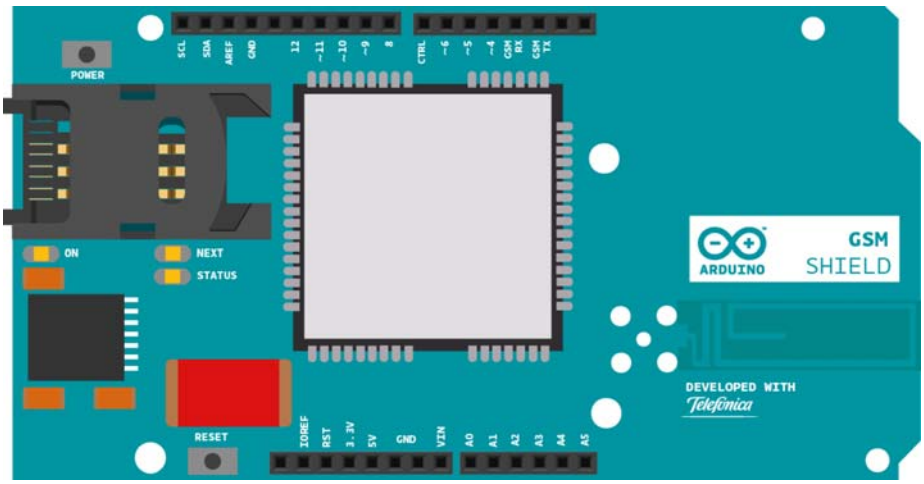
GSM Scan Networks

This example prints out the IMEI number of the modem, then checks to see if it's connected to a carrier and prints out its signal strength. It also scans for all nearby networks.

Hardware Required

- Arduino or Genuino Board
- Arduino + Telefonica GSM/GPRS Shield (//www.arduino.cc/en/Main/ArduinoGSMShield)
- SIM card enable for Data

Circuit



(//www.arduino.cc/en/uploads/Tutorial/GSMShield_ArduinoUno.jpg)
image of the Arduino GSM Shield on top of an Arduino or Genuino board

Code

First, import the GSM library

```
#include <GSM.h>
```

SIM cards may have a PIN number that enables their functionality. Define the PIN for your SIM. If your SIM has no PIN, you can leave it blank :

```
#define PINNUMBER ""
```

Initialize instances of the classes you're going to use. You're going to need the GSM, GSMScanner, and GSMModem classes.

```
GSM gsmAccess;
GSMScanner scannerNetworks;
GSMModem modemTest;
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=2)

Create a variable to hold the IMEI number, and a status messages to send to the serial monitor:

```
String IMEI = "";

String errortext = "ERROR";
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=3)

In `setup`, open a serial connection to the computer. After opening the connection, send a message to the Serial Monitor indicating the sketch has started. Call @scannerNetworks.begin()@@ to reset the modem.

```
void setup(){
  Serial.begin(9600);
  Serial.println("GSM networks scanner");
  scannerNetworks.begin();
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=4)

Create a local variable to track the connection status. You'll use this to keep the sketch from starting until the SIM is connected to the network :

```
boolean notConnected = true;
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=5)

Connect to the network by calling `gsmAccess.begin()`. It takes the SIM card's PIN as an argument. By placing this inside a `while()` loop, you can continually check the status of the connection. When the modem does connect, `gsmAccess()` will return `GSM_READY`. Use this as a flag to set the `notConnected` variable to `true` or `false`. Once connected, the remainder of `setup` will run.

```
while(notConnected)
  {
    if(gsmAccess.begin(PINNUMBER)==GSM_READY)
      notConnected = false;
    else
    {
      Serial.println("Not connected");
      delay(1000);
    }
  }
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=6)

Get the IMEI of the modem with `modemTest.getIMEI()` and print it out to the serial monitor.

```
Serial.print("Modem IMEI: ");
  IMEI = modemTest.getIMEI();
  IMEI.replace("\n","");
  if(IMEI != NULL)
    Serial.println(IMEI);
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=7)

In `loop()`, scan and print out all available networks. This may take some time

```
Serial.println("Scanning available networks. May take some seconds.");
  Serial.println(scannerNetworks.readNetworks());
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=8)

Print out the current connected carrier, and the strength of the signal. Signal strength is on a scale of 0-31, where 0 is the lowest, and 31 is the highest. close the `loop()`.

```
Serial.print("Current carrier: ");
  Serial.println(scannerNetworks.getCurrentCarrier());
```

```
  Serial.print("Signal Strength: ");
  Serial.print(scannerNetworks.getSignalStrength());
  Serial.println(" [0-31]");
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=9)

Once your code is uploaded, open the serial monitor to see the status of the connection.

The complete sketch is below.

```
/*

 GSM Scan Networks

 This example prints out the IMEI number of the modem,
 then checks to see if it's connected to a carrier. If so,
 it prints the phone number associated with the card.
 Then it scans for nearby networks and prints out their signal strengths.

 Circuit:
 * GSM shield
 * SIM card

 Created 8 Mar 2012
 by Tom Igoe, implemented by Javier Carazo
 Modified 4 Feb 2013
 by Scott Fitzgerald

 http://www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks

 This example code is part of the public domain
 */

// libraries
#include <GSM.h>

// PIN Number
#define PINNUMBER ""

// initialize the library instance
GSM gsmAccess;     // include a 'true' parameter to enable debugging
GSMScanner scannerNetworks;
GSMModem modemTest;

// Save data variables
String IMEI = "";

// serial monitor result messages
String errortext = "ERROR";

void setup() {
  // initialize serial communications and wait for port to open:
  Serial.begin(9600);
  while (!Serial) {
    ; // wait for serial port to connect. Needed for Leonardo only
  }

  Serial.println("GSM networks scanner");
  scannerNetworks.begin();

  // connection state
  boolean notConnected = true;

  // Start GSM shield
  // If your SIM has PIN, pass it as a parameter of begin() in quotes
  while (notConnected) {
    if (gsmAccess.begin(PINNUMBER) == GSM_READY) {
      notConnected = false;
    } else {
      Serial.println("Not connected");
      delay(1000);
    }
  }

  // get modem parameters
```

```
  // IMEI, modem unique identifier
  Serial.print("Modem IMEI: ");
  IMEI = modemTest.getIMEI();
  IMEI.replace("\n", "");
  if (IMEI != NULL) {
    Serial.println(IMEI);
  }
}

void loop() {
  // scan for existing networks, displays a list of networks
  Serial.println("Scanning available networks. May take some seconds.");
  Serial.println(scannerNetworks.readNetworks());

  // currently connected carrier
  Serial.print("Current carrier: ");
  Serial.println(scannerNetworks.getCurrentCarrier());

  // returns strength and ber
  // signal strength in 0-31 scale. 31 means power > 51dBm
  // BER is the Bit Error Rate. 0-7 scale. 99=not detectable
  Serial.print("Signal Strength: ");
  Serial.print(scannerNetworks.getSignalStrength());
  Serial.println(" [0-31]");

}
```

[Get Code] (//www.arduino.cc/en/Tutorial/GSMToolsGsmScanNetworks?action=sourceblock&num=1)

See Also:

- Arduino GSM Shield (//www.arduino.cc/en/Main/ArduinoGSMShield) – Complete product description.
- Getting started with the GSM Shield (//www.arduino.cc/en/Guide/ArduinoGSMShield) – Get everything set up in minutes.
- GSM library (//www.arduino.cc/en/Reference/GSM) – Your reference for the GSM Library.

- GSMScanner (//www.arduino.cc/en/Reference/GSMScannerConstructor)
- begin (//www.arduino.cc/en/Reference/GSMScannerBegin)()
- getCurrentCarrier (//www.arduino.cc/en/Reference/GSMScannerGetCurrentCarrier)()
- getSignalStrength (//www.arduino.cc/en/Reference/GSMScannerGetSignalStrength)()
- readNetworks (//www.arduino.cc/en/Reference/GSMScannerReadNetworks)()

- GSMToolsTestGPRS (//www.arduino.cc/en/Tutorial/GSMToolsTestGPRS) - Tries to access the internet over GPRS with supplied APN and credentials.
- GSMToolsBandManagement (//www.arduino.cc/en/Tutorial/GSMToolsBandManagement) - Checks the band currently configured in the modem and allows you to change it.
- GSMToolsPinManagement (//www.arduino.cc/en/Tutorial/GSMToolsPinManagement) - How to to change or remove the PIN number.
- GSMToolsTestModem (//www.arduino.cc/en/Tutorial/GSMToolsTestModem) - Tests to see if the modem of the GSM shield is working correctly.
- GSMToolsTestWebServer (//www.arduino.cc/en/Tutorial/GSMToolsTestWebServer) - A simple web server that replies with nothing, but prints the client's request and the server IP address.
- GSMExamplesMakeVoiceCall (//www.arduino.cc/en/Tutorial/GSMExamplesMakeVoiceCall) - How to make a voice call with mic and speaker.

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