

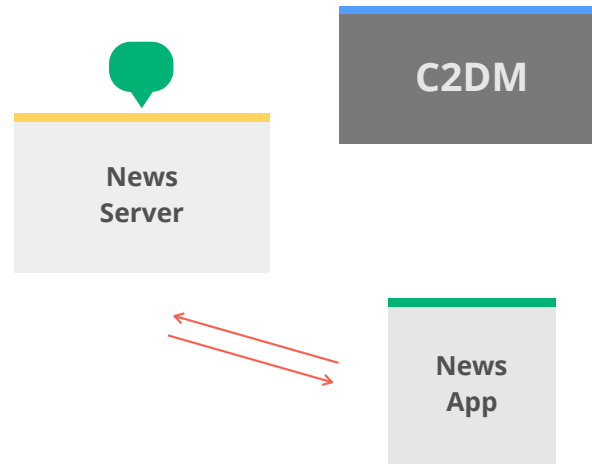


# Cloud Messaging in Android

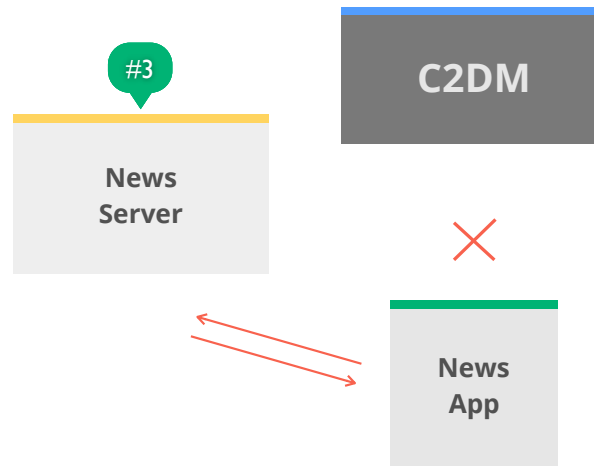
Francesco Nerieri  
Engineering Manager



# Android Cloud To Device Messaging



# Android Cloud To Device Messaging



# Android Cloud To Device Messaging

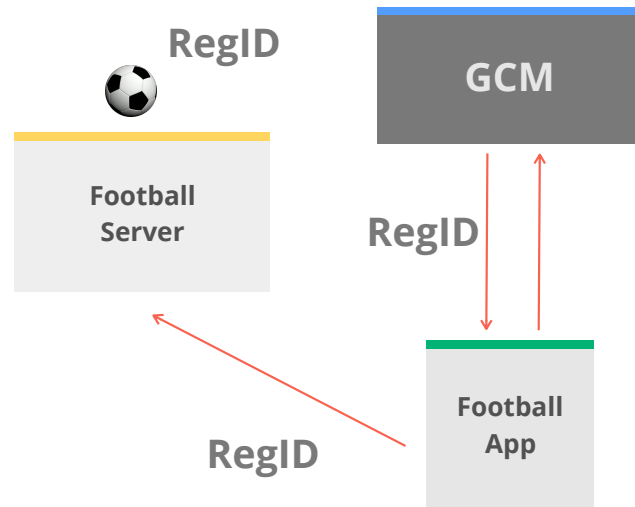




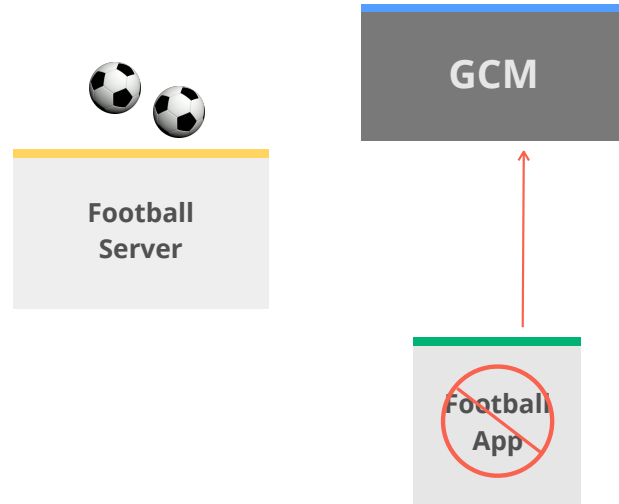
4.7 milliseconds



# GCM - Registration



# GCM - Unregistration





# Auth

Browser address bar: <https://devconsole-canary.corp.google.com/apis/b/0/?pli=1#project:968350041068:access>

Navigation: Mail Calendar Drive Sites Video Groups More ▾

Google apis


API Project ▾

- Overview
- Services
- Team
- API Access**
- Reports
- Quotas

### API Access

To prevent abuse, Google places limits on API requests. Using a valid OAuth token or API key allow

#### Authorized API Access

OAuth 2.0 allows users to share specific data with you (for example, contact lists) while keeping their usernames, passwords, and other information private. A single project may contain up to 5 client IDs.  [Learn more](#)

[Create an OAuth 2.0 client ID...](#)

#### Simple API Access

Use API keys to identify your project when you do not need to access user data. [Learn more](#)

##### Key for browser apps (with referers)

API key: [AIZAydj59wrQhdZRe4efQG-M4\\_EAEHoCsbWt3](#)

Referers: Any referer allowed

Activated on: Jun 12, 2012 3:53 PM

Activated by: nero@google.com – you

[Create new Server key...](#) [Create new Browser key...](#)



# Register



```
import com.google.android.gcm.GCMRegistrar;  
  
@Override  
protected void onCreate(Bundle savedInstanceState) {  
    GCMRegistrar.register(this, "968350041068");  
}
```

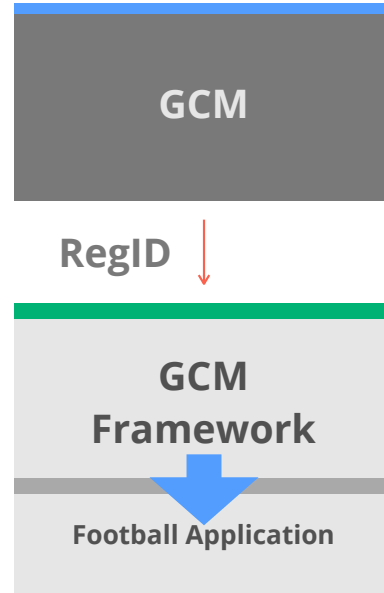


```
import com.google.android.gcm.GCMRegistrar;

@Override
protected void onCreate(Bundle savedInstanceState) {
    if (GCMRegistrar.getRegistrationId(this).equals("")) {
        GCMRegistrar.register(this, "968350041068");
    }
}
```



# Receive data



```
import com.google.android.gcm.GCMBaseIntentService;  
  
public class GCMIntentService extends  
    GCMBaseIntentService {  
  
    @Override  
    protected void onRegistered(Context ctx, String regId) {  
        sendToFootballServer(regId);  
    }  
}
```



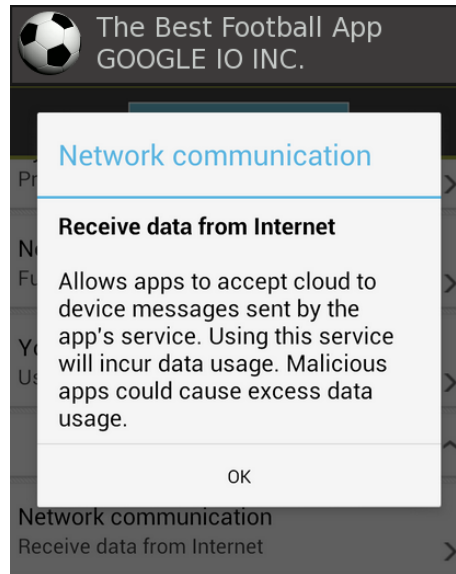
```
import com.google.android.gcm.GCMBaseIntentService;

public class GCMIntentService extends
    GCMBaseIntentService {

    @Override
    protected void onMessage(Context ctx, Intent intent) {
        final Bundle bundle = intent.getExtras();
        doSomeMagic(bundle);
    }
}
```



# Declare permissions





```
<uses-permission  
    android:name="com.google.android.c2dm.permission.RECEIVE"  
>
```



# Football application



Register with GCM



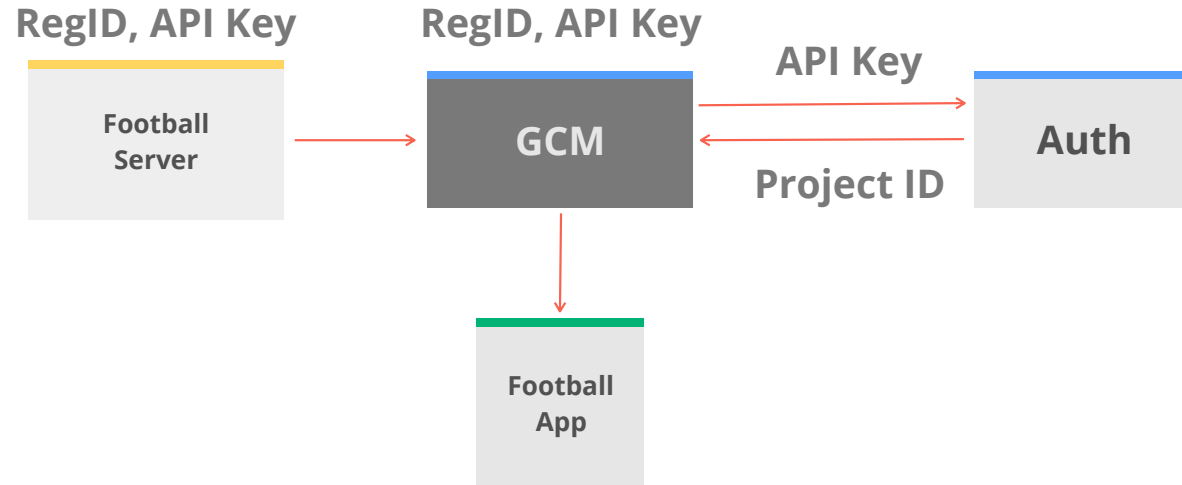
Receive real time updates!



Declare permissions



# Server



Content-Type:application/json

Authorization:key=AIzaSyB-1uEai2WiUapxCs2Q0GZYzPu7Udno5aA

```
{
  "registration_ids" :
    ["APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx..."],
  "data" : {
    "Team" : "Portugal",
    "Score" : "3",
    "Player" : "Varela",
  },
}
```



# Portugal vs Denmark



Pepe 24  
Postiga 36

Bendtner 41  
Bendtner 80

Varela 87

## GOAL!!!





USA



**Born:** May 2, 1975  
[Leytonstone](#)

**Height:** 6' 0" (1.83 m)

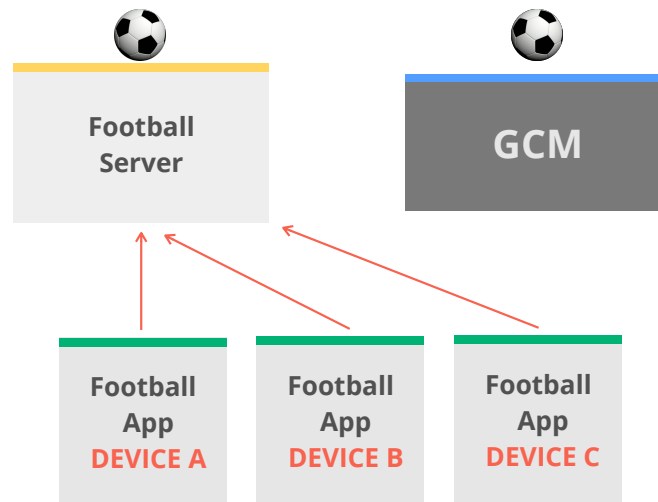
**Team:** LA Galaxy

**David Beckham**

**News**



# Message Multicasting



```
{  
  "collapse_key" : "Beckham-News",  
  "data" : {  
    "Team" : "LA Galaxy",  
    "Player" : "David Beckham",  
  }  
  "registration_ids": [  
    "APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx...",  
    "APQ23XFer5MtP0retKMfe1KSFWaFUH-1EWab...",  
  ]  
},
```





```
{  
  "multicast_id" : "5814378600346514436",  
  "success":1,  
  "failure":1,  
  "results":[  
    { "message_id":"0:1337639984251701%921c249af9fd7ecd", },  
    { "error":"DeviceNotRegistered", }  
  ],  
}
```



# Message Multicasting




One Request Many Devices




Up to 1000 devices simultaneously





USA 



**Born:** May 2, 1975  
[Leytonstone](#)


**Height:** 6' 0" (1.83 m)


**Team:** LA Galaxy


**David Beckham**

**News**

[David Beckham lifts Stanley Cup](#)



USA 



**Born:** May 2, 1975  
[Leytonstone](#)


**Height:** 6' 0" (1.83 m)

**Team:** LA Galaxy

**David Beckham**

**News**

[David Beckham lifts Stanley Cup](#)





USA



**Born:** May 2, 1975  
[Leytonstone](#)

**Height:** 6' 0" (1.83 m)

**Team:** LA Galaxy



**David Beckham**

**News**



# Multiple Senders



Football  
Server

GCM



Social Updates  
Server

Football  
App



```
import com.google.android.gcm.GCMRegistrar;

@Override
protected void onCreate(Bundle savedInstanceState) {
    if (GCMRegistrar.getRegistrationId(this).equals("")) {
        GCMRegistrar.register(this, "968350041068",
            "652183961211");
    }
}
```



```
import com.google.android.gcm.GCMBaseIntentService;

public class GCMIntentService extends
    GCMBaseIntentService {

    @Override
    protected void onRegistered(Context ctx, String regId) {
        sendToFootballServer\(regId\);
        sendToSocialUpdatesServer\(regId\);
    }
}
```



## Multiple Senders



One common RegistrationID



Multiple parties can send  
messages to one application



Up to 100 project IDs







USA



**Born:** May 2, 1975  
[Leytonstone](#)

**Height:** 6' 0" (1.83 m)

**Team:** LA Galaxy



Me with the (pretty big) Stanley...

## David Beckham

### News

[David Beckham lifts Stanley Cup](#)





San Francisco



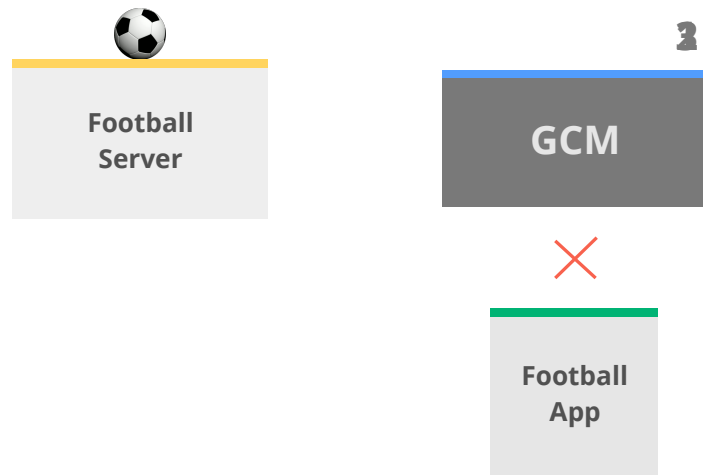
**KICK OFF!**



**25% OFF**



# Time To Live



```
{  
  "collapse_key" : "Food-Promo",  
  "time_to_live" : 3600,  
  "delay_while_idle" : "true",  
  "data" : {  
    "Category" : "FOOD",  
  }  
  "registration_ids":  
    ["APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx..."],  
},
```



## Time To Live



From 0 seconds to 4 weeks

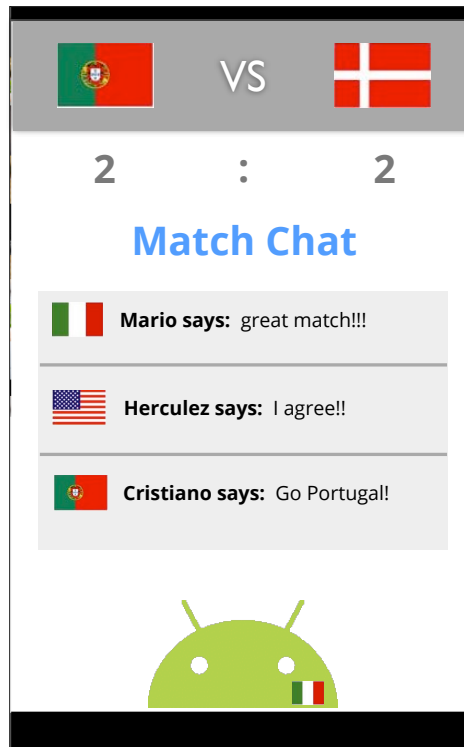


Messages with TTL value of 0  
are not stored on GCM



Default TTL time is 4 weeks





The screenshot shows a mobile application interface for a football match chat. At the top, there is a grey header bar containing the flag of Portugal on the left, the text "VS" in the center, and the flag of Denmark on the right. Below the header, the score "2 : 2" is displayed in a large, bold font. Underneath the score, the text "Match Chat" is written in a blue, sans-serif font. The main content area consists of three chat messages, each in a light grey box with a thin border. The first message features a small Italian flag icon followed by the text "Mario says: great match!!!". The second message features a small American flag icon followed by "Herculez says: I agree!!". The third message features a small Portuguese flag icon followed by "Cristiano says: Go Portugal!". At the bottom of the chat area, there is a green Android robot icon with a small Italian flag on its chest. The entire app interface is set against a white background within a black border.



# Messages with Payload

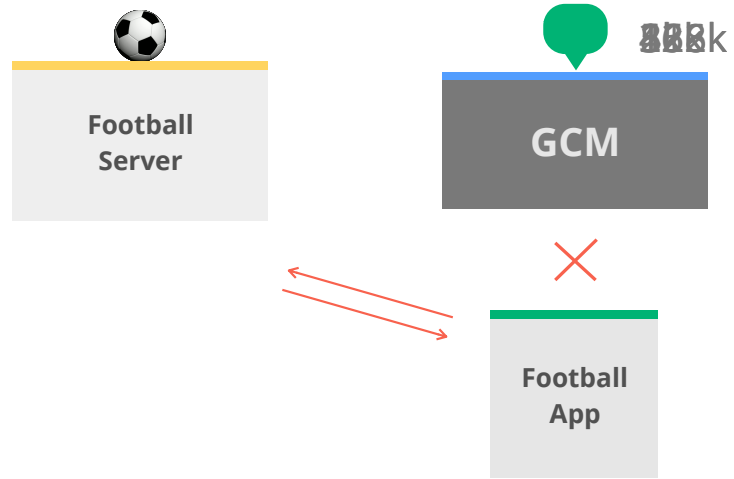


```
{  
  "registration_ids" :  
    [ "APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx..." ],  
  "data" : {  
    "Nick" : "Mario",  
    "Text" : "great match!",  
    "Room" : "PortugalVSDenmark",  
  },  
}
```





# Messages with Payload



```
{  
  "message_type" : "deleted_messages",  
  "total_deleted" : "115",  
},
```



```
import com.google.android.gcm.GCMBaseIntentService;

public class GCMIntentService extends
    GCMBaseIntentService {

    @Override
    protected void onDeletedMessages(Context ctx, int total) {
        fullSyncWithFootballServer(total);
    }
}
```



## Messages with Payload



Payload up to 4K per message



Up to 100 messages are  
stored by GCM



Message to trigger sync after that



## Summary



Message Multicasting for News



Multiple Senders for Social Updates



Time To Live for Events and Promos



Messages with Payload for IM



## Portugal vs Denmark



Pepe 24  
Postiga 36  
Varela 87

Bendtner 41  
Bendtner 80



```
{
  "collapse_key" : "PortugalDenmark",
  "time_to_live" : 4400,
  "data" : {
    "Team" : "Portugal",
    "Score" : "3",
  }
  "registration_ids":[
    "APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx...",
    "APQ23XFer5MtP0retKMfe1KSFWaFUH-1EWab..."
  ]
},
```



# GCM - Reliability





# GCM Optimization



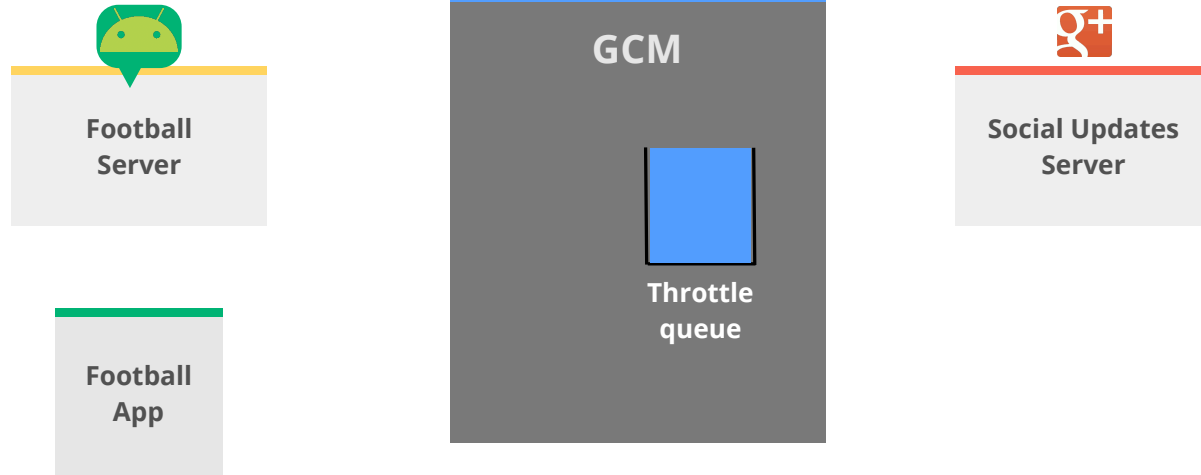
Provide fresh data all the time



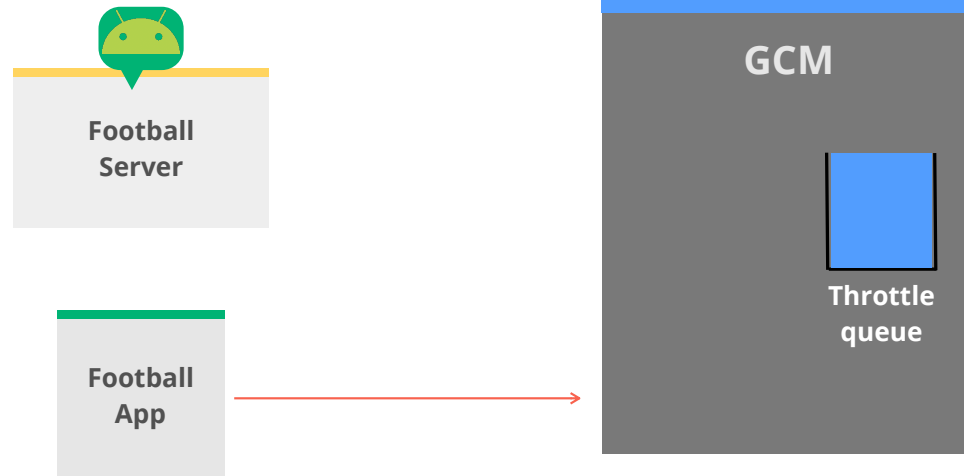
Optimized for battery life



# GCM Optimization

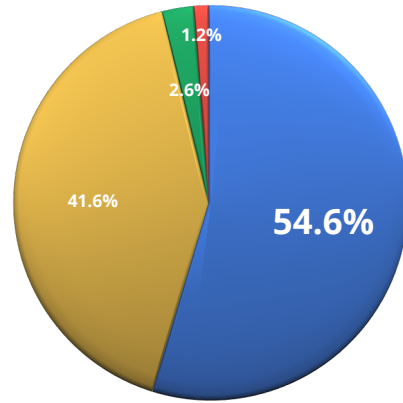


# GCM Optimization



# GCM Messages Metrics

- Sent
- Stored
- Throttled
- Collapsed



Overview **Sample C2DM App** [Export as CSV](#)

GCM registrations for May 20, 2012 - Jun 16, 2012 Show: last month 3m 6m 1y all

Errors

Ratings & Reviews

**Stats**

APK

Store Listing

Pricing and Distribution

In-app Products

Services & APIs

Android Version Device Country Language App Version Carrier GCM Errors

**GCM registrations by Android version**

**GCM registrations on June 16, 2012**

	Your app	All apps in Shopping
<input checked="" type="checkbox"/> Android 2.3.3+	849 61.84 %	0.00 %
<input checked="" type="checkbox"/> Android 4.0.3 - 4.0.4	401 29.21 %	0.00 %
<input checked="" type="checkbox"/> Android 2.2	79 5.75 %	0.00 %
<input type="checkbox"/> Android 3.2	25 1.82 %	0.00 %
<input type="checkbox"/> Android 4.0 - 4.0.2	6 0.44 %	0.00 %
<input type="checkbox"/> Android 3.1	2 0.15 %	0.00 %
<input type="checkbox"/> Android 2.3	1 0.07 %	0.00 %
<input type="checkbox"/> Others	10 0.73 %	

- Overview
- Errors
- Ratings & Reviews
- Stats**
- APK
- Store Listing
- Pricing and Distribution
- In-app Products
- Services & APIs

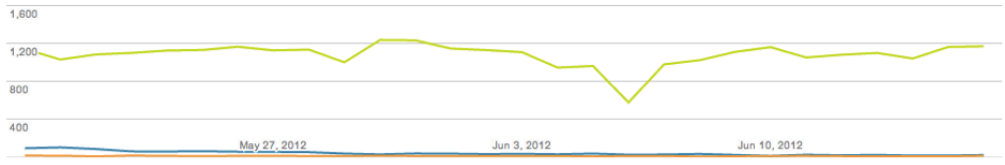
GCM registrations for May 20, 2012 - Jun 16, 2012

Show: last month 3m 6m 1y all



- Android Version
- Device
- Country
- Language
- App Version**
- Carrier
- GCM Errors

GCM registrations by app version



GCM registrations on June 16, 2012



Overview **Sample C2DM App** [Export as CSV](#)

**GCM registrations** for May 20, 2012 - Jun 16, 2012 Show: last month 3m 6m 1y all

**Stats**

- APK
- Store Listing
- Pricing and Distribution
- In-app Products
- Services & APIs

**Android Version** **Device** **Country** **Language** **App Version** **Carrier** **GCM Errors**

**GCM registrations by GCM errors**

**GCM registrations on June 16, 2012**

Your app	
<input checked="" type="checkbox"/> HTTP 200 - OK	1,373 100.00 %

Overview **Sample C2DM App** Export as CSV

Errors **GCM messages** for May 20, 2012 - Jun 16, 2012 Show: last month 3m 6m 1y all

Ratings & Reviews

Stats

APK

Store Listing

Pricing and Distribution

In-app Products

Services & APIs

Android Version Device Country Language App Version Carrier GCM Message Status GCM Errors

### GCM messages by Android Version

### GCM messages on June 16, 2012

	Your app	All apps in Shopping
<input checked="" type="checkbox"/> Android 2.3.3+	470,314 45.78 %	0.00 %
<input checked="" type="checkbox"/> Android 2.2	178,399 17.36 %	0.00 %
<input checked="" type="checkbox"/> Android 4.0 - 4.0.2	170,500 16.60 %	0.00 %
<input type="checkbox"/> Android 4.0.3 - 4.0.4	158,533 15.43 %	0.00 %
<input type="checkbox"/> Android 3.2	6,111 0.59 %	0.00 %
<input type="checkbox"/> Android 3.1	930 0.09 %	0.00 %
<input type="checkbox"/> Android 3.0	533 0.05 %	0.00 %
<input type="checkbox"/> Android 2.3	132 0.01 %	0.00 %



Overview **Sample C2DM App** [Export as CSV](#)

GCM messages for May 20, 2012 - Jun 16, 2012 Show: last month 3m 6m 1y all

Errors

Ratings & Reviews

**Stats**

APK

Store Listing

Pricing and Distribution

In-app Products

Services & APIs

Android Version Device **Country** Language App Version Carrier GCM Message Status GCM Errors

**GCM messages by country**

**GCM messages on June 16, 2012**

	Your app	All apps in Shopping
<input checked="" type="checkbox"/> United States	743,669 72.38 %	0.00 %
<input checked="" type="checkbox"/> Canada	185,442 18.05 %	0.00 %
<input checked="" type="checkbox"/> China	525 0.05 %	0.00 %
<input type="checkbox"/> Taiwan	300 0.03 %	0.00 %
<input type="checkbox"/> France	264 0.03 %	0.00 %
<input type="checkbox"/> Saudi Arabia	258 0.03 %	0.00 %
<input type="checkbox"/> India	187 0.02 %	0.00 %
<input type="checkbox"/> Puerto Rico	176 0.02 %	0.00 %

Overview **Sample C2DM App** [Export as CSV](#)

GCM messages for May 20, 2012 - Jun 16, 2012 Show: last month 3m 6m 1y all

Errors

Ratings & Reviews

**Stats**

APK

Store Listing

Pricing and Distribution

In-app Products

Services & APIs

Android Version Device Country Language App Version Carrier **GCM Message Status** GCM Errors

**GCM messages by GCM message status**

**GCM messages on June 16, 2012**

Stored 193,481 (18.8%)

Your app	
<input checked="" type="checkbox"/> Invalid Request	735,918 71.63 %
<input checked="" type="checkbox"/> Stored	193,481 18.83 %
<input checked="" type="checkbox"/> Sent	96,507 9.39 %
<input checked="" type="checkbox"/> Collapsed	1,409 0.14 %
<input type="checkbox"/> Throttled	65 0.01 %

- Overview
- Errors
- Ratings & Reviews
- Stats**
- APK
- Store Listing
- Pricing and Distribution
- In-app Products
- Services & APIs

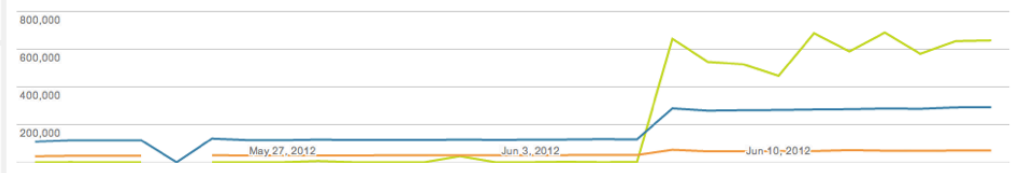
GCM messages for May 20, 2012 - Jun 16, 2012

Show: last month 3m 6m 1y all

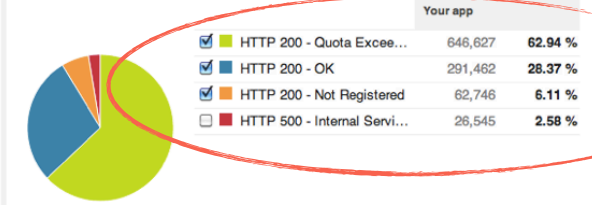


- Android Version
- Device
- Country
- Language
- App Version
- Carrier
- GCM Message Status
- GCM Errors**

GCM messages by GCM errors



GCM messages on June 16, 2012



## C2DM to GCM Migration



C2DM sign ups and quota requests  
are now closed!



C2DM servers will keep running!



GCM is now LIVE!



## C2DM to GCM Migration



Enable GCM



Point your server to:  
<http://android.googleapis.com/gcm/send>



New Client App version with projectId  
as authorized sender



## GCM Documentation



Getting started guide with a  
step by step tutorial



**<http://developer.android.com>**



Getting started for experienced  
C2DM developers



GCM Advanced topics



[developer.android.com](https://developer.android.com)



Google cloud messaging