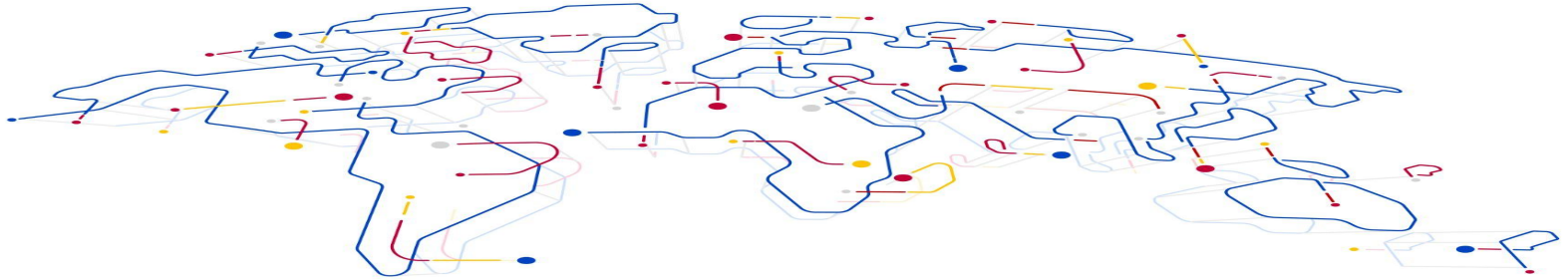


# GSMA Call Check VS STIR/SHAKEN



**Explaining the Two Competing Paradigms for the Global Prevention of CLI Spoofing**

Eric Priezkalns, Commsrisk

Last Updated April 2025

# The Global Challenge of CLI Spoofing

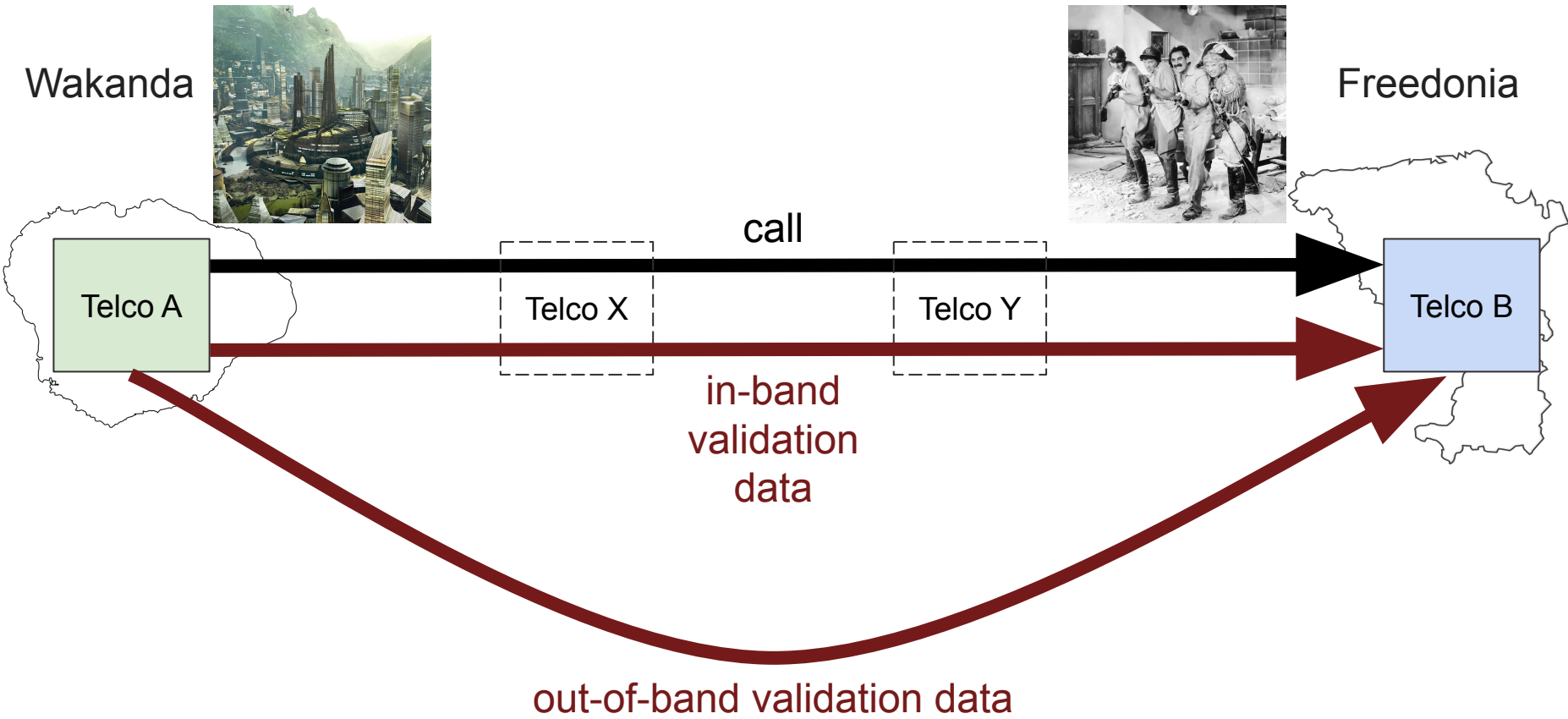
# Why CLI Spoofing Is a Problem

- Used as part of consumer scams
- The transition to IP networks for telephony makes it easy to spoof CLIs
  - Calling Line Identity (CLI) is also known as caller ID
- Some legitimate businesses also spoof CLIs
  - Laws and customs vary greatly between different countries
  - Some countries ban the use of domestic numbers for spoofing inbound international calls
  - In other countries it is common practice for businesses to spoof international calls from offshored call centres to increase the rate at which consumers pick up
- Misleading to present CLI spoofing as merely a technical problem when it relates to *national laws and culture* as well

# In-Band vs Out-of-Band: The Fundamental Design Choice

- Phone networks were not designed to carry the data needed to validate if a CLI is consistent with the actual origin of a call
- Demanding validation of 'legitimately' spoofed calls adds another layer of complexity
  - 'Legitimately' is in inverted commas because legitimacy depends on *national laws and culture* not what some American engineers and businessmen have decided is best for everyone
- This validation data could be conveyed in-band or out-of-band
  - The key challenge with in-band is how to carry sufficient data from end to end without the data sometimes being lost along the way
  - The key challenge with out-of-band is how to carry the data quickly enough to synchronize with the execution of the call that is being validated

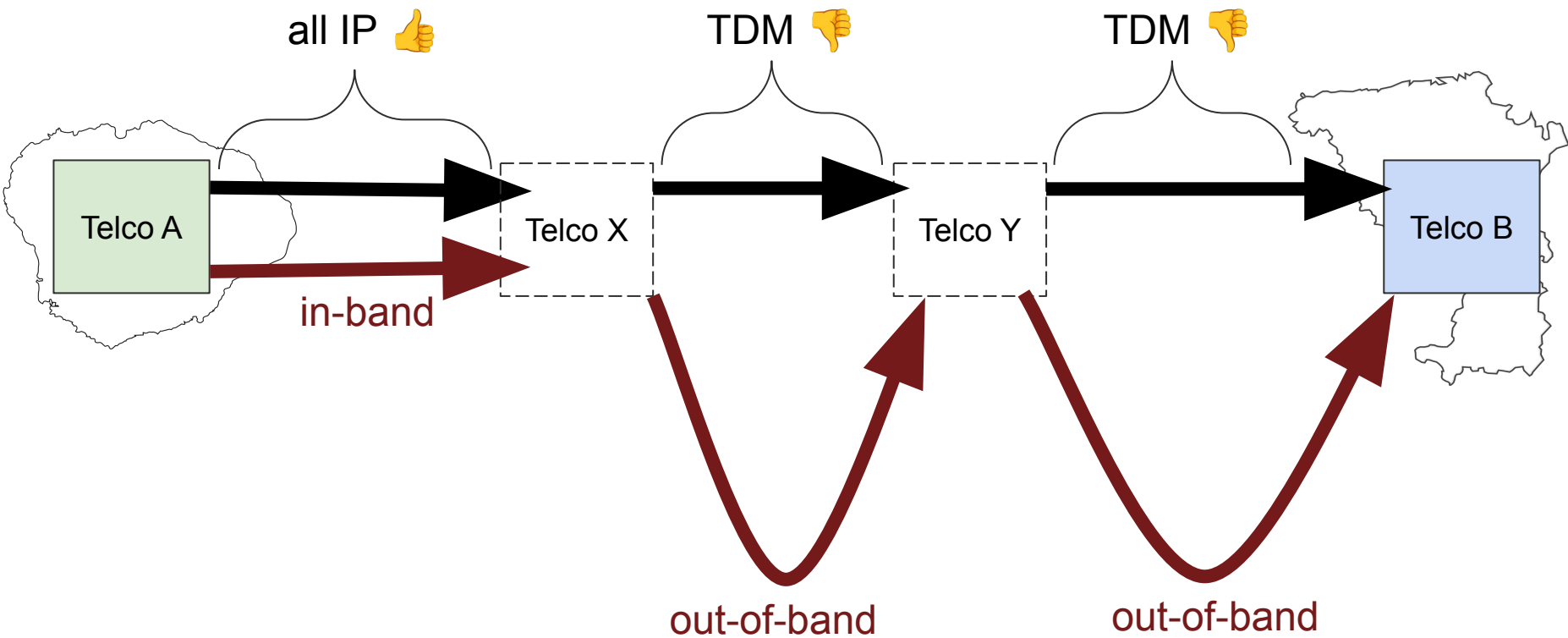
# Illustration: In-Band vs Out-of-Band Transfer of Anti-Fraud Data



# The US Strategy Is In-Band Except When It Is Not

- STIR is a way to carry data in-band on IP networks
  - Inserts additional data into the same SIP signaling channel that manages the call
- SHAKEN is a series of governance rules that are meant\* to ensure STIR is only used to carry reliable data for validating calls
  - STIR can be used without SHAKEN; the importance of the distinction is often neglected
  - \*But there are no specific know-your-customer obligations in SHAKEN or US regulations, leaving an obvious weakness that criminals used to undermine the 'authentication' of calls
- FCC mandated STIR and SHAKEN for IP networks in the USA since June 2021
  - Lots of voice traffic still crosses non-IP networks in the USA
- It was claimed that the validation data would be carried out-of-band on those occasions when it was impossible to carry it in-band
  - Has not happened in practice

# Applying Out-of-Band STIR/SHAKEN to International Calls?



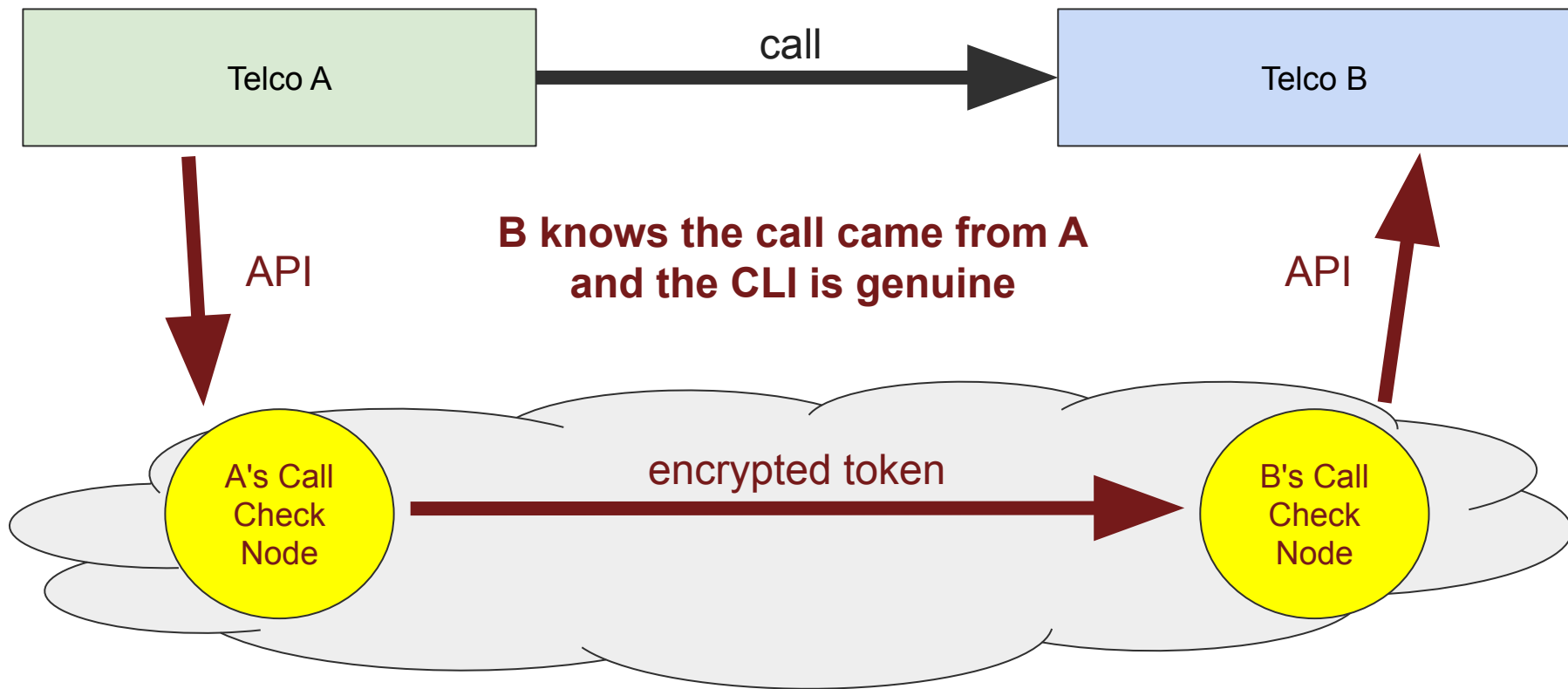
# Why Would In-Band + Out-of-Band Be a Good Design?

- Yet to hear any engineer give a convincing answer to this question
- Some just say every telco should be forced to use IP networks, resolving the issue by never needing to transfer data out-of-band
  - Not a realistic approach to tackling international scam calls any time soon
- Others say the out-of-band workarounds are effective, though actual practice suggests nobody wants, or is able to use them
  - They likely introduce so many delays and synchronizing issues in real life that they make end-to-end transfers of data too slow and unreliable
- The real explanation for preferring this ugly mish-mash design has nothing to do with technology, and little to do with stopping consumer scams

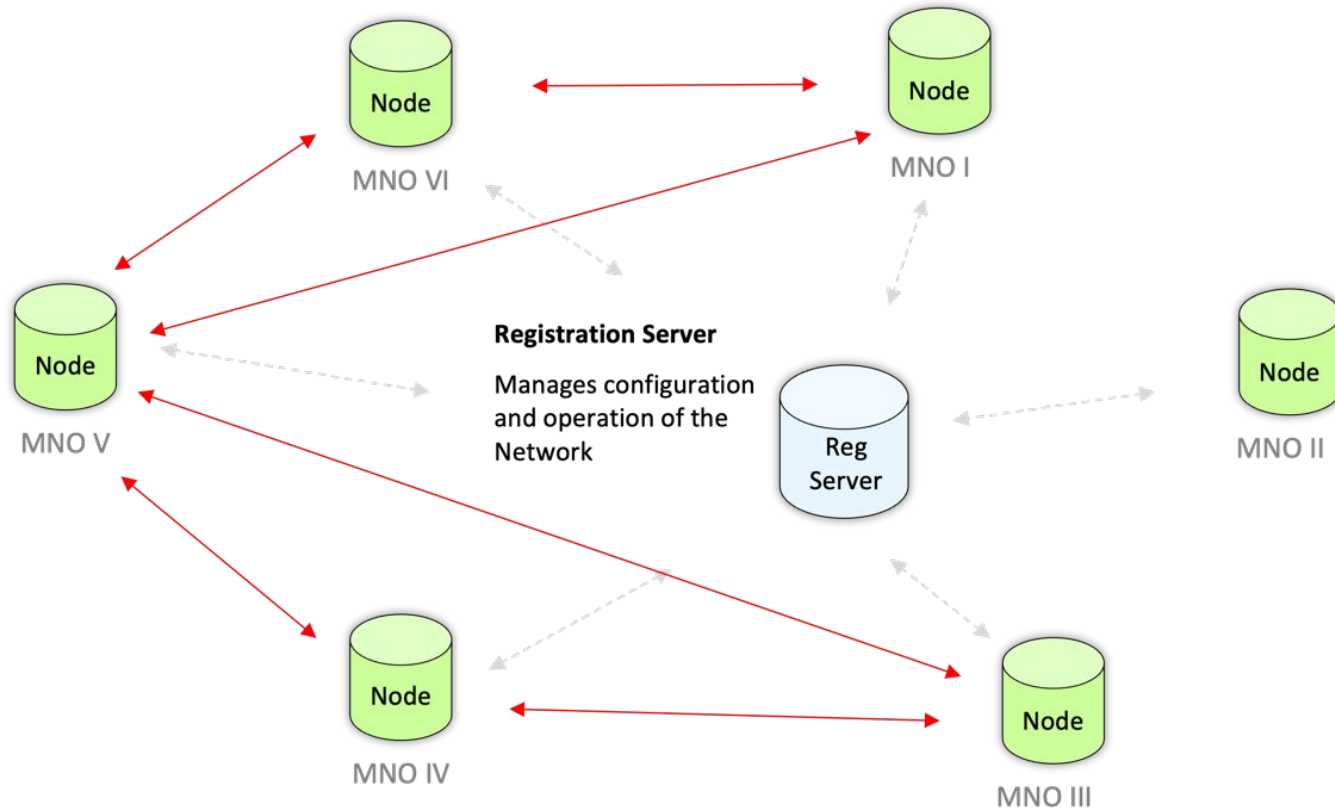
# GSMA Call Check Is a Completely Out-of-Band Method

- Solved the problem of how to pass data between two telcos quickly enough to synchronize with the execution of a call
  - Typical latency ~150ms; latency ~350ms even under an abnormally heavy and sustained load
- Every telco that uses Call Check has its own 'node', which is an instance of the same software running in a cloud container
  - Default services runs on a Kubernetes RKE2 cluster; RKE2 is also known as 'RKE Government' because it was designed to meet the security needs of the US government
- Each node can communicate with each other node in parallel to the execution of the call
  - The telco communicates with its node via APIs
- Will be used to exchange data to validate CLIs in real time, but also has great potential to communicate many other kinds of anti-fraud data

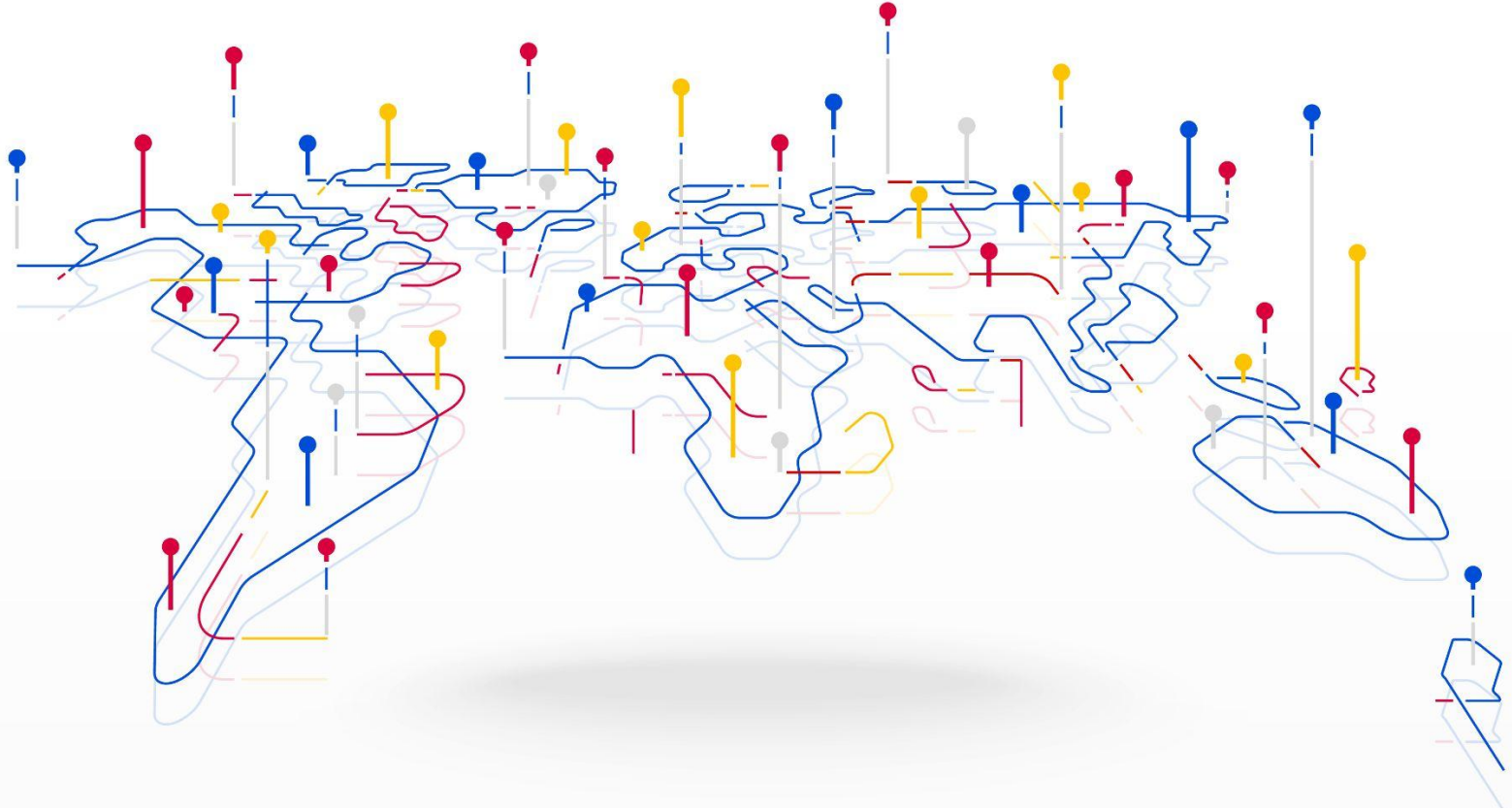
# Illustration: Preventing CLI Spoofing with GSMA Call Check



# The Core of GSMA Call Check Is a Mesh of Nodes in the Cloud



# Imagine What Could Be Accomplished If Every Telco Had a Node!



# Why GSMA Call Check?

- Cheap
  - For small telcos, the annual cost of renting a Call Check node is less than half of the lowest price that any US provider will offer for the equivalent STIR/SHAKEN service
  - Keeping the cost low is important if we really want a global solution
- Quick and simple to implement
- Adaptable
- Universal
  - Does not matter if the call is conveyed over IP or TDM
  - Only needs to be supported by the telcos at the beginning and end of the call

# Security and Privacy

- Secure
  - Data is encrypted
  - Penetration tested by Security Research Labs, top German telco security firm
- Privacy by design
  - Only exchanges the data really needed for validation, unlike some rival methods
  - No central storage of any of the data exchanged by telcos using Call Check
  - Data is automatically deleted once the call validation process is complete
- Vetting, not surveillance
  - GSMA decides who can get a node, denying access to bad actors
  - No central body has visibility of the data exchanged by nodes, not even the GSMA

# Retail and Wholesale (1)

- Consumer scams are generally perceived to be an issue for telcos whose customers are consumers
- However, the international aspect of scam traffic means wholesale carriers have been sucked into the vortex created by surging levels of fraud
  - Note the challenge with applying international solutions to distinguish between good and bad traffic when the notion of good and bad is determined by *national law and culture*
- For STIR/SHAKEN to stop CLI spoofing globally would require the compliance of every retail telco and every wholesale telco
- Call Check would stop CLI spoofing without intermediate telcos needing to do anything

## Retail and Wholesale (2)

- Call Check places the emphasis on the terminating telco deciding how to handle the traffic it receives
  - This is inherently more flexible; easy to accommodate differences in national law and culture
  - The terminating telco knows the end recipient and which rules should be applied to traffic sent to that recipient; intermediate telcos cannot possibly know this
- GSMA is only offering Call Check to mobile network operators in the first instance
  - Less risky than the 'big bang' approach in the USA which saw many bad actors immediately applying STIR/SHAKEN signatures to their calls
  - The marketing of RCD effectively admits the mistake with the roll-out of STIR/SHAKEN
- But it is easy to see how the same concept of a mesh of cloud nodes would also solve problems for wholesale carriers too
  - For example, refiling frauds that abuse origin-based rating

# Network Effects

- "A phenomenon whereby a product or service gains additional value as more people use it"
- Call Check could be adopted worldwide this year, but it will take longer because of network effects
  - Neither cost nor implementation time is a significant barrier to adoption
  - Many telcos will inevitably wait to see which other telcos will implement it first
  - Ditto for national regulators
- What is the incentive to be proactive?
  - Ironically, the best motivation for immediately implementing Call Check stems from the most popular method of preventing international spoofed calls after regulators realized STIR/SHAKEN would be ineffective at reducing cross-border scam traffic

# ECC Recommendation 23(03) and Its Kin

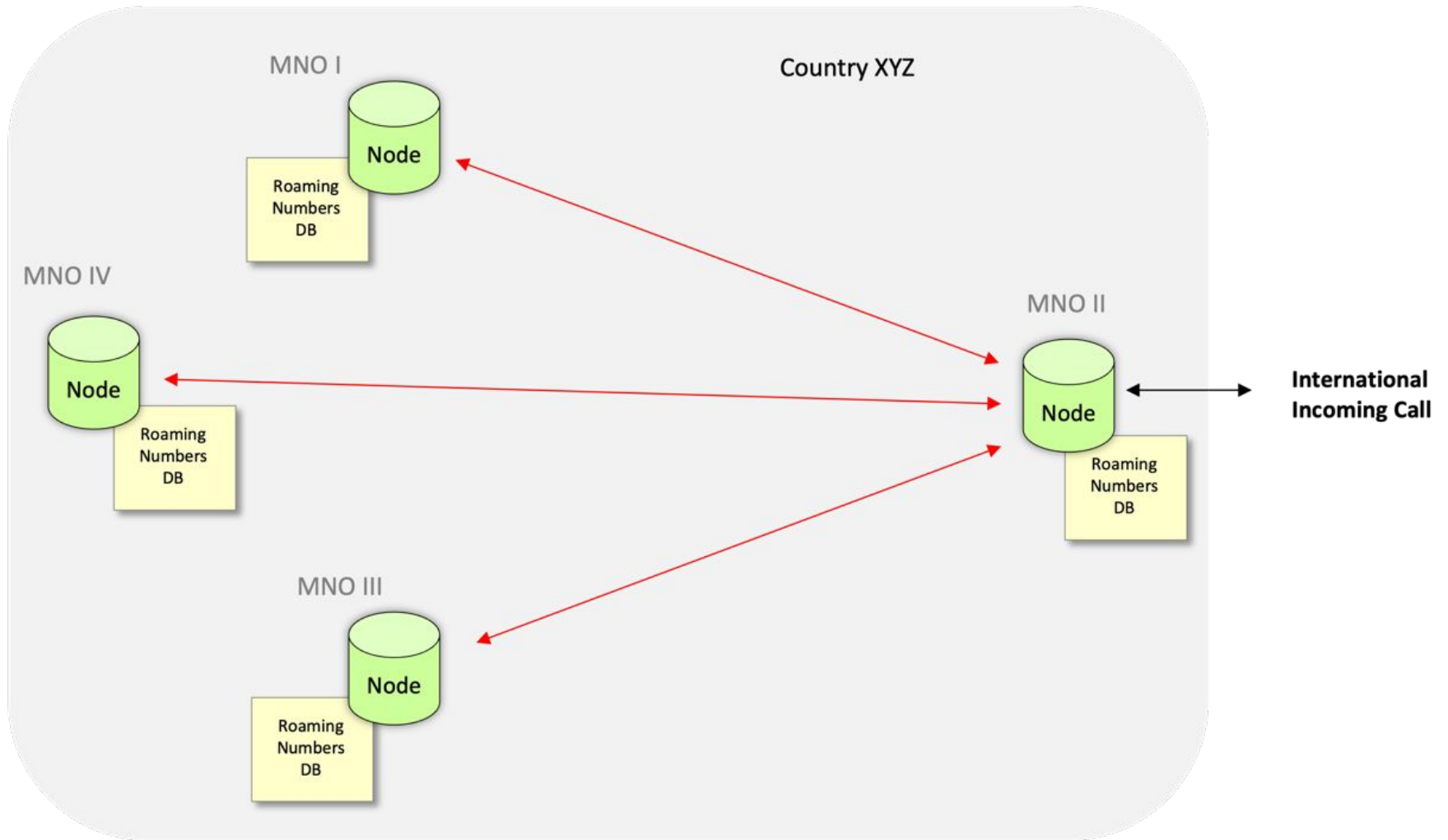
- Leading countries greatly reduced scam and spam calls by blocking inbound international calls that presented a domestic phone number
  - Discussed in my 2022 analysis: "[The Lightning Review of Every Method Currently Proposed for Authenticating Phone Calls](#)"
- [ECC Recommendation 23\(03\)](#) adopted in November 2023
  - The Electronic Communications Committee (ECC) of CEPT is responsible for developing policy in a European context
  - 46 countries belong to the European Conference of Postal and Telecommunications Administrations (CEPT)
  - A huge blow to advocates of 'international SHAKEN' but the impact of this recommendation is unknown to the public because regulators lack the resources for sustained marketing
- Same approach has also been independently adopted by countries outside of Europe e.g. India, Australia

# Is It Possible to Follow ECC Recommendation 23(03)?

- In most countries, the answer is 'yes'
- Some US industry insiders insist it is 'not possible' in the USA
  - US corporations lobbied against European regulators adopting ECC Recommendation 23(03)
  - Not clear if technical challenges to adopting ECC Recommendation 23(03) in the USA are being exaggerated for commercial reasons
- The main challenge with ECC Recommendation 23(03) is how to prevent the spoofing of domestic mobile numbers without blocking outbound roamers
- Various countries have implemented or are considering several different methods of exchanging data between telcos on a *national* level so the telcos would all know if a mobile phone from that country is roaming or not
- Otherwise known as a roaming status check

# Did Somebody Say Something about Exchanging Data?

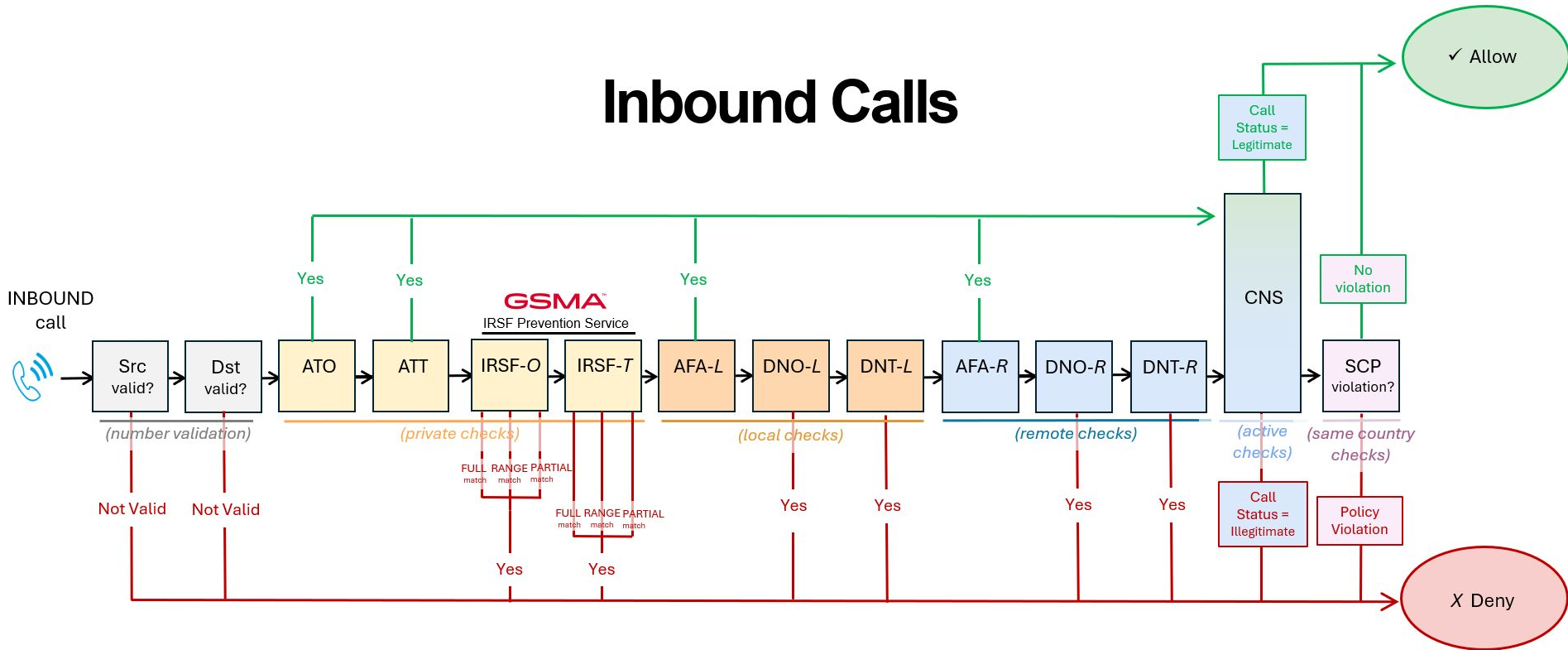
- GSMA Call Check was not specifically developed to manage the exchange of data involved in a roaming status check
- But it is perfectly capable of performing that task
- Each national regulator following ECC Recommendation 23(03) has a choice
- Either they mandate their own method of exchanging the roaming status data within their country
- Or mandate GSMA Call Check, knowing that nodes used for roaming status checks could also be used to stop in-country CLI spoofing too
- The nodes would also be interoperable with nodes of telcos in other countries
- And they could be used for more anti-fraud checks in future



# It Is Too Easy to Think of Other Uses for Call Check

- GSMA launched Call Check in September 2024 but the marketing was confused
  - Too many examples of tasks that Call Check can perform
  - Uninteresting examples of tasks that Call Check can perform
- These slides focus on just two use cases because none of the potential will be realized if we do not identify the use cases that will drive adoption
  - It makes sense for countries to adopt Call Check
  - It makes sense for international groups to adopt Call Check
  - Network effects will then motivate its use between countries and between rival groups
- The following diagram shows 14 checks that GSMA Call Check can perform

# Inbound Calls



Abbreviations :

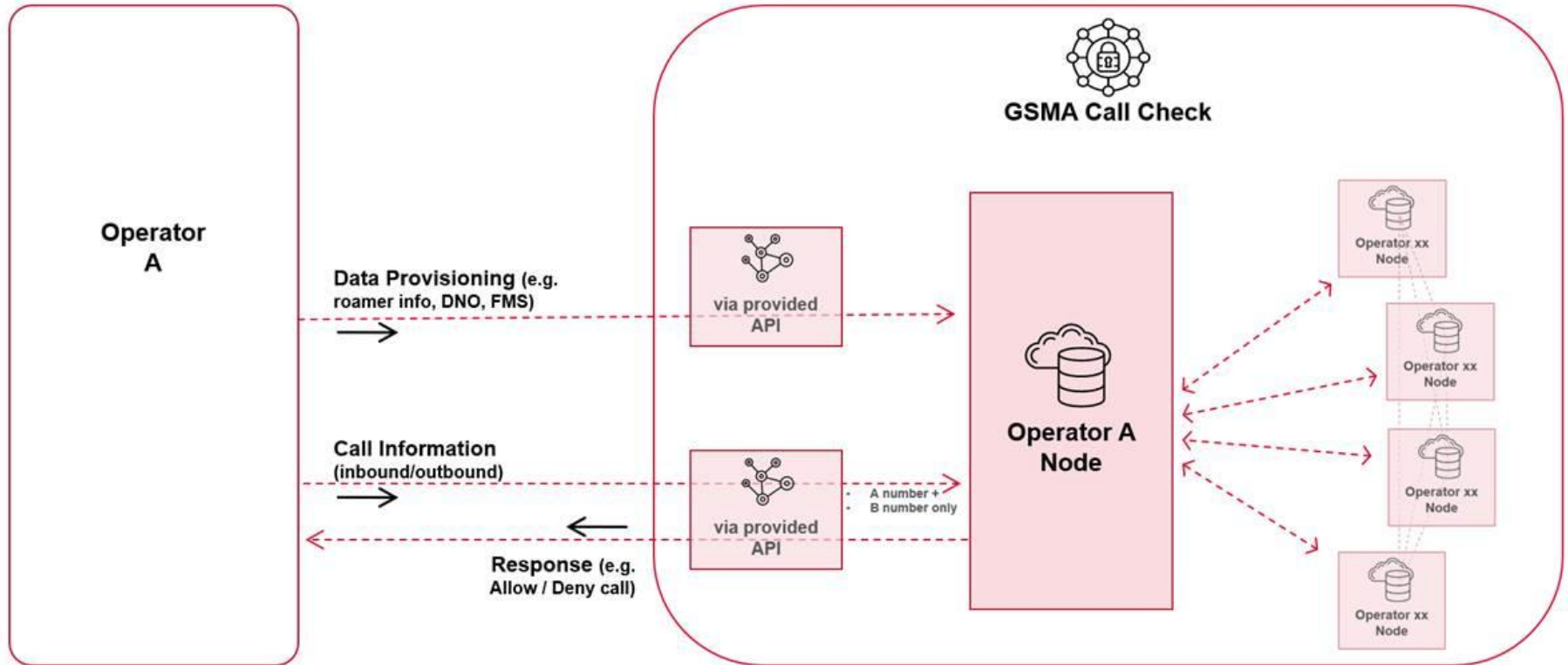
**ATO** Allow to Originate  
**ATT** Allow to Terminate  
**IRSF** IRSF Prevention Service  
**AFA** Allow from Abroad  
**DNO** Do Not Originate  
**DNT** Do Not Terminate  
**CNS** Call Notification Service (active call checks)  
**SCP** Same Country Policy (e.g. driven by regulatory requirement)

suffix **-L** Local checks (no dependency on network collaboration)  
 suffix **-R** Remote checks (benefit from network collaboration)  
 suffix **-O** Originating traffic  
 suffix **-T** Terminating traffic  
 (no suffix) Private checks (not shared with other operators)

# Telcos Can Even Invent Their Own Anti-Fraud Checks

- Call Check is a low latency method of comparing a live call, during set up, with whichever sources of data the telco wants to compare it with
  - A do not originate (DNO) list
  - A do not call (DNC) list
  - A watchlist for international revenue share fraud (IRSF)
  - A list of numbers that the telco uploaded to their own Call Check node for some reason I have not thought of
- The following GSMA diagram illustrates how the essence of Call Check involves an API for reference data as well as the API for live call data
  - Examples of reference data would include recording new DNO numbers for nationwide use

# Operator Node(s)



# Leveraging the Cloud Is Better than Adapting Telco Networks

- From this perspective, the choice between GSMA Call Check and STIR/SHAKEN is not just out-of-band vs in-band
  - Solve problems by leveraging investments made in cloud technology and infrastructure
  - Or try to solve those problems by altering the networks that carry calls
- If the out-of-band synchronization and latency problem is solved, as claimed by GSMA Call Check, then co-opting the cloud will be cheaper and more flexible in the long run
  - If all is fair, then the cheaper and more flexible approach will be adopted globally
- Call Check is a foundation for tackling *any* problem that can be solved by one instance of software running in the cloud exchanging data with another instance of the same software in the cloud

## And So On...

Q. Want the quickest possible method of tracing a call back to its origin?

A. Store a record of each call whose origin was validated using Call Check

Q. Want to use Rich Call Data (RCD) to convey information about the brand of the business making a telemarketing call but without the headache of implementing STIR/SHAKEN first?

A. RCD is inaccurately described as part of the STIR/SHAKEN 'family' of protocols but RCD does not depend on the other protocols; it could be conveyed in-band using STIR (without SHAKEN) or it could be conveyed out-of-band using Call Check

## And On Again...

Q. Want to provide a mechanism so a business can cryptographically sign something they communicated (e.g. a message, a contract) so the recipient can independently verify the signature (such as a verifiable Legal Entity Identifier)?

A. Transmit the data using Call Check

Q. Are you imagining a future where the same thing is done by *individuals*?

A. By now, you appreciate the point that it is misleading to assert that everything depends on the adoption of STIR/SHAKEN; the merits of STIR/SHAKEN should be judged in isolation, not based on a skewed understanding of what it could enable because Call Check can also enable the same outcomes and more

# So Why Might GSMA Call Check Fail?

- Network effects
  - A poorer solution can defeat a superior solution in the market place if it benefits from decisions made by early adopters or government
- A lack of focus on the specific use cases that would motivate the adoption of the first Call Check nodes
- Regulators and telcos may keep selecting specific bespoke solutions to specific problems instead of embracing a bigger vision for fraud prevention
- GSMA is weak at lobbying governments and at product marketing compared to the US corporations that push STIR/SHAKEN
- The central appeal of the STIR/SHAKEN lobby is that they will deliver an increase to telco revenues, not a reduction in consumer fraud

**What Was Our Objective?**

# It's All about the Benjamins

- How did the US industry get into a situation where its regulator tells customers they are protected from scams by STIR/SHAKEN even though telcos are in no rush to replace TDM interconnects?
- No contradiction between keeping TDM when it is good for business and selling STIR/SHAKEN as a way to increase telemarketing pick-up rates
- If you are trying to stop scams then 99% coverage is inadequate; scammers will selectively push traffic through the remaining 1% of routes
- But if you are trying to sell branded calling to businesses then you can still make 99% of the revenue if the method works for 99% of calls
- STIR/SHAKEN coverage in the USA is a lot less than 99%

**STIR/SHAKEN Was Only a Step towards a  
New Revenue Stream for US Telcos**

# The SIP Forum Announces BRANDED CALLING SUMMIT 2025 Webinar Series Registrations Are Open

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Instead of the standard and limited caller ID information of caller name and number, branded calls can include up to 32 characters to describe the nature of the call.

And thanks to the associated RCD (Rich Call Data) standard developed within the SIP Forum/ATIS IP-NNI Task Force (and which is part of the STIR/SHAKEN Call Authentication Framework), Branded Calls are also able to offer graphics in the form of logos and other rich data in the caller ID.

The net benefit of Branded Calling to service providers is that it presents a valuable new revenue opportunity for their voice calling operations, for businesses the promise of dramatically increased answer rates (there are reports indicating that customers are 105% more likely to answer calls that are branded), and for call recipients a compelling new mechanism of engagement and trust with the brands and companies they do business with.

The benefits of Branded Calling include:

- A New Source of Revenue for Carriers
- Mitigated Call Blocking and Spam Mislabeling of Calls
- Increased Brand Loyalty
- Increased Brand Awareness
- Enhanced Customer Engagement
- Increased Customer Trust
- Enhanced Security against Fraud
- Dramatically Improved Call Answer Rates

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# Global Robocall Mitigation & Branded Calling Market: 2024-2029

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## Key Statistics

**\$73bn**

Total fraudulent losses to robocalling in 2024

**\$1.5bn**

Total branded calling revenue in 2029

**3,318%**

Branded calling market growth, 2024-2029

**2024-2029**

Forecast period

**Traffic over Non-IP Networks  
Started Increasing Again**

# STIR/SHAKEN statistics from February 2025

## STIR/SHAKEN coverage

Signed calls at termination down

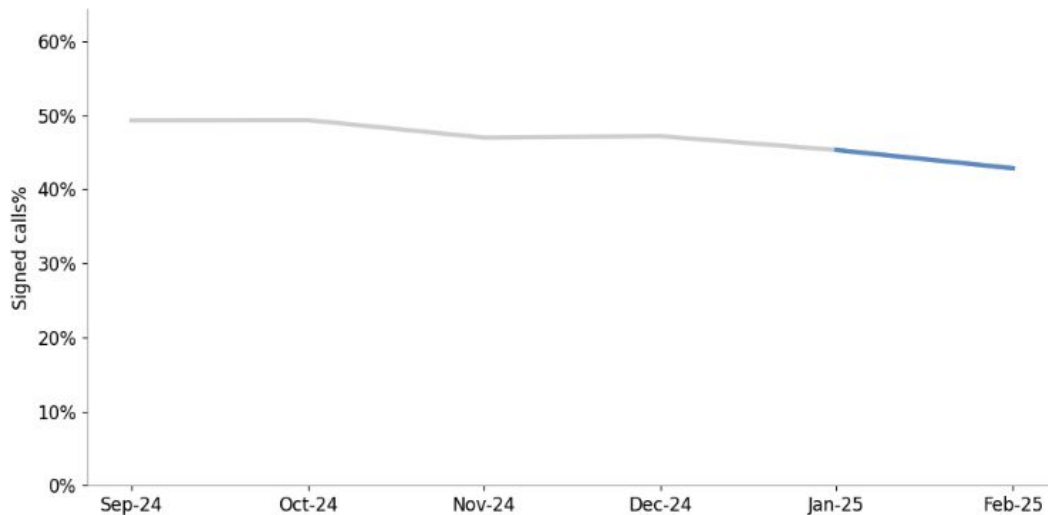


Figure 4. The Percentage of Signed Calls at Termination Last 6 Months

Figure 4 shows the percentage of signed calls at termination for the past six months. This dropped 2.5% in February, to 42.8%. This continues a gradual decline from October 2024.

## STIR/SHAKEN statistics from February 2025

The combination of *increasing participation* yet *decreasing coverage* suggests that more calls are being routed across non-IP segments in the call path, where SHAKEN information is lost.

# The Politics of Blocking Calls and Blocking Telcos

# SHAKEN Is Politically Centralized (1)

- The governance inherent to SHAKEN means the technology can be used as a 'kill switch' that prevents a telco from connecting calls with other telcos
- The concept is simple but the consequences are never discussed
  - Suppose a telco can only legally terminate a call if it has a SHAKEN signature
  - Certificate authorities (CAs) act as the root of trust; a telco can only sign its calls if a certificate has been issued by a CA
  - If no CA will provide a certificate then that telco will not be able to connect its calls with any of the telcos that require signatures
- Getting corporations to make governance decisions about blocking traffic does not make those decisions less political

# SHAKEN Is Politically Centralized (2)

- The US government ultimately has the power to dictate the decisions that nominally sit with the US corporations that govern SHAKEN
  - Businesses tend to lose if they fight government; they will sometimes anticipate the decisions the government wants without always waiting to be forced into making them
- Some US businesses have reportedly begun telling their comms providers to block calls that have no STIR/SHAKEN signature
- It was always intended that the presence of a signature would influence other algorithms that determine if a call is blocked
  - Or if the call is soft-blocked by being labeled as spam or diverted to voicemail

## SHAKEN Is Politically Centralized (3)

- Americans tend not to see any downside with a global governance framework that ultimately answers only to the US government
- The *global* governance body for SHAKEN already exists, and is run by the same US corporations that sit on the US governance body for SHAKEN
  - And they already appointed the same US business to administer policy for the global CAs
  - And that business actively lobbies national regulators worldwide
- They have completely ignored the problem of jurisdiction
- Taking away the power to sign calls means barring a telco from *all* the countries where that signature is required to terminate a call
- The bad politics of STIR/SHAKEN is a key reason for why so little progress has been made with making it work for calls between the USA and Canada

# No Doubt about the Ultimate Governance Model for SHAKEN

- These political issues have been muted so far because STIR/SHAKEN coverage is too low to risk mandatory blocking of unsigned calls
- But the *legal framework* for blocking any non-compliant telco in the world was created alongside the mandate for STIR/SHAKEN
- Saudi Arabia's second largest mobile network operator, Mobily, has already been barred from terminating calls in the USA
- The prohibition is meaningless; Mobily is not that kind of telco
  - Mobily submitted a robocall mitigation plan to the US Robocall Mitigation Database that was deemed 'deficient' although Mobily's submission was based on a fundamental misunderstanding about who is required to submit
- Nevertheless, the FCC barred them anyway

# A More European Approach?

- The speed with which ECC Recommendation 23(03) has been acted upon in Europe is suggestive of the difference between European and US politics
  - For example, Germany did not want to block spoofed inbound international calls, so the recommendation was written so they could remove the CLI instead i.e. a form of soft-block
- GSMA Call Check does not require a transnational governance body in the way SHAKEN does
  - Similar to the way ECC Recommendation 23(03) placed the emphasis on the terminating country instead of mandating a supra-national framework that all must obey
- All decisions remain with the terminating telco and no obligations are created for carriers of international traffic

# Conclusions

# Consistency

- It can be argued that consumer protection necessitates more consistent rules for international traffic
- Unfortunately, the US strategy for consumer protection is deeply inconsistent
  - No meaningful plan to extend STIR/SHAKEN from IP networks to non-IP networks
  - No meaningful KYC rules written for telcos to follow in practice
  - Very few prosecutions of crooks that make illegal phone calls despite the claim that STIR/SHAKEN was created to facilitate traceback; most fines directed at telcos instead
  - If the goal was traceback then why put a green tick on the consumer's handset?
  - If the goal was a trustworthy tick on the handset then why are there no KYC rules?
  - No governance rules to manage the number of tracebacks demanded by US government bodies of foreign telcos or to prevent this power being abused
  - The USA does not even have a consolidated national DNO list; telcos must use one of several separately-maintained DNO lists despite the obvious risk of inconsistent treatment of calls

# Conformant Technology, Diverse Cultures

- Technology may complement or enable a consumer protection strategy; technology is not a substitute for a consumer protection strategy
- Fundamentals like KYC matter
- If nations do not agree on fundamentals then it is reckless to impose a one-size-fits-all enforcement technology for international traffic
  - What one person considers to be a legitimate telemarketing call will be considered a despicable nuisance by another
- Technology should respect national diversity

# Choices

- The number and type of telemarketing calls acceptable to an American would not be acceptable to some other nationalities
- Do we want culture to increasingly converge between countries, as has occurred through the content made available on the web?
  - Some countries now considering whether to prohibit kids from having phones
  - It may have been better to apply more national control over content available via phones
- Or will we insist that phone culture remains as diverse as it currently is?
- STIR/SHAKEN is the best choice if we want revenues to be maximized in richer countries where telemarketing is more common
- GSMA Call Check is the best choice if we want scams to be minimized across all countries

# Relevant Contacts for GSMA Call Check

- Jordi Castellvi oversees GSMA Call Check
  - [jcastellvi@gsma.com](mailto:jcastellvi@gsma.com)
- Oculeus GmbH developed the technology
  - Gavin Stewart is their initial point of contact
  - [stewart@oculeus.com](mailto:stewart@oculeus.com)