

Android APIs 2.0, 2.1 & 2.2

What's new?



Markus Junginger

droidcon Berlin

27. Mai 2010

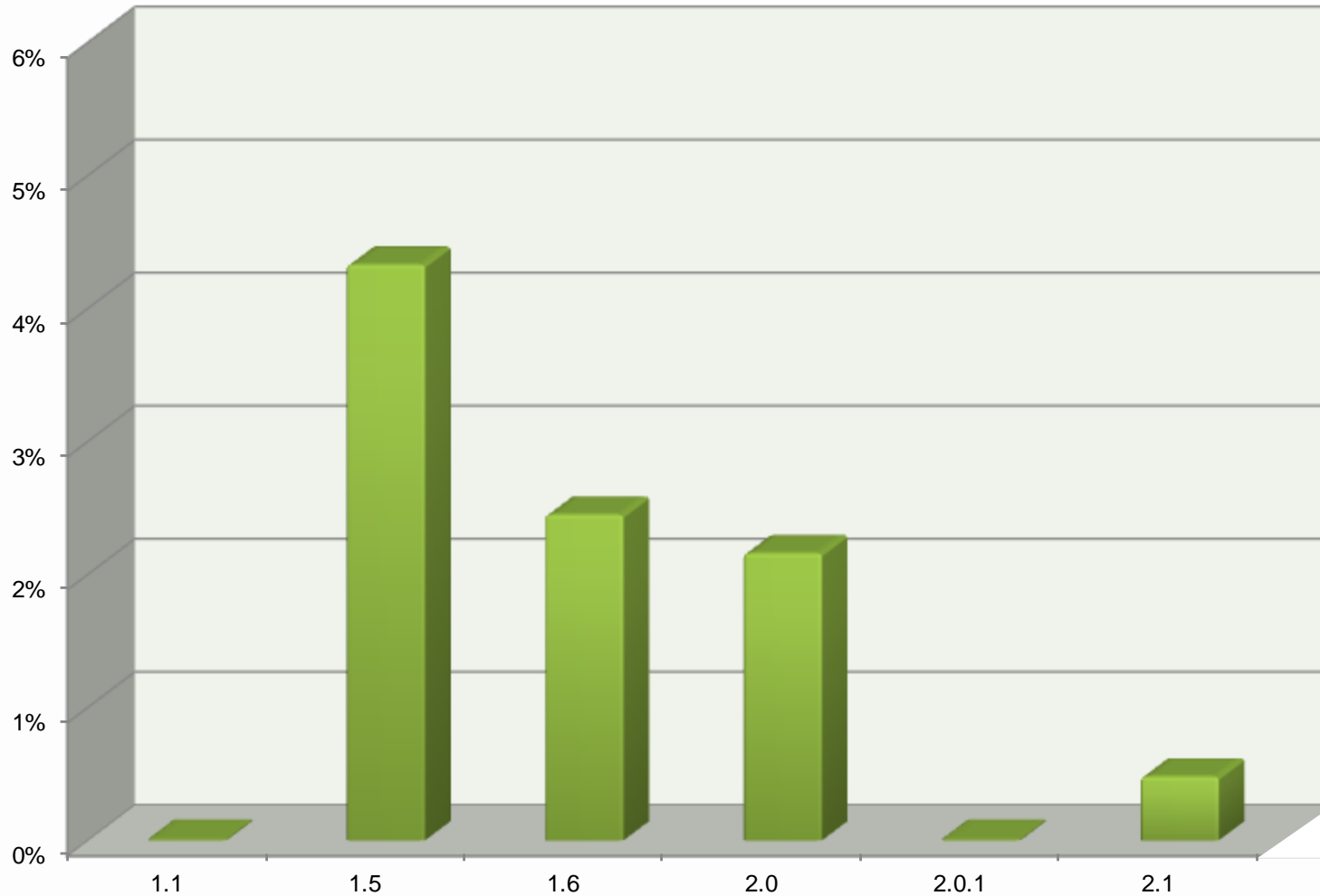
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Outline

- Bluetooth
- Quick Contacts
- Multitouch
- Live Wallpaper
- External Storage
- Cloud-to-device service
- Data backup
- JIT & misc.



Android API Changes Statistics



Bluetooth

- Android 2.0 (API Level 5)
- Android BT Stack based upon Bluez
 - Linux standard
- Bluetooth 2.1 EDR (2,1 Mb/s)
- `permission.BLUETOOTH`
 - Connect paired devices
- `permission.BLUETOOTH_ADMIN`
 - Discover and pair devices

Bluetooth Workflow

- Similar to TCP Sockets
- Bind BluetoothServerSocket
- Start Discovery → BluetoothDevice
- Open BluetoothSocket via BluetoothDevice
- Read/write using streams

Bluetooth API: Classes

- BluetoothAdapter:
 - Enable/Disable BT, query status
 - Start discovery (results: BroadcastReceiver)
 - Server BT socket
- BluetoothDevice: Remote BT-Gerät
 - Properties (name, address, ...)
 - Client BT socket
- Bluetooth(Server)Socket: RFCOMM
 - getInputStream, getOutputStream

Code: Bluetooth Server

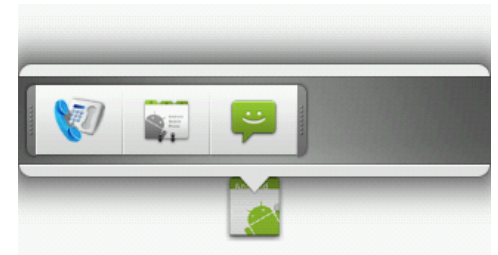
```
UUID uuid = uuid.fromString("27648B4D-D854-5674-  
FA60E4F535E44AF7");
```

```
BluetoothServerSocket serverSocket =  
    adapter.listenUsingRfcommWithServiceRecord("MyBlue  
toothApp", uuid);
```

```
BluetoothSocket socket = serverSocket.accept();  
InputStream in = socket.getInputStream();  
OutputStream out = socket.getOutputStream();  
// Read, write, and close
```

Quick Contact

- New widget extending `ImageView`
`android.widget.QuickContactBadge`
- Get quickly in touch with contacts
- Easy to integrate in your app
- Identify a contact by URI, email, or telefon number



Quick Contact – Code Example

```
protected void onCreate(Bundle savedInstanceState) {  
    super.onCreate(savedInstanceState);  
    setContentView(R.layout.contacts);  
  
    String phoneNumber = "0891234";  
    QuickContactBadge badge = (QuickContactBadge)  
        findViewById(R.id.QuickContactBadge);  
    badge.assignContactFromPhone(phoneNumber, true);  
}
```

Touch and Multitouch UIs

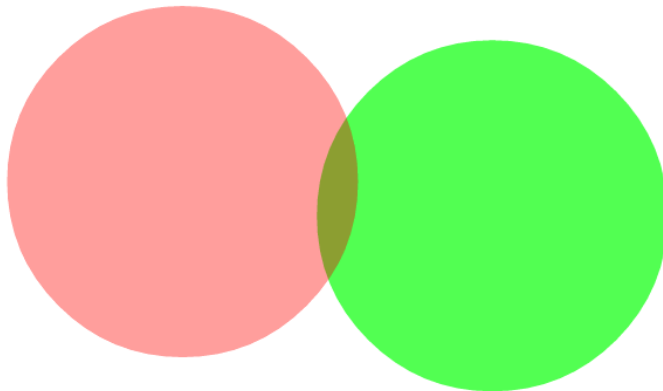
- Touch: essential part of modern mobile UIs
- iPhone demonstrated how it works
- Multitouch gestures (pinch & zoom, etc.)
- Most Android devices support multitouch gestures
- API support introduced in Android 2.0
 - Based on the existing touch API

(Single) Touch Events

- Since Android 1.0
- Register for MotionEvent
 - Activity.onTouchEvent
 - onTouchListener
- MotionEvent data
 - Action: Down, Move, Up
 - X and Y coordinates

Android 2.0 Multitouch API

- MotionEvent carries additional data
- Pointers
- `event.getPointerCount()`
- `event.getX/Y(pointerIndex)`
- `event.getPointerId(pointerIdx)`



Multitouch: Action Encoding

- Action for multitouch events

```
int action = event.getAction() &  
MotionEvent.ACTION_MASK;
```

- Identify pointer ID

```
int id = (event.getAction() &  
MotionEvent.ACTION_POINTER_ID_MASK) >>  
MotionEvent.ACTION_POINTER_ID_SHIFT;
```

- New ACTION codes

- ACTION_POINTER_DOWN
- ACTION_POINTER_UP

Example Workflow (no Move)

- ACTION_DOWN: 1. finger
- ACTION_POINTER_DOWN: 2. finger
- ACTION_POINTER_UP: 1./2. finger
- ACTION_UP: last finger

Multitouch notes

- Unlimited number of pointers
- Motorola droid / Milestone
 - Supports 2 pointers
- Most HTC devices are more restrictive:
 - Bounding-Box of 2 fingers
- HTC Evo 4G

Live Wallpaper

- Android 2.1
- Animations, interactions
- WallpaperService
- Main class to implement: WallpaperService.Engine
- XML meta data
 - Manifest
 - Settings



WallpaperService Class

```
public class MyWallpaper extends WallpaperService {  
    @Override  
    public Engine onCreateEngine () {  
        return new MyWallpaperEngine ();  
    }  
  
    // onCreate, onDestroy, ...  
}
```

WallpaperService.Engine

- Life-Cycle methods
`onCreate`, `onDestroy`
- Screen offset changes
`onOffsetsChanged`
- Surface callbacks
`onSurface...`
- Touch interaction
`onTouchEvent`

Wallpaper Drawing

- SurfaceHolder (Engine)

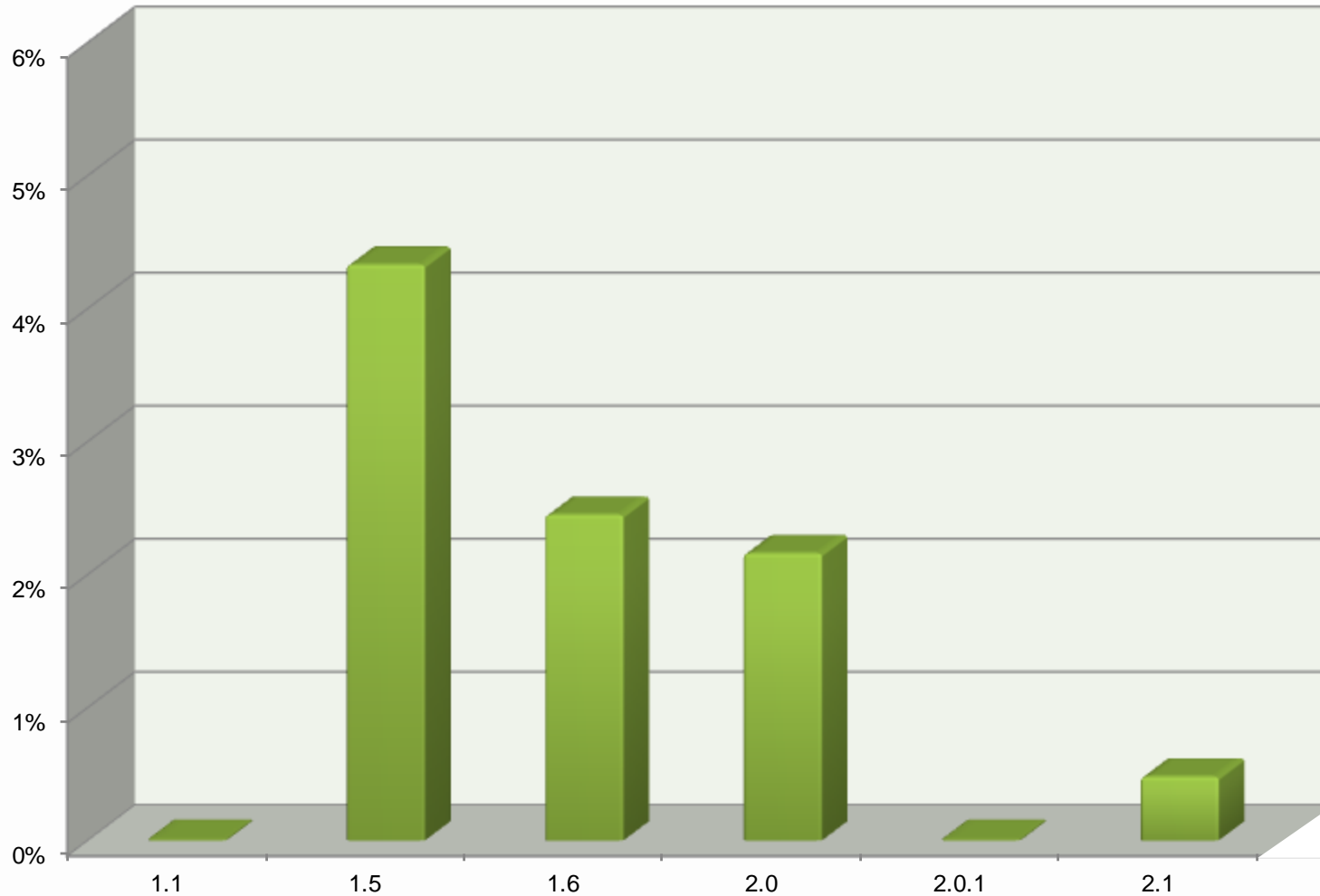
```
final SurfaceHolder holder = getSurfaceHolder() ;  
Canvas c = holder.lockCanvas() ;  
if (c != null) {  
    drawSomething(c) ;  
    holder.unlockCanvasAndPost(c) ;  
}
```

- Asynchronous: Thread or Handler

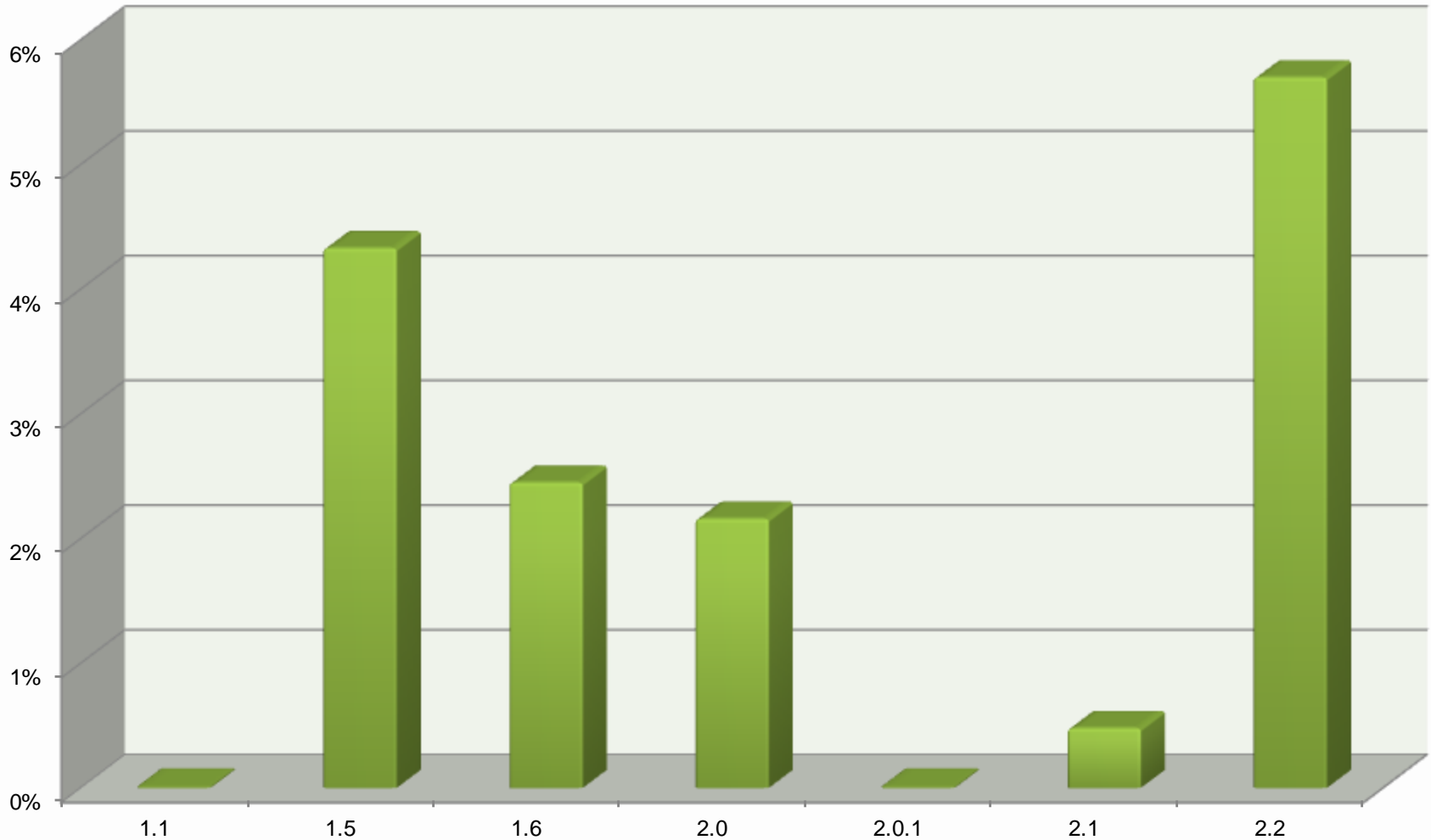


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Android API Changes Statistics



Android API Changes Statistics



Installation on External Storage

- Apps on SD cards save internal space
- `<manifest android:installLocation="auto">`
- `internalOnly`
- `auto, preferExternal`
 - When full/unavailable other storage is used
 - User may copy from/to external storage

Cloud-to-Device

- Cloud to Device Messaging Framework (C2DM)
- Google's push service
- Requirements: Android 2.2 & Market
- Basic Workflow
 - Client app requests ID from the cloud
 - Application server sends message to cloud for a client's ID
 - On the client, a message triggers an Intent

Cloud-to-Device Notes

- Messages may carry application data (key/value based, max. 1 KB)
- Message collapse (key based)
- Delivery when active (screen on)
- Unicast only
- SSL encrypted
- Same connection as used by Gmail, etc.
- Free of charge, but quota is enforced
- No TTL yet

Cloud-to-Device Availability

- Not open to everyone yet
- Docs and Sign up:
<http://code.google.com/intl/de-DE/android/c2dm/index.html>

Data Backup

- Backup application data to the cloud
- No synchronization! :/
- Extend BackupAgentHelper
 - Add helpers in onCreate()
- Add helpers
 - SharedPreferencesBackupHelper
 - FileBackupHelper (consider synchronization)
- Alternative: extend BackupAgent
- Trigger: BackupManager.dataChanged()

More new APIs in Android 2.2

- android.opengl.GLES20: OpenGL ES 2.0 (NDK: Android 2.0)
- SoundPool & other media improvements
- Speech recognition
- Device admin. (password, wipe data)
- WebKit, V8

Type	Additions	Changes	Removals	Total
Packages	11	40	0	51
Classes <i>Interfaces</i>	60	122	0	182
Constructors	3	3	1	7
Methods	206	37	3	246
Fields	195	23	29	247
Total	475	225	33	733

JIT Compiler

- Typical app: low percentage interpreted
- Dalvik interpretes 2x faster (regular JVM)
- Compiled code is 2-5 times faster
 - Extensive calculations
 - ListView
- Uses only around 100k per process
- More optimizations to come (& better GC)

By the way...

- `android.permission.BRICK`

„Required to be able to disable the device (very dangerous!).”

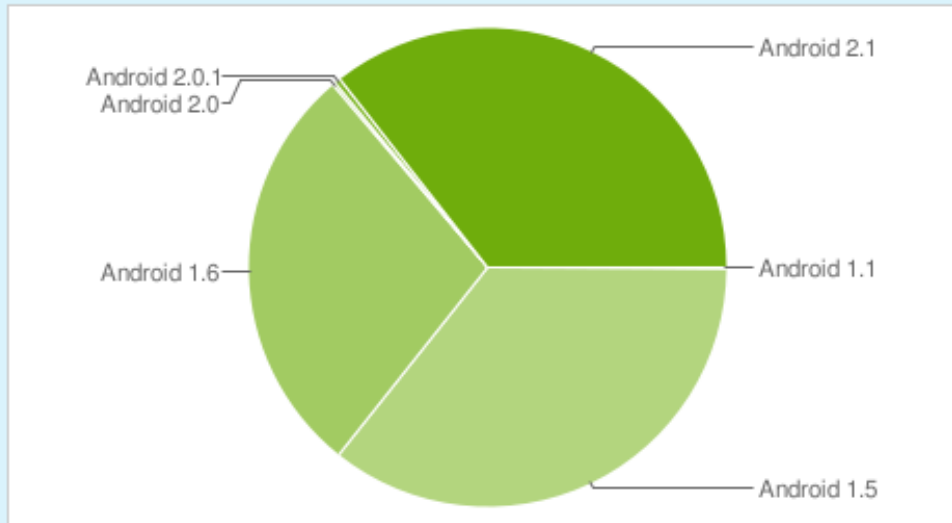
- `Log.wtf()`

Officially titled „What a Terrible Failure“

- `ActivityManager.isUserAMonkey()`

Returns "true" if the user interface is currently being messed with by a monkey.

„Don't say the F word...“



Android Platform	Percent of Devices
Android 1.1	0.1%
Android 1.5	34.1%
Android 1.6	28.0%
Android 2.0	0.2%
Android 2.0.1	0.4%
Android 2.1	37.2%

Data collected during two weeks ending on May 17, 2010

Backward compatibility

- Code for 1.x, use 2.x features optionally
- Reflection, or:
- Wrapper classes
 - Delegate calls to new API
 - Check if class is available

```
try {  
    Class.forName("NewClass");  
} catch (Exception ex) {  
    // Unavailable, handle or throw  
}
```


Future

■ Confirmed

- VM & JIT Compiler optimizations
- Hardware-accelerated rendering
- Market website & synchronization

■ Wishlist

- More payment methods (semi confirmed)
- In-app purchases
- Uniformed multitouch
- Solution upgrading old Android version

Thank you! Q&A

kontakt@greenrobot.de

<http://greenrobot.de>

Twitter: [greenrobot_de](https://twitter.com/greenrobot_de)



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