta-data to your Android manifest file.

```
<meta-data android:name="com.samsung.android.sdk.multiwindow.style"
    android:value="forceTitleBar/fullscreenOnly" />
```

The table below shows the styles that MultiWindow supports.

Table 1: MultiWindow styles

MultiWindow Style	Description
"forceTitleBar"	Make multiwindow titlebar force if the window cannot make titlebar. (ex. Translucent window type)
"fullscreenOnly"	Blocks support for MultiWindow for some activities in applications where MultiWindow is supported

Use the divider '|' to assign two or more styles.

4.1.5. Configuring your Traybar

To configure a Traybar for your application, add the following code. By default, the Traybar is enabled.

```
import android.view.WindowManager;

WindowManager.LayoutParams lp = getWindow().getAttributes();
lp.privateFlags |= WindowManager.LayoutParams.
    PRIVATE_FLAG_DISABLE_MULTI_WINDOW_TRAY_BAR;getWindow().setAttributes(lp);
```

The Traybar is show in the figure below.

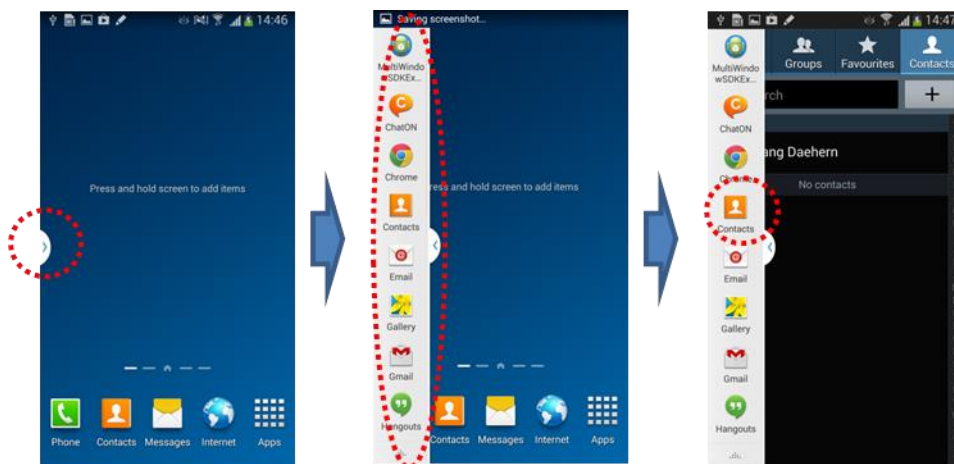


Figure 4: Traybar

4.2. Checking for MultiWindow Support on a Device

To check for MultiWindow support on a device, use the `SMultiWindow.getVersionCode()` method. MultiWindow is supported if the value returned is greater than 0.

```

mMultiWindow = new SMultiWindow();

mMultiWindow = new SMultiWindow();

SMultiWindow mMultiWindow = new SMultiWindow();
if (mMultiWindow.getVersionCode() > 0) {
    // This device support MultiWindow Feature.
}

if (mMultiWindow.isFeatureEnabled(SMultiWindow.MULTIWINDOW)) {
    // This device support MultiWindow.
}

```

4.3. Running MultiWindow

You can use multiwindow operation APIs to change and check current state and to listen to multiwindow status change events.

4.3.1. Change MultiWindow Status

You can change the application's window status by using the below apis. .

- Intent makeMultiWindowIntent(Intent intent, int zoneInfo)

You can change the application's window to split style multi window status using above api. And multiWindow zone info is based on the task record. You have to specify the zone info.

```

// Executes MultiWindow
String launchType = launchTypes.get(which);
ResolveInfo selectApp = mMultiWindowApplList.get(selectedApp);
ComponentInfo selectAppInfo = selectApp.activityInfo != null ?
    selectApp.activityInfo : selectApp.serviceInfo;

Intent intent = new Intent(Intent.ACTION_MAIN);
intent.setFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
intent.setComponent(new ComponentName(selectAppInfo.packageName,
    selectAppInfo.name));

// for split style multi window launch
SMultiWindowActivity.makeMultiWindowIntent(intent, SMultiWindowActivity.ZONE_A);
startActivity(intent);

```

- Intent makeMultiWindowIntent(Intent intent, int zoneInfo, float scale)

You can also change the application window to free style window by above api. In this case, you need to set the scale value for second parameter.

```

// for free style multi window launch
SMultiWindowActivity.makeMultiWindowIntent(intent, 0.6f);
startActivity(intent);

```

- Void minimizedWindow()
Minimized the window state.

- `Void normalWindow()`
Changed window state to normal window size.

For more information, see `onModeChanged()` in `MultiWindowDemoFunction.java` in `MultiWindowSampleApp`.

4.3.2. Checking MultiWindow Status Information

You can use the following methods to check the MultiWindow status information:

- `boolean isNormalWindow()` : to check window state is normal
- `boolean isMultiWindow()` : to check window state is multiWindow
- `boolean isScaleWindow()` (Added in 4.4 API level 19) : to check window state is scaled
- `boolean isMinimized()` (Added in 4.4 API level 19) : to check window state is minimized

For more information, see `getDemoResult()` in `MultiWindowDemoFunction.java` in `MultiWindowSampleApp`.

4.3.3. Listening to MultiWindow Status Change Events

You can listen to MultiWindow status change events by registering a MultiWindow `StateChangeListener` instance. Only this API is operated from Android API level 18(Android 4.3) or above version.

- **StateChangeListener:** Called when there are changes in the Mode, Zone, or Size status in MultiWindow.

Listener Method	Description
<code>onModeChanged</code>	Called when the status changes between Normal Window and MultiWindow. The Boolean parameter value indicates the status change.
<code>onZoneChanged</code>	Called when the information on the top/bottom or the left/right changes. The changed zone information is checked with the integer parameter information.
<code>onSizeChanged</code>	Called when the size of the application changes through the Centerbar UI. The changed Rect information is checked with the Rect parameter information.

```
// Registers window state listener

mMultiWindowActivity
    .setStateChangeListener(new SMultiWindowActivity.StateChangeListener() {
        public void onModeChanged(boolean isMultiWindow) {
            if (isMultiWindow)
                ;// TO BE IMPLEMENTED
                // Normal true --> called when changing to
                // Multiple Window
            else
```

```

        ;// TO BE IMPLEMENTED
        // Multiple false -> called when changing to
        // Normal Window
    }

    public void onZoneChanged(int arg0) {
        if (arg0 == SMultiWindowActivity.ZONE_A)
            ;// TO BE IMPLEMENTED
        else if (arg0 == SMultiWindowActivity.ZONE_B)
            ;// TO BE IMPLEMENTED
    }

    public void onSizeChanged(Rect arg0) {
    }

});

```

For more information, see `onModeChanged()` in `MultiWindowDemoFunction.java` in `MultiWindowSampleApp`.

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