Introduction to Android Connectivity

CS 436 Software Development on Mobile

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Connectivity Manager

Connectivity Manager

Connectivity Manager is class that answers queries about the state of network connectivity. It also notifies applications when network connectivity changes

-Monitor network connections (Wi-Fi, GPRS, UMTS, etc.)
-Send broadcast intents when network connectivity changes
-Attempt to "fail over" to another network when connectivity to a network is lost
-Provide an API that allows applications to query the coarse-grained or fine-grained state of the available networks

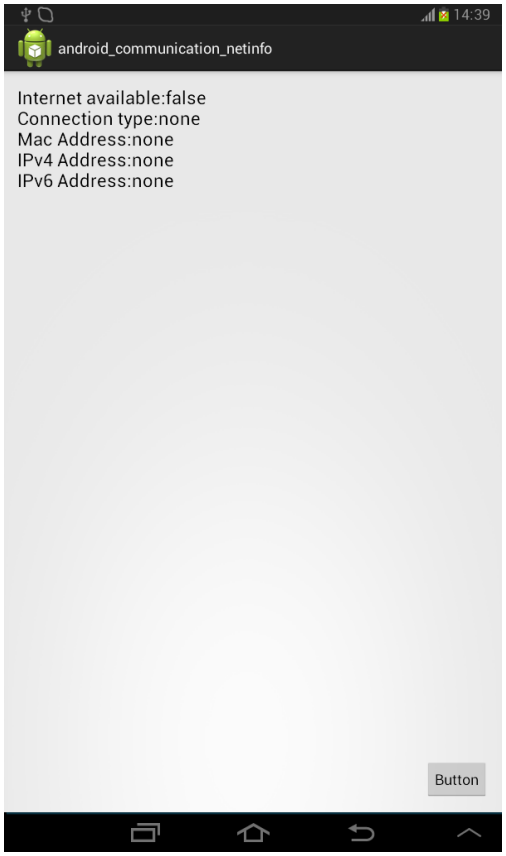
Connectivity Manager must used with Broadcast Receiver Class

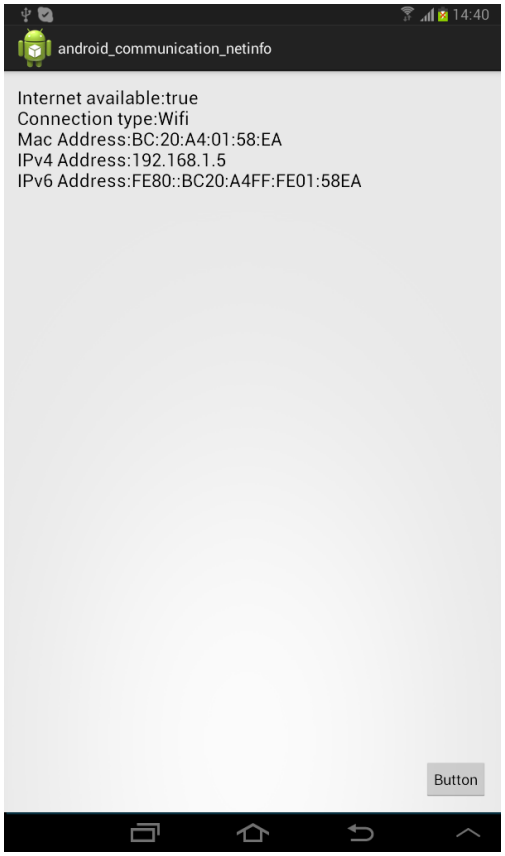
Connectivity Manager

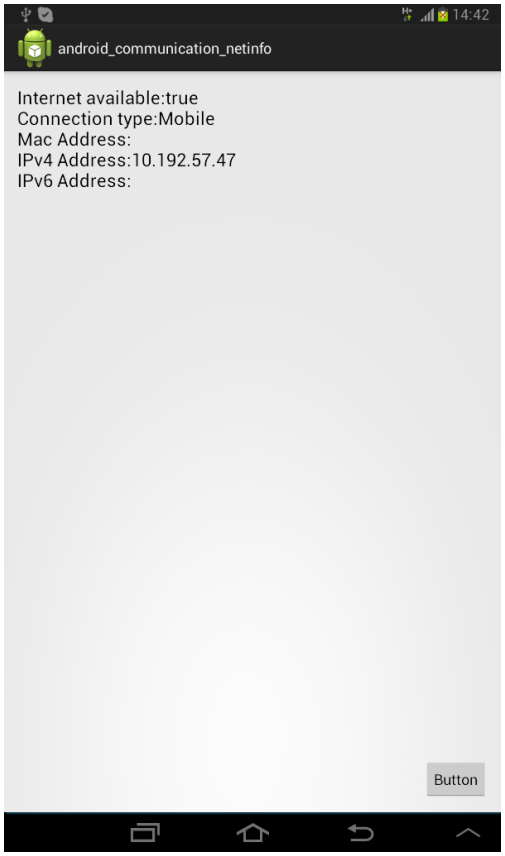
Technology supported

TYPE_BLUETOOTH	**The Default Bluetooth data connection.**
TYPE_DUMMY	Dummy data connection.
TYPE_ETHERNET	**The Default Ethernet data connection.**
TYPE_MOBILE	**The Default Mobile data connection.**
TYPE_MOBILE_DUN	A DUN-specific Mobile data connection.
TYPE_MOBILE_HIPRI	A High Priority Mobile data connection.
TYPE_MOBILE_MMS	**An MMS-specific Mobile data connection.**
TYPE_MOBILE_SUPL	A SUPL-specific Mobile data connection.
TYPE_WIFI	**The Default WIFI data connection.**
TYPE_WIMAX	**The Default WiMAX data connection.**

Connectivity Manager







Project: android_communication_netinfo

Connectivity Manager

Check for online status

1) Uses permission "android.permission.ACCESS_NETWORK_STATE“ and "android.permission.INTERNET“
2) Create broadcast receiver for intent “android.net.conn.CONNECTIVITY_CHANGE”
3) Use ConnectivityManager to query Network info
4) Query IP address and Mac address from Linux Kernel (using NetUtil class)

Connectivity Manager

Check for online status

1) Uses permission

```
 <uses-permission
android:name="android.permission.ACCESS_NETWORK_STATE"/>
   <uses-permission
android:name="android.permission.INTERNET"/>
```

Connectivity Manager

Check for online status

2) Create broadcast receiver for intent "android.net.conn.CONNECTIVITY_CHANGE"

```
IntentFilter ifilter_charge = new
IntentFilter("android.net.conn.CONNECTIVITY_CHANGE");
BroadcastReceiver batteryLevelReceiver = new
BroadcastReceiver(){
        @Override
        public void onReceive(Context arg0, Intent arg1) {
                //UpdateNetStatus();
        }};

registerReceiver(batteryLevelReceiver, ifilter_charge);
```

Connectivity Manager

Check for online status

3) Use ConnectivityManager to query Network info

```
public boolean isOnline() {
ConnectivityManager cm =(ConnectivityManager)
getSystemService(Context.CONNECTIVITY_SERVICE);

  return cm.getActiveNetworkInfo() != null &&
                cm.getActiveNetworkInfo().isConnectedOrConnecting();
          }
```

Connectivity Manager

Check for online status

3) Use ConnectivityManager to query Network info

```
private void UpdateNetStatus()
        {
                boolean isOnline_msg=isOnline();
                 String connectiontype="none";
                  if(isOnline_msg==true)
                  {    ConnectivityManager cm =

(ConnectivityManager)this.getSystemService(Context.CONNECTIVITY_SERVICE);
            NetworkInfo activeNetwork = cm.getActiveNetworkInfo();
boolean isConnected = activeNetwork.isConnectedOrConnecting();
```

Connectivity Manager

Check for online status

```
switch(activeNetwork.getType())
{
case ConnectivityManager.TYPE_BLUETOOTH:connectiontype="Bluetooth";break;
case ConnectivityManager.TYPE_ETHERNET:connectiontype="Ethernet";break;
case ConnectivityManager.TYPE_MOBILE:connectiontype="Mobile";break;
case ConnectivityManager.TYPE_MOBILE_DUN:connectiontype="Dial up";break;
case ConnectivityManager.TYPE_WIFI:connectiontype="Wifi";break;
case ConnectivityManager.TYPE_WIMAX:connectiontype="Wimax";
}
                        }
            }
```

Connectivity Manager

Check for online status

4) Use NetUtil class to decode IP address and Mac address

Required:
NetUtil.java

```
String MacAddress="none";
String IpV4Address="none";
String IpV6Address="none";


MacAddress=NetUtil.getMACAddress("wlan0");
IpV4Address=NetUtil.getIPAddress(true);
IpV6Address=NetUtil.getIPAddress(false);
```

True= IPv4,False=IPv6

Connectivity Manager

```
public class CheckNet extends BroadcastReceiver {
        public CheckNet() {
        }
        @Override
        public void onReceive(Context arg0, Intent arg1) {
Log.v("net state", "change");
// do something
        }
}
```

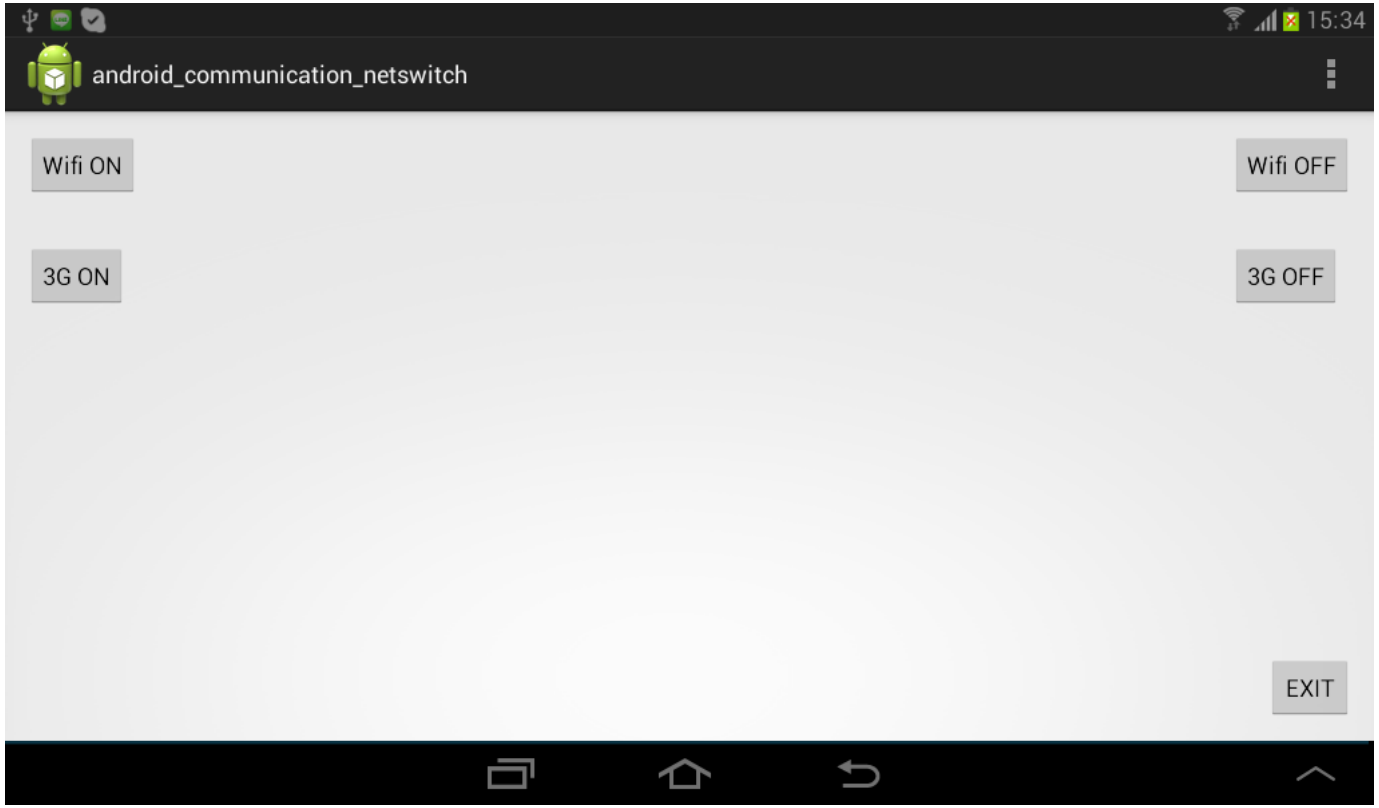
```
<receiver android:name="CheckNet" android:enabled="true"
android:permission="android.net.conn.CONNECTIVITY_CHANGE">
    <intent-filter>
        <action android:name="android.net.conn.CONNECTIVITY_CHANGE"/>
    </intent-filter>
</receiver>
```

Connectivity Manager

Control network interfaces

Wifi Manager and Connectivity Manager

Connectivity Manager



Project: android_communication_netswitch

Connectivity Manager

Control Mobile data

1) Uses permission "android.permission.CHANGE_WIFI_STATE" and "android.permission.CHANGE_NETWORK_STATE“
2) Create WifiManager instance
3) Control WIFI using method setWifiEnabled

Connectivity Manager

Control Mobile data

1) Uses permission "android.permission.CHANGE_WIFI_STATE" and "android.permission.CHANGE_NETWORK_STATE“

```
 <uses-permission
android:name="android.permission.CHANGE_WIFI_STATE"/>
   <uses-permission
android:name="android.permission.CHANGE_NETWORK_STATE"/
>
```

Connectivity Manager

Control Mobile data

2) Create WifiManager instance

```
WifiManager wifiManager;
wifiManager =
(WifiManager)this.getSystemService(Context.WIFI_SERVICE);
```

Connectivity Manager

Control Mobile data

3) Control WIFI using method setWifiEnabled

```
wifiManager.setWifiEnabled(true);
wifiManager.setWifiEnabled(false);
```

Connectivity Manager

Control Mobile data

1) Uses permission "android.permission.CHANGE_WIFI_STATE" and "android.permission.CHANGE_NETWORK_STATE“
2) Create ConnectivityManager instance
3) Use Java reflection to access method MobileDataEnabled
4) Use method MobileDataEnabled to turn 3G on and off

Connectivity Manager

Control Mobile data

1) Uses permission "android.permission.CHANGE_WIFI_STATE" and "android.permission.CHANGE_NETWORK_STATE“

```
 <uses-permission
android:name="android.permission.CHANGE_WIFI_STATE"/>
   <uses-permission
android:name="android.permission.CHANGE_NETWORK_STATE"/
>
```

Connectivity Manager

Control WIFI

2) Create ConnectivityManager instance

```
ConnectivityManager conman;
 conman = (ConnectivityManager)
this.getSystemService(Context.CONNECTIVITY_SERVICE);
```

Connectivity Manager

Control WIFI

3) Use Java reflection to access method MobileDataEnabled

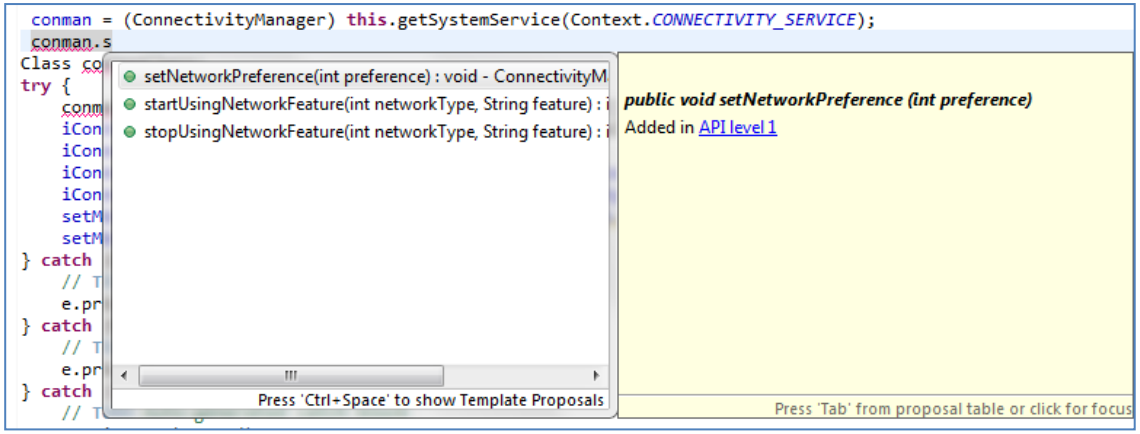
Reflection is the ability of a computer program to examine (see type introspection) and modify the structure and behavior (specifically the values, meta-data, properties and functions) of an object at runtime.

In this case, we use reflection for late biding method

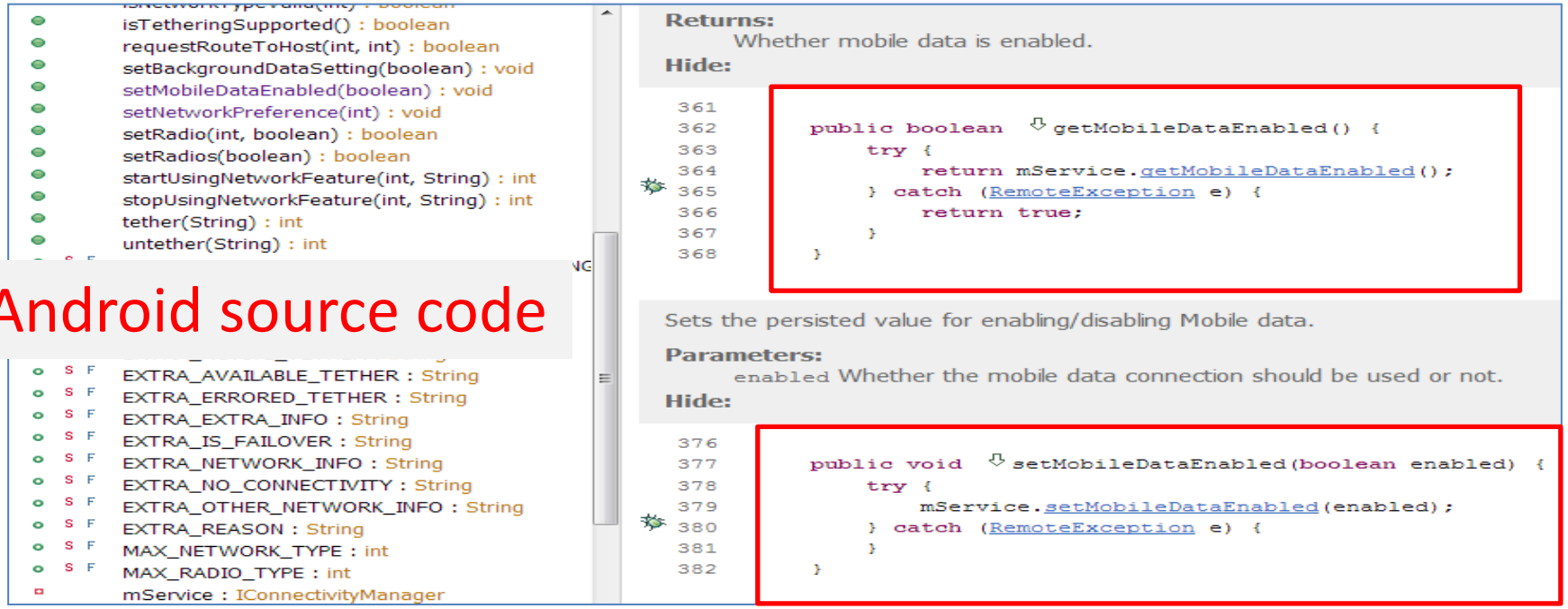
Connectivity Manager

3) Use Java reflection to access method MobileDataEnabled

API

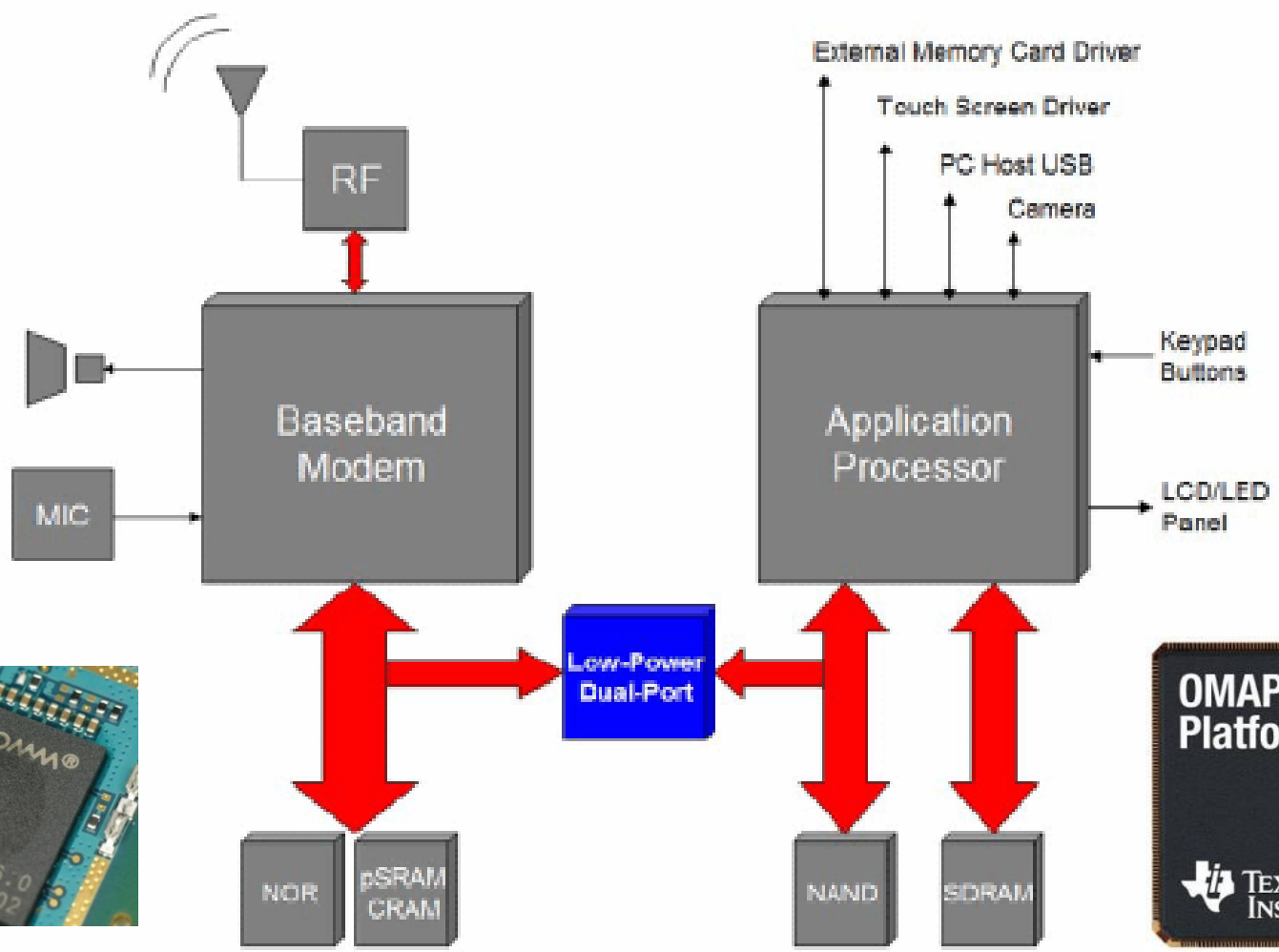


Android source code



http://grepcode.com/search/?query=google+android&entity=project

THE SMART PHONE



OMAP™ 4 Platform

Texas Instruments

Connectivity Manager

Control Mobile data

3) Use Java reflection to access method MobileDataEnabled

```
Field iConnectivityManagerField;
Object iConnectivityManager;
Class iConnectivityManagerClass;
Method setMobileDataEnabledMethod;
……
```

Connectivity Manager

3) Use Java reflection to access method MobileDataEnabled

```
Class conmanClass;
try {
            conmanClass = Class.forName(conman.getClass().getName());
   iConnectivityManagerField = conmanClass.getDeclaredField("mService");
            iConnectivityManagerField.setAccessible(true);
            iConnectivityManager = iConnectivityManagerField.get(conman);
            iConnectivityManagerClass =
Class.forName(iConnectivityManager.getClass().getName());
            setMobileDataEnabledMethod =
iConnectivityManagerClass.getDeclaredMethod("setMobileDataEnabled",
Boolean.TYPE);
            setMobileDataEnabledMethod.setAccessible(true);
} catch (ClassNotFoundException e) {
} catch (NoSuchFieldException e) {
} catch (IllegalArgumentException e) {
} catch (IllegalAccessException e) {
} catch (NoSuchMethodException e) {
}
```

Connectivity Manager

4) Use method MobileDataEnabled to turn 3G on and off

```
try {
setMobileDataEnabledMethod.invoke(iConnectivityManager, true);
                    } catch (IllegalArgumentException e) {
                    } catch (IllegalAccessException e) {
                    } catch (InvocationTargetException e) {
                    }
```

```
try {
setMobileDataEnabledMethod.invoke(iConnectivityManager, false);
                    } catch (IllegalArgumentException e) {
                    } catch (IllegalAccessException e) {
                    } catch (InvocationTargetException e) {
                    }
```