CARIBBEAN ICT Roadshow

Overview of DNSSEC

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Roseau Dominica
richard.lamb@icann.org

Caribbean
Telecommunications
Union

ICT Innovation for
Caribbean DEVELOPMENT

- The Internet did not have security designed into it.

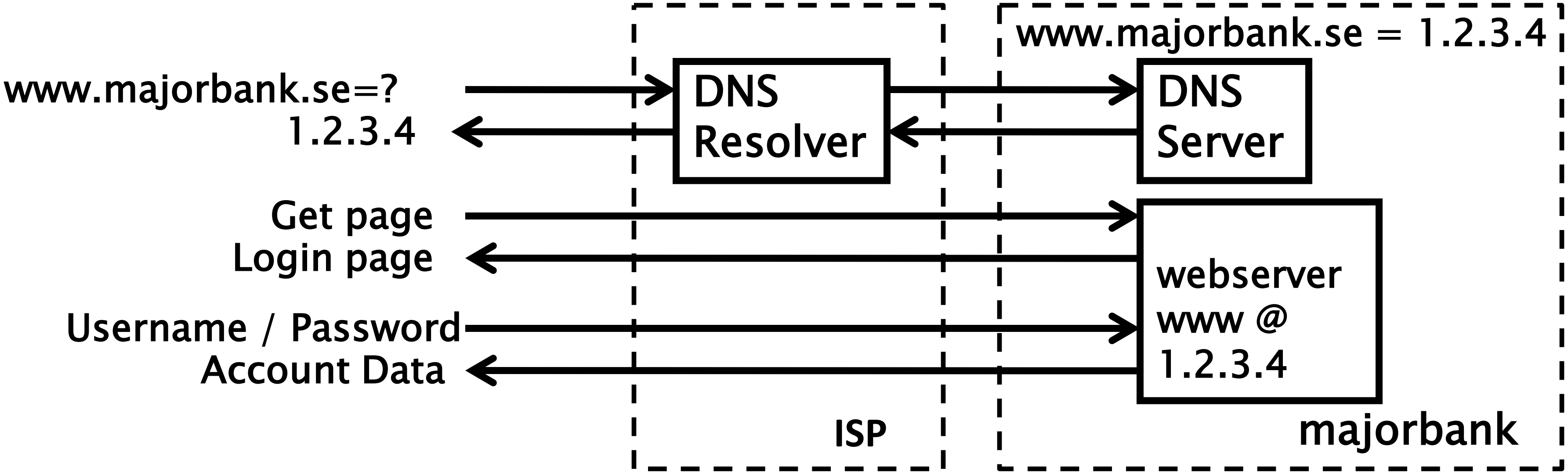
- But has demonstrated time and again that it is a platform for innovation - good and bad.

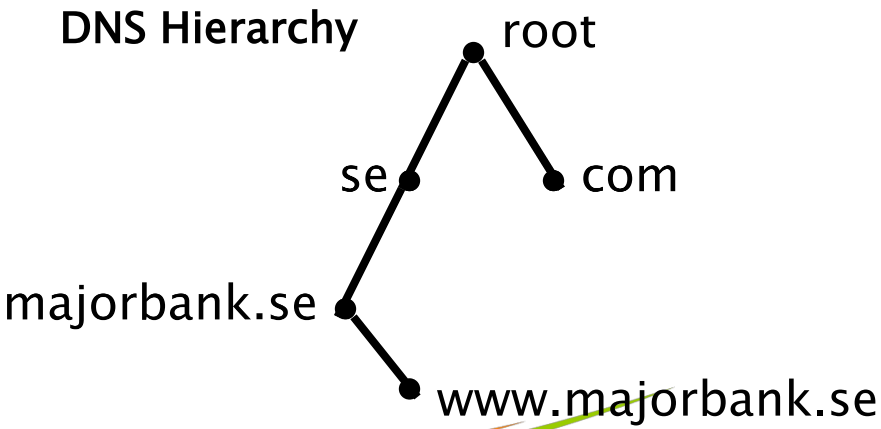
Recent News

- 9 Nov 2011 - DNSChanger/Ghost Click: 4M PCs across 100 countries
- 7 Nov 2011 - Large scale Brazilian ISP DNS poisoning attack
- 3 Aug 2008 - Dan Kaminsky reveals DNS cache poisoning shortcut
- Highlights need for securing DNS

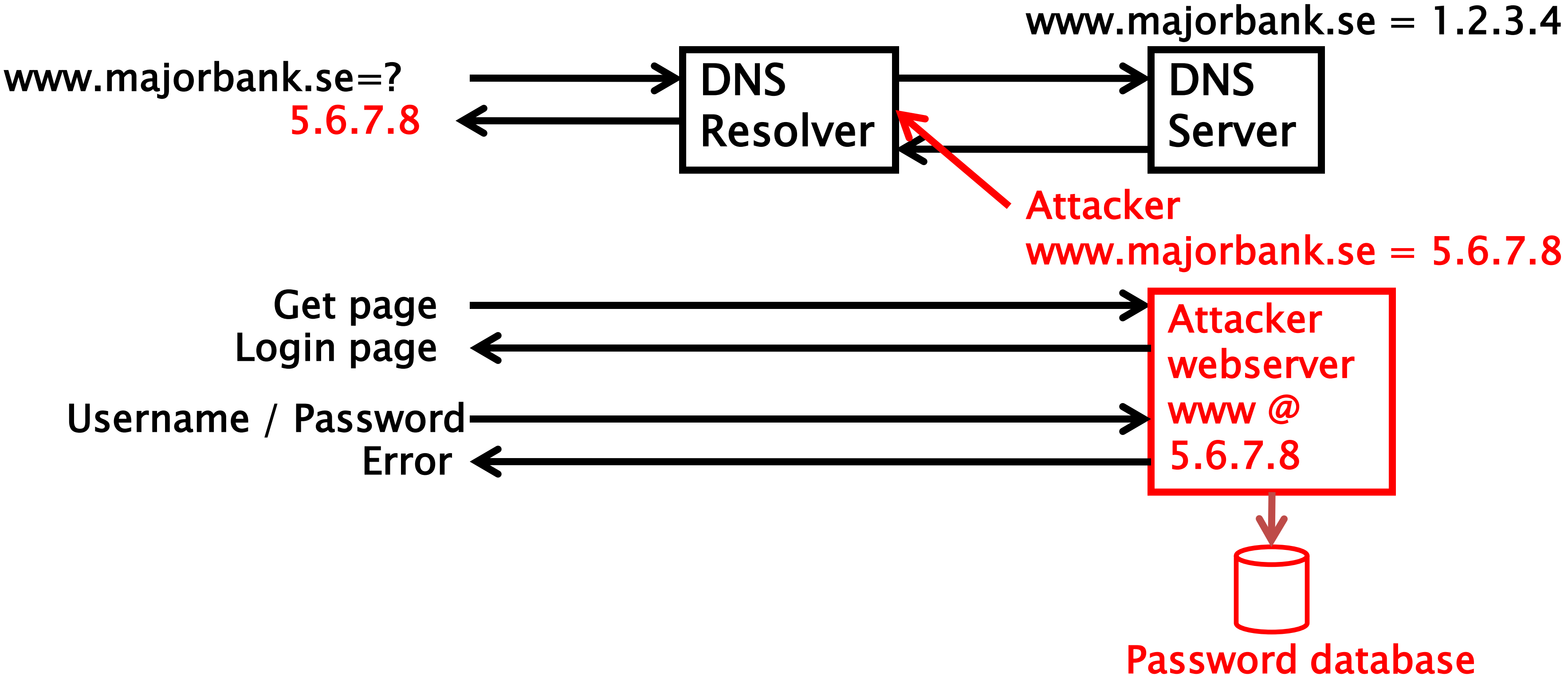
http://krebsonsecurity.com/2011/11/malware-click-fraud-kingpins-arrested-in-estonia/
http://www.securelist.com/en/blog/208193214/Massive_DNS_poisoning_attacks_in_Brazil
http://www.seattlepi.com/local/article/Seattle-security-expert-helped-uncover-major-1281123.php

The Internet’s Phone Book - Domain Name System (DNS)





The Problem: DNS Cache Poisoning Attack



www.majorbank.se = 1.2.3.4

www.majorbank.se=?

5.6.7.8

DNS Resolver

DNS Server

Attacker

www.majorbank.se = 5.6.7.8

Get page

Login page

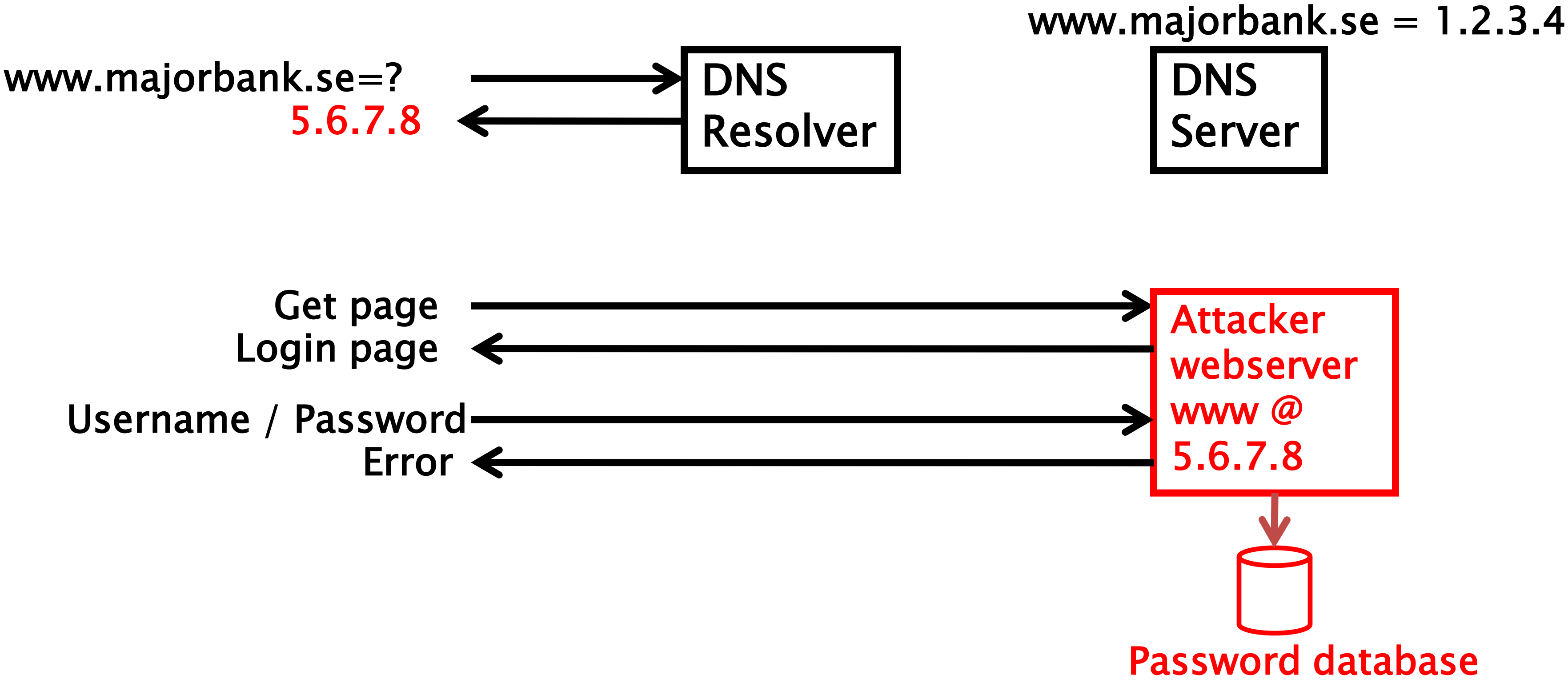
Username / Password

Error

Attacker webserver www @ 5.6.7.8

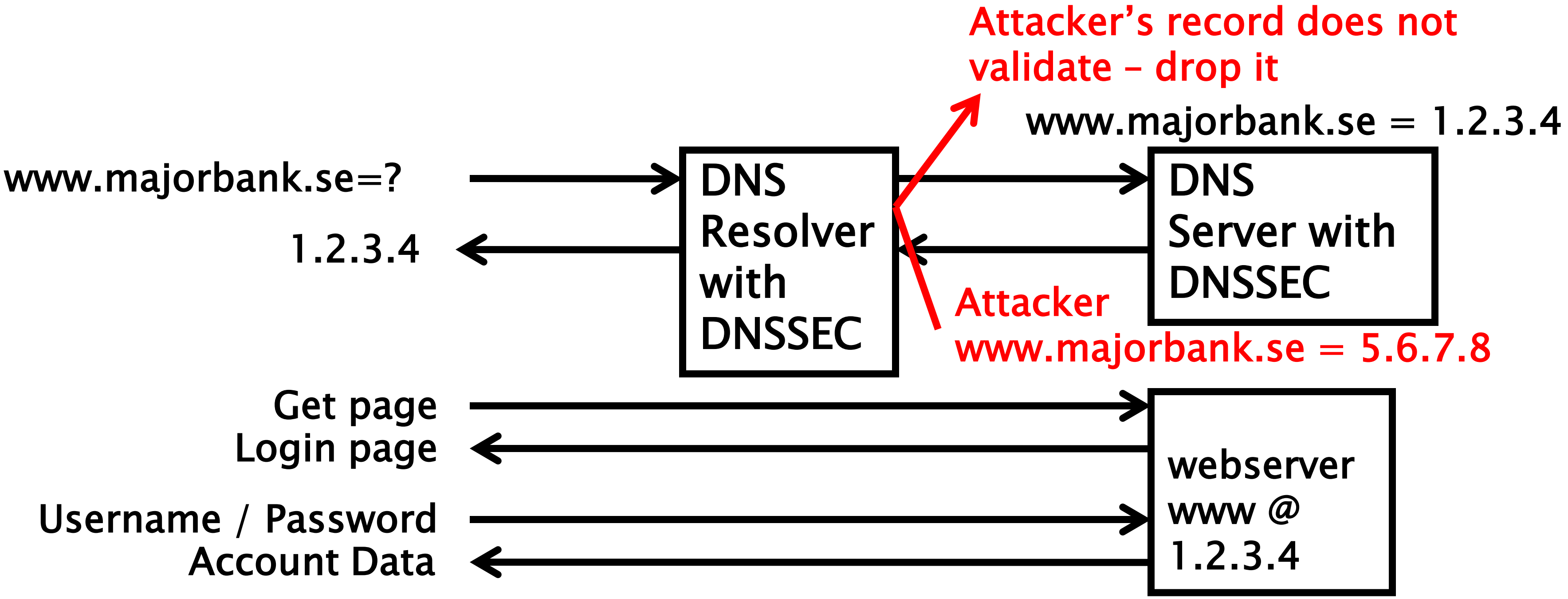
Password database

Argghh! Now all ISP customers get sent to attacker.



Securing The Phone Book - DNS Security Extensions (DNSSEC)

- Add keys to hierarchy; 15+ years of standards work; backwards compatible



Attacker's record does not validate – drop it

www.majorbank.se = 1.2.3.4

www.majorbank.se=?

1.2.3.4

DNS Resolver with DNSSEC

DNS Server with DNSSEC

Attacker www.majorbank.se = 5.6.7.8

Get page

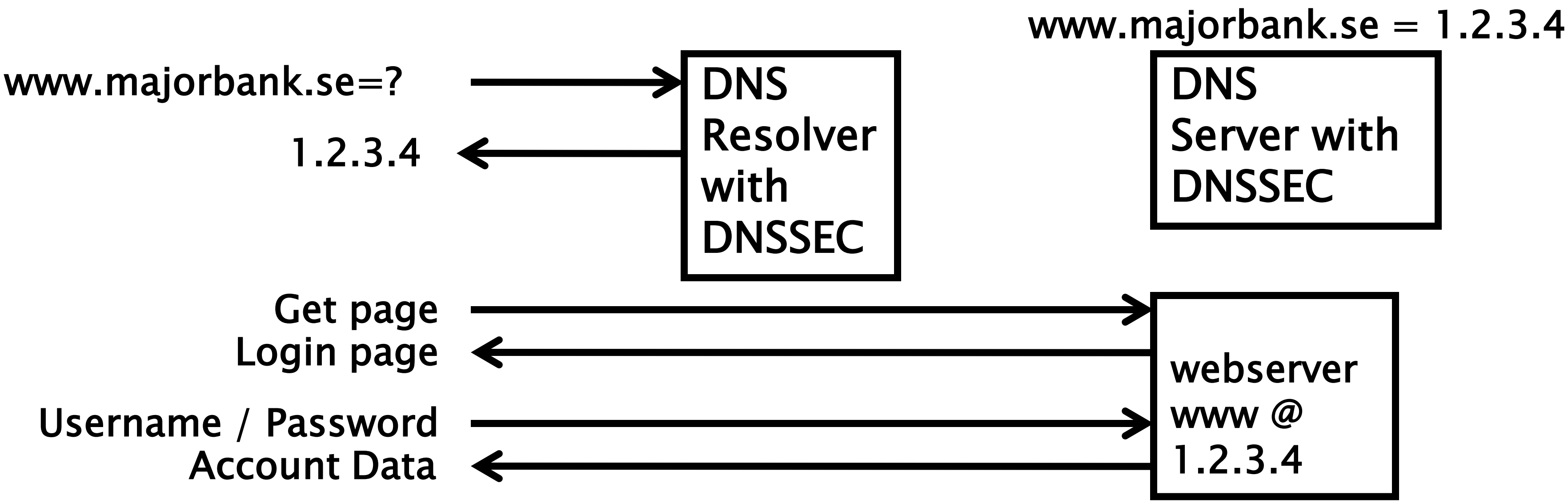
Login page

Username / Password

Account Data

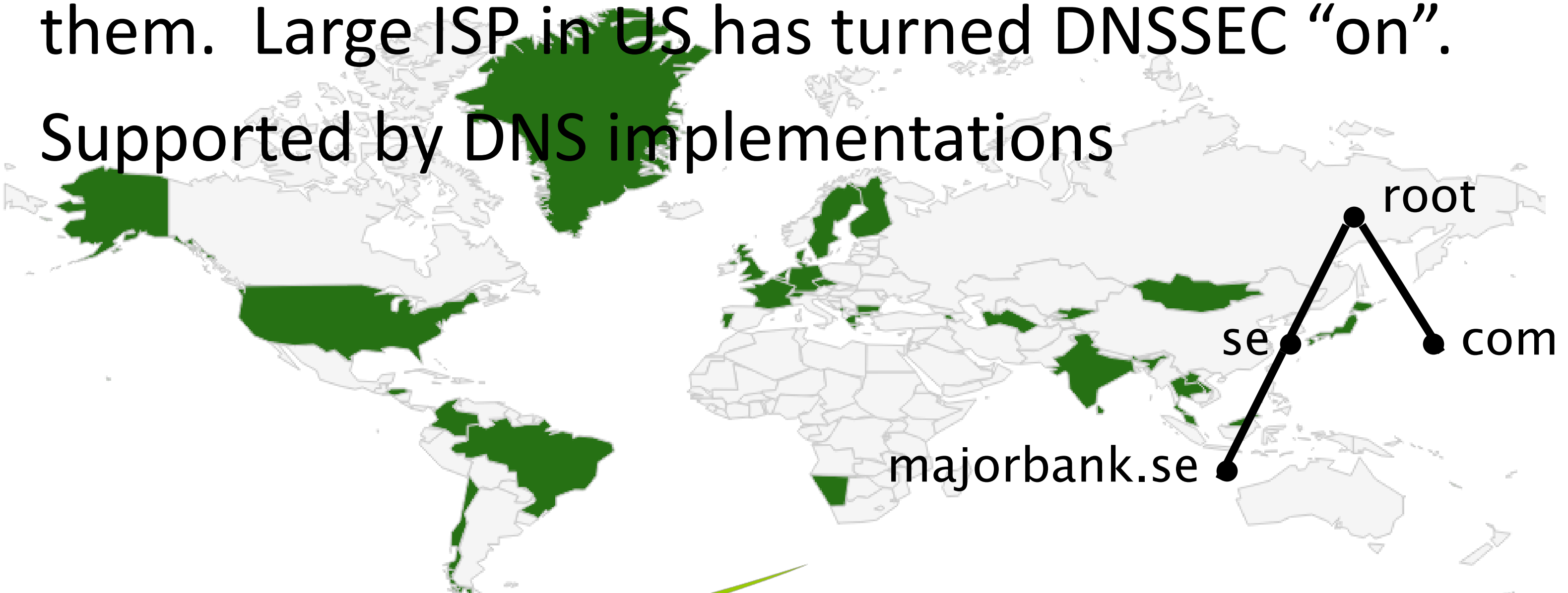
webserver www @ 1.2.3.4

Resolver only caches validated records



DNSSEC Deployment: Where we are now

- < 1% DNSSEC still needs to deployed on more domain names.
- 82/312 top level domain (e.g., .se) have DNSSEC deployed.   Multi-stakeholder managed root key.
- 82% of domain names can have DNSSEC deployed on them. Large ISP in US has turned DNSSEC “on”.
- Supported by DNS implementations



Last week ALL 17.8 M COMCAST Internet customers. Vodafone, Telefonica CZ

Deploying DNSSEC at the top (root) An International Multi-Stakeholder, Bottom-up, Cooperative effort

- **Bottom-up**: Responding to calls for deployment at root by Internet Community, IT security researchers, and Governments. Based on 15+ years of development in IETF and experience from early deployments by ccTLDs (SE, BR, PR, etc..).
- **Multi-Stakeholder**: "root signed" 15 July 2010 and managed with direct participation by 21 respected Internet representatives from 17 countries.
- **Transparent**: We publish and broadcast everything and have annual 3rd party audit.

SysTrust

Result

- Biggest upgrade to the Internet’s core infrastructure in 20 years
- Enabled DNSSEC deployment throughout hierarchy
- Who is

  this guy?

NOTICE
NOTICE UNAUTHORIZED PERSONS NOT PERMITTED BEYOND THIS POINT
NOTICE NO FOOD OR DRINK BEYOND THIS POINT
ICANN
EXIT
One World. One Internet. Everyone Connected.
19036

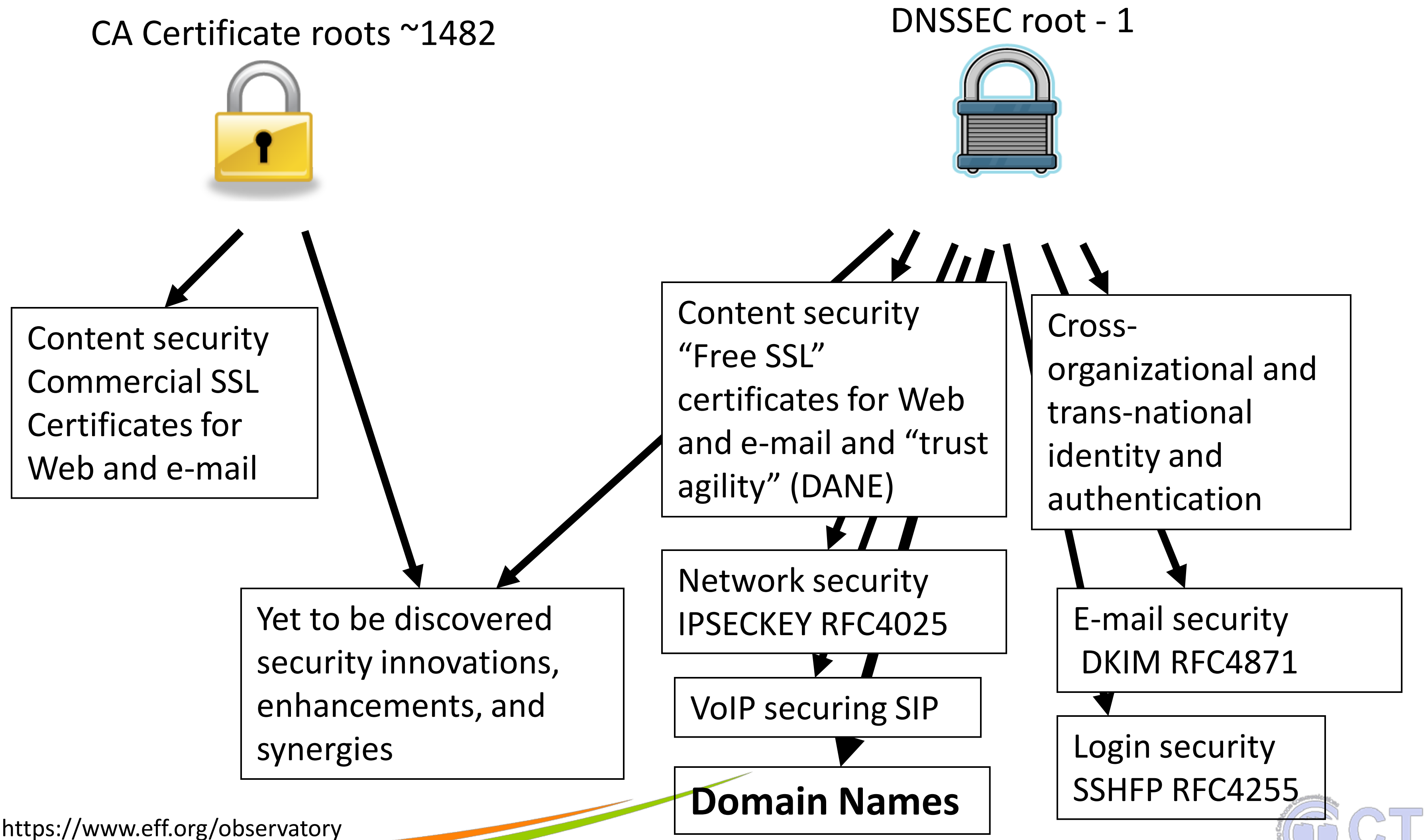
How to implement DNSSEC?

- ***For Companies:***
  - – Sign your corporate domain names (ask Registrars to support DNSSEC)
  - – Just turn on validation on corporate DNS resolvers
- ***For Users:***
  - – Ask ISP to turn on validation on their DNS resolvers
- Take advantage of ICANN and other organizations offering education and training.

But wait, there's more…

- Looks like we now have a global, secure database for "free"!
- A globally trusted Public Key Infrastructure
- Enabler for global security applications
- An authentication platform for identification
- Cross-organizational and trans-national
- .. A global platform for innovation

Another Source of Trust on the Internet



CA Certificate roots ~1482

DNSSEC root - 1

Content security
Commercial SSL
Certificates for
Web and e-mail

Yet to be discovered
security innovations,
enhancements, and
synergies

Content security
“Free SSL”
certificates for Web
and e-mail and “trust
agility” (DANE)

Network security
IPSECKEY RFC4025

VoIP securing SIP

Domain Names

Cross-
organizational and
trans-national
identity and
authentication

E-mail security
DKIM RFC4871

Login security
SSHFP RFC4255

https://www.eff.org/observatory
http://royal.pingdom.com/2011/01/12/internet-2010-in-numbers/

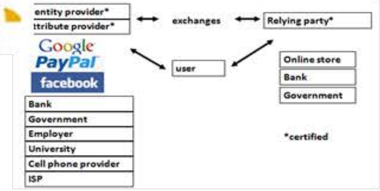
Potential Applications

- Build and improve on established trust models, e.g., CAs
- Greatly expanded SSL usage (currently ~4M/200M)
- Make SMIME a reality
- May work in concert with in enhancing or extending other cyber security efforts like digital Identities, WebID, BrowserID, CAs, ..
- Securing VoIP
- Simplify WiFi roaming security
- Secure distribution of configurations (e.g., blacklists, anti-virus sigs)

Opportunity for Indigenous Certification Authorities

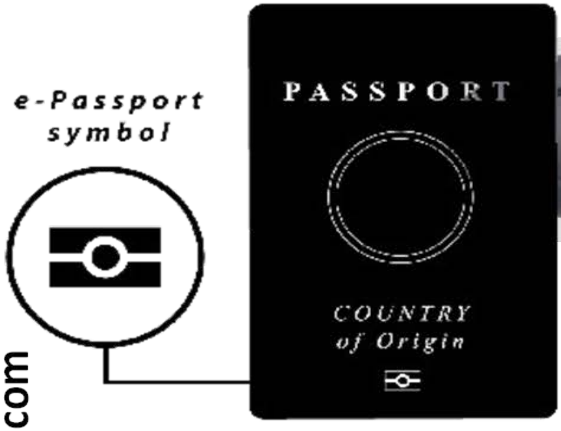
- CAs located in only 52 countries
  - 'AE', 'AT', 'AU', 'BE', 'BG', 'BM', 'BR', 'CA', 'CH', 'CL', 'CN', 'CO', 'CZ','DE', 'DK', 'EE', 'ES', 'EU', 'FI', 'FR', 'GB', 'HK', 'HU', 'IE', 'IL', 'IN', 'IS', 'IT', 'JP', 'KR', 'LT', 'LV', 'MK', 'MO', 'MX', 'MY', 'NL', 'NO', 'PL', 'PT', 'RO', 'RU', 'SE', 'SG', 'SI', 'SK', 'TN', 'TR', 'TW', 'UK', 'US', 'UY', 'WW', 'ZA'
- Even then, some countries are not using their own CAs.
- Synergy: Reduced barriers, Alignment with TLD, DNSSEC operations

DNS is a part of all ecosystems



entity provider*
attribute provider*
exchanges
Relying party*
Google
PayPal
facebook
user
Online store
Bank
Government
Bank
Government
Employer
University
Cell phone provider
ISP
*certified

e-Passport symbol



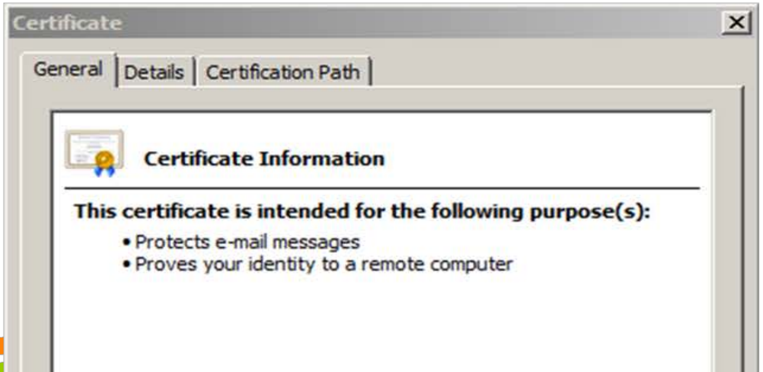
SVERIGE SWEDEN SUÈDE
SVENSK/SWE
O chip permitiria o armazenamento de dados sobre o cidadão
O Registro de Identidade Civil seria um número nacional de identificação
REPÚBLICA FEDERATIVA DO BRASIL
FERNANDA CARVALHO DA SILVA
0000000001-9
UTOPIA / UT
10/05/1975
JOÃO CARVALHO DA SILVA
MARIA CARVALHO DA SILVA
JUL/JUL 07
JUL/JUL 12
A1410634
21.02.2012
ARVALHO<FERNANDA<<<<<<

Trust frameworks are not new

Identity providers
Relying parties
VISA
Exchange (clearing house)
users
TOK&STOK
C&C
amazon.com
macys

mydomainname.com

Smart Electrical Grid



Certificate Information

This certificate is intended for the following purpose(s):

- Protects e-mail messages
- Proves your identity to a remote computer

What needs to still happen

- Needs to be widely deployed across more domain names
- Registrars, ISPs, and hosting providers need to support it in a trustworthy fashion
- DNSSEC validation needs to be pushed to the end user
- Raise awareness of the security benefits of DNSSEC and its secure deployment.

Summary

- DNSSEC is a platform for cyber security innovation and international cooperation.
- DNSSEC does not solve all the ills of the Internet but can become a powerful tool in improving the security of the Internet.
- DNSSEC will be a critical tool in combating the global nature of cyber crime allowing cross-organizational and trans-national authentication.
- DNSSEC is a game changing example of what can result from the bottom-up, multi-stakeholder process the Internet has come to be known for.
- In order to realize the full benefits of DNSSEC, greater end user and domain name owner awareness is needed to drive a virtuous cycle for effective deployment.