Android BYOD Security using Trusted Network Connect Protocol Suite

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AWARENESS IMAGINATION COLLABORATION AND SECURITY

Where the heck is Rapperswil?

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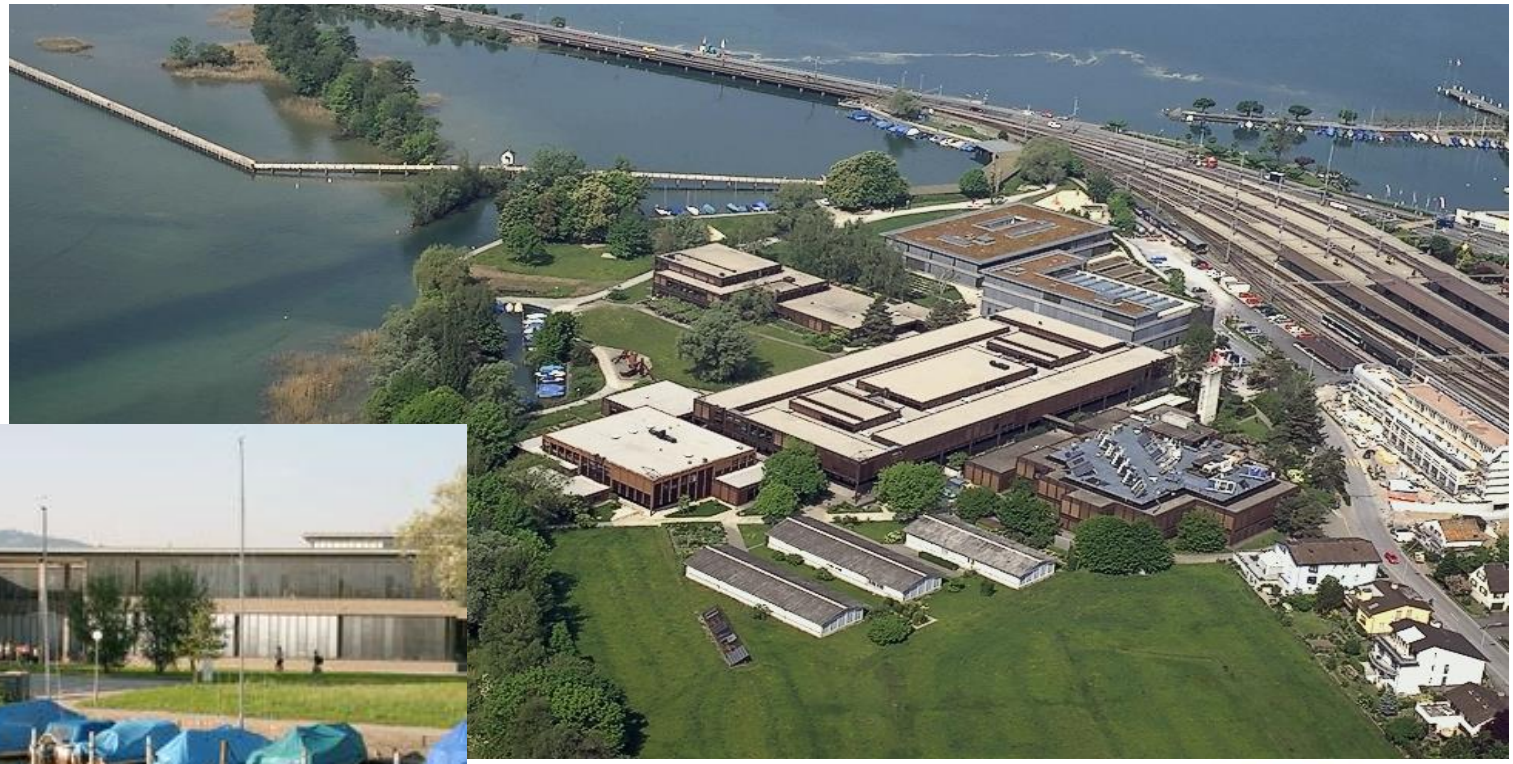
HSR Hochschule für Technik Rapperswil

HSR
HOCHSCHULE FÜR TECHNIK
RAPPERSWIL
FHO Fachhochschule Ostschweiz

- University of Applied Sciences with about 1500 students
- Faculty of Information Technology (300-400 students)
- Bachelor Course (3 years), Master Course (+1.5 years)



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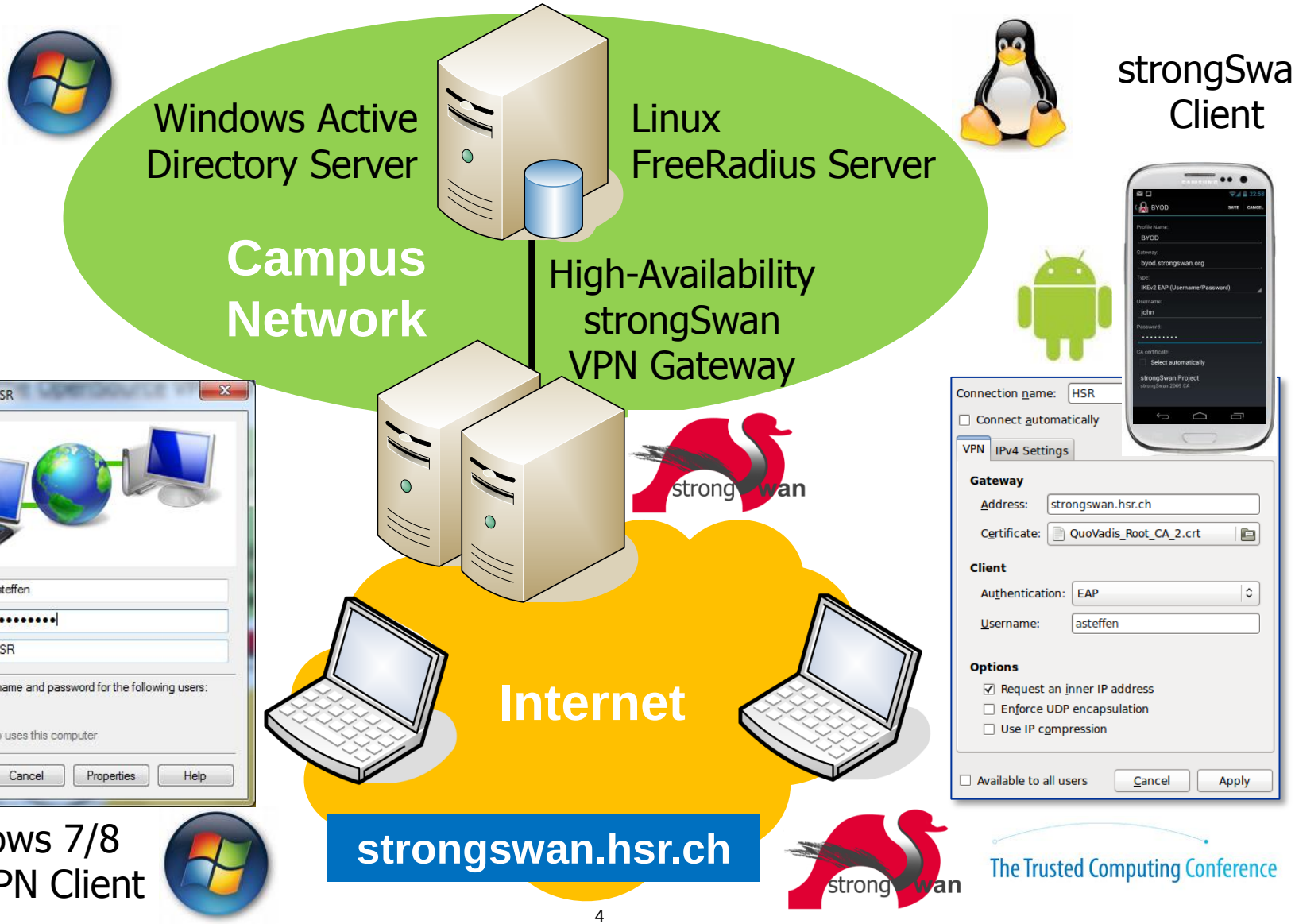
strongSwan – the Open Source VPN Solution

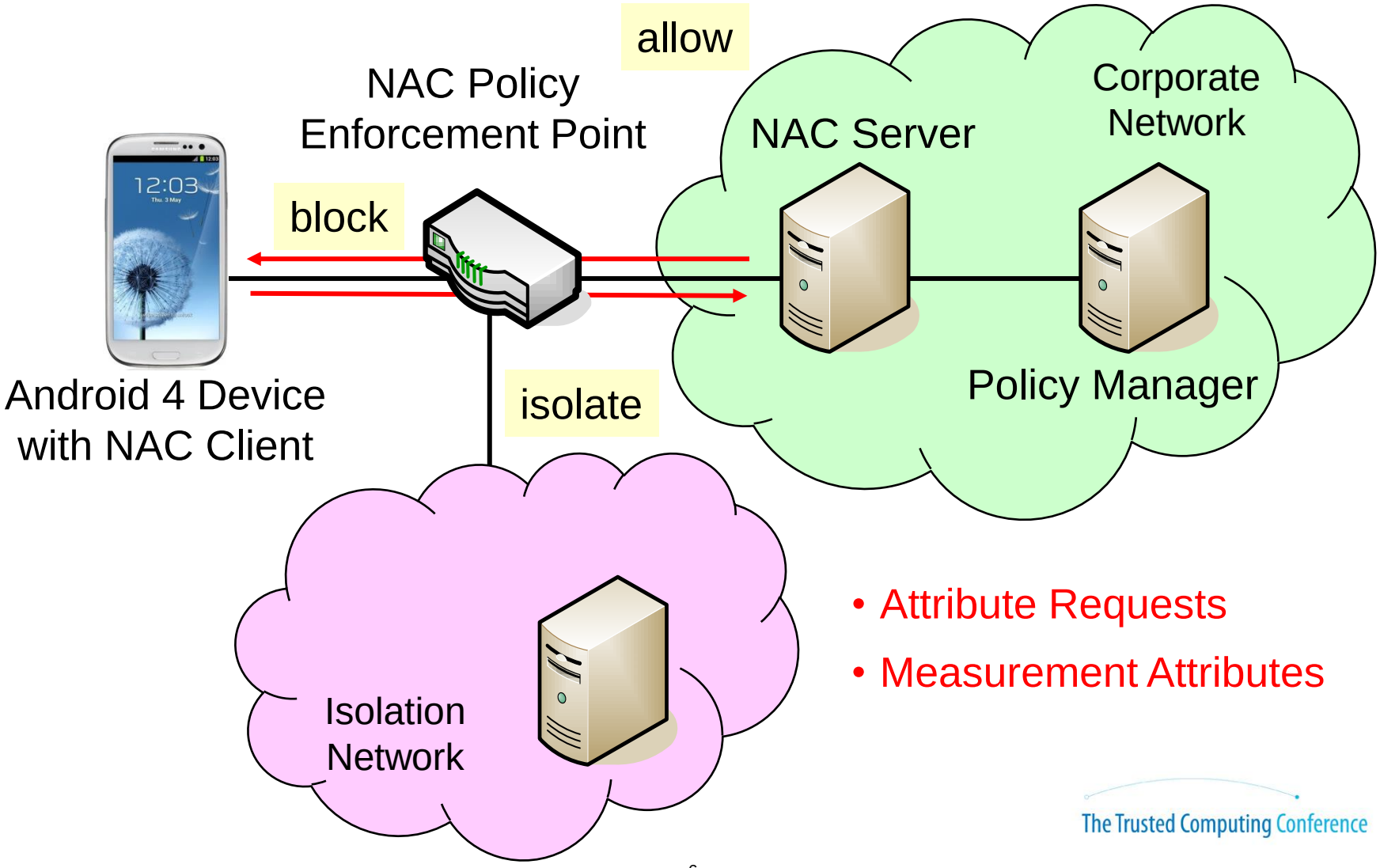


BYOD – Bring Your Own Device

Security Issues

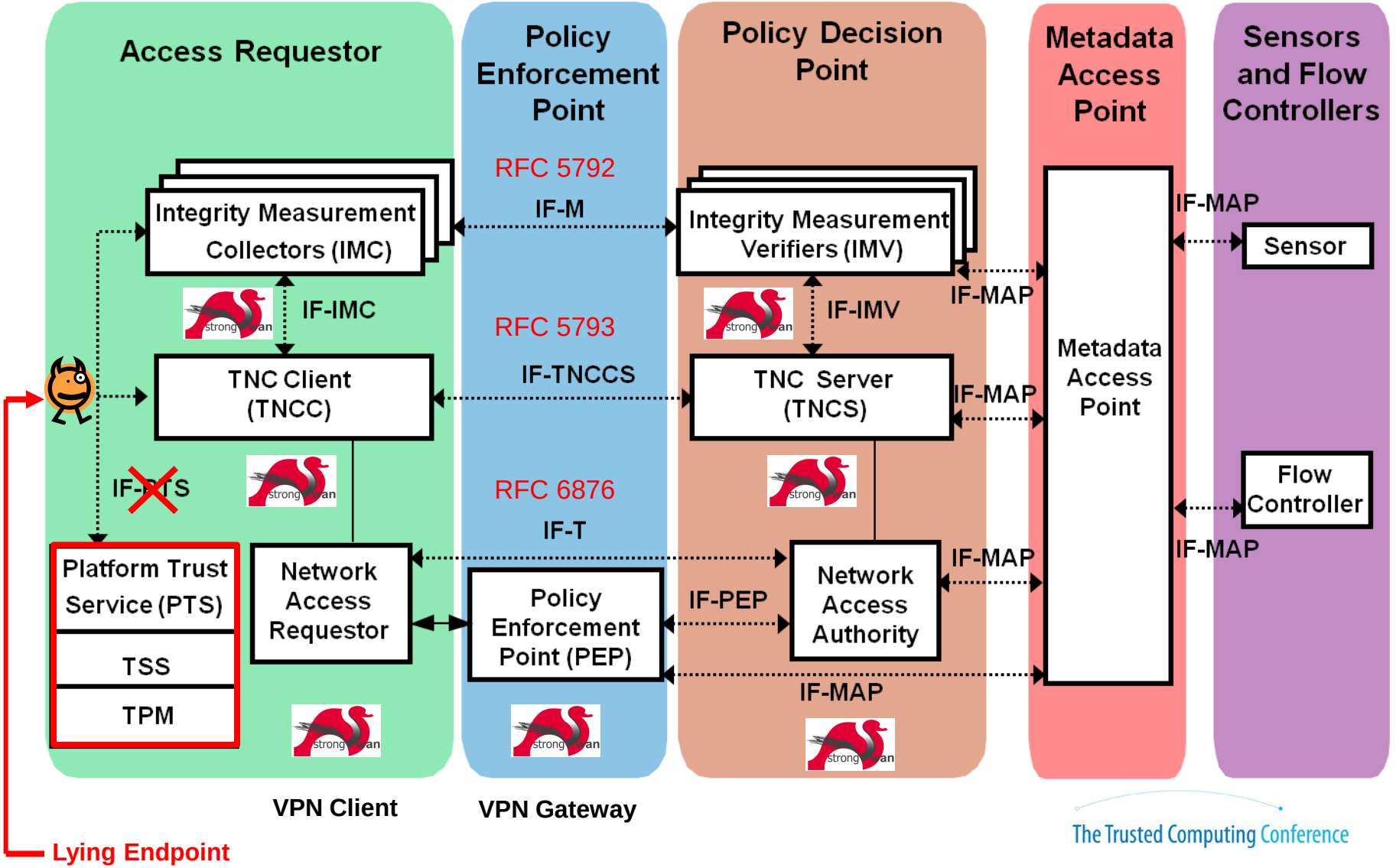
- Users do not protect access to their devices or use weak passwords or login methods.
- Users download and install dangerous software packages containing malware from unknown sources.
- Users do not regularly apply security updates to the installed software packages and operating system.
- Users run server applications potentially giving third parties access to the corporate network and/or sensitive data
- Malware might embed itself into the operating system, modifying system commands and libraries.

Android BYOD with Network Access Control



- Attribute Requests
- Measurement Attributes

TCG Trusted Network Connect (TNC) Architecture



Layered TNC Protocol Stack

- IF-T Transport Protocol — PT-TLS (RFC 6876) or PT-EAP

```
[NET] received packet: from 152.96.15.29[50871] to 77.56.144.51[4500] (320 bytes)
[ENC] parsed IKE_AUTH request 8 [ EAP/RES/TTLS ]
[IKE] received tunneled EAP-TTLS AVP [EAP/RES/TNC]
```

- IF-TNCCS TNC Client-Server Protocol — PB-TNC (RFC 5793)

```
[TNC] received TNCCS batch (160 bytes) for Connection ID 1
[TNC] PB-TNC state transition from 'Init' to 'Server Working'
[TNC] processing PB-TNC CDATA batch
[TNC] processing PB-Language-Preference message (31 bytes)
[TNC] processing PB-PA message (121 bytes)
[TNC] setting language preference to 'en'
```

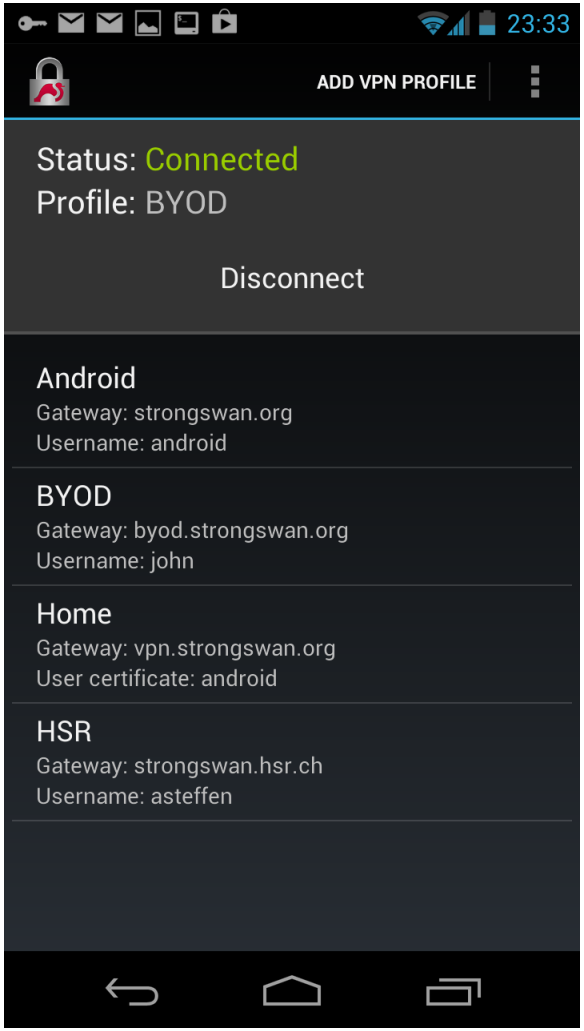
- IF-M Measurement Protocol — PA-TNC (RFC 5792)

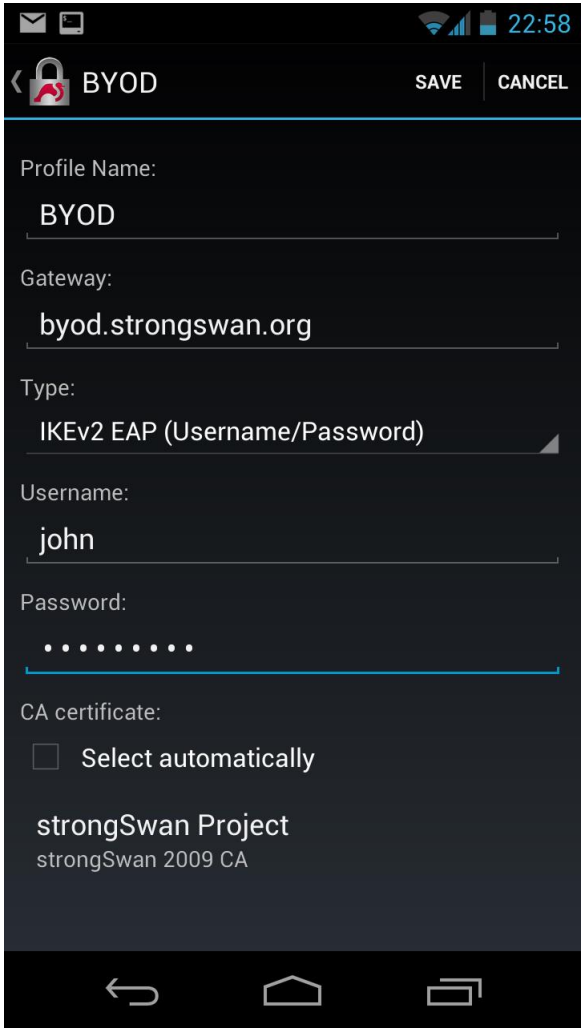
```
[TNC] handling PB-PA message type 'IETF/Operating System' 0x000000/0x00000001
[IMV] IMV 1 "OS" received message for Connection ID 1 from IMC 1
[TNC] processing PA-TNC message with ID 0xec41ce1d
[TNC] processing PA-TNC attribute type 'IETF/Product Information' 0x000000/0x00000002
[TNC] processing PA-TNC attribute type 'IETF/String Version' 0x000000/0x00000004
[TNC} processing PA-TNC attribute type 'ITA-HSR/Device ID' 0x00902a/0x00000008
```

- TNC Measurement Data

```
[IMV] operating system name is 'Android' from vendor Google
[IMV] operating system version is '4.2.1'
[IMV] device ID is cf5e4cbcc6e6a2db
```

strongSwan Android VPN Client: Easy to Connect





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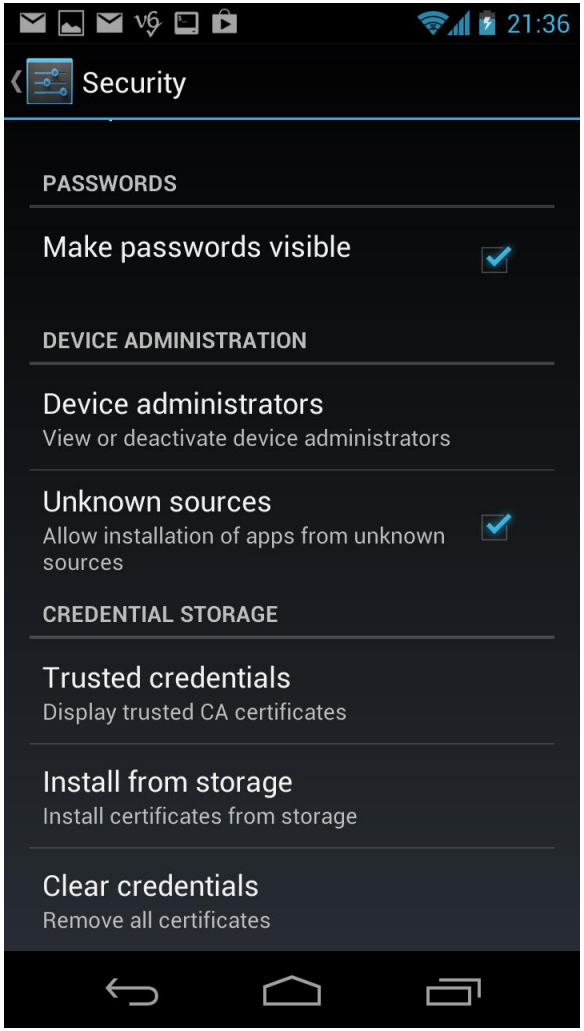
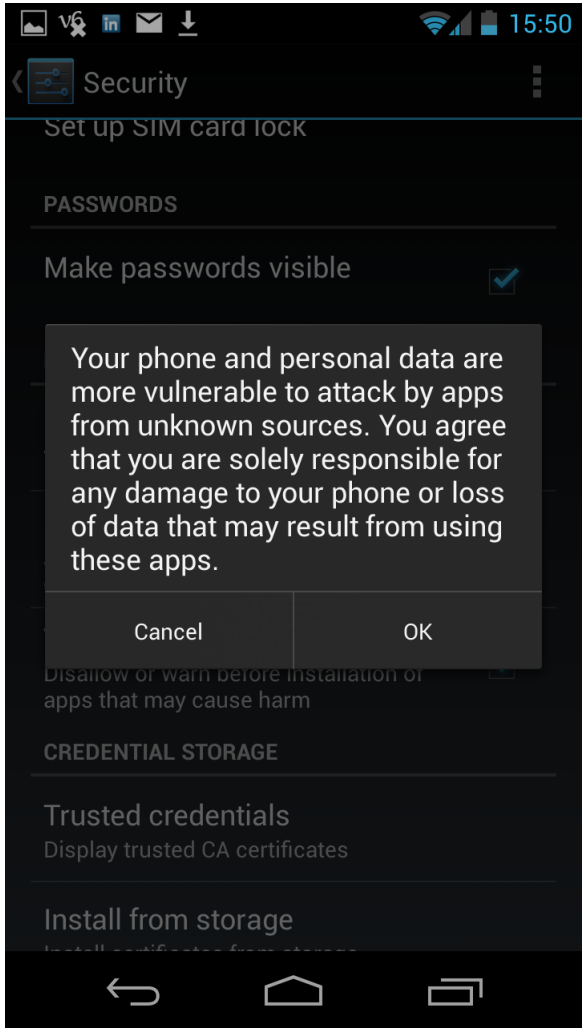
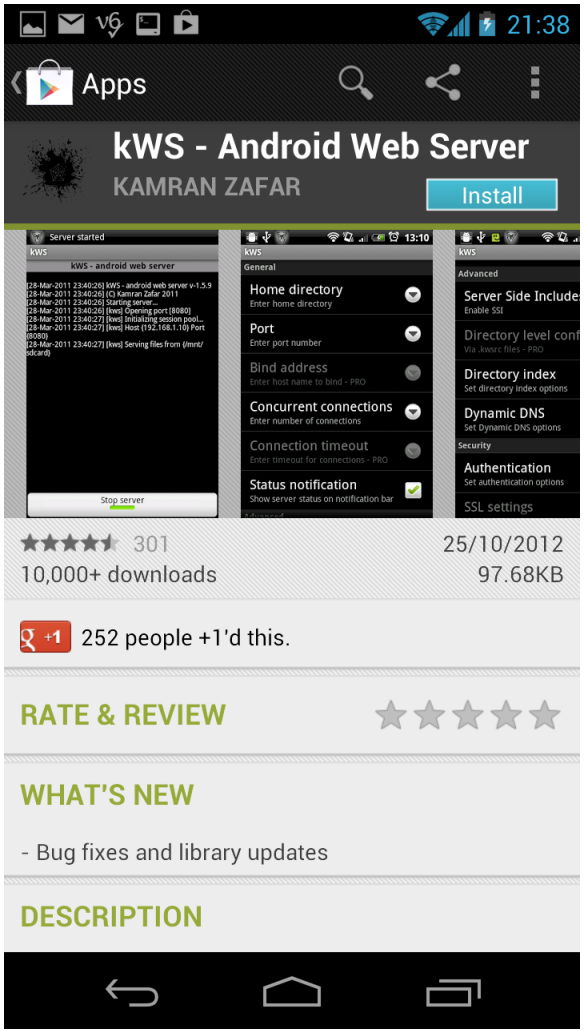
Dangerous: Allow Download from Unknown Sources





Install Blacklisted Android Web Server Package



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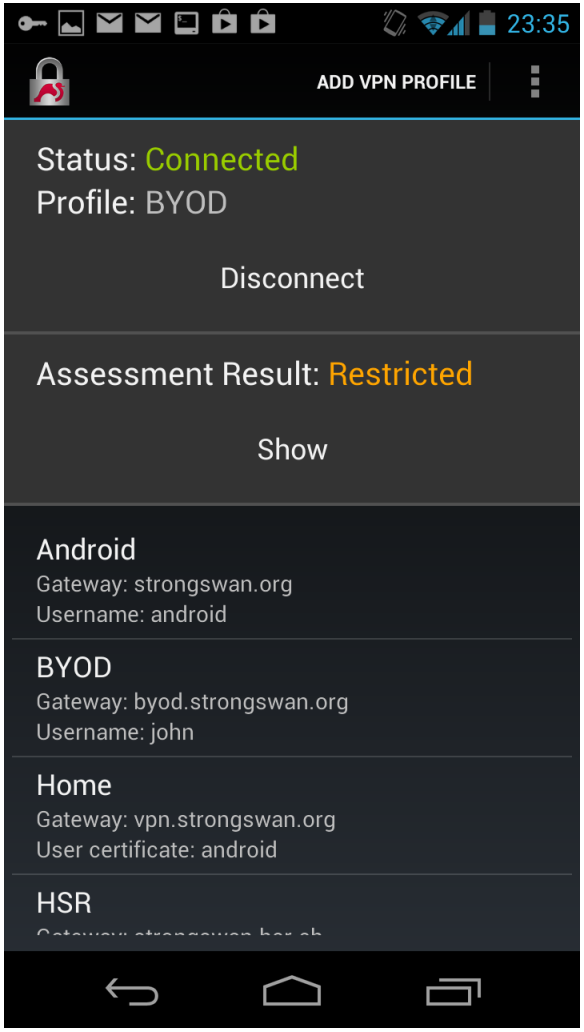
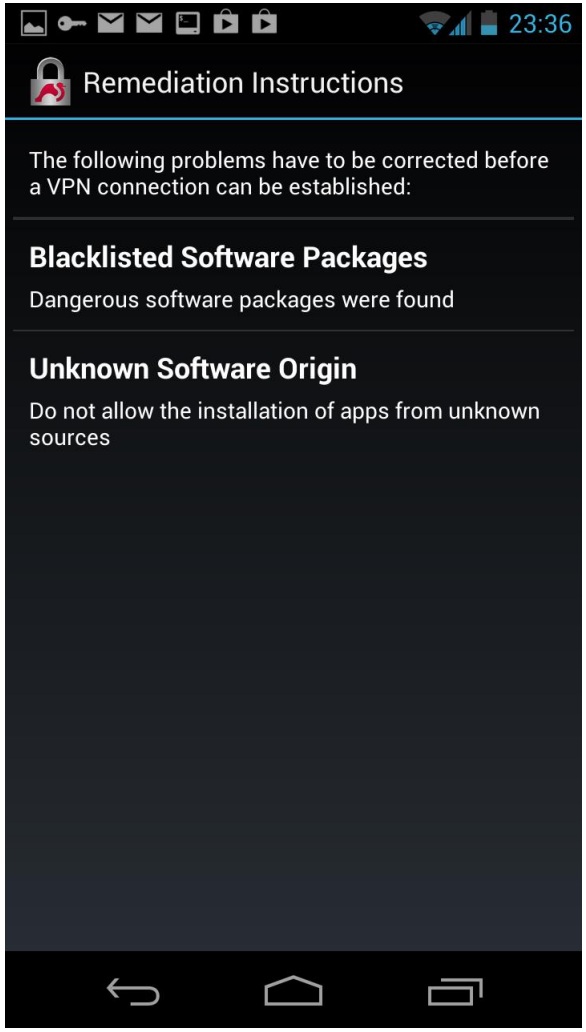
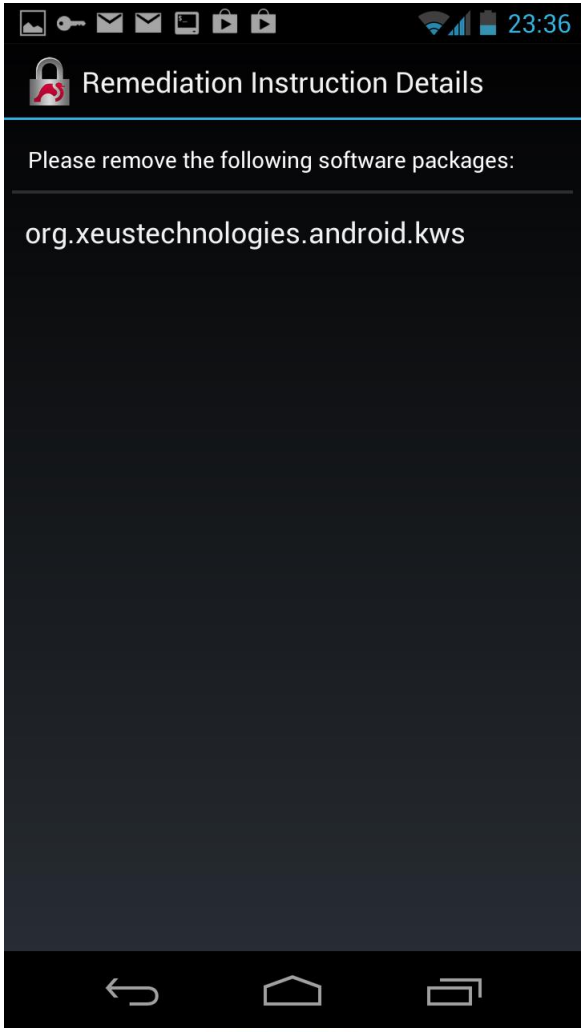
Minor Non-Compliance: Isolate Client







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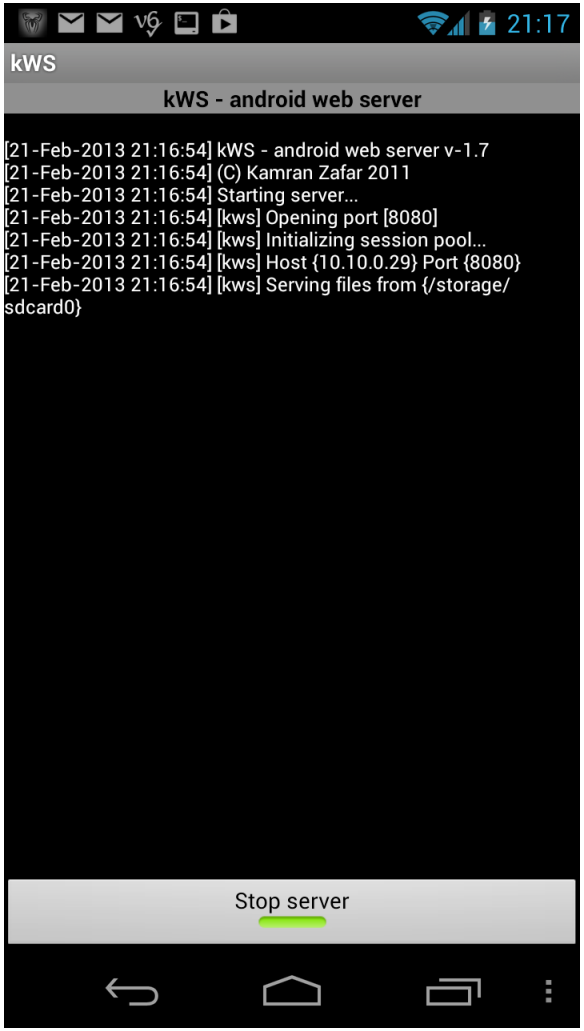
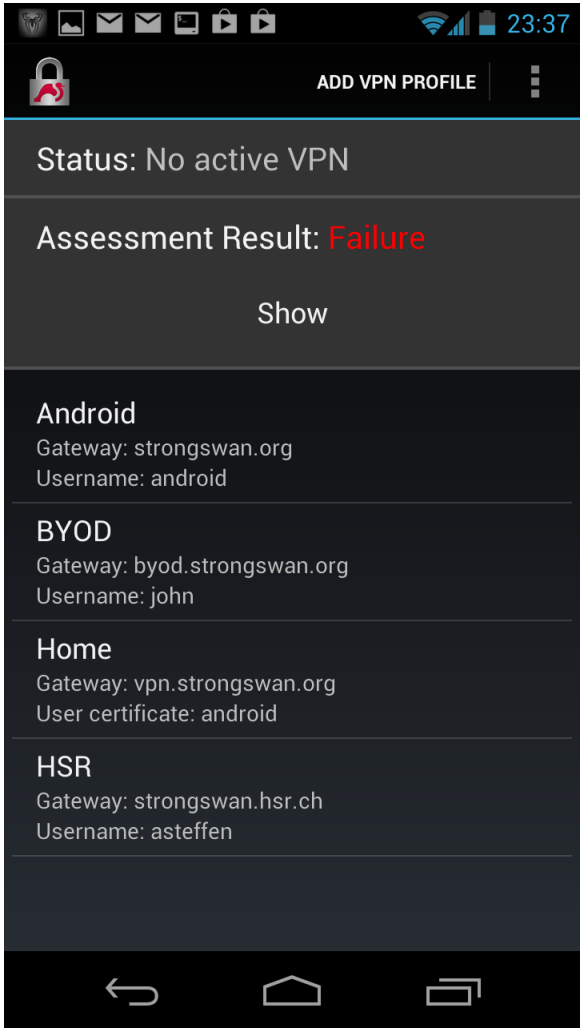
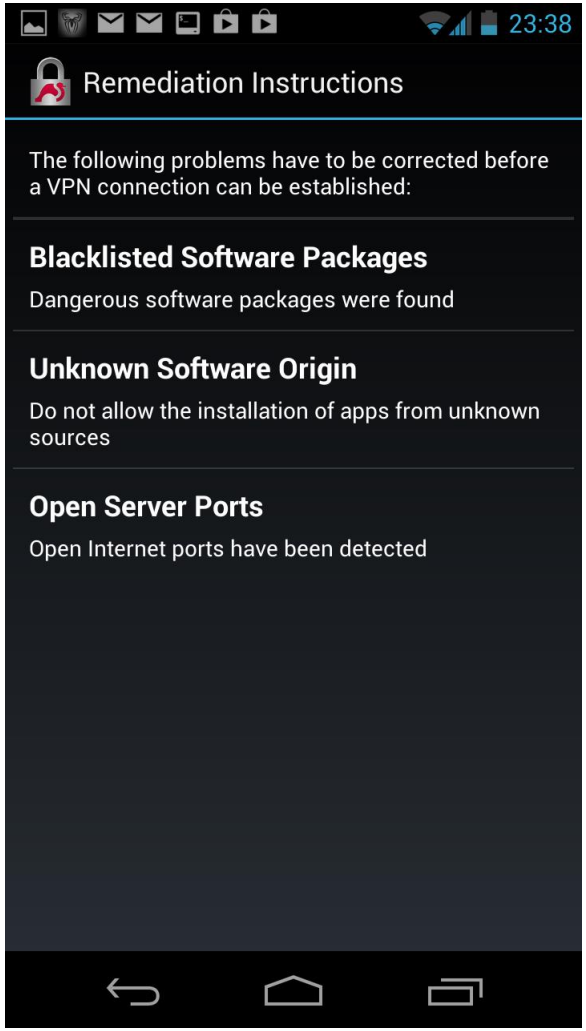
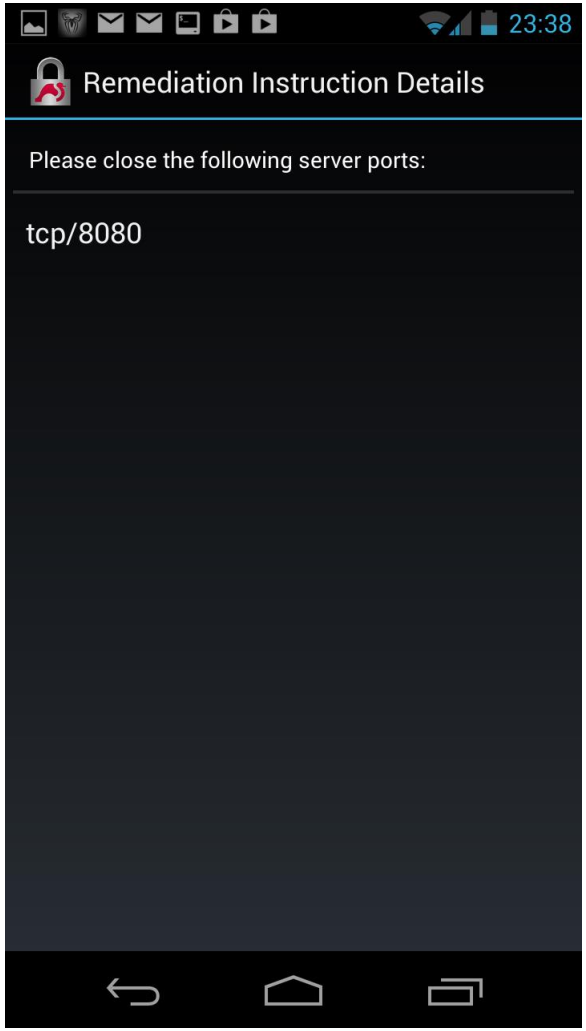
Start the Android Web Server



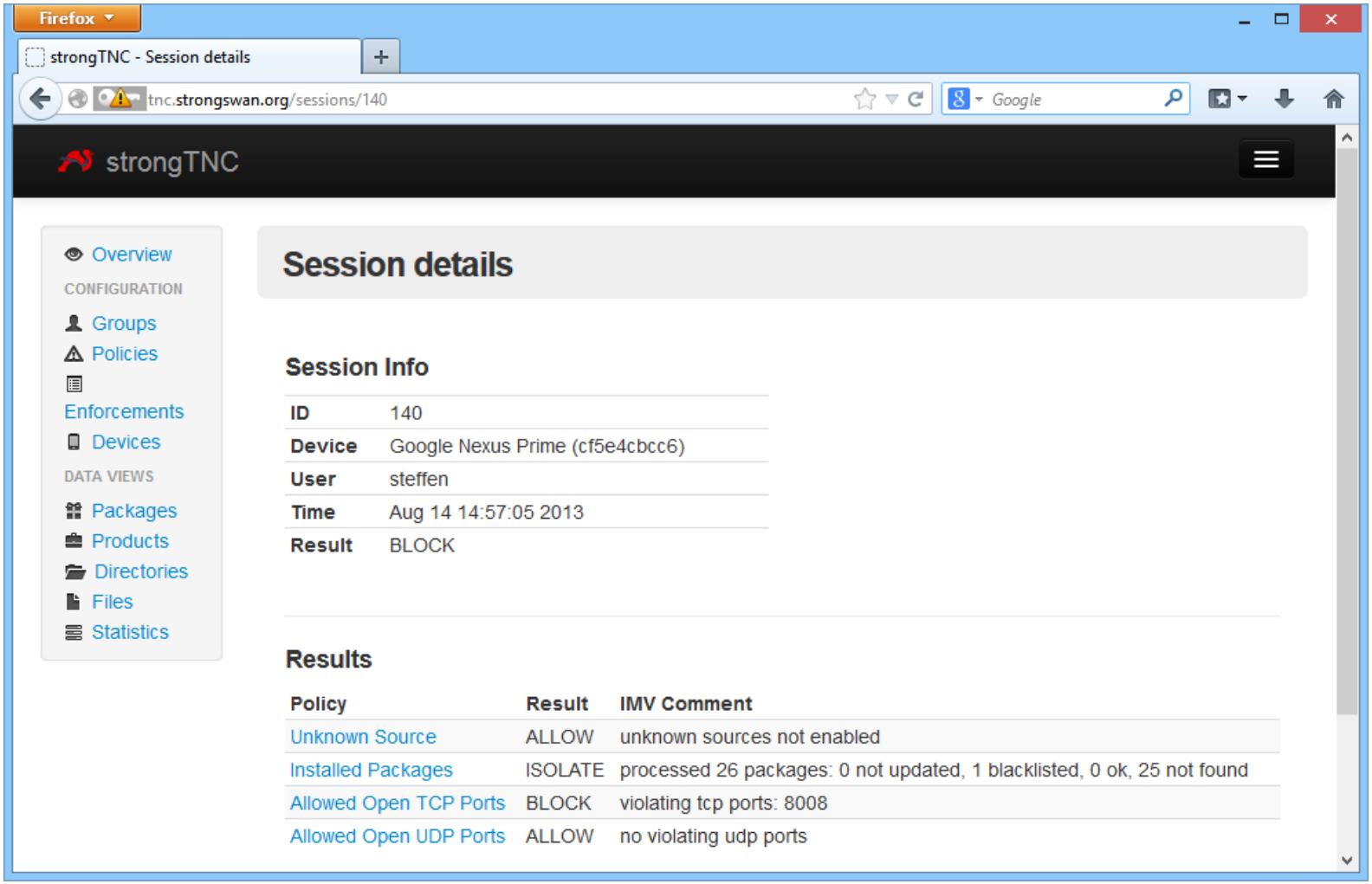
Major Non-Compliance: Block Client







strongTNC Policy Manager

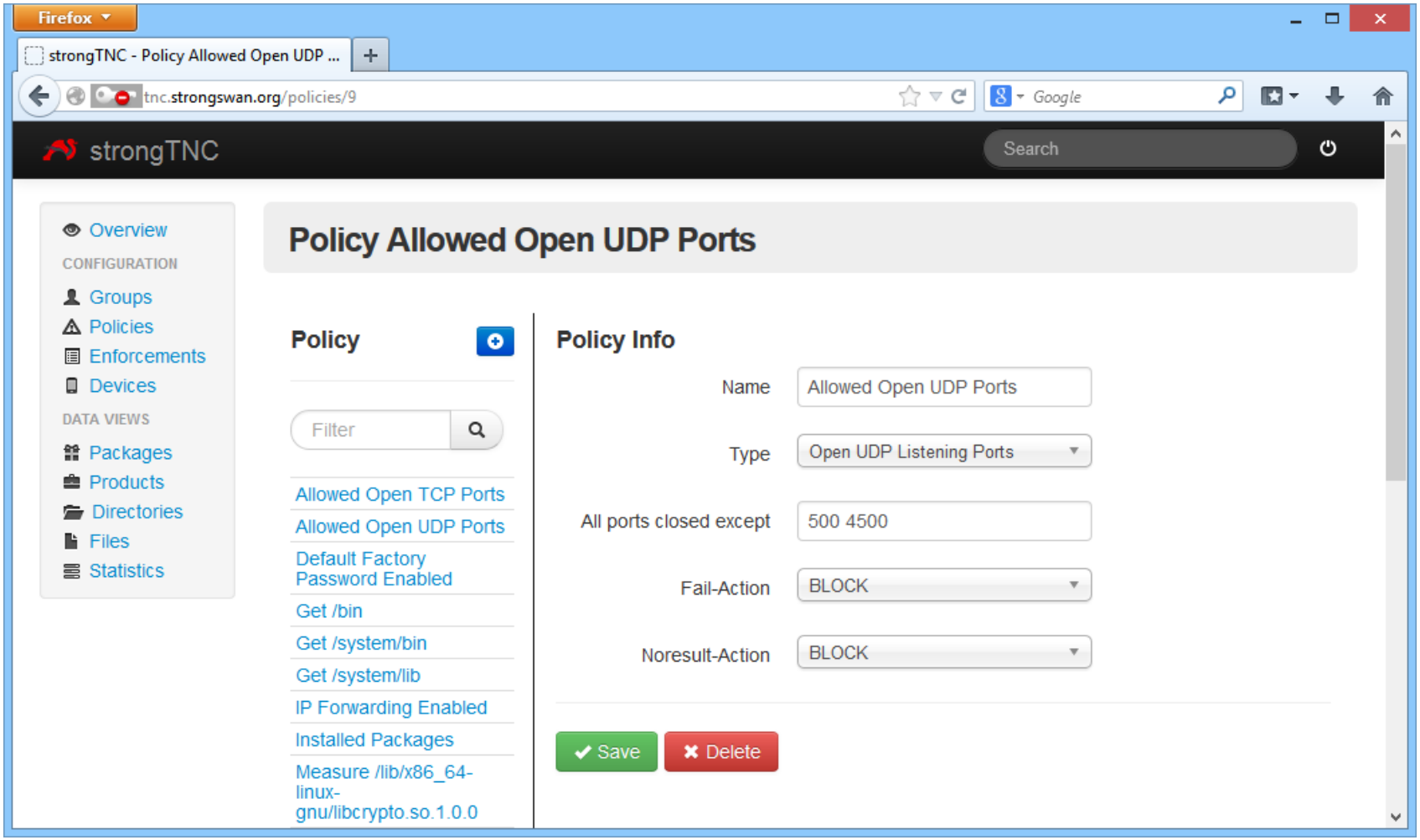


Defining Measurement Policies and Enforcements

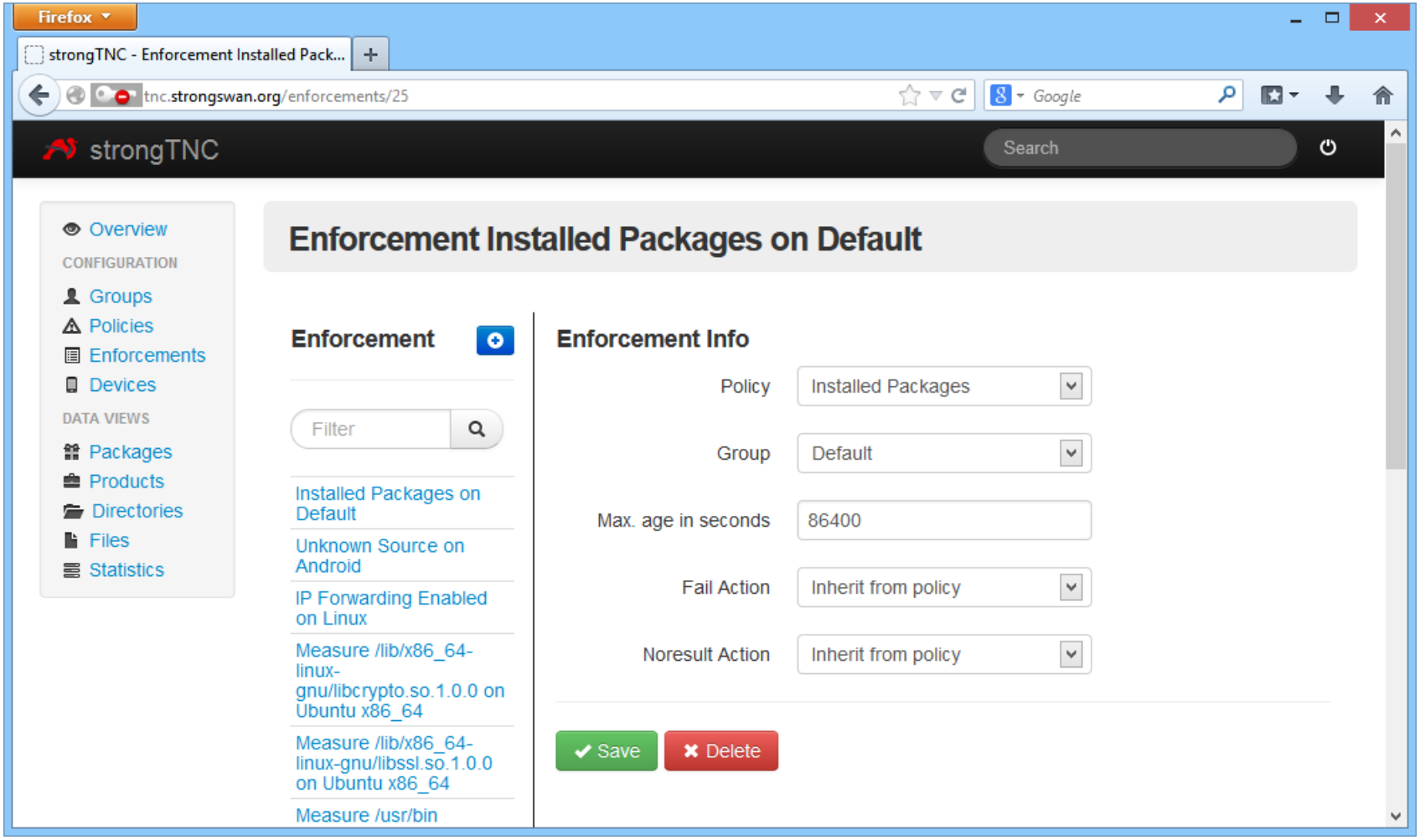
Currently supported policy types:

• PWDEN	Factory Default Password Enabled	
• FWDEN	Forwarding Enabled	
• TCPOP	TCP Ports allowed to be Open	Closed Port Default Policy
• TCPBL	TCP Ports to be Blocked	Open Port Default Policy
• UDPOP	UDP Ports allowed to be Open	Closed Port Default Policy
• UDPBL	UDP Ports to be Blocked	Open Port Default Policy
• PCKGS	Installed Packages	
• UNSRC	Unknown Sources	
• SWIDT	SWID (Software ID) Tag Inventory	Visit Demo at TCG Booth!
• FREFM	File Reference Measurement	SHA1/SHA256 Hash
• FMEAS	File Measurement	SHA1/SHA256 Hash
• FMETA	File Metadata	Create, Modify, Access Times
• DREFM	Directory Reference Measurement	SHA1/SHA256 Hashes
• DMEAS	Directory Measurement	SHA1/SHA256 Hashes
• DMETA	Directory Metadata	

Add/Edit Policies



Define Enforcements



Summary

- The TNC protocols have become Internet Standards
- The TNC protocols are platform-independent and allow interoperability
- The TNC protocols support trustworthy TPM-based remote attestation
- The strongSwan BYOD Showcase demonstrates that TNC is ready for use
- The strongTNC policy manager bases measurements on past client behaviour

Thank You

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