STIR/SHAKEN: How to stop the Robocalling madness?

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REGULATORS & LEGISLATORS ARE MANDATING CALL AUTHENTICATION

**REGULATORS**

Ajit Pai, FCC Chairman

Nov 5, 2018: FCC demands phone companies adopt call authentication by end of 2019

June 6, 2019: FCC votes to greenlight default robocall blocking

**SENATE BILL**

TRACED Act: Telephone Robocall Abuse Criminal Enforcement and Deterrence

115th CONGRESS 2nd Session

S. 3655

To deter original robocall violations and improve enforcement of section 227(b) of the Communications Act of 1934, and for other purposes.

IN THE SENATE OF THE UNITED STATES
November 15, 2018

Mr. THUNE (for himself, Mr. MARKEY, and Mr. WICKER) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

Mar 2019: Coalition of attorneys-general from 54 states and territories express support for TRACED

May 23, 2019: Senate votes 97-1 to approve TRACED Act

**HOUSE BILL**

Stopping Bad Robocalls Act

115th CONGRESS 2nd Session

H. R. 6026

To amend the Communications Act of 1934 to clarify the prohibitions on making robocalls, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES
June 7, 2018

Mr. PALLONE introduced the following bill; which was referred to the Committee on Energy and Commerce

Feb 2019: House reintroduced the Stopping Bad Robocalls Act

June 20, 2019: House announce bipartisan compromise on robocall bill
JULY 11TH FCC SUMMIT ON STIR-SHAKEN

• Purpose of the summit was to understand implementation challenges, progress made and best practices relating to STIR/SHAKEN testing and deployment

• Three panel discussions:
  1. Progress Made by Major Voice Service Providers
     • Tier 1 providers
  2. Using STIR/SHAKEN to Improve the Consumer Experience
     • Participation by consumer advocacy groups and analytics vendors
  3. Challenges to Deployment Facing Smaller Voice Service Providers
     • Ribbon participated on this panel
     • Smaller carriers that are members of NTCA
KEY TAKEAWAYS FROM THE FCC SUMMIT

• Large carriers are IOT testing with other carriers and are in early stages of deployment
  • Tracking towards end of year milestone set by the FCC
  • Attestation levels A and B are preferred
  • Looking at evolving standards for TN Delegation, Enhanced CNAM
  • Policy Administration Framework to be available by the end of the year

• Consumer advocacy groups calling for default blocking based on June 6th FCC ruling
  • Option for the customer to turn off blocking
  • Robocall CallerID Display needs to be made very simple for end consumers to understand and find useful
  • Use of analytics to enhance STIR/SHAKEN

• Small carriers need an easy to use solution
  • Flexibility in deployment models
  • Sensitive to price – need flexible pricing models
  • TDM still in play
INDUSTRY RESPONSE FOR CALL AUTHENTICATION

“SHAKEN, NOT STIRred”
STIR (Secure Telephony Identity Revisited)
- standardized by IETF and defines a signature to verify the calling number, and specifies how it will be transported in SIP “on the wire”

SHAKEN (Signature-based Handling of Asserted information using toKEns)
- framework developed by the ATIS/SIP Forum IP-NNI task force to provide a STIR implementation profile for service providers. STIR/SHAKEN will be the basis for authenticating calls and facilitating the ability to trust the caller ID information

The idea behind STIR/SHAKEN:
Apply security and digital certificate technologies to phone calls, similar to web transactions, and combat spoofing to increase the chances of a consumer answering the call
How would you characterize your knowledge of STIR/SHAKEN and Robocall Analytics?

1. Industry expert
2. Competent to architect a solution in my network
3. Knowledgeable enough to partner with a vendor to architect a solution
4. Know enough to be dangerous
5. Still sorting out some things
JOINT STIR/SHAKEN SOLUTION FOR 2019 COMPLIANCE

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1. **SKS**: Secure Key Store
2. **SP-KMS**: Service Provider-Key Management Server
3. **STI-CR**: STI-Certificate Repository
4. **STI-AS**: STI-Authentication Service
5. **STI-VS**: STI-Verification Service

**STI** = Secure Telephone Identity

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ribbon

1. **SBC**: Session Border Controller
2. **PSX**: Policy and Routing Control Server

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Governance/Policy

Key Management

Call Management
CHALLENGES FOR 2019 DEPLOYMENT

Larger Carriers
- Minimize network impact
- Testing, including broad range of existing call flows
- IOT with other carriers
- Scalability
- Some need extensibility of SHAKEN framework, including delegation

Smaller Carriers
- Resource requirements for up-front investment / implementation and maintenance
- TDM interconnection
RECOMMENDATIONS FOR LARGER CARRIERS FOR 2019 DEPLOYMENT

- Centralized PSX deployment
  - Minimizes network impact
  - Testing is localized to the PSX and SBC

- Flexible Policy on PSX
  - Allows granular policy for attestation
  - Enables enhanced CNAM support and subscriber policy
  - Interfaces with analytics
RECOMMENDATIONS FOR LARGER CARRIERS FOR 2019 DEPLOYMENT

• Builds on the advantages from the previous use case

• Network-wide solution
  • One solution for Ribbon and 3rd party network elements
  • One interface for STIR/SHAKEN, Analytics, LCR, LNP, CNAM, Number Translations and more
SCALABLE, ACTIVE-ACTIVE, GEO REDUNDANT DEPLOYMENTS

Provisioning UI

Data Center 1

- (UI) Web Server\(_1\)
  - Active
- STI-AS/SKS\(_1\)
  - Active
- STI-AS/SKS\(_2\)
  - Active
- STI-AS/SKS\(_3\)
  - Active
- STI-AS/SKS\(_4\)
  - Active
- STI-VS\(_1\)
  - Active
- STI-VS\(_2\)
  - Active
- STI-VS\(_3\)
  - Active
- STI-VS\(_4\)
  - Active
- STI-LB\(_1\)
  - Active
- STI-LB\(_2\)
  - Active
- EMS DB\(_1\)
  - Active
- STI-CR\(_1\)
  - Active

Data Center 2

- (UI) Web Server\(_2\)
  - Standby
- SP-KMS\(_2\)
  - Standby
- STI-CR\(_2\)
  - Standby
- STI-AS/SKS\(_2\)
  - Active
- STI-AS/SKS\(_3\)
  - Active
- STI-AS/SKS\(_4\)
  - Active
- STI-VS\(_3\)
  - Active
- STI-VS\(_4\)
  - Active
- STI-LB\(_3\)
  - Active
- STI-LB\(_4\)
  - Active
- EMS DB\(_2\)
  - Standby
- STI-CR\(_2\)
  - Standby

REST

Replication
HOSTED STIR/SHAKEN SOLUTION OPTION

U.S. Governance/Policy (Target 12/11/19)

- STI-PA
- STI-GA

Certified Caller STI - VS

STIR/SHAKEN Network(s)

CARRIER A

REST STIR/SHAKEN Queries/Responses

Certified Caller SP-KMS

Certified Caller SKS

Certified Caller STI-AS

Certified Caller STI-CR

Certified Caller STI-VS

VoIP Gateway

SBC

TDM Network(s)

VoIP Switch

SIP INVITEs w/Identity Headers

CARRIER A

VoIP Gateway or 3rd Party

Transit Network(s)

CARRIER A

1 CARRIER A Customer telephone calls

2 CARRIER A Key Management Provisioning

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CALL BLOCKING AND SUBSCRIBER OPT-OUT

1. SIP INVITEs w/Identity Headers
   - Originating Networks

2. REST Verification Queries/Responses
   - Portal with Policy Management, minimally “opt out”

3. Pre-integrated REST “CVT” Queries/Responses
   - (for CNAM/Number Ownership/eCNAM Robocall Mitigation data)

4. Policy-applied Call Blocking Responses
   - Certified Caller STI-VS
   - Policy
   - RoboProtect Rules

5. VoIP Switch
   - Block Call

- SBC or 3rd Party
STIR/SHAKEN CALL AUTHENTICATION + ANALYTICS

1. SIP INVITE w/Identity Header
2. REST STIR/SHAKEN Verification Query
3. 3rd Party Call Validation Treatment Query (for Call Treatment after Verification Process)
4. Query Response “[X] FRAUDULENT”

(S402) 234-5678
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Display Policy-applied 15-character Caller ID (CNAM)

VoIP Switch

Terminating Network

SBC

PSX

Certified Caller
STI-VS

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RoboProtect

Spam/Robocaller List

Neustar Robocall Mitigation DB

3rd Party Robo Block DB

Spam/Robocaller List
When is the earliest that you see being able to implement STIR/SHAKEN?

1. Before end of 2019
2. Before first half of 2020
3. After first half of 2020
4. Before any legislative or regulatory mandate deadline
5. STIR/SHAKEN implementation not applicable to me
BEYOND SHAKEN IN 2019…

• “Delegation” – Extending the STIR/SHAKEN framework to support various VoIP service providers, resellers, enterprises and legitimate spoofing use cases
• Governance – Policy Administrator deployment and approval of one or more Certification Authorities (updates to ATIS-1000080)
• Display – If/how verification result gets displayed/communicated to end users
• Default call blocking and subscriber “opt out”
• SHAKEN and Public Safety (e.g., 911, contemplates changes to ATIS-1000074)
• New PASSporT extensions (additional use cases, functionality)
  ▪ RPH (Resource Priority Handling for emergency/priority services)
  ▪ DIV (Diversion, for example call forwarding)
  ▪ RCD (Rich Call Data)
• Traceback and metrics on framework effectiveness
• Multiple SIP Identity headers and processing (e.g., message size)
• SIP error/response code processing and handling (across carrier networks)
• Cross-border STIR/SHAKEN (e.g., with Canada)
• STIR Out Of Band (complement to SHAKEN during IP transition)
WHAT IS ATTESTATION?

A. **Full Attestation.** The signing provider:

- is responsible for the origination of the call onto the IP-based service provider voice network
- has a direct authenticated relationship with the customer and can identify the customer
- has established a verified association with the telephone number used for the call

B. **Partial Attestation.** The signing provider:

- is responsible for the origination of the call onto the IP-based service provider voice network
- has a direct authenticated relationship with the customer and can identify the customer
- has NOT established a verified association with the telephone number being used for the call

C. **Gateway Attestation.** The signing provider:

- has no relationship to the initiator of the call (e.g., international gateways).
SHAKEN PER-CALL AUTHENTICATION (EXAMPLE 1)

Carrier A (VoIP/IMS)
Responsible for (908-666-XXXX)

Call from 908-666-9102
Carrier A Consumer

Carrier A to Carrier B:
“This is my customer. I gave them this telephone number. This call originated on my network.”

Attestation/Trust Indication="A"

Analytics
Verification Service (STI-VS)

Verification Indicator Sent
SHAKEN PER-CALL AUTHENTICATION (EXAMPLE 2)

Carrier A (VoIP/IMS)

Authentication Service (STI-AS)

Carrier B (VoIP/IMS)

Authentication Service (STI-AS)

Carrier C (VoIP/IMS)

Verification Service (STI-VS)

Analytics

Call from 201-555-2019

Reseller

Reseller

Consumer

Attestation/Trust Indication="B"

Carrier A to Carrier C:
"This is my customer. This call originated on my network. However, I did not give them this telephone number."

But how will Carrier C treat this call?

Verification Indicator Sent

Reseller

Consumer

Carrier A to Carrier C: "This is my customer. This call originated on my network. However, I did not give them this telephone number."
TWO GENERAL APPROACHES BEING CONSIDERED

1. Extend defined SHAKEN framework for more non-traditional providers (and others)
   - Permitted to get OCNs or pseudo-OCNs to sign calls
     - Works with SHAKEN “off the shelf” (provided that carriers trust you)
     - Entails a level of governance (e.g., dealing with STI-GA/STI-PA)
   - Places burden on carriers to get OCNs or pseudo-OCNs for providers (and others)
     - Difficult to validate in real-time whether a calling number falls under an OCN, let alone for a pseudo-OCN (will require a new industry database)

2. Non-traditional providers (and others) can receive a “delegation” from a carrier
   - Carriers with STIR/SHAKEN certificates from STI-CAs can delegate* a subordinate credential to those authorized to sign calls on their behalf
     - Providers can then sign for the subset of numbers they lease from carriers (or further delegate)
   - Relying parties then validate the delegation (certificate chain) during normal STIR/SHAKEN verification

Stay tuned…

* See “STIR Certificate Delegation”, draft-ietf-stir-cert-delegation-00
SUMMARY

“Resistance is futile. You are going to adopt STIR/SHAKEN. This is going to happen. There is going to be no way to avoid this.”

– Richard Shockey, Chairman of the SIP Forum

• 2019 solution
  • Tag, Sign and Verify with an easy to operate solution

• Challenges
  • Minimize network impact
  • In-network testing and IOT testing with other carriers
  • Scalability
  • Cost to implement

• Recommendations
  • Centralized deployment with Ribbon PSX and Neustar STI
  • Certified in the ATIS lab and deployed in large carriers
  • Geographically distributed, scalable solution
  • Cloud-hosted and On-prem solutions available

• Shaken 2.0
  • Analytics based Call Blocking
  • Delegation
  • Enhanced CNAM

Better Together: Ribbon and Neustar partnership brings customers the best in breed solutions in a single package
FOR MORE INFORMATION

➢  https://info.rbbn.com/stir-shaken-robocalls/#Ribbon-and-Neustar