International STIR/SHAKEN

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July 2021

June 30 was only a couple weeks ago…

Is it time to start thinking internationally?

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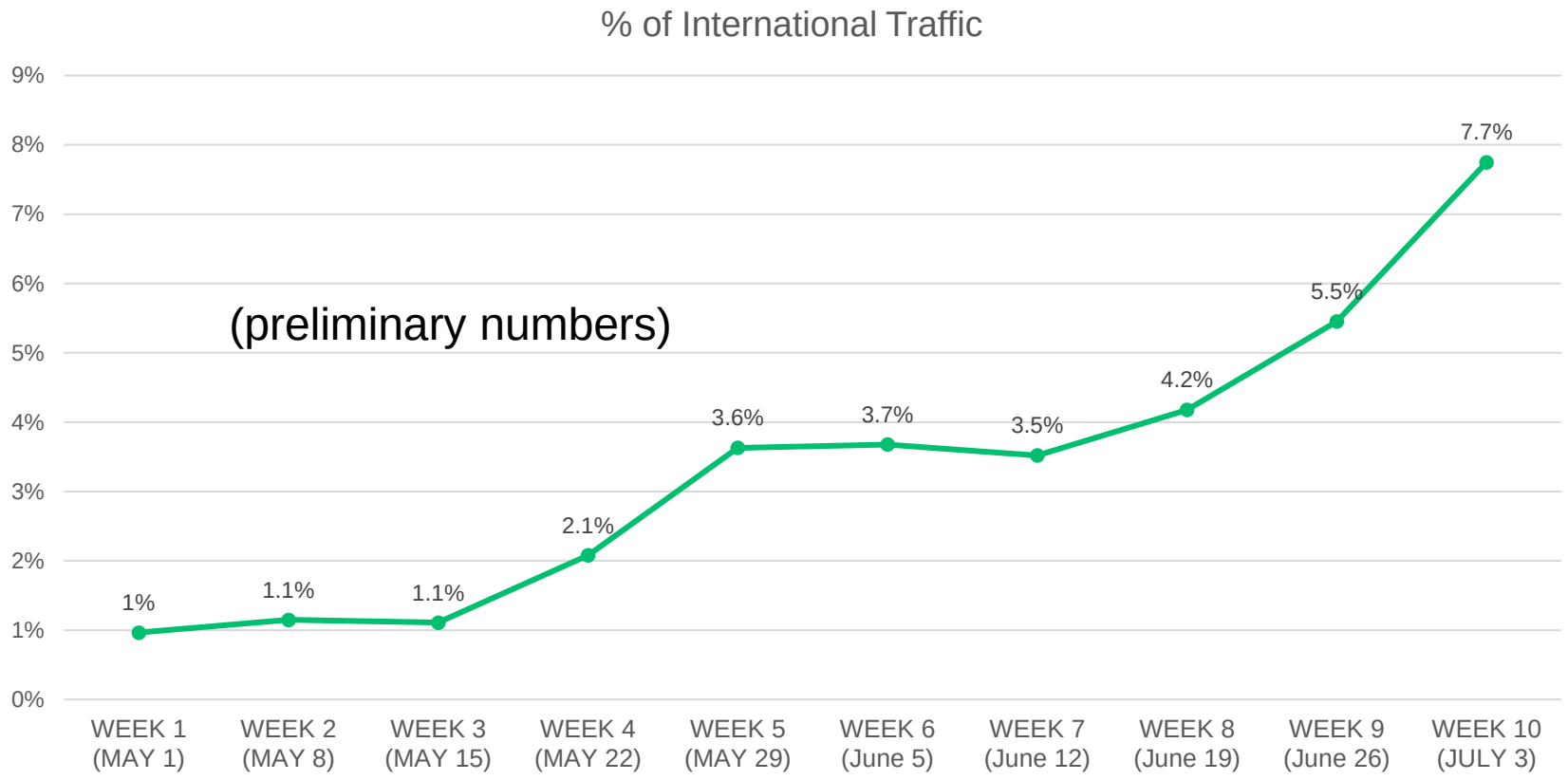
INTERNATIONALLY ORIGINATED (NON +1) STIR/SHAKEN TRAFFIC (AT VS)

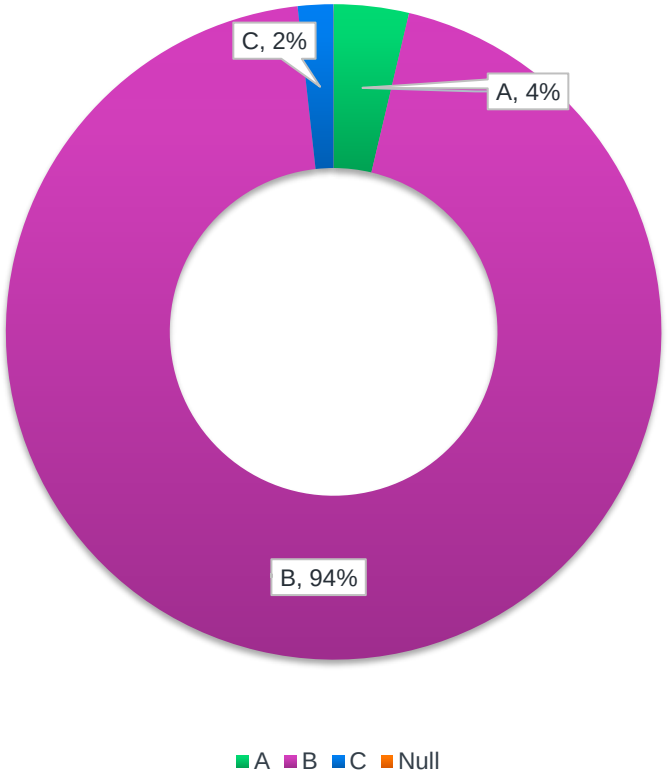


(signed calls increased ~20x over this timespan)

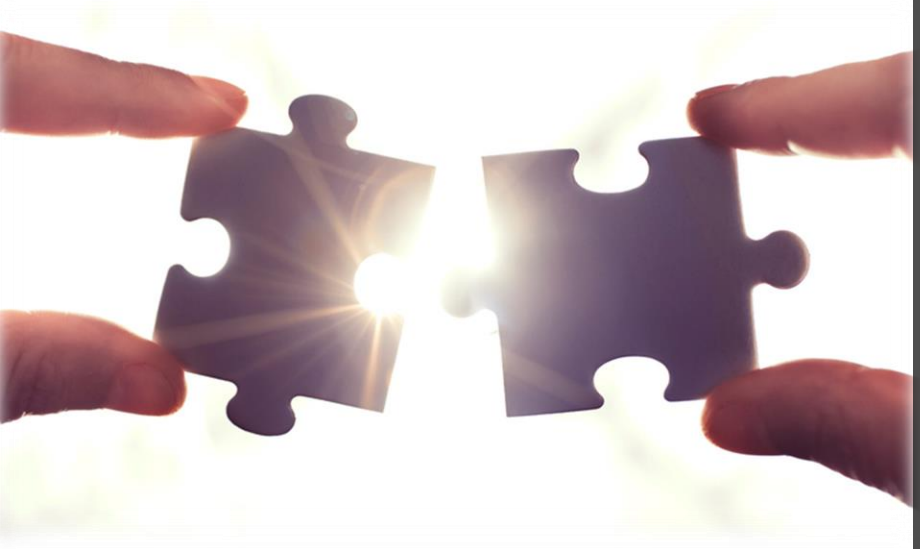
HOW ARE INTERNATIONAL CALLS BEING ATTESTED?

- Figures from a recent day
  - **Non +1 ”orig” numbers**
  - Some anomalies, seeing “C” spiking on other days
  - Early indications are that “B” is by far the most popular choice
- Is “B” the right choice?
  - The consequences of signing with “C” might be worrisome…

94% of Calls are signed with 'B'



WHAT DOES SHAKEN ***ATTESTATION*** REALLY MEAN?



How can legitimate calls receive the highest level of attestation avoiding the attestation gap?

A. FULL ATTESTATION

The OSP

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

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

B. PARTIAL ATTESTATION

The OSP

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

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

C. GATEWAY ATTESTATION

The OSP

- has no relationship to the initiator of the call (e.g., international gateways).

Carrier A to Carrier B:
This call originated outside my network.

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THREE KEY QUESTIONS ABOUT INTERNATIONAL

1. How will international calls to the USA be treated?
   - What are the chances they will be blocked improperly?
2. How different are international threat models from the USA model?
   - Just trying to stop spam calls, or is fraud the real target? Or something else?
3. How similar is TN administration to the USA model?
   - How well do attestation levels apply?
   - How much of GA/PA structures could (or should) be retained?

But before we get into that…

Poll Question #1

REGULATORY AND LEGISLATIVE RESPONSES FOR STOPPING NUISANCE CALLS IS GROWING WORLDWIDE

United States 

- June 2019: FCC allows blocking of illegal AND unwanted robocalls using “reasonable analytics”
- Dec 2019: Congress passes Pallone-Thune TRACED Act mandating carriers to implement STIR/SHAKEN or Robocall Mitigation. Fine violators up to $10k/call.
- June 2021: Deadline to implement STIR/SHAKEN
- September 2021: Database registration deadline

United Kingdom 

- 1999: Launched TPS Do Not Call Registry
- 2013: Ofcom launches action plan to prevent nuisance calls
- 2020-2021: Ofcom and NICC exploring STIR implementation framework

Canada 

- 2018: CRTC mandates Caller ID authentication via STIR/SHAKEN
- 2019: CRTC establishes the Canadian Secure Token - Governance Authority (CST-GA)
- November 2021: Deadline to implement STIR/SHAKEN
- Dec 2019: FCC and CRTC make first official cross-border call using STIR/SHAKEN between US and Canada

Plenty of other regulators are looking at these solutions

More and more regulators see eradicating nuisance calls and caller ID spoofing as top priority

GSMA VINES

(Validating Integrity of End-to-End Signalling)

VINES is looking at a series of security threats confronting mobile operators today

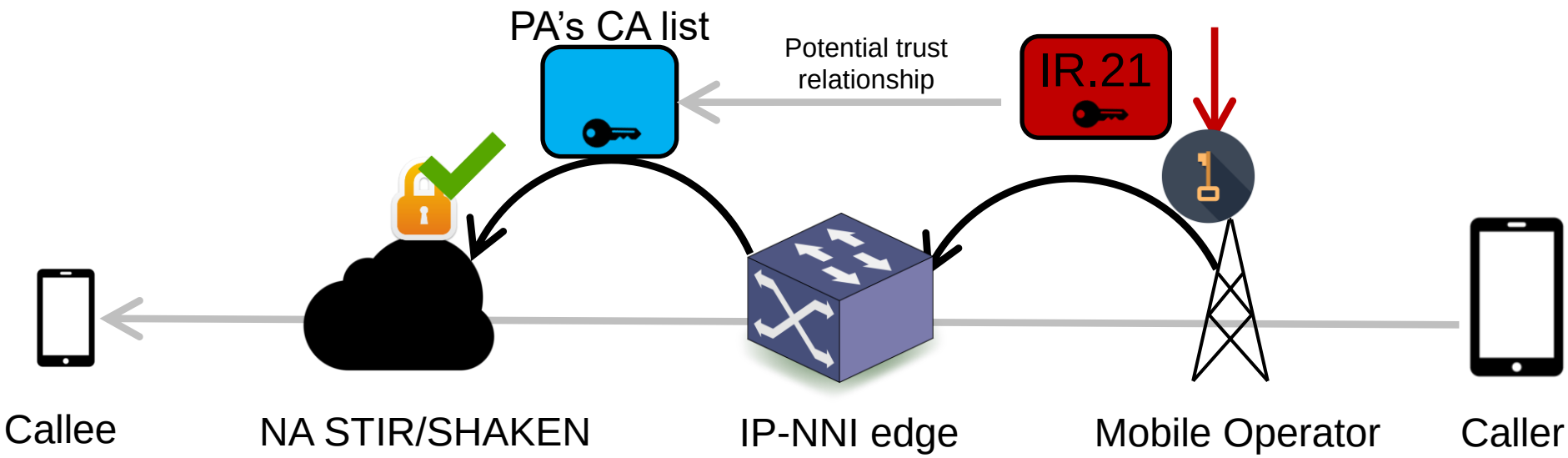
- CLI spoofing, and thus nuisance calling
- Re-routing (various forms of hacking, hijacking, and malicious redirection)
- Resizing (short-stopping, false ring)
- Traffic pumping

STIR/SHAKEN has been proposed as a solution in VINES

- Reuse 5G keying work from **DESS** key management to sign calls, potentially – through IR.21/IR.85
- Many interesting use cases are for out-of-band STIR

Also plenty of work in 3GPP supporting STIR/SHAKEN

WILL CALLS COMING INTO NA BE BLOCKED?



AN EXAMPLE ATTESTATION PROBLEM

In the UK, there's a distinction between "network number" and "presentation number"

- Which number operators see, versus which should be shown to the user
  - Typically PAID carries network number, From carries presentation
  - Numerous "presentation number types" differentiate relationship of operators to the presentation number
    - 5 of them to map to 3 levels of attestation, potentially
- So, is attestation level about network number or presentation number?
  - What if attestation isn't about the number in PAID in the UK?
  - And what would happen if a UK-signed call arrived in the US?

Crucial that we understand how calling identity is different in international environments

Poll Question #2

+33 AND +44

Millions of STIR/SHAKEN calls a day are already being signed with +33 and +44 numbers

- About 1% of signed international calls we see are UK
- 2% of signed international calls are FR

Let’s hear from some people who operate (and/or regulate) those numbers

- What root problems are they trying to solve?
- What might STIR/SHAKEN do for them?
- What are the potential hurdles and roadblocks?

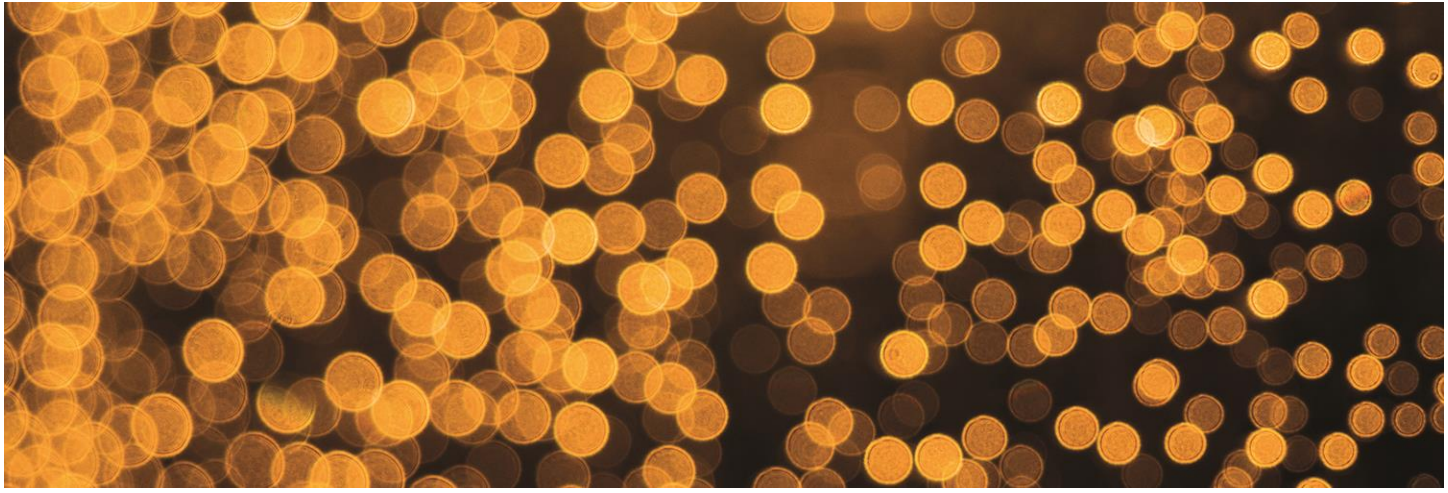
Let’s start with the UK (Huw)

MAKING COMMUNICATIONS WORK FOR **EVERYONE**

Ofcom's work on "nuisance calls" – is STIR the answer?

Huw Saunders, Director Network Infrastructure and Resilience

19th July 2021



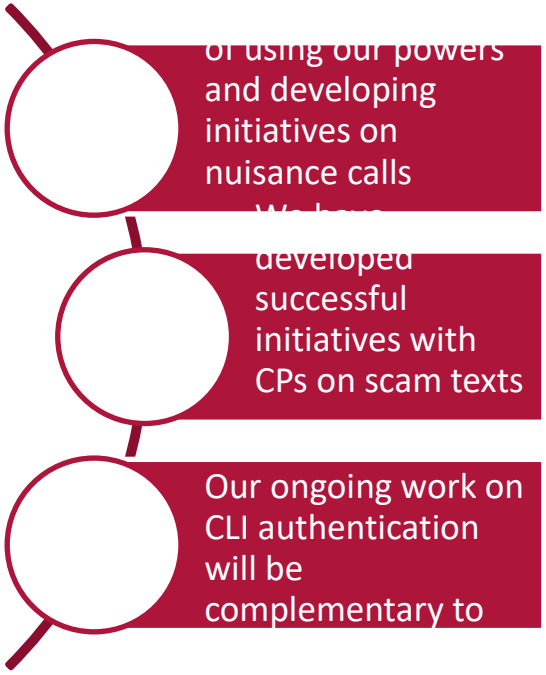
MAKING COMMUNICATIONS WORK FOR **EVERYONE**

We have a longstanding programme of work on countering nuisance calls and scams

Concern about scams and their impact on consumers has been growing…

- There were an estimated 4.4 million fraud and scams incidents in England and Wales in the year to September 2020 (around 37% of all incidents of crime).
- Scams can cause significant harm to consumers. Research in the UK reported that seven out of ten people scammed in the past two years lost money. Half lost more than £100, nearly a quarter lost more than £500. Emotional harm may also be significant.
- Communications services can be an important enabler of scams, with a recent consumer survey finding that nearly eight in ten people had been exposed to a scam via a communications channel in the past two years.

…we have been working on related issues for a number of years



MAKING COMMUNICATIONS WORK FOR **EVERYONE**

The ‘nuisance call’ problem is now a scams problem

As a result we have shifted more to cooperation with providers to mitigate harm

Nuisance calls - 2015

- Problematic “robocalls” were generally nuisance calls, causing annoyance to consumers – estimated volumes reached ~ 8 billion annually
- Nuisance calls could be managed by:
  - Requirement to enable CLIs
  - Requirement to block invalid CLIs
  - Consumer education
  - Information Commissioner’s Office powers to fine nuisance marketing callers

Scams - 2019 onwards

- Higher proportion of scam calls plus other contact methods, for example **SMS**.
- Rapidly changing **false numbers** (spoofing) or **false texts** (smishing) frequently used, making it difficult to trace back calls or block problematic CLIs.
- Scams appear credible and play on consumer doubts / expectations making **education more difficult**.
- Illegitimate callers are unlikely to respond to regulatory sanctions, even if they can be located, making effective ex-post **enforcement difficult.**

We have continuously coordinated with other industry bodies and regulators: Telco Industry Working Group; Joint work with ICO; International Collaboration; FCA; Home Office; National Trading Standards; Which? UK; and Scotland Scams Strategy

MAKING COMMUNICATIONS WORK FOR **EVERYONE**

Individual scams may be complex

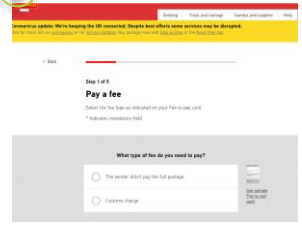
Example: The Royal Mail parcel scam takes advantage of increases in online shopping, and customs confusion post-Brexit

1

Text message arrives on numerous phones that claims a parcel is awaiting delivery by Royal Mail.

Weblink includes 'Royal Mail' in address.

2



Link leads to fake Royal Mail website where individual enters payment details.

3

Scammer calls victim pretending to be bank, using spoofed CLI.

Says has been attempted fraud, and instructs victim to transfer money into another account.

4

New account, is rapidly emptied and closed.

MAKING COMMUNICATIONS WORK FOR EVERYONE

Potential future nuisance call and scam prevention activities

- Looking across work being undertaken by Ofcom and others, we are targetting three parts of the 'scams journey'.

	Helping consumers avoid scams	Promoting understanding and collaboration	Disrupting scams
Types of activities	• Improve the consumer experience through consistent information and call screening tools	• Improve CPs' processes for identifying and responding to scam calls. • Explore with CPs the most effective approaches for reducing fraudulent text messages (smishing)	• Improve CPs' checks for allocating numbers or providing call services • Improve the effectiveness of number blocking lists • Develop approach to CLI authentication

However, given the dynamic nature of scams no single preventative action on its own will be a 'silver bullet'.

MAKING COMMUNICATIONS WORK FOR EVERYONE

Mitigating harm – "blocking" measures being implemented

Underpinned by Ofcom General Condition C6 that requires CLI is "a valid, diallable number which enables the calling party to be identified"

- **C6.6** Where technically feasible, Regulated Providers must: (a) take all reasonable steps to identify calls, other than calls to Emergency Organisations, in relation to which invalid or non-diallable CLI Data is provided; and **(b) prevent those calls from being connected to the called party, where such calls are identified.**

- **"Do Not Originate"** - blocking list implemented by major telcos and app/device providers with bank and Government agency "in bound" only numbers – 12500 and rising……

- **International gateways** and other telcos encouraged to bar ingress of calls with UK Country Code (+44) as Network Number/PAID except for mobile roaming and some types of corporate traffic – see UK standards group NICC Recommendations - https://niccstandards.org.uk/wp-content/uploads/2021/04/ND1447V1.1.1.pdf

MAKING COMMUNICATIONS WORK FOR EVERYONE

CLI authentications via STIR in the UK?

Still in scope of GC6……..

- **PSTN switch off** is still underway in the UK - **more than 50% of fixed lines are TDM**. However, we have concluded that there is no need to wait for STIR based CLI authentication until the migration to all-IP has been completed.

- **There is already sufficient SIP/IMS and IP Interconnect** in the UK networks to provide real benefits for consumers, possibly starting with mobile to mobile calling via VoLTE. (NICC is already working on implementation issues - https://niccstandards.org.uk/work/1008/)

- **The lack of a Common Numbering Database** (CND) poses major challenges for full implementation of STIR. However, other benefits of CND, particularly for better number porting, are increasingly acknowledged by UK stakeholders.

- **A target solution architecture for number management/portability** using CND was presented at a recent industry meeting. A new NICC task group has been set up to consider existing CND solutions – they have asked Ofcom for guidance on requirements.

MAKING COMMUNICATIONS WORK FOR EVERYONE

Next steps for Ofcom

- **Governance** - In the STIR framework, service providers use digital certificates to sign and verify calls with the appropriate authentication information. These certificates must be obtained from a certificate authority. First key step is to establish an appropriate governance framework for issuing certificates and there is no obvious industry body currently available.
- **Review GC mandate** – is the current regulatory regime sufficient to ensure widespread STIR implementation?
- **Work with telcos and NICC** – ensure STIR roadmap for the UK is developed and incorporated into telco network development plans
- **International** – liaise with other regulators (FCC, CRTC, ACMA etc) and industry bodies (ATIS, IETF, SIP Forum etc) to leverage their learnings and work towards international certificate recognition…..

What about France?

CLI Authentication – France (1)

- The [alleged] problem:
  - "aggressive telemarketing“, robot-calling…
  - Limited or partial impact of the measures in place
    - Don’tCallMe list (aka Bloctel)
    - Blocking of International calls using CC +33 as CLIs
    - AI, pattern analysis, analytics etc.
    - No strong enforcement of numbering policies (or lack of a legal instrument to do so)
  - No typology/observatory of/for those nuisance calls
- The [supposed] solution: Loi Naegelen (September 2020, enforced in July 2023)
  - *Les opérateurs sont tenus de **veiller à l'authenticité des numéros issus du plan de numérotation** établi par l'autorité lorsqu'ils sont utilisés comme **identifiant d'appelant** pour les appels et messages reçus par leurs clients utilisateurs finals.*
    *« Les opérateurs utilisent un **dispositif d'authentification** permettant de confirmer l'authenticité des appels et messages utilisant un numéro issu du plan de numérotation établi par l'autorité comme identifiant d'appelant.*
    *« Les opérateurs veillent à **l'interopérabilité des dispositifs d'authentification** mis en œuvre. A cette fin, la mise en œuvre par chaque opérateur du dispositif d'authentification de l'identifiant de l'appelant peut s'appuyer sur des spécifications techniques élaborées de façon commune par les opérateurs.*
    « Lorsque le dispositif d'authentification n'est pas utilisé ou qu'il ne permet pas de confirmer l'authenticité d'un appel ou message destiné à l'un de ses clients utilisateurs finals ou transitant par son réseau, l'opérateur interrompt l'acheminement de l'appel ou du message. […] (emphasis added)

=> The operators must ensure the numbers that are presented as CLIs are not spoofed

*=> If the verification of the calling party's authorization/right to use the number fails, the operator **shall block the call**.*

CLI Authentication – France (2)

- April 2020 – May 2021 Industry Group under the auspices of the NRA
  - Authentication WG with a mandate to define the principles of an authentication framework that would respect the Law
    - Review of Requirements, use cases, other national WGs etc.
    - Basically a “functional architecture” or Architectures
  - 26 meetings, 13 operators
- June 2021- WG report was sent to the entity that manages the national number portability infrastructure (aka APNF) for “implementation/review” of that functional architecture (for July 2023)
- APNF’s work started 7 July 2021

CLI Authentication – France (3)

- Functional architecture outline
  - 2 complementary (potentially overlapping) approaches
    - BNE - Base des Numéros Exploités – list of all allowed PAI-From-transit-operator 3-tuples
    - STIR/Shaken-like (or light) => STIR passport
    - (text/SMS is addressed separately)
  - Phased approach to get to implementation by 2023
- Question marks for next steps (and the work of the APNF)
  - Costs, certificate issuance & management, certificate delegation & adherence to the numbering resource lifecycle, policing & legal
    - TBD
  - PSTN – the letter of the law is unlikely to be met
  - *International interoperability*
    - BNE is unlikely to interoperate ☹
  - Risk of loopholes “Just as weak as the weakest link in the chain”
    - *Asserting calls from other CCs is probably a must have*

WRAP-UP AND TAKEAWAYS

Thanks Huw and Philippe!

- Signing for international calls is already upon us
- Different countries are addressing somewhat different problems
  - Has the potential to introduce variations in implementation
- Mobile already had to deal with real-time international IP exchanges, a lot to learn from it
  - Possibly some shortcuts for expanding STIR/SHAKEN deployment
- Still a lot of work to do getting the bits and bytes right
  - Good news is we're all talking about it and working through it

Questions?