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ASCT

Android Security Configuration Tester



Introducción

- ❑ Android Security **Configuration** Tester
- ❑ Certificaciones ligeras
- ❑ Inspirado en certificaciones Common Criteria

7.6 CATEGORÍA: PROTECCIÓN DE EQUIPOS Y SERVICIOS

7.6.1. FAMILIA: DISPOSITIVOS MÓVILES

GALAXY Note 8 (SM-N950F)

Versión	Android 7.1.1 Kernel 4.4.13 Compilación NRD90M
Familia	Dispositivos móviles
Fabricante	Samsung Electronics
Clasificación	ENS ALTO
Fecha Inclusión	01/06/2018
Revisión de Validez	30/11/2020



Descripción

Galaxy Note 8 es un Smartphone Samsung con Sistema operativo Android. Destaca por su pantalla de 6,3". En su interior cuenta con procesador de 10nm, almacenamiento interno de 64GB que puede extenderse hasta los 256GB a través de microSD, y RAM de 6GB. Todo ello protegido con su plataforma Samsung Knox, certificación IP68.

Observaciones

Procedimiento de empleo seguro: CCN-STIC 1601 Configuración Segura Samsung Galaxy S8/S8+

Certificaciones ligeras



<https://www.jtsec.es/es/entrada-blog/18/ccn-publica-la-metodologia-lince-para-evaluacion-de-productos-it>

ASCT

- ☐ 1. Análisis de aplicaciones
- ☐ 2. Análisis del sistema de ficheros
- ☐ 3. Kernel Module Signing
- ☐ 4. Security-Enhanced Linux
- ☐ 5. Análisis de procesos
- ☐ 6. Comprobación del cifrado
- ☐ 7. Address Space Layout Randomization
- ☐ 8. Android Verified Boot



1. Aplicaciones instaladas



3. Protecciones de Linux



2. Sistema de ficheros



4. Estado del cifrado



6. Android Verified Boot



5. ASLR

Análisis de aplicaciones instaladas




```
#### SRC-IG-0100: Extracción de aplicaciones ####
```

```
Extrayendo aplicaciones del dispositivo
```

Análisis de aplicaciones instaladas

```
I: Loading resource table...
I: Decoding AndroidManifest.xml with resources...
S: WARNING: Could not write to (/home/berbus/.local/share/apktool/framework), us
ing /tmp instead...
S: Please be aware this is a volatile directory and frameworks could go missing,
  please utilize --frame-path if the default storage directory is unavailable
I: Loading resource table from file: /tmp/1.apk
I: Regular manifest package...
I: Decoding file-resources...
I: Decoding values */* XMLs...
I: Baksmaling classes.dex...
I: Copying assets and libs...
I: Copying unknown files...
I: Copying original files...
I: Using Apktool 2.3.4 on DefaultContainerService.apk
I: Loading resource table...
I: Decoding Shared Library (androidhwext), pkgId: 2
I: Decoding AndroidManifest.xml with resources...
S: WARNING: Could not write to (/home/berbus/.local/share/apktool/framework), us
ing /tmp instead...
S: Please be aware this is a volatile directory and frameworks could go missing,
  please utilize --frame-path if the default storage directory is unavailable
I: Loading resource table from file: /tmp/1.apk
```

Análisis de aplicaciones instaladas

❑ Estructura de ficheros de la aplicación

```

Amazon_Shopping_Global.apk
Amazon_Shopping_Global.apk.files
Apps_store_ZA.apk
Apps_store_ZA.apk.files
BackupRestoreConfirmation.apk
BackupRestoreConfirmation.apk.files
BasicDreams.apk
BasicDreams.apk.files
Bluetooth.apk
Bluetooth.apk.files
Books.apk
Books.apk.files
Calculator.apk
Calculator.apk.files
Calendar.apk
Calendar.apk.files
CalendarProvider.apk
CalendarProvider.apk.files
CaptivePortalLogin.apk
CaptivePortalLogin.apk.files
CellBroadcastReceiver.apk
CellBroadcastReceiver.apk.files
CertInstaller.apk
CertInstaller.apk.files
Chrome.apk
HwCamera.apk
HwCamera.apk.files
HwCardManager.apk
HwCardManager.apk.files
HwCompass.apk
HwCompass.apk.files
HwDeskClock.apk
HwDeskClock.apk.files
HwFileManager.apk
HwFileManager.apk.files
HwFloatTasks.apk
HwFloatTasks.apk.files
HwFMRadio.apk
HwFMRadio.apk.files
HwIms.apk
HwIms.apk.files
HwInternetAudioService.apk
HwInternetAudioService.apk.files
HwLauncher6.apk
HwLauncher6.apk.files
HwLogCollectService.apk
HwLogCollectService.apk.files
HwMediaCenter.apk
HwMediaCenter.apk.files
HwMisses.apk
MyVodafone_CZ.apk
MyVodafone_CZ.apk.files
MyVodafone_IT.apk
MyVodafone_IT.apk.files
MyVodafone_R0.apk
MyVodafone_R0.apk.files
Newsstand.apk
Newsstand.apk.files
NfcNci.apk
NfcNci.apk.files
NoiseField.apk
NoiseField.apk.files
OMACP.apk
OMACP.apk.files
PacProcessor.apk
PacProcessor.apk.files
PartnerBookmarksProvider.apk
PartnerBookmarksProvider.apk.files
PhaseBeam.apk
PhaseBeam.apk.files
Phonesky.apk
Phonesky.apk.files
Photos.apk
Photos.apk.files
PhotoTable.apk

```

Análisis de aplicaciones instaladas

❑ Contenido de las aplicaciones

```
apps [master] ⚡ tree GoogleFeedback.apk.files -L 1
GoogleFeedback.apk.files
├── AndroidManifest.xml
├── apktool.yml
├── original
├── res
└── smali
```

```
1 <?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:installLocation="auto" package="cn.wps.moffice_eng">
1   <application android:allowBackup="false" android:debuggable="false" android:icon="@drawable/icon" android:label="@null" android:name="cn.wps.moffice.OfficeApp" android:sharedUserId="cn.wps.moffice" android:theme="@null">
2       <activity android:excludeFromRecents="true" android:launchMode="singleTask" android:name="cn.wps.moffice.manager.PreStartActivity2" android:taskAffinity="cn.wps.moffice_eng.thirdparty" android:windowSoftInputMode="adjustResize">
3           <intent-filter>
4               <action android:name="android.intent.action.VIEW"/>
5               <action android:name="android.intent.action.EDIT"/>
6               <category android:name="android.intent.category.DEFAULT"/>
7               <category android:name="android.intent.category.BROWSABLE"/>
8               <data android:mimeType="text/plain"/>
9               <data android:mimeType="application/msexcel"/>

```


Análisis de aplicaciones instaladas

```
#### SRC-IG-0101: Buscando sharedUserId ####

Buscando permisos del tipo sharedUserId
Match found in FusedLocat_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="android.uid.system" coreApp="true" package="com.android.location.fused" platformBuildVersionName="6.0-eng.jenkins.20161125.024427">
Match found in GmsCore.apk_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="com.google.uid.shared" android:sharedUserLabel="@string/common_google_android_gms" platformBuildVersionCode="23" platformBuildVersionName="6.0-2166767">
Match found in GoogleBack_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="com.google.uid.shared" package="com.google.android.backuptransport" platformBuildVersionName="6.0.1">
Match found in GoogleCale_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="com.google.android.calendar.uid.shared" package="com.google.android.calendar" platformBuildVersionCode="23" platformBuildVersionName="M-2103336">
Match found in GoogleLogi_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="com.google.uid.shared" android:sharedUserLabel="@string/shared_user_label_google_android_gsf_login" platformBuildVersionCode="23" platformBuildVersionName="6.0.1">
Match found in GoogleServ_AndroidManifest.xml
1:<?xml version="1.0" encoding="utf-8" standalone="no"?><manifest xmlns:android="http://schemas.android.com/apk/res/android" android:sharedUserId="com.google.uid.shared" package="com.google.android.gsf" platformBuildVersionName="6.0.1">
Match found in HwAppObser_AndroidManifest.xml
```

Análisis del sistema de archivos

- ☐ SETUID
- ☐ SETGID
- ☐ Sticky bit

/app	Stock apps installed
/bin	Native binaries and daemons
/etc	Configuration files
/fonts	TTFs
/framework	Android framework .jar files
/lib	Native libraries
/usr	Miniature “/usr”
/xbin	Optional/Extra binaries

Protecciones de Linux

- ❑ Se extrae la información de boot.img en la imagen del firmware.
- ❑ Kernel Module Signing
 - Comprueba la firma de los módulos que se cargan durante el arranque del sistema.
- ❑ Security-Enhanced Linux
 - Control de acceso MAC complementario al sistema tradicional.

Protecciones de Linux

- ❑ Extraer boot.img usando abootimg

```
/tmp/test » abootimg -x boot.img  
writing boot image config in bootimg.cfg  
extracting kernel in zImage  
extracting ramdisk in initrd.img
```

- ❑ Extraer kernel config de zImage

```
/tmp/test » ./extract-kernel-config zImage | more
```

- ✓ <https://github.com/torvalds/linux/blob/master/scripts/extract-vmlinux>
- ✓ <https://github.com/ggrandou/abootimg>

Protecciones de Linux

- ❑ Resultado de analizar la configuración de SELinux

```
#### SRC-IG-0103: Configuración de SELinux ####  
  
SELinux Mode: Enforcing  
CONFIG_AUDIT=y  
CONFIG_AUDITSYSCALL=y  
CONFIG_AUDIT_WATCH=y  
CONFIG_IP_NF_SECURITY=y  
config_ip6 nf security is not set  
config_security< is not set  
CONFIG_SECURITY_NETWORK=y  
CONFIG_SECURITY_SELINUX=y  
CONFIG_LSM_MMAP_MIN_ADDR=4096  
config_security_selinux bootparam is not set  
CONFIG_SECURITY_SELINUX_DEVELOP=y  
config_security_selinux disable is not set  
CONFIG_SECURITY_SELINUX_AVC_STATS=y  
CONFIG_DEFAULT_SECURITY_SELINUX=y  
CONFIG_IP_NF_SECURITY=y
```

Address Space Layout Randomization

- ❑ Comprobación de los parámetros de configuración.
- ❑ Test de aleatoriedad de las diferentes partes de la ASLR.

```
Linker
7f79798000-7f797ca000 r-xp 00000000 103:06 241 /system/bin/linker64
7f797da000-7f797db000 r--p 00032000 103:06 241 /system/bin/linker64
7f797db000-7f797dd000 rw-p 00033000 103:06 241 /system/bin/linker64
7fad5ac000-7fad5de000 r-xp 00000000 103:06 241 /system/bin/linker64
7fad5ee000-7fad5ef000 r--p 00032000 103:06 241 /system/bin/linker64
7fad5ef000-7fad5f1000 rw-p 00033000 103:06 241 /system/bin/linker64
7f93690000-7f936c2000 r-xp 00000000 103:06 241 /system/bin/linker64
7f936d2000-7f936d3000 r--p 00032000 103:06 241 /system/bin/linker64
7f936d3000-7f936d5000 rw-p 00033000 103:06 241 /system/bin/linker64
```

Address Space Layout Randomization

- ❑ Modo de compilación de los binarios.

```
#### SRC-IG-0402: Prueba del modo de compilación de los binarios ####

Resultados en ./input/binaries
Extrayendo binarios de /system/bin...
Extrayendo 79b77788-9789-4a7a-a2be-b60155eef5f4.sec
```

```
input [master] ⚡ tree binaries
binaries
├── acpi
├── agnsscontrol
├── agnsslog
├── am
├── applypatch
├── appops
├── app_process
├── app_process32
├── app_process64
├── appwidget
├── atcmdserver
└── atrace
```

Address Space Layout Randomization

- ❑ Modo de compilación de los binarios.

SRC-IG-0402: Prueba del modo de compilación de los binarios

```
./input/binaries
acpi: DYN
agnsscontrol: DYN
agnsslog: DYN
am: DYN
applypatch: DYN
appops: DYN
app_process: DYN
app_process32: DYN
app_process64: DYN
appwidget: DYN
atcmdserver: DYN
atrace: DYN
basename: DYN
bcc: DYN
blkid: DYN
blockdev: DYN
bmgr: DYN
bootanimation: DYN
bu: DYN
bugreport: DYN
bzcac: DYN
cal: DYN
cat: DYN
chargelocat: DYN
```

```
expr: DYN
factory_log_service: EXE
fallocate: DYN
false: DYN
```

```
binaries [master] ⚡ readelf -h yes
ELF Header:
  Magic:   7f 45 4c 46 02 01 01 00 00 00 00 00 00 00 00 00
  Class:                                ELF64
  Data:                                      2's complement, little endian
  Version:                               1 (current)
  OS/ABI:                                UNIX - System V
  ABI Version:                           0
  Type:                                  DYN (Shared object file)
  Machine:                               AArch64
  Version:                               0x1
  Entry point address:                   0xa2d4
  Start of program headers:              64 (bytes into file)
  Start of section headers:              321448 (bytes into file)
  Flags:                                  0x0
  Size of this header:                   64 (bytes)
  Size of program headers:               56 (bytes)
  Number of program headers:              9
  Size of section headers:               64 (bytes)
  Number of section headers:              27
  Section header string table index:     26
```


Comprobaciones sobre el cifrado

- ☐ Full Disk Encryption
- ☐ File Based Encryption

```
#### SRC-IG-0300: Información sobre el cifrado ####
```

```
Encryption state: encrypted  
Encryption type: block
```

```
#### SRC-IG-0301: Configuración cifrado basado en HW ####
```

```
config_dm_req_crypt= y  
config_crypto_xts= y  
config_crypto_dev_qcrypto= y
```

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Android Verified Boot (AVB)

- ❑ Comprobación de los parámetros que habilitan AVB.

```
#### SRC-IG-0500: Comprobación del AVB ####  
CONFIG_DM_VERITY: OK  
veritymode: not found
```



Your device has loaded a different operating system.

Visit this link on another device:
g.co/ABH



Your device software can't be checked for corruption. Please lock the bootloader.

Visit this link on another device:
g.co/ABH



Your device is corrupt. It can't be trusted and may not work properly.

Visit this link on another device:
g.co/ABH

Posibles mejoras

- ☐ Análisis del código de las aplicaciones
- ☐ Mayor profundidad de análisis de SELinux
- ☐ Mejorar las pruebas sobre la ASLR
- ☐ Pruebas simples de fuerza bruta
- ☐ Prueba de AVB con modificaciones



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