# DNSSEC Deployment in Enterprises:

# A Multi-stakeholder Game

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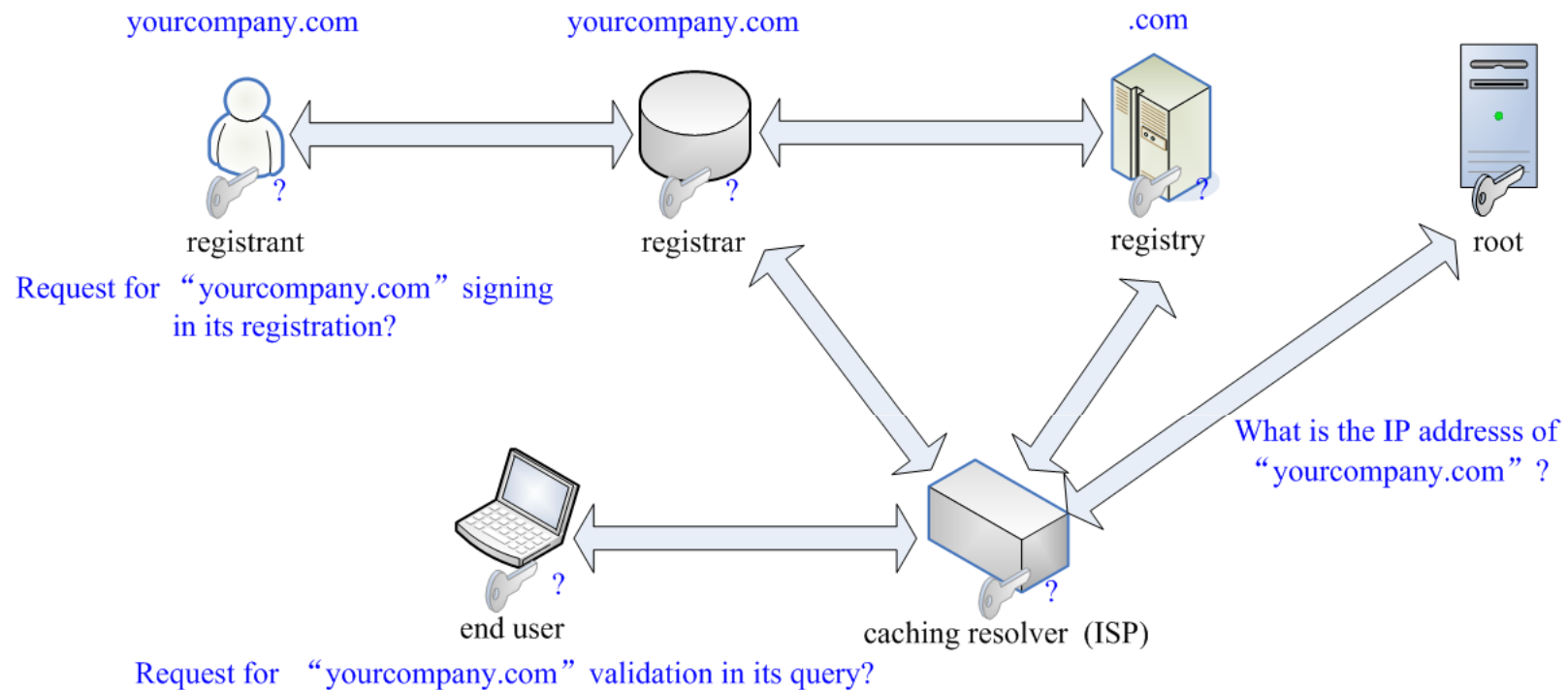
# Agenda

- Multi-stakeholders in DNSSEC deployment

- Enterprises' roles in DNSSEC deployment

- DNSSEC deployment game

- Solution to the game

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yourcompany.com     yourcompany.com     .com

registrant     registrar     registry     root

Request for "yourcompany.com" signing
in its registration?

What is the IP addresss of
"yourcompany.com"?

end user     caching resolver (ISP)

Request for "yourcompany.com" validation in its query?

✓ Root is already signed

✓ The problem is: how the other stakeholders behave in the game?

- **As DNS caching resolver operators:**
  - ✓ Deploy DNSSEC on corporate DNS infrastructure (self-serve company)
  - ✓ Provide DNSSEC validation for its Internet users (ISP)

    Dominant percentage of Internet users!

- **As domain name registrants:**
  - ✓ Deploy DNSSEC on your domain names ("sign" your corporate domain names)

**Assumption:**

- ✓ DNSSEC deployment is basically driven by the economic considerations of each stake-holder

**Observations:**

- ✓ Economic incentives for DNSSEC deployment of each stake-holder may depend on the prevailing of DNSSEC in other stake-holders

- ✓ DNSSEC deployment is hardly ego-driven from an economic perspective

- ✓ But the analysis may be suggestive for finding a way out

- **Strategy and cost analysis**

  - ✓ Neither the authoritative data originator, provider nor requestor, but only the intermediate in the resolution system

  - ✓ No so much concern about the DNS security as end user, registrant, registrar, and registry

  - ✓ DNSSEC deployment requires significant DNSSEC validation cost (bandwidth, computational resources, protocol support, …),

  - ✓ DNSSEC is a large investment for little revenue

- **Conclusions**

  - ✓ Low economic incentives for DNSSEC deployment

  - ✓ Unlikely to be driven by the proactive actions of other stake-holders

**Strategy and cost analysis**

- ✓ DNSSEC means significant signing cost (bandwidth, computational resources, protocol support, …)

- ✓ Much dependent of the DNSEC deployment strategies of its registrars

- ✓ If all or most registrars are DNSSEC-oblivious, DNSSEC off is expected to incur minor impacts on revenue

- ✓ If all or most registrars support DNSSEC, DNSSEC off is of high revenue risks due to the expected registration downturn

- ✓ NOT considering ICANN's DNSSEC efforts in requirements for new gTLDs

**Conclusions**

- ✓ Economic incentives for DNSSEC deployment emerge only if registrars provide DNSSEC service

# Registrar in the game

- **Strategy and cost analysis**
  - ✓ DNSSEC means significant signing cost (bandwidth, computational resources, protocol support, ...)
  - ✓ Depending on the DNSEC deployment initiates of its registrants
  - ✓ If all or most registrants require DNSSEC, DNSSEC service will be worth the investments to meet the customer expectations
  - ✓ If all or most registrants are DNSSEC-oblivious, DNSSEC off is a better deal

- **Conclusions**
  - ✓ Economic incentives for DNSSEC deployment emerges only if registrants request DNSSEC service

- **Strategy and cost analysis**
  - ✓ DNSSEC may bring extra costs for the signing service
  - ✓ Depending on the willingness of end users to initiate DNSSEC queries
  - ✓ If all or most end users require DNSSEC validation in its queries, DNSSEC will be necessary for the protection of their DNS data
  - ✓ If all or most end users send DNSSEC-oblivious queries, DNSSEC off is a better strategy in terms of cost effectiveness

- **Conclusions**
  - ✓ Economic incentives for DNSSEC deployment emerges only if end users request DNSSEC in their queries

# End user in the game

- **Strategy and cost analysis**
    - ✓ DNSSEC means somewhat increased query delay and processing burden, and installing or upgrades of its stub resolvers
    - ✓ Depending on the DNSSEC readiness at the authoritative servers AND caching resolvers, or of registrars AND registries AND ISPs (DNSSEC validation fails if any of them fails to support DNSSEC)

- **Conclusions**
    - ✓ Economic incentives for DNSSEC requests emerge only if registrars AND registries AND ISPs are DNSSEC ready

✓ Promoting DNSSEC at registries and/or registrars without stimulating other stake-holders may not be an effective way to DNSSEC because this method cannot necessarily provide incentives for other stake-holders

✓ We should stress the importance of raising the awareness of end users and/or registrants about DNSSEC because actions taken by any of them can provide incentives for other stake-holders except ISP

✓ ISP's DNSSEC strategy is independent of other stake-holders'. Therefore, external funding, guidance or subsidy may be needed to give economic incentives to ISPs.
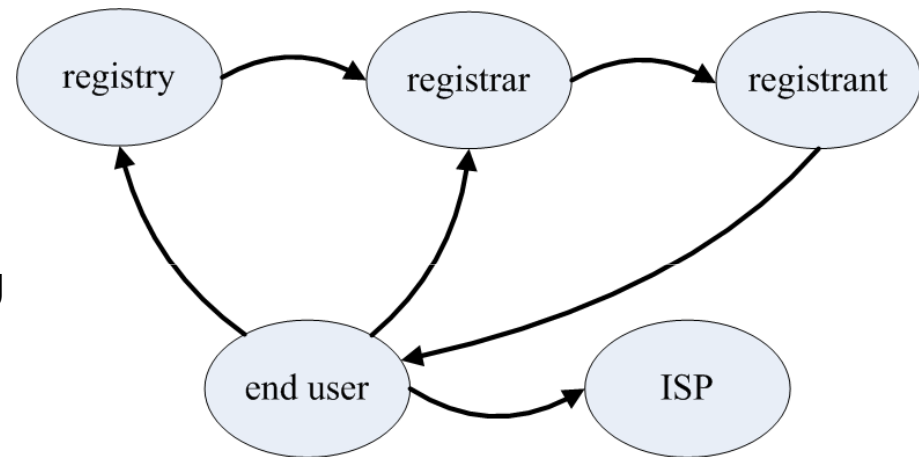


Dependency graph of the game

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Thank You !