What your Network Looks Like to the Bad Guys

Dave De Coster

decoster@wisc.edu

Disclaimer!

This is a VERY brief overview

Assumptions

- Following common best practices
- Have a firewall
- Patched
- Anti(virus|malware|spam|et cetera) running
- Passwords set

- All the other “normal” things

What can you see from the outside?

- If you run very few services, probably very little
- But…..

The Perimeter

The crunchy shell

Theory

Featureless barrier

Exposes very little

Keeps them guessing

Reality

A barrier

Get glimpses of the inside

Commonly Overlooked

Firewalls have external management capabilities as well.

Firewall Admin Interfaces

Commercial

- SNMP
- SSH
- Proprietary

SOHO

- Web / SOAP
- SSDP (UPnP)
- Telnet

Simple Network Management Protocol

- Typically used for collecting information from network connected devices
  - Modems, Routers, Switches, Servers, Printers, and more

- When asked nicely, it’ll respond with lots of information
- snmpget -c public -v 2c [IP] 1.3.6.1.2.1.1.1.0

```
iso.3.6.1.2.1.1.1.0 = STRING: "Cisco IOS Software, C800 Software (C800-UNIVERSALK9-M), Version 15.3(3)M6, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Tue 04-Aug-15 05:50 by prod_rel_team"
```

Simple Service Discovery Protocol

- Can be found on port 1900/UDP
- Provides a pointer to where the device’s admin interface is
- Designed for Plug’n Play
- Unfortunately, it often gets bound to the external interface

SSDP

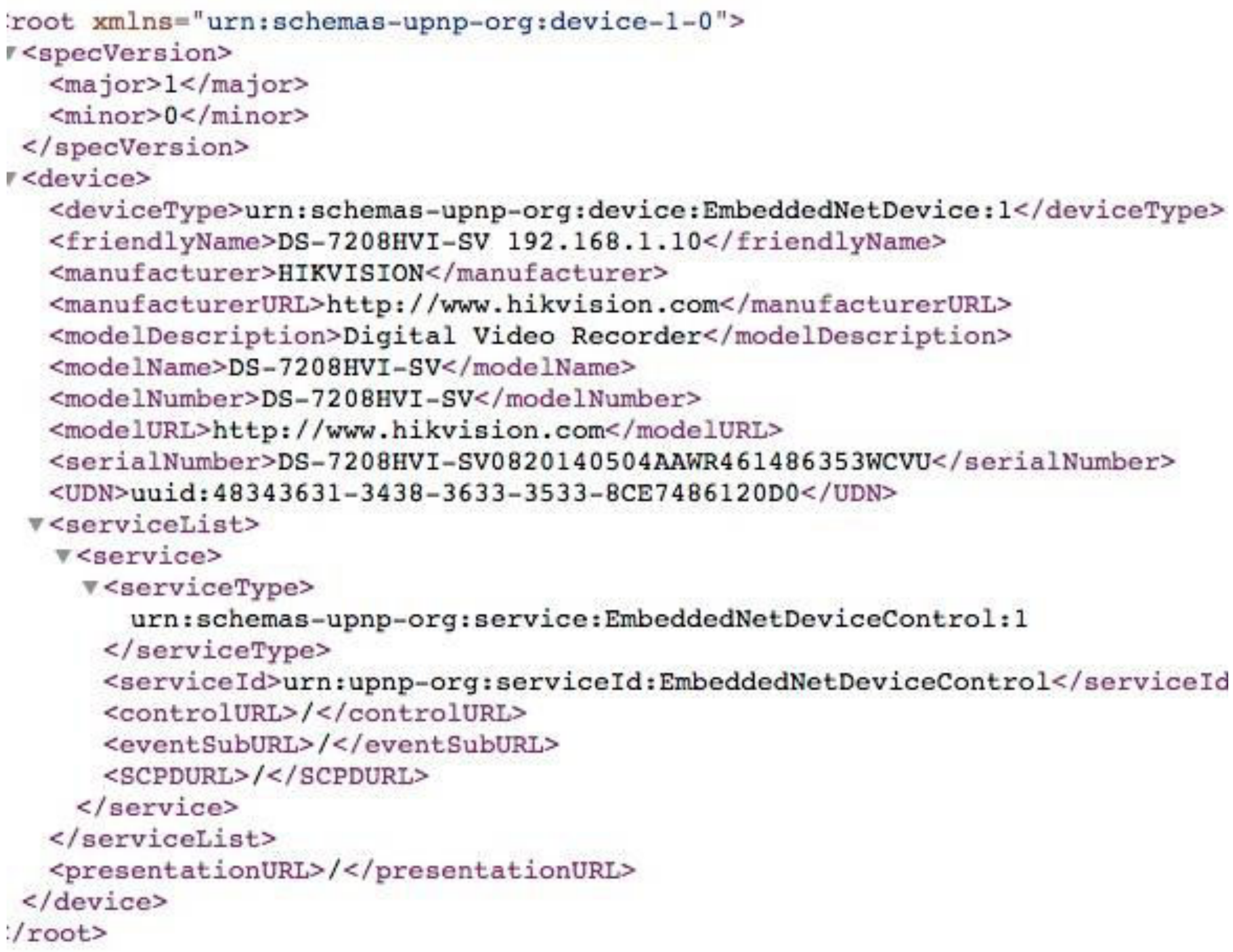
```
HTTP/1.1 200 OK
LOCATION: http://192.168.1.1:37215/upnpdev.xml
SERVER: Linux UPnP/1.0 Huawei-ATP-IGD
CACHE-CONTROL: max-age=86500
EXT:
ST: upnp:rootdevice
USN: uuid:00e0fc37-2525-2828-2500-5c7d5e42b8a4::upnp:rootdevice
```

SSDP (non-router)

```
HTTP/1.1 200 OK
CACHE-CONTROL: max-age=1800
DATE: Wed, 30 May 2018 02:09:35 GMT
EXT:
LOCATION: http://192.168.1.10:8011/upnpdevicedesc.xml
OPT: "http://schemas.upnp.org/upnp/1/0/"; ns=01
01-NLS: 8b5a241a-1dd2-11b2-b980-b1899108f595
SERVER: Linux/3.0.8, UPnP/1.0, Portable SDK for UPnP devices/1.6.18
X-User-Agent: redsonic
ST: upnp:rootdevice
USN: uuid:48343631-3438-3633-3533-8CE7486120D0::upnp:rootdevice
```

SSDP

Substitute the IP you probed and…



```
root xmlns="urn:schemas-upnp-org:device-1-0">
▼<specVersion>
   <major>1</major>
   <minor>0</minor>
 </specVersion>
▼<device>
   <deviceType>urn:schemas-upnp-org:device:EmbeddedNetDevice:1</deviceType>
   <friendlyName>DS-7208HVI-SV 192.168.1.10</friendlyName>
   <manufacturer>HIKVISION</manufacturer>
   <manufacturerURL>http://www.hikvision.com</manufacturerURL>
   <modelDescription>Digital Video Recorder</modelDescription>
   <modelName>DS-7208HVI-SV</modelName>
   <modelNumber>DS-7208HVI-SV</modelNumber>
   <modelURL>http://www.hikvision.com</modelURL>
   <serialNumber>DS-7208HVI-SV0820140504AAWR461486353WCVU</serialNumber>
   <UDN>uuid:48343631-3438-3633-3533-8CE7486120D0</UDN>
  ▼<serviceList>
    ▼<service>
      ▼<serviceType>
         urn:schemas-upnp-org:service:EmbeddedNetDeviceControl:1
       </serviceType>
       <serviceId>urn:upnp-org:serviceId:EmbeddedNetDeviceControl</serviceId
       <controlURL>/</controlURL>
       <eventSubURL>/</eventSubURL>
       <SCPDURL>/</SCPDURL>
     </service>
   </serviceList>
   <presentationURL>/</presentationURL>
 </device>
/root>
```

NTP

Network Time Protocol

Great for synchronizing times

Has multiple modes

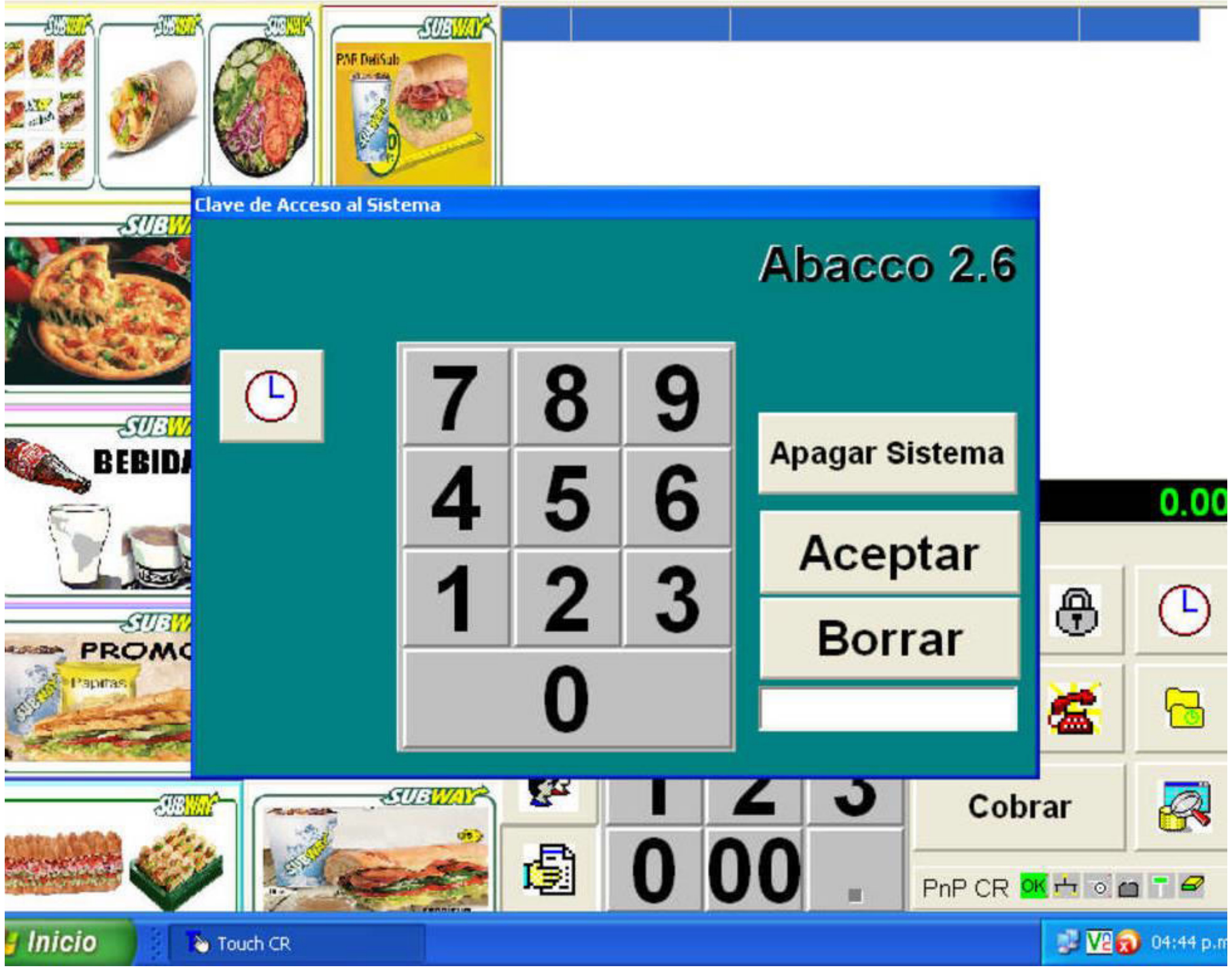
Some modes spit out more info

NTP Version Queries

```
version="ntpd 4.2.6p2@1.2194 Thu Apr 23 19:52:02 UTC 2015 (2)",
processor="x86_64", system="Linux/3.4.10", leap=0, stratum=2,
precision=-20, rootdelay=0.537, rootdispersion=2.108, peer=759,
refid=10.191.50.58, reftime=0xdeb87a12.e3f47f3a, poll=6,
clock=0xdeb87a63.ef6adc08, offset=0.028, frequency=1.415, noise=0.038,
jitter=0.050, stability=0.012
```

VNC/Remote Desktop

Very convenient for users, but (may) provide console access to the world



Enough Doom and Gloom

What can I do?

Limiting Exposure

- Check your firewall configs
  - Restrict access to only those things that need it

  - You can still provide access to devices while making life difficult to everyone else

Limiting Exposure

- Consider Egress blocking
  - Block SSDP and SNMP responses

Limiting Exposure

- Enforce the use of VPN
  - Helps mitigate the exposure of RDP/VNC

Limiting Exposure

- Look to see what your network looks like from the outside
- Provider-type services
  - Shodan
    - https://www.shodan.io
    - Easy to use
    - Data is pre-parsed
  - Censys
    - https://scans.io
    - Little more involved
    - Data is raw

Limiting Exposure

- Do it yourself
  - Qualys
    - Has an option to scan from off-campus
    - Talk to the Office of Cybersecurity for details
  - Nmap
    - https://nmap.org
    - Make sure that you have permission to scan before testing yourself!

Questions?