

One Consortium Response To:

CEPT
Draft ECC Report 371 - *“Issues concerning the use of virtual numbers”*

Brussels

15th December, 2025

INDEX

<i>One Consortium Response To:</i>	1
<i>1. Introduction / Executive Summary</i>	3
<i>2. What is a Cloud Number?</i>	5
<i>3. Cloud Number Use Cases</i>	6
<i>4. Why should the NRAs adopt a cloud number supporting regulatory framework?</i>	12
<i>5. The complex carrier environment in a cloud number marketplace</i>	16
<i>6. Suballocation is the preferred trading model in the new communications market</i>	18
<i>7. Acceptance and misunderstanding of suballocation of numbers</i>	19
Scam/fraud	19
Inefficient use of scarce numbering resources	21
How to overcome scam and fraud calling?	21
Use the technological advancements of all-IP	22
KYC (Know Your Customer)	22
Traceback	23
Digital Signatures to ID the origin of the communication	24
<i>8. Summary and Conclusion</i>	25
<i>9. Glossary of acronyms and abbreviations</i>	26

1. Introduction / Executive Summary

In this response to CEPT draft report into ‘*Issues concerning the use of virtual numbers*’ we, One Consortium, will point towards an irreversible trend towards all-IP infrastructure, its impact on telephone numbers but also the market and societal opportunities ahead. The shift of technology does however pose questions in the field of fraud and scam but we are confident that with more alignment across the ecosystem, these can be overcome.

One Consortium is a not-for-profit, member funded, member led organization of the global Telecom industry, and the “industry pillar” of the Restore Trust initiative to fight spams and scams globally. One Consortium’s 50+ members include Telecom service providers and carriers, vendors, and industry organizations such as GSMA, i3Forum, CCA, ITG, CCUK and NICC. One Consortium’s objective is to co-develop and drive adoption of a set of recommendations and guidelines to fight scams and fraud, working with the 40+ Telecom regulators from 5 continents who participate in GIRAF, the global informal regulatory forum and the “regulatory pillar” of the initiative.

The paper is structured and contain the following themes:

1. Introduction: The Irreversible Shift to Cloud Numbers

- The communications market is rapidly evolving, with cloud-based SaaS tools now delivering everything from apps and PBX systems to contact centers and collaboration platforms.
- Telephone numbers remain central to connectivity, but their management and delivery have shifted from physical infrastructure to the cloud.
- The transition to cloud numbers is irreversible; there is no going back to legacy models.

2. What is a Cloud Number?

- Cloud numbers (sometimes called virtual numbers) are not fundamentally different from traditional numbers in function, but their provisioning is decoupled from physical infrastructure to their cloud-based network functions.
- They enable mobility, flexibility, advanced features (e.g., call routing, IVR, AI agents), scalability, and cost efficiency.
- The distinction between “cloud” and “traditional” numbers is increasingly irrelevant; all numbers are converging in the cloud as markets migrate to all-IP environments.

3. Cloud Number Use Cases

We provide a range of use cases that use cloud numbers, but it is important to note that new use cases continue to emerge, and regulatory frameworks must remain flexible to support ongoing innovation.

4. Regulatory Evolution: The Need for Nuanced Controls Market Changes and Regulatory Response

- As numbering resources remain local yet become global, NRAs have begun restricting who can control and allocate numbers, aiming to combat fraud and misuse.

- Overly restrictive, “blunt” controls risk stifling innovation, competition, and economic growth.
- Suballocation (the bedrock of the wholesale market) is the preferred model for enabling new services, fostering competition, and efficiently managing resources.

5. Addressing Fraud, Transparency, and Resource Efficiency

- Fraud (especially spoofing) is a growing concern, but evidence shows that suballocation is not the root cause; technological flexibility in all-IP environments is. Additionally, there is no evidence that cloud numbers are more prone to being used in scams or fraud events.
- Lack of transparency can be addressed through registration requirements and traceability mechanisms, not by banning suballocation.
- Suballocation is more efficient than traditional block assignments in numbering resources management, allowing precise allocation and reducing resource waste.

6. Restoring Trust: Enhanced Traceability and KYC

Technological Solutions

- The fight against fraud requires leveraging all-IP advancements, not reverting to legacy models.
- Know Your Customer (KYC) processes must be robust and enforced for all number assignments, with industry-wide collaboration on standards.
- Traceback mechanisms should be enabled and made interoperable internationally and globally, enabling authorities to swiftly identify and act against fraudulent actors.
- Right-to-use and user verification models offer promise for authenticating caller identity, though they are not a panacea and must be part of a layered approach.

7. Recommendations

- NRAs should adopt liberal, innovation-friendly frameworks for cloud numbers, focusing on outcomes rather than rigid controls.
- Suballocation should be permitted and supported, with transparency and accountability ensured through registration and traceability.
- Strong, harmonized KYC and traceback processes are essential to combat fraud while enabling the benefits of cloud communications.
- Stakeholders should collaborate globally to develop standards and share best practices, ensuring trust and growth in the communications ecosystem.

8. Conclusion

The transition to cloud numbers and all-IP communications is a fundamental, irreversible shift. Regulatory frameworks must evolve to support innovation, efficiency, and trust, balancing the need to combat fraud with the imperative to enable new services and economic growth while enabling improved end-user experiences. OneConsortium.org stands ready to support GIRAF and NRAs worldwide in developing collaborative, forward-looking approaches for the future of communications.

2. What is a Cloud Number?

It is somewhat unhelpful to single out and refer to telephone numbers used in a cloud setting as ‘Cloud Numbers’ (at times referred to as ‘virtual numbers’¹) as they are not necessarily new (in use) and do not necessarily provide a different service to non-cloud, or traditional-numbers-based services. Simplistically put: numbers are numbers and we urge NRAs not to be too swift in subdividing number types without careful consideration.

Traditionally, telephone numbers were linked to physical locations where they were deployed but nowadays the very same telephone numbers gather their service attributes as they are deployed. Today, the same numbers are used to provide services via *the internet* in an all-IP environment and is not tied to a specific physical line or device. However, in both the traditional as well as the modern and evolved cloud sense, the telephone number provides the same functionality for end users and businesses: identifying calling parties.

Having acknowledged that the telephone number itself is not changing but the *technologies using* the telephone number are, we can now see that in many cases telephone numbers have in fact been used in a ‘cloud setting’ for several decades. For example, a business may have used the same telephone numbers for its traditional (physical) PBX service but has removed the PBX from its premises and transferred the functionality into the network; today, that would likely mean ‘into the cloud’ but the very same functionality existed before the term ‘cloud’ was coined.

Based on the above described evolution of technology as well as some known overlap between ‘traditional’ as well as ‘cloud’ numbers in terms of end-user experienced uses, but also a recognition of an dramatic expansion of new, innovative, uses: we suggest to the CEPT and its constituent members that focus on any classification of numbers should be technologically neutral and be based on the actual use of the numbers (as experienced by end-customer making or receiving the communication in question). As such, we are advising some caution when seeking to differentiate between telephone numbers as an inappropriate differentiation may result in undesired regulatory and commercial outcomes.

We are, however, in this paper, adopting the term ‘cloud numbers’ in order to be consistent with the general market use of this term and as it is universally accepted to be a more modern analogy to the term ‘virtual numbers’ used by CEPTs title to its consultation.

¹ Cloud numbers and virtual numbers are effectively the same concept in commercial and technical usage, though “cloud” and “virtual” highlight different aspects. Most industry sources explicitly say that cloud numbers, virtual numbers, online numbers, VoIP numbers and sometimes DID numbers are just different labels for a phone number that is not hard-wired to a specific physical line or SIM but is hosted and controlled in the cloud. A typical definition of a virtual number is “a number that exists in the cloud, not tied to a particular physical line or device,” which matches how cloud phone numbers are described. “Virtual number” is the older, more generic telecom term, emphasising that the number is logically, not physically, bound and can be flexibly routed or associated.

The global transition to all-IP means that telephone numbers will continue their convergence in the cloud and drive an expansion of uses. NRAs and Number Administrators are urged to consider *de facto* use of number as the source for any classification of number type as failing to do so may result in inefficient and undesired regulatory outcomes.

The adoption of All-IP / Cloud numbers is and will continue to drive:

- **Mobility and Flexibility** - Cloud numbers offer significant mobility—calls can be made and received from anywhere, ideal for remote work and business travel.
- **Advanced Features** – Cloud numbers typically provide advanced telephony features, such as, but not limited to, those described in CEPT and One Consortium listed use cases.
- **AI Agents** – Whilst trend in 2025 shows that person-to-person calling will not disappear it will increasingly be complemented and augmented by person-to-AI agent interactions from the Cloud.² AI Agent platforms will need Cloud numbers.
- **Scalability and Global Reach** - Cloud numbers can be scaled up quickly as the functionality managing the numbers is software based and not associated with physical control; businesses can add numbers or users with a simple request, often accessing local or international numbers without physical infrastructure.
- **Cost and Setup** - Cloud numbers are generally more cost-effective, with lower initial investment and maintenance since no physical hardware is required and setup is fast.

As can be seen from the above stated, liberating the use of numbers from a traditional and physical network build into a ‘cloud’ manner enables innovative operators to exponentially expand on functionality. This change offers tremendous macro-economic opportunities and the delivery of values to society.

3. Cloud Number Use Cases

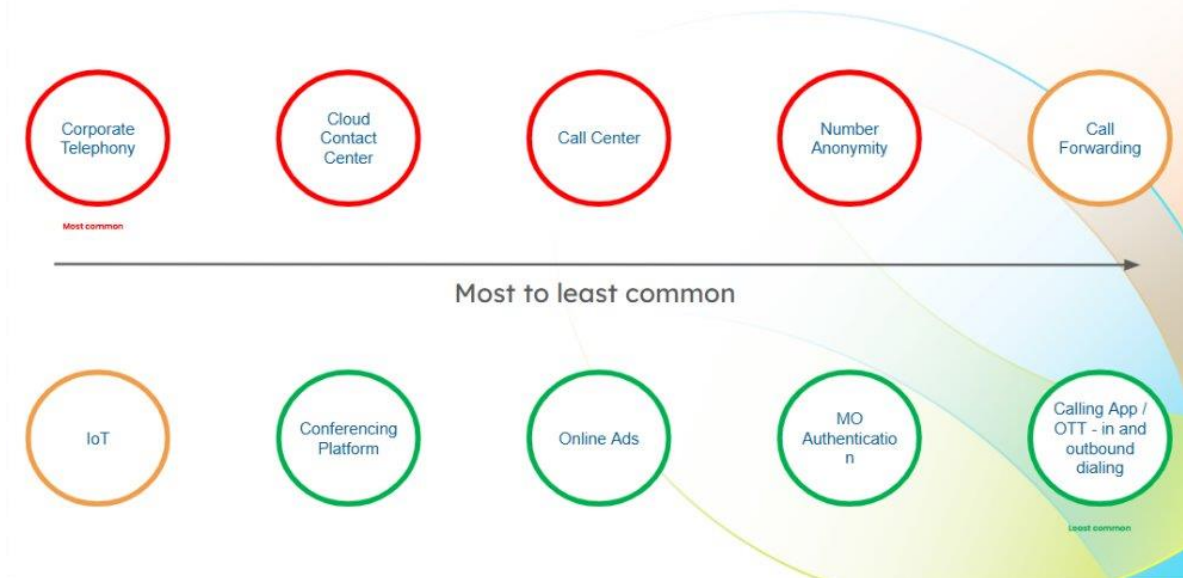
As stated above, differentiating number uses in a modern – cloud – setting from more traditional use, is not without its challenges. Additionally, the creation of any list in a market as flexible as that based on all-IP infrastructure and as rapidly developing as it currently is, *any* list is likely to become out of date or inaccurate very rapidly; likewise, any regulator that establishes a regulatory framework with sole reference to such a list (or assumption it will not change) will end up with a market that stifles innovation and competition and the values to the market these bring.

However, for the purposes of listing a range of use cases where telephone numbers have been ‘transferred’ away from the end-user to the ‘cloud’, we provide the below details³:

² <https://www.vinsys.com/blog/ai-agents-trends>

³ See further standalone One Consortium paper on ‘Use cases in a cloud environment’

Overview: Use-Cases from the customer perspective (end-user / business)

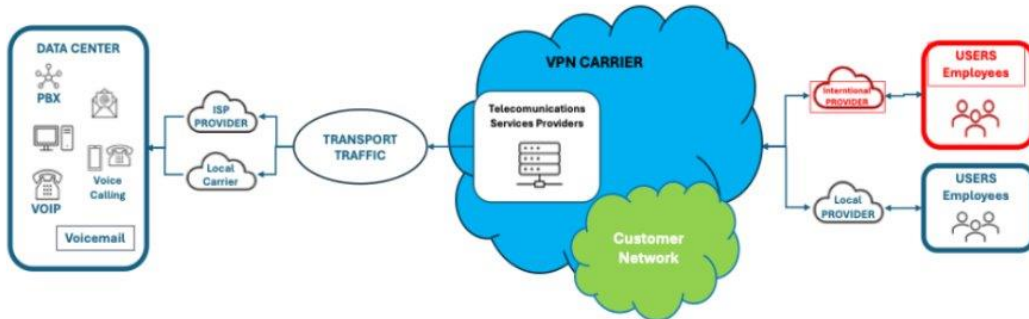


Corporate Telephony

Use cases: Most common

Corporate Telephony

- Corporate telephony refers to the **telephony infrastructure** used by companies to manage and **enhance** internal and external **communications**.
- It typically includes services such as **voice calls, voicemail** and other **unified communications systems** (e.g. VoIP, PBX systems).
- It is a replacement for the **PSTN**, which provides business telecommunications services over SIP trunks.



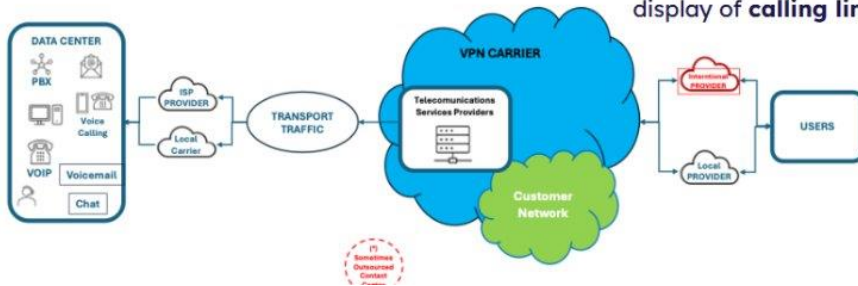
Cloud contact centre

Use cases: Most common

Cloud Contact Center

- A Contact Center in the cloud is a **system** that is accessed through the Internet and from which all the **company's communication channels** with customers (Omnichannel - voice, chat, email) are **managed**.

- Some of these contact centers may be **outsourced**, being operated by third-party providers and may not even be located in the same country as the company they represent.
- Using local numbers from the customer's region, **PAI (P-Asserted-Identity)** and from headers in **SIP signaling** will differ to maintain compliance and ensure proper display of **calling line identification**.



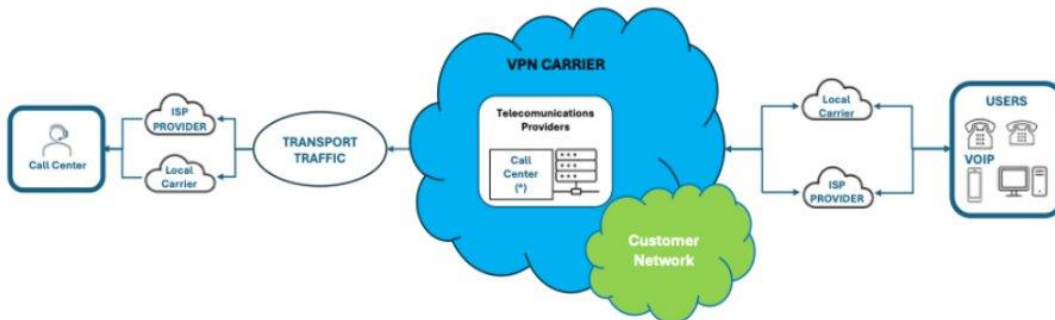
Call centre

Use cases: Most common

Call Center

- Customer communication platform, cloud numbers and inbound calls allow customers to access the contact center (typically **inbound voice services only**).

- But that **can include CPaaS-type solutions** where inbound and outbound numbers can be assigned to various services provided through the CPaaS platform that provides API integration and custom-coded call flows.

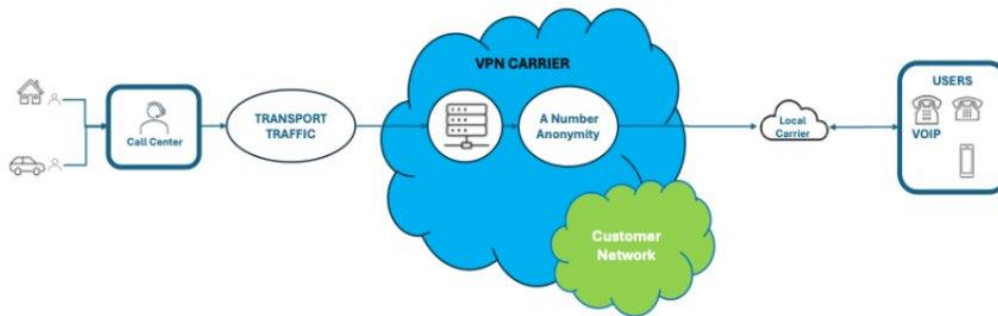


Privacy enhancement

Use cases: Most common

Number Anonymity

- Service requiring a **pool of numbers to anonymize** caller identification.
- Identity mask is **widely used** by **platforms** that facilitate communication between users (e.g., users and service providers) without exposing their personal phone numbers. The service acts as an **intermediary**, ensuring that both parties can communicate while their real phone numbers remain hidden.



Call forwarding / IoT

Call Forwarding

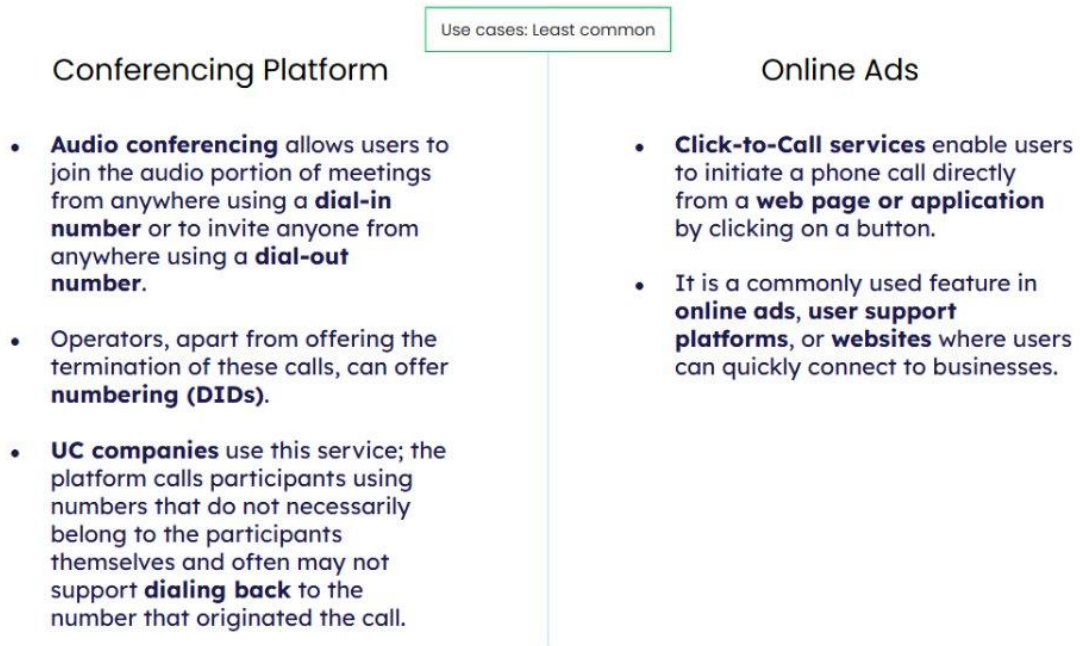
Use cases: Common

- Service requiring a **pool of numbers**, for instance, call forwarding is used to route the call to a server to **track and collect metrics** regarding the profile of the calls (e.g., **call duration, caller location, time of day, call volumes**).
- This service is **often used by businesses** for marketing campaigns, customer service, or contact centers to **monitor and optimize the performance** of their communication channels.

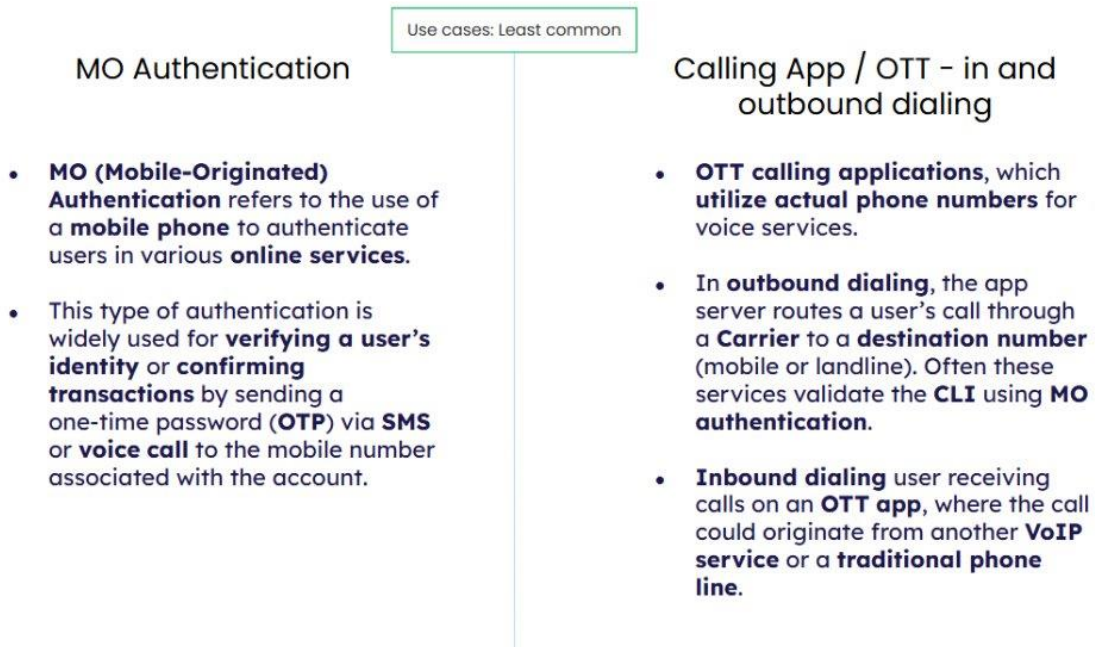
IoT

- There are some **special projects** that require **case-by-case analysis**. Niche cases related with **remote devices** where **DIDs** could complement **IoT** or **mobile connection**.
- Numbers provided for IoT (**IP end points**) devices (i.e. cars, eolic station, vending...)

Conferencing platform / Online Ads



Mobile origination authentication / OTT calling apps

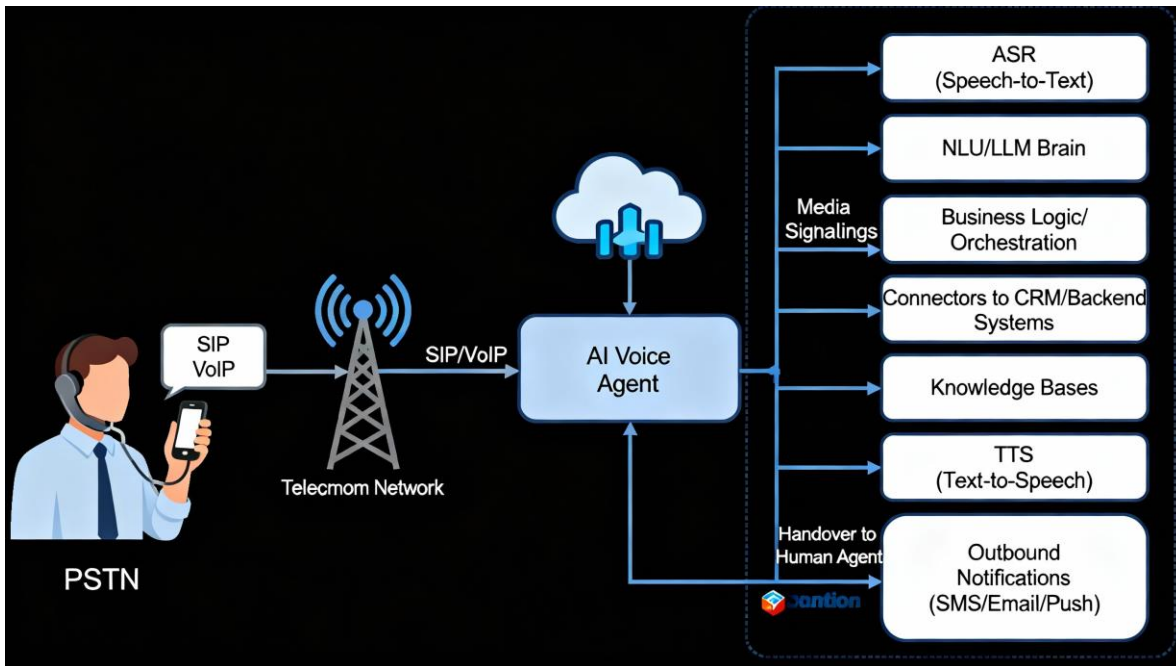


Whilst the objective of this paper is merely to intend to show and explain some of the most common uses of cloud numbers, one should appreciate that new use cases emerge on a regular basis and

NRAs are encouraged to permit this innovation to continue. Any regulatory intervention affecting this natural technological and feature evolution in the marketplace should be, if at all, conditioned by regulatory intervention only if such is necessary to safeguard the end-user, objectively justified and proportionate to this end.

As an example of emerging use cases that are forecasted to make a tangible impact on the external market:

Direct-to-consumer AI voice agent



All of the above use cases of cloud numbers demonstrate the wide variety of functionality offered to the markets and end-users. However, when assessing the correct regulatory framework for the future, it should be borne in mind that many of the use cases and regulatory areas to consider have already been explored and are not new.

For example: PBX services have transitioned to what is now called the ‘cloud’ for at least 20 years and IVR technology has performed a very basic related service to that of cloud driven contact centre / AI contact centre. As such, taking a *negative* approach to the regulatory framework for services making use of cloud numbers, could force unravelling multiple decades worth of established commercial use. The disruption to the industry and the macroeconomic as well as societal losses would be catastrophic.

Similarly, some NRAs find it challenging to accept ‘Number Anonymity’ as a valid and societally useful use case. On this, we note that many NRAs do however permit (in fact make it a regulatory obligation if caller requests it) ‘CLI withheld’ functionality. This, of course, already represents 50% of the ‘Number Anonymity’ functionality and has again been available for several decades. Many NRAs across the world have issued guidance on market valuable use of Anonymization and we, One Consortium, would be more than happy to discuss these with CEPT and its members.

Therefore, cloud phone numbers offer a modern solution for both businesses and individuals looking for efficient and versatile communication options. The functionality that these numbers offer have been available in the marketplace – initially labelled ‘virtual numbers’ - for at least two decades and CEPT as well as its members should focus on the uses these numbers have and the valuable impact to today's market they offer, not technological configurations.

4. Why should the NRAs adopt a cloud number supporting regulatory framework?

The tremendous changes occurring in the global telecommunications sector is accelerating the transition away from traditional copper-based voice infrastructure, like the traditional PSTN and ISDN systems, to software enabled all-IP environments and the Cloud. Within One Consortium, we note that approximately 70 countries have formal plans or are actively migrating to all-IP, and the majority of the world’s 194 countries are at some stage in this transition, though timelines vary.⁴ Below a top-level view of global move to cloud numbers in general and all-IP specifically:

Country / region	PSTN stop-sell (indicative)	Announced / reported PSTN switch-off year	All-IP migration status (high level)
Estonia	Completed earlier in 2020s (no new PSTN)	Completed (PSTN already off)	PSTN widely reported as already retired; fixed voice is all-IP.
Netherlands	Completed earlier in 2020s	Completed (PSTN already off)	Often cited as one of the first in Europe to fully retire PSTN and move fixed voice to IP.
Germany	Stop-sell largely completed in late 2010s	Completed (around 2018–2019)	Major operator migrations (e.g. Deutsche Telekom) completed; fixed voice delivered as VoIP/VoB.
Sweden	Legacy PSTN no longer sold in most areas	Reported as in process / largely complete	Listed among countries “already ahead” in PSTN retirement; fixed voice effectively all-IP in most of the market.

⁴ <https://phonesystemglobal.com/2025/10/09/global-pstn-switch-off-from-copper-to-cloud-by-2025-2030-what-you-need-to-know-pstn-vs-voip/>

Spain	Stop-sell phases completed by early-mid 2020s	Reported as close to or at completion	Frequently named as having largely completed PSTN withdrawal and migrated customers to IP.
Portugal	Progressive stop-sell through 2020s	In process, nearing completion	Included in lists of countries that have moved or are moving fixed access to IP, with PSTN withdrawal underway.
Iceland	Not clearly dated in secondary sources	Planned / in progress	Cited among European countries that have retired or are planning to retire traditional networks, with IP migration underway.
UK	Nationwide stop-sell from Sept 2023	Switch-off now targeted for 2027 (delay from 2025)	PSTN/ISDN being phased out; all customers to be on digital/all-IP fixed services by 2027.
France	Various copper/PSTN stop-sell waves	In process during 2020s	PSTN being phased out as part of copper retirement; fixed telephony moving to VoIP over fibre/DSL.
Norway	PSTN no longer sold in most areas	In process, advanced	Frequently grouped with early all-IP adopters in Northern Europe.
Denmark	Progressive stop-sell	Target around 2030	Reported as planning PSTN switch-off by about 2030, aligned with all-IP migration.
Austria, Belgium, Switzerland, Ireland, Italy (cluster)	Various operator-specific stop-sells	In process during 2020s	Operator material describes ongoing PSTN withdrawal and migration of remaining lines to IP, even if no single national date is always publicised.
Japan	Stop-sell phases during 2020s	Target completion mid-2020s	Named as already ahead of the UK in PSTN phase-out; migration to IP fixed voice under way.

Australia	Legacy fixed voice no longer sold on PSTN	National PSTN withdrawal essentially complete with NBN rollout (early-mid 2020s)	PSTN/ISDN switched off progressively in favour of all-IP voice over NBN.
New Zealand	Stop-sell progressing with fibre rollout	Target around 2030	Government and operators signalling PSTN switch-off tied to completion of fibre/IP networks.
Singapore	Stop-sell of traditional PSTN completed	PSTN already switched off	Often cited as an early non-European example of full PSTN retirement and IP migration.
USA	No single national stop-sell date; incumbent telcos have progressively stopped selling traditional POTS/ISDN in many areas over the 2010s–2020s	No single national “PSTN off” year; copper retirement and IP migration are ongoing and state-by-state	Large US incumbents have migrated a substantial share of access to VoIP over fibre or cable; copper/POTS is being decommissioned regionally, but legacy lines still exist and there is no single nationwide cut-off date yet.
Canada	Similarly, no single, formal national stop-sell date; major carriers have restricted or ceased sale of new traditional PSTN lines over the 2010s–2020s	No single formal national switch-off year; migration to IP and copper retirement is progressive	Canadian incumbents have moved much of fixed voice to IP platforms (fibre/cable), with legacy PSTN shrinking; as in the US, the transition is evolutionary rather than defined by a clear national “switch-off day”.

The global changes, as well as opportunities, triggered by this world-spanning transiting to all-IP and cloud at this level are dramatic:

Global PSTN *call* volumes are already in steep structural decline and, once major markets complete all-IP migration, residual PSTN minutes will fall to effectively zero within a few years. Existing evidence and traffic trends support an indicative post-migration decline rate of at least 10–15% per year globally, with faster shrinkage in advanced markets. As an example: In Japan, the incumbent

reported that fixed-line calls on the legacy network fell by 93% and total call duration by 97% between 2000 and 2015.

However, the rapid drop of traditional call volumes does not mean that the call market itself is in decline. Rather, a growing share of voice moves to has moved to mobile, UCaaS, CPaaS and embedded application voice amongst many other new uses of communication. The use cases above describe some of them.

From a macro-economic perspective, the new, and nascent, communications industry is a multi-billion dollar and rapidly growing sector which drives wide-reaching economic gains through cost efficiencies, enhanced productivity, innovation, and enabling next-generation digital services globally which, enable improved and augmented services to the end-users. Changes to market participants, services demanded and provided to end-users and the value these changes, at a macro and societal level, means that NRAs should carefully explore how best to enable and incentivize early and wide adoption.

By way of example, the wider CPaaS market (Communications Platform as a Service (CPaaS), which by definition uses numbers in the cloud sense, and which is also dependant on cloud telephone numbers to ‘connect’ with communicating end users, is valued at approximately \$22.89 billion to \$32 billion in 2025. End-user preferences of services drive rapid market forecast growth with estimates suggesting the market could reach anywhere from around \$86 billion to over \$100 billion by 2030⁵, representing a compound annual growth rate (CAGR) between 18% and 29% depending on the analyst.

Moreover, the young global Voice AI Agents market is seeing rapid expansion, with most estimates placing its current value at a mere \$2.4–\$3.5 billion in 2024 but with forecasts of it reaching \$21–\$47.5 billion by 2030–2034, depending on the source and segment definition. This represents a compound annual growth rate (CAGR) between 30% and 37% for voice AI agents, reflecting their surge in adoption across industries such as customer service, healthcare, banking, and retail.⁶ Like CPaaS, Voice AI Agents need numbers to communicate with end users.

CPaaS and Voice AI Agents are two platforms within the broader digital transformation that is taking place at a global level. In a study commissioned by BT PLC (September 2025) in relation to effects of digital transformation in the United Kingdom, ‘beneficiaries’ of all-IP infrastructure rationalization include Health care (250M GBP), Utilities (2.1B GBP), Local government (480M GBP) and Emergency Services (140M GBP).⁷

Of course, societal values are crucial too and, arguably, we can here see the true impact of Cloud numbers:

⁵ <https://www.precedenceresearch.com/communication-platform-as-a-service-market>

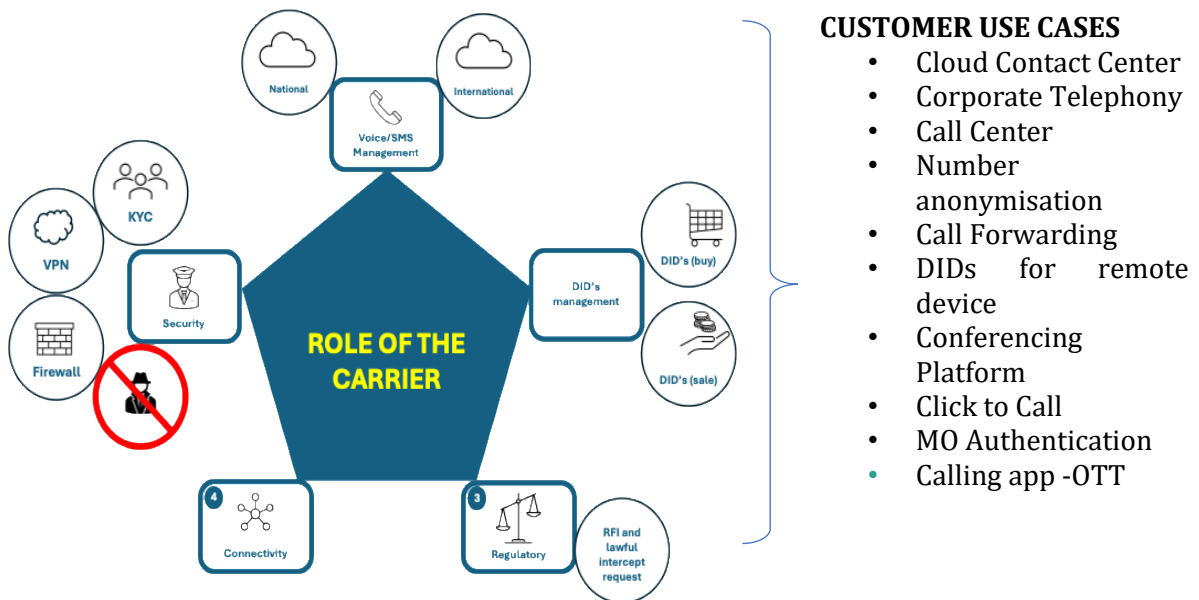
⁶ <https://market.us/report/voice-ai-agents-market/>

⁷ <https://www.bt.com/content/dam/bt-plc/assets/documents/about-bt/policy-and-regulation/download-centre/2025/economic-benefits-of-digital-migration-for-critical-national-infrastructure-customers.pdf> Page 4

Cloud numbers have driven enormous opportunities for flexible working; not just being able to ‘work from home’ (which in its own right lowers barriers to employment) but because cloud numbers are not tied to a physical line or location, they make it easier for remote workers, micro-entrepreneurs and people in under-served areas to participate in the digital economy. Cloud numbers reduce the cost of domestic and especially international calling by using IP networks instead of traditional long-distance tariffs. Local virtual numbers in other countries make it cheaper and easier for families, migrants and diasporas to stay in touch, and for organisations (including NGOs) to offer reachable contact points across borders. Cloud numbers offer protection in the form of Anonymization when the user so feels it is necessary: whether when booking a taxi or when making a life changing contact with health/support or other organisation where privacy has tended to be a barrier to seeking help. From a technical perspective, Cloud numbers enhance the protection of individual's data, fraud resilience, network security and can be re-routed during outages, disasters or local disruptions, helping maintain access to critical services and support lines. However, the main societal values, we submit, are the ones yet to be launched and explored by end-users; we are merely at the cusp of the re-invention of the communications industry and at One Consortium we are eager to learn how the end-users decide to make value of it.

5. The complex carrier environment in a cloud number marketplace

As the CEPT draft report rightly indicates, the change in the marketplace is not merely linked to the use of Cloud numbers but is also dependant on crucial changes as to the composition of the market itself and how it is functionally structured. CEPT should recognize that the vast majority of the use cases and the values they drive depend on enabling a new ‘generation’ of communications providers to enter the wider carrier environment.



The market we see today depends on welcoming in new technologies, skills and way of working; When in the past a ‘phone call’ was made and carried from end to end by a single provider at a network level (or multiple providers at the same network level via interconnections) the new market is a multi-layered environment.

The 7 Layers of the OSI Model

7	Application Layer	Human-computer interaction layer, where applications can access the network services
6	Presentation Layer	Ensures that data is in usable format and is where data encryption occurs
5	Session Layer	Maintains connections and is responsible for controlling ports and sessions
4	Transport Layer	Transmits data using transmission protocols including TCP and UDP
3	Network Layer	Decides which physical path the data will take
2	Data Link Layer	Defines the format of data on the network
1	Physical Layer	Transmits raw bit stream over the physical medium

8

The OSI model helps show that all-IP and cloud communications are logically layered data services, whereas traditional PSTN is a vertically integrated, circuit-switched telephony service.

Layers 1–3: Access and routing – ‘Traditional’ communications providers

In PSTN, the physical, data link and “network” functions are tied to dedicated TDM circuits and SS7 signalling, with fixed paths and strong coupling between switching and transport. In all-IP/cloud architectures, these same OSI layers are implemented by packet networks using Ethernet, IP and MPLS, decoupling service logic from the underlying access (fibre, cable, mobile, etc.)

Layers 4–7: Services and applications

In contrast, IP and cloud communications run over generic transport (TCP/UDP over IP) and implement voice, messaging, video and AI agents as application-layer services that can evolve independently of the lower layers

Of course, whilst there are providers/operators that straddle multiple layers of the OSI table, it is nevertheless a functional depiction of the changed nature of the evolving communications market.

The complex carrier environment required for enabling cloud number services and to drive the vast values it can release to the markets, is necessitated by an effective partnership between providers at

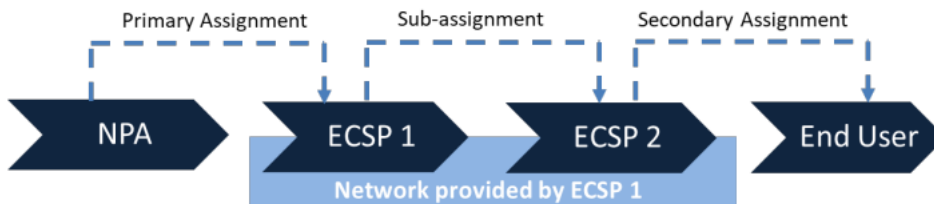
⁸ <https://www.corero.com/what-is-the-osi-model/>

these different levels of the OSI table and in accordance with the commercial realities between the OSI layered partners.

6. Suballocation is the preferred trading model in the new communications market

The complex OSI layered reality of today's cloud number-based market requires a partnership across multiple layers and in a majority of cases, the preferred⁹ trading model for the providers of Cloud, CPaaS and AI voice agents etc. who wish to enter a market involving communications services, including telephone numbers, is through suballocation.

Suballocation is a trading model in which the original number allocatee (typically a traditional telecommunications operator with network assets, in-house knowledge technical and regulatory knowledge – NPA in the figure) permits another [downstream] provider (ECSPx in the figure) to use these numbers in their service. This is accomplished by the initial allocatee taking on board the technical network matters, including hosting, number management, switching/routing and other regulatory mandated activities, allowing the sub-allocatee to focus on delivering its services and value. Further details can be found in CEPT/ECC REPORT 311¹⁰



11

⁹ The other hypothetical trading model option is 'hosting'. In this model the the Cloud, CPaaS and AI voice agents providers acquire numbers from domestic Number Administrator but otherwise rely on a technical arrangement where a carrier or infrastructure provider "hosts" the routing and termination of a telephone number on behalf of the Cloud, CPaaS and AI voice agents. Here, hosting focuses on routing, signaling, and technical enablement—not regulatory ownership.) Given the Cloud, CPaaS and AI voice agents *global* platforms, skillset and commercial models, 'hosting' introduces a dramatic market entry barrier which too often prevent the roll out of services in a country that does not allow the Cloud, CPaaS and AI voice agents to focus on their skills through the model of suballocation.

¹⁰ <https://docdb.cept.org/download/1420>

¹¹ ECC REPORT 311, page 9

It is not a new trading model. “Suballocation” as a numbering concept appears in European discussions at least by the 2000s and is common in NRA and consultancy material referencing CEPT/ECC work on numbering and authorization.

The trading model of suballocation of telecommunications services is therefore inherent, and in many cases necessary, in this evolved market of cloud communications services. Without enabling efficient market entry to the evolved communications industry, on terms that allows them to function and focus on their societal value-add, the nascent as well as forecasted benefits illustrated in this paper, will not materialise. The technological evolution in the country will stagnate, a corporations, public bodies and end-users will be short-changed: both macro-economically but also at an individual developmental level.

However, despite clear commercial preferences and numerous NRAs recognizing that suballocation enables rapid launch of new CPaaS, UCaaS, or AI agent applications, through the removal of regulatory bottlenecks and speeding up innovation, some NRAs have mistakenly equated suballocation with fraud and scam. As we can show below, this is deeply erroneous and unless combatted at source, likely to drive enormous macro-economic losses for the country prohibiting sub-allocations.

7. Acceptance and misunderstanding of suballocation of numbers

Numerous NRAs see the value of wholesale service provider models that include the use of suballocation to innovative operators requiring market entry access.

On a non-exhaustive basis:

- Some examples where suballocations are permitted in the EU are: Belgium, Finland, Germany, Italy, Ireland, Spain, Portugal.
- A little further afield: Switzerland and the UK also permit suballocations.
- Looking with a global perspective: Argentina, Australia, Chile, Colombia, Hong Kong, Malaysia, New Zealand, Peru, Philippines and Singapore and the USA etc.

Whilst sub-allocation is merely a trading process that, in itself, is wholly neutral to ‘fraudulent intent’, at times, some NRAs have equated suballocation with scam/fraud, lack of transparency and inefficient use of scarce resources. We submit that these are ill-founded accusations.

The sub-allocation trading model is merely the outcome between the commercial requirements of the operators and the legal and regulatory framework of the country and these three ‘concerns’ can be more effectively resolved than through banning sub-allocation.

Scam/fraud

Europol identifies that spoofing, not suballocation, accounts for approximately 64% of reported fraud and scam cases.¹² Some of our members who are actively monitoring instances of suspected scam and fraud calls expect the actual % of spoofing to be higher than so.

Suballocation itself is hence not required (or advantageous) for spoofing or scam and fraud. In fact, a criminal intending to defraud a victim likely desires to hide his identify for the purpose of the deception and does not need 'suballocation' or being granted any number at all. In fact, “[s]cammers can either use freely available open-source VoIP tools or create an account with a VoIP provider that allows them to substitute their original number with any number they want.”¹³ .

This is not to say that ‘VoIP telephony’ is in itself ‘bad’ but merely a reflection of the inherent flexibility of all-IP technology; society no longer wants point-to-point copper communications (which had a physical protection against scam and fraud) and soon, much of world’s communication will be based on flexible all-IP technology. Therefore, rather than blindly blaming a trading model or use of ‘VoIP’, we urge that NRAs across the world – in collaboration with the experts within the industry- find effective and proportional measures to combat and weed out the fraudsters and scammers at source. The starting point for this is to have a sober understanding of the reasons why fraud and scam calls have risen dramatically in the recent decade (not point towards an objectively irrelevant trading model) and to put in place the right incentives for the market players and law enforcement agencies to make full use of the inherent capabilities of an all-IP based network environment. At present, the fraudsters and scammers are maximising their nefarious value creation precisely due to their use of all-IP flexibility in a criminally, morally and regulatory-wise unhindered manner.

Rejecting suballocation based on the belief it will reduce scam and fraud is not only statistically incorrect, but it shows a lack of understanding of how the market functions and how fraudsters operate as well as failing to understand how the technology in all countries is rapidly transitioning. This belief-set leads the NRA and decision makers to an ill-founded and dangerous road that will only impede valuable market changes and exacerbate scam and fraud calling.

1. Lack of transparency

Whilst it is correct that suballocation *can* add some lack of transparency (and subsequently also lack of accountability) as to who the originating operator of a communication is, especially if the suballocation is done in cascade, it is easily overcome by introducing suballocation registration requirement as is in place in numerous countries, for example Australia, Portugal and Spain and, if so desired, limiting suballocation to one-step or two-steps. It is also worth pointing out that ‘pure’ wholesaler to wholesaler suballocation (in cascade) will never have a material (if any) impact on the external market; only the very last step (reseller to end-user) can and will impact the external

¹² <https://www.europol.europa.eu/cms/sites/default/files/documents/Position-Paper-Caller-ID-Spoofing.pdf>

¹³ <https://www.comparitech.com/blog/information-security/number-spoofing-scams/>

market. Ultimately, lack of transparency is therefore predominantly a shortcoming of lacking the necessary rules than a shortcoming of the preferred trading model.

Rejecting suballocation based on a lack of Transparency and accountability risks all macro-economic gains of the CPaaS, all-IP and Agent AI market for a very limited cost saving (in not managing the suballocation register) by the NRA.

Inefficient use of scarce numbering resources

Suballocation allows for extreme flexibility in assignment; if a reseller requires a single number, the suballocator can provide a single number instead of requiring the reseller to apply for a block of 1k-10k (typically). It is inherently a more efficient model of assignment. We have yet to see any statistics showing that suballocation drives inefficiencies of scarce resources. Rather our view, and as is publicly corroborated by the NRAs that have investigated¹⁴, shows that suballocation is dramatically more efficient than merely allowing the primary assignment.

Rejecting suballocation under the pre-text it will improve efficiency of scarce numbering resources is logically and evidentially incorrect.

How to overcome scam and fraud calling?

This is the big question and why we at One Consortium have come together.

Though we represent the entire spectrum of the international communications industry: from traditional operators to CPaaS and from hardware to software providers – and the many steps in between, we all share our singular mission: To cooperate with Telecommunications Regulators (NRAs) globally in order to fight unwanted/fraudulent voice calls and messages originating from abroad. We aim to accomplish our mission by providing NRAs, whether through GIRAF or individually, with information from across the industry that will allow all market participants, operators as well as NRAs, to find an effective response to the scam and fraud we all want to crack down on. We also want GIRAF and NRAs to understand that the ‘cloud communications’ market is *not* a source of scam and fraud; as explained elsewhere, the undesired calls are both better *associated* with the inherent flexibility of modern communications services (that deliver \$Billions in macro-economic gains as well) and *prevented* by maximising the capabilities of all-IP.

To advance the fight against scam and fraud: The international carrier community follows the guidelines of the Anti-Fraud Code of Conduct, co-developed by the Global Leaders' Forum together with the i3Forum, which sets out the principles to cooperate, prevent and avoid fraud by monitoring and analysing the profile of communications to prevent and combat fraud by stopping any fraudulent communications and preventing the fraudster from reaping the economic benefits of these activities.

¹⁴ Please refer to [Spanish](#) and [Portuguese](#) NRA in their respective decisions on suballocation

The Global Leaders Forum link:

<https://glfcommunity.com/>

Link to Global Leader Forum's jointly with i3Forum antifraud Codes of Conduct:

<https://glfcommunity.com/our-work/fighting-fraud/code-of-conduct>

The i3Forum link:

<https://i3forum.org>

There are additionally a vast number of domestic, regional and global ‘communications forums’ as well as regulatory / governmental projects all focussed on winning the fight against fraud and scam. One Consortium, both directly and indirectly through its many members across the world, operate at a vast number of these forums.

However, rather than finding the task overly daunting, we share a growing sense of optimism that the fight can and will be won as, increasingly, we are seeing direct and focused attention by NRAs / Legislators as well as the vast majority of communications providers at all levels on the OSI table. But we want and need your help to win it and to do so comprehensively and with speed.

In this paper, which exclusively presents importance of Cloud Numbers, and where we elsewhere in this paper we have outlined why these Cloud Numbers are not to be uniquely singled out for a discussion around scam and fraud, we will not go into depth of One Consortium's multiple working groups singularly focused on re-establishing trust in the communications market. We will simply highlight here to readers who still believe that Cloud Numbers could be a source of fraud and scam, the typical steps that can reduce fraud and scam whilst at the same time allow the inevitable journey to an all-IP environment to become successful for society.

Use the technological advancements of all-IP

It almost goes without saying: Whilst the industry has been busy introducing and adopting new technologies and NRAs have been pre-occupied understanding how these new technologies affect (old) regulatory frameworks, fraudsters have run ahead and maximised (nefariously) the inherent flexibility of all-IP networks.

Realistically, with the fraudster always seeking to maximise its opportunities, no market will be able to reap the benefits of the all-IP / Cloud technologies unless the full suite of technological capabilities in this new environment is harnessed. We must therefore, industry and NRAs alike, choose to think boldly and with a vision: How can we use technology in a manner that drives the macro-economic advantages of all-IP and Cloud services, that brings value to end-users and to the society but at the same time drives out fraudsters and scammers from the market?

KYC (Know Your Customer)

KYC is the *sine qua non* in the fight against scam and fraud enabling a preventive approach and must be established as well as enforced when numbers, be that Cloud or otherwise, are assigned to customers.

There are numerous useful sources for what a responsible communications provider should be expected to verify prior to assigning numbers to an end user. For example, One Consortium's parent organization, I3 Forum, has published a well-received KYC guidance document¹⁵ valid for 'traditional' and 'cloud' communications, for voice and for SMS services; and Ofcom (UK) published¹⁶ a 'Good Practice Guide' which contains several relevant and practical considerations. Many industry forums also produce KYC standards that its members must adhere to.

Though, there is a risk that all well-intended producers of KYC guidance / standards create a market that fluctuates dramatically in expected KYC assessments. This could result in unforeseen barriers to entry and unnecessary complexity. It may also lead to inadvertent non-compliance by otherwise well intending operators.

Furthermore, care should be taken when mandating KYC and describing the details required. The North American Numbering Council stated, in relation to conditions that may be applied before assigning numbers to an operator and/or prior to allocating numbers to the end-user:

“[I]mposing stringent and prescriptive numbering restrictions may risk harming the innovation in the ecosystem, reducing competition, and slowing economic growth. The U.S. should continue fostering an environment that encourages innovation by maintaining a balanced approach to numbering resources, ensuring that policies support new and emerging business models while avoiding overly burdensome requirements that stymie growth.”

They then continued:

“While these restrictive frameworks may be intended to limit bad actors, they also introduce substantial overhead and stifle innovation. Notably, such limitations do not appear to have positively impacted GDP growth or economic dynamism in these countries. By focusing on prescriptive control, these policies hinder the rapid and flexible deployment of new services that rely on numbering resources, placing additional costs on legitimate businesses without demonstrable economic benefit.”¹⁷

We at One Consortium therefore, at this juncture, merely advocate for 'strong' and 'enforced' KYC but recommend industry wide, validated regulatory wide and open discussion and collaboration as to exact levels and process.

Traceback

Traceback allows an authorised Authority (police or prosecutor typically) to request the sending operator who the originating caller is. As such, whilst Traceback does not in itself verify accuracy

¹⁵ <https://i3forum.org/blog/2025/09/15/i3forum-releases-industry-wide-kyc-kyt-guidelines/>

¹⁶ <https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-2-6-weeks/232890-good-practice-guide-on-sub-allocated-and-assigned-numbers/associated-documents/annex2-good-practice-guide.pdf?v=328768>

¹⁷ Working Group Draft Prepared for Deliberation by the North American Numbering Council, ” Report on Direct Access to Numbers by Interconnected Voice over Internet Protocol (VoIP) Providers” pages 15-16

of presented CLI, a better and swifter Traceback environment (especially if made interoperable on an international level) can reasonably be expected to drive end-user trust as more scammers and fraudsters are swifter taken down. Comprehensive KYC and KYT registries can help improve and accelerate Traceback mechanisms.

In today's market, Traceback typically exists (as a minimum) within the country's criminal investigatory code and being wholly manual (and slow) in process, but many NRAs are working on initiatives that will speed up Traceback and automate. Of interest, The European Commission will introduce new legislation in this area, e-evidence¹⁸, during two phases in 2026.

At One Consortium, Traceback forms an integral part and is a dedicated working group. With our global members, we are a repository of information on how Traceback works in individual countries but can also see how NRAs should be cooperating *inter se* to ensure functional Traceback at a global level, especially considering the impact of fraud on international communications, Discussion and collaboration are key and we welcome NRAs, whether current GIRAF members or not, to reach out.

Digital Signatures to ID the origin of the communication

STIR¹⁹ is a protocol designed to combat caller ID spoofing in IP-based voice networks. STIR (Secure Telephony Identity Revisited) uses digital certificates and public key cryptography to authenticate the caller ID of phone calls at the service-provider level, while SHAKEN (Signature-based Handling of Asserted information using toKENs) defines how these signatures are handled, verified, and transmitted across service provider networks within national boundaries.

By ensuring each call carries a verifiable digital signature attesting to the originating caller's right to use the claimed number (if the signature is cascaded from origin to destination in the call chain), or alternatively attesting that the CLI has not been manipulated as from a given point (if the signature is cascaded through partial portions of the call chain),

At present, USA, Canada, Brazil and France have rolled out different forms of STIR/SHAKEN and a number of countries (as well as operators) across the globe are considering or experimenting with other digital signatures options more adequate for their jurisdictions.

Within One Consortium, we are technologically neutral and welcome an inclusive discussion with market players and regulators to find the best system / configuration to authenticate identity / create digital signatures as countries and operators move into the all-IP world fully.

We do however not expect that a single approach will work ubiquitously but a dynamic approach to shared problems of fraud and scam need to factor in domestic circumstances and be a multi-layered approach. We are however fully cognizant of the fact that fraud is a global dilemma and requires global cooperation as well as global interoperability of these systems to enhance CLI validity through digital signatures.

¹⁸ https://commission.europa.eu/law/cross-border-cases/judicial-cooperation/types-judicial-cooperation/e-evidence-cross-border-access-electronic-evidence_en

¹⁹ <https://www.fcc.gov/call-authentication>

8. Summary and Conclusion

As demonstrated in this short paper, the fundamental overhaul of the communications market - as it rapidly transitions to an All-IP market and exclusively based on Cloud Numbers – will permit a suite of desirable features, functionality and innovation for all levels of society. These changes will drive macro-economic value in the hundreds of billions of US\$, if not trillions.

At the same time, the technological metamorphosis in society where end-users, businesses and governmental bodies communicate across online internet platforms or talk on All-IP networks, has provided scammers and fraudsters new territory to inflict damage. All scam and fraud is assessed to cost society more than 1 Trillion US\$²⁰ whereas the Global annual losses from phone scams are estimated to exceed \$80 billion in 2025.²¹

This is the challenge for NRAs and Legislators worldwide: enable society changing benefits of All-IP / Cloud / Digitalization but at the same time crack down on the opportunities for fraudsters and scammers to misuse the technological advancements.

It is not a small challenge but in this paper, we have highlighted some of the key considerations: welcome technological change but seek to maximise the opportunities for good. Acknowledge that the communications markets today support the digitalization of services and are fundamentally more diverse and complex than ever before but we all still need telephone numbers to identify ourselves. At present, in the nascent stage of this market, we call the numbers use in the All-IP market 'Cloud Numbers', but as countries are rapidly closing traditional copper-based networks, all numbers will become Cloud Numbers, thus rendering the prefix meaningless.

Be bold, have a clear vision and collaborate drive growth, innovation and competition through liberal access to telephone numbers. Identify and focus on the regulatory outcomes desired: Suballocation is critical in this new market and should be permitted; there are, as described, many better options more easily at hand for NRAs to overcome any (unwarranted in our view) concerns about transparency and scam calling.

We at One Consortium are here to support a lively and collaborative discussion with stakeholders, NRAs and other relevant Authorities, across the globe, on how we can collectively deliver a vibrant communications market based on trust.

²⁰ <https://www.gasa.org/post/global-state-of-scams-report-2024-1-trillion-stolen-in-12-months-gasa-feedzai>

²¹ <https://www.juniperresearch.com/press/robocalling-fraud-global-consumer-losses-to-exceed-80bn/>

9. Glossary of acronyms and abbreviations

API: Application Programming Interface, is a set of rules and protocols that allows different software applications to communicate with each other.

App: Application, software program designed to perform a specific function or set of functions on a computer, smartphone or Tablet.

ARP: Address Resolution Protocol, protocol used to map an IP address to a MAC (Media Access Control) address within a local network.

B2B: Business to Business, refers to commercial transactions, relationships or activities conducted between two business rather than between a business and individual.

B2B2C: Business to Business to Consumer is a business model where a company (the provider) partners with another business (the intermediary or distributor) to offer products or services directly to end consumers.

B2C: Business to Consumer, commercial transactions where a business sells products or services directly to individual consumers.

C2B: Consumer to Business, consumers offer products, services or information to businesses.

CLI: Calling Line Identification

CPaaS type: Communications Platform as a Service. Cloud-based platforms that enable business to integrate communication features -such as voice calls, messaging, and video calls- into their own applications via APIs.

DDoS: Distributed Denial of Service, is a type of cyberattack where multiple compromised computers or devices are used to flood a website or online service with excessive traffic.

DID: Direct Inward Dialling, service that allows callers to directly dial specific phone numbers within a company's phone system without going through a receptionist or an operator.

DNS: Domain Name System, system that translates human-readable domain names into numerical IP addresses that computers use to identify each other on the internet.

DoS: Denial of Service, cyberattack where a network or website is overwhelmed with excessive traffic or data, causing it to become slow, unresponsive, or unavailable to legitimate users.

FMS: Fraud Management System, Telefonica's traffic management tool that allows the prevention and detection of fraud, both in incoming and outgoing traffic flows.

GPS: Global Positioning System, a satellite-based navigation system that allows users to determine their exact location anywhere in the world in real time.

ILD network: Interconnect Long Distance is a telecommunications network that facilitates international long-distance calls between different countries or regions.

IMS: IP Multimedia Subsystem, framework used to deliver multimedia services over IP networks.

IoT: Internet of Things, refers to interconnected network of physical objects, devices, sensors, and systems that communicate and share data over the internet.

IP: Internet Protocol

IRSF: International Revenue Share Fraud

ITFS: International Toll Free Services, allows callers from different countries to make free calls to specific toll-free numbers, enabling international communication without charge to the caller.

KYC: Know Your Customer

nA: Calling Number

nB: Called Number

OTP: One Time Password, it's a unique, temporary code used for authentication purposes, often sent via SMS or generated by a device to verify a user's identity during login or transactions

OTT: Over The Top, it refers to services or content delivered directly to users over the internet, bypassing traditional telecom networks.

PAI: P-Asserted-Identity) is a protocol used, particularly in VoIP and IMS networks. It allows a network element, such as SIP to assert or indicate the identity of the user who is actually requesting or initiating a call.

PBX: Private Branch Exchange, private telephone switching system used within an organization. It manages internal calls between employees and connects them to external phone lines for outgoing and incoming calls.

PSTN: Public Switched Telephone Network is the traditional global network of fixed-line telephones that connects calls through circuit-switched technology.

SIP: Session Initiation Protocol, a signalling protocol used to create, manage, and terminate communication sessions over IP networks. It's the primary technology in VoIP.

SIPTRUNK: Session Initiation Protocol Trunk, is a virtual connection that uses the SIP to provide voice and data communication services between a business and its telecom service provider over the internet or IP networks.

SMS: Short Message Service

UIFN: Universal International Free Number, is a type of international toll-free number.

VoIP: Voice over Internet Protocol, is a technology that allows voice communication and multimedia sessions to be transmitted over the internet or other IP networks.

VPN: Virtual Private Network, a service that creates a secure and encrypted connection between your device and a private network over the internet.

X-aas: Extended Automatic Signalling, protocol or system used within signaling networks to support advanced or extended signaling features beyond basics functions, related to routing, call setup, etc.