

ICANN65 NEXTGEN

# AUTHENTICATION AND ADAPTIVE SECURITY FOR DNS

Presented by ADISA BOLUTIFE

@blogger | [www.digitalgrassroots.org](http://www.digitalgrassroots.org)

# INTRODUCTION

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## A BRIEF OUTLINE

DNS - How it works?

Vulnerabilities of the DNS

Understanding DNSSEC

The state of DNSSEC validation

To the future





# DOMAIN NAME SYSTEM

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## HOW DOES IT WORK?

Links : Hostnames, IP addresses, text records, MX records, NS records, security key information defined in Resource Records.

# VULNERABILITIES OF THE DNS

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## DNS OPEN RESOLVERS

Allows DNS clients that are not part of its administrative domain to use that server for performing recursive name resolution. Attacks on this service mostly result to Denial of Service (DoS) or Distributed DoS (DDoS).

# VULNERABILITIES OF THE DNS

## DNS CACHE POISONING ATTACKS

Occurs when an attacker sends falsified and usually spoofed RR information to a DNS resolver.

## DNS AMPLIFICATION AND REFLECTION ATTACKS

Sending DNS messages to multiple open resolvers using a forged source IP address.

## RESOURCE UTILIZATION ATTACKS

Consumes all available resources to negatively impact operations of the open resolver.

## PREVENT DNS OPEN RESOLVER CONFIGURATIO NS

A configured open resolver exposed to the Internet allows anyone to send DNS queries to the resolver.

# UNDERSTANDING DNSSEC

## □ SECURITY

DNSSEC supplements the hierarchical nature of the DNS with cryptographic characteristics

## □ CRYPTOGRAPHIC SIGNATURES

Makes it possible to verify the authenticity of information stored in the DNS

## □ RRSIG

Cryptographic signatures are published in a DNSSEC-specific resource record type called RRSIG

## □ MESSAGE SIZE

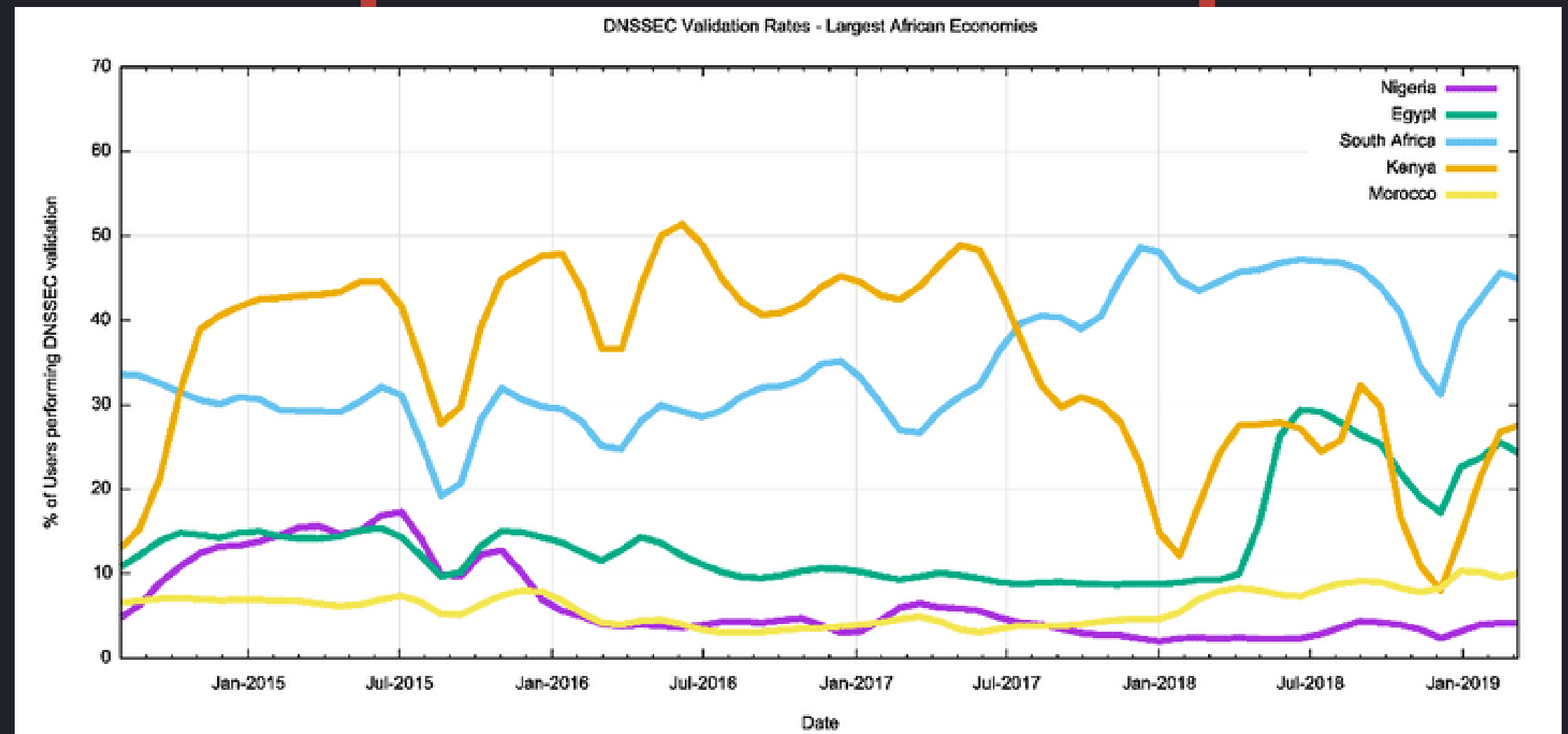
DNS - 512 Bytes

DNSSEC - Up to 4096 Bytes

# VALIDATION RATES

## IN AFRICA

DNSSEC validation use peaked at 22% of users in mid-2016 and declined to 12% by early 2018 and has shifted back to 18% in early 2019







## DNSSEC - NO?

- Increased responsibility for zone administrator
- Increase size and inefficiencies
- Validation takes additional time
- Costs outweigh the potential benefit



## DNSSEC - YES?

- Internet security
- Trust
- DNSSEC - work-in-progress but our only option.
- Issues are being worked on.



# To the Future

FOR SECURING THE DNS  
THERE IS NO PLAN B  
BEYOND DNSSEC



OPERATIONAL  
EXPERIENCE WILL GUIDE  
THE FURTHER  
REFINEMENT OF DNSSEC  
TOOLS AND TECHNIQUES.

## WEBSITE

[www.digitalgrassroots.com](http://www.digitalgrassroots.com)

## TWITTER

@blogger

## EMAIL

[adisabolutifeo@gmail.com](mailto:adisabolutifeo@gmail.com)

[adisa.b@digitalgrassroots.org](mailto:adisa.b@digitalgrassroots.org)

# GET IN TOUCH

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**WE'D LOVE TO HEAR  
YOUR THOUGHTS**