THE EVOLUTION OF CALLER ID FOR MOBILE, IP, AND OTT
Renewing Truth in Calling with Secure Caller Identity

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Executive Summary

Caller identification services, the ubiquitous feature set that provides a caller's telephone number and name to the called party, is rapidly evolving. Together, new technology and innovative thinking are transforming the calling experience. At the core of this change are smartphones and the corresponding transition to IP, which have forever changed the way we communicate. And with the rise in popularity of over the top (OTT) applications, we are increasingly likely to be texting, instant messaging, or talking using non-traditional communication technologies.

Whatever the modality or reason for engagement, one aspect of communication remains unchanged: consumers and enterprises alike want to know who is contacting them. As well, both parties stand to benefit more from the exchange of valid information about a caller before, during, and after each engagement. Unfortunately, rapid innovation in communications has rendered traditional Caller ID services less trustworthy today due to spoofing, swatting, and vishing. Worse, bad actors are misrepresenting their identity with the goal of misleading us into answering or responding to an email, call or text, and more damaging, into providing personal information that can be used to defraud or steal our identity.

With these threats to the validity of yesterday's plain old Caller ID, how can we trust enhanced services for identification and engagement? Carriers, subscribers, newer communications technology providers, and regulatory agencies are all seeking solutions to address these issues.

This white paper discusses how Neustar is uniquely positioned to address these challenges with its innovative platform and solutions for Caller ID authentication and verification.

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The Telephone Number in an Increasingly Mobile World

Over the last two decades, much has changed in the manner and channels through which we communicate. As a result, the telephone number has become a key anchor to identity. It is tied not only to phones, devices, apps, and social network profiles, but also to tablets, portable hot spots, and cellular-enabled automobiles that rely on mobile numbering.

Furthermore, with the percentage of wireless-only households steadily increasing, wireless telephone numbers are becoming a core component of communications today. As shown in Figure 1, during the first 6 months of 2015, approximately 113 million adults (46.7 percent) and nearly 41 million children (55.3 percent) in the U.S. lived in households with only wireless telephones. The 3.4-percentage-point increase from the first 6 months of 2014 through the first 6 months of 2015 was statistically significant. The 3.6-percentage-point increase for adults, and the 3.2-percentage-point increase for youth over the same period were also statistically significant.
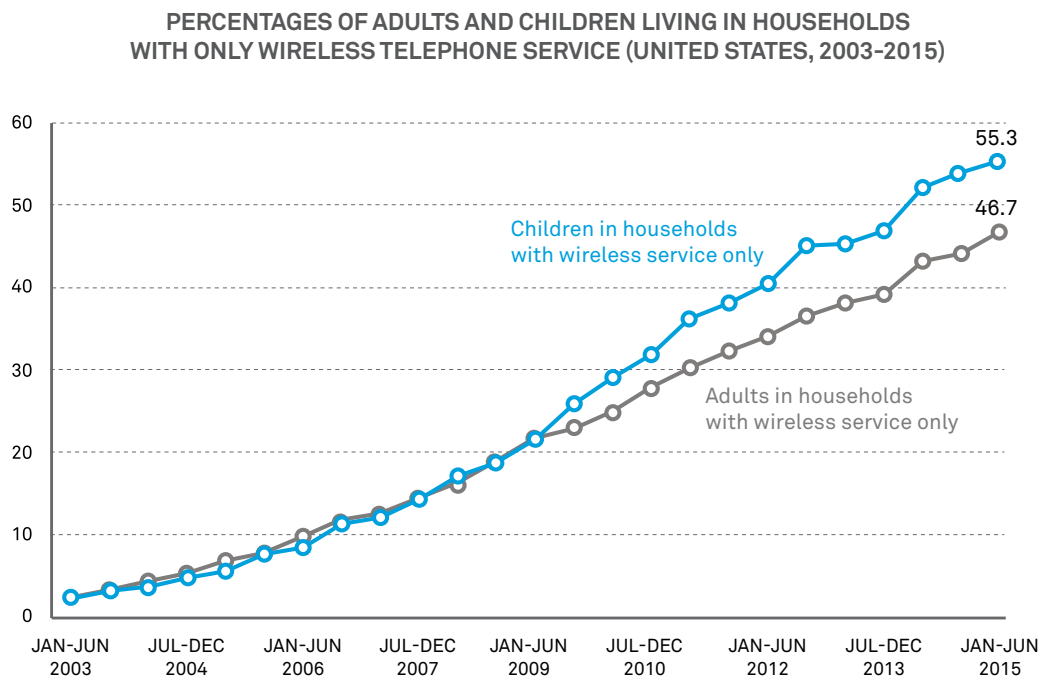
PERCENTAGES OF ADULTS AND CHILDREN LIVING IN HOUSEHOLDS WITH ONLY WIRELESS TELEPHONE SERVICE (UNITED STATES, 2003–2015)

Figure 1: (Source: CDC/NCHS, National Health Interview Survey, January 2012 – June 2015)

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The Role of Caller ID in Identification

With the tighter connection between the telephone number and consumer or device identity, Caller ID has taken on renewed and greater significance. Caller ID technology has been widely available and used with wireline calling for nearly 30 years, so it's no surprise that Caller ID information is available for over 90% of wireline telephone numbers. However, there is tremendous opportunity for new and advanced caller identification services specifically for mobile phones, which enable direct communications to the phone and via apps that extend communications beyond wireline service.

Combined with the increasing shift towards mobile and IP services, the opportunities in Caller ID bring to the forefront the realities of an increasingly personalized world:

1. **The association of numbers to individuals.** Wireline numbers are typically associated with a physical location or fixed address. Mobile numbers, on the other hand, are associated with an individual—an aspect that's further complicated by local number portability, which makes it difficult to accurately identify at a glance the true originating location of a call.

2. **The opt-in practice for wireless Caller ID.** Unlike wireline numbers where subscribers' information is published in print and online directories by default, some large mobile operators do not make personal mobile data available unless subscribers explicitly opt in to have their wireless numbers included in the wider caller ID ecosystem. Correspondingly, Caller ID for mobile is largely associated with information contained in the personal address book on an end user's device.

3. **The power of smartphones to aggregate information.** Mobile devices are "smart," leveraging intelligence on the device, within apps and from the network. In contrast, wireline phones tend to be limited to traditional data linkages of name, address, and telephone number.

The Challenges to Caller ID in the Era of IP

The transition from traditional, closed TDM networks to flat, interconnected IP networks affords great opportunities—but with commensurate risks. The new communications paradigm enabled by IP networks has given rise to numerous fraudulent practices, including spoofing, phishing, vishing, and swatting. Specifically, bad actors can easily spoof a call to include a fully legitimate number, and in turn, use the implicit trust in Caller ID to defraud the called party.

Additionally, it is time consuming and difficult for law enforcement to track down scammers who often operate overseas or place their calls over VoIP, which must often be traced through multiple carriers. Compared to 7.8% of the general public who use VoIP as a means for phone communication, attackers use VoIP lines for 53% of their calls. (Source: Pindrop Security, June 2015) As a result, the practice persists with little abatement.

Exacerbating the problem, the calling name can now be asserted as part of an originating communication, as opposed to being queried for and provided by the terminating carrier. So now, in addition to being able to spoof the number, scammers can spoof the name of the calling organization.

COMMON TACTICS USED TO DEFRAUD CALLED PARTIES

Spoofing: deliberately falsifying the telephone number and/or name of Caller ID information to disguise the identity of the calling

Illegal Robocalling: using automated dialing equipment to deliver pre-recorded messages without proper consent

Phishing: attempts to fraudulently obtain sensitive information such as social security number, credit card information, or bank account information

Vishing: using the telephone in an attempt to scam the user into surrendering private information that will be used for identity theft

Swatting: tricking 911 systems to dispatch SWAT or emergency personnel to false situations

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Collectively, these problems have become substantial. In the United States alone:

- **Consumers lose $350 million** a year to phone scams—$19 million alone from spoofers claiming to be from the IRS

- Nearly **33,000 formal consumer complaints** were filed with the FCC in October and November 2015 *(Source: Consumer Complaints at the FCC: Data on Unwanted Calls)*

- The FTC has **recovered less than 8 percent of the $1.2 billion** in fines levied for do-not-call and robocall violations *(Source: Consumers Union)*

The Urgency for Caller ID Evolution

The greater risk of fraud and identity tampering has become an enormous challenge for communications service providers (CSPs), rendering traditional delivery of Caller ID on the terminating end as the most trusted and secure method. Consequently, the industry finds itself at the crossroad of mobile innovation, high subscriber expectations, and eroding trust in Caller ID. Further regulation and deployment of enhanced subscriber tools for blocking and violation reporting will provide only incremental relief to subscribers. What is really needed—and will take time to evolve—are more universal solutions that operate at scale and across all networks, interfaces, and modalities.

These next-generation Caller ID solutions must:

1. Maintain trust in basic and enhanced identity presentation to facilitate engagement between subscribers and enterprises

2. Enable enterprises and brands to deliver relevant information that allows customers to recognize who is contacting them and why

3. Extend control to subscribers in preventing unwanted engagement

The bottom line is that the promise of Caller ID continues to be held in high regard to the majority of stakeholders who matter: consumers, businesses, and regulators. But the traditional service as we know it today cannot be sustained for any meaningful or lasting value.

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Neustar Caller ID: Rich Engagement to Authenticate and Vertify Callers

Neustar is uniquely positioned to provide next-generation Caller ID services through a suite of solutions. These solutions empower CSPs to address the aforementioned challenges while extending new capabilities for business and consumer interactions. Key among these capabilities is *rich engagement* between both parties, which begins with providing users more than just a telephone number and name. It extends to providing relevant, contextual information, along with confidence in the true identity of the caller. For this discussion, we are referring to smartphones and other communication devices and methods that support displaying rich communications beyond 15 characters and for users who opt in to the wireless Caller ID ecosystem.

Enhanced and Certified Caller ID Solutions

With traditional caller identification services, only the caller's phone number, city, and state are displayed to the called party (see Figure 2). Neustar's Enhanced Caller ID supports the delivery of more descriptive Calling Name information beyond today's 15-character standard, providing context and information when callers engage. For enabled devices and for users who have opted in, Neustar will validate and augment the calling party name with additional attributes, including but not limited to extended business attributes, the reason for the call, and other key contextual information (see Figure 3). The result: enhanced caller information that verifies the identity of the calling party. Consumers benefit from the trust in knowing who is calling. Enterprises benefit by increasing engagement while projecting and protecting their brands.

Figure 2: In today's mobile experience, when a caller's information is not stored on the called device, the caller's phone number, city, and state are displayed.

FRAUD ALERT
Personalized detail of the calling party to catch the called party's attention

ENTERPRISE CALLER
Personalized contact with details of the caller with multimedia capabilities for logo, URL, photo, gif, video

TRUST INDICATORS
Information that empowers the decision to answer, ignore or report

Figure 3: Neustar's enhanced Caller ID and Certified ID solutions provide relevant and trusted information for the benefit of the calling and called parties.

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With rich engagement and caller verification, Caller ID will provide a level of trust and authority for both consumers and enterprise never before experienced. Consider the following scenarios:

- A working parent receives a call from the school nurse because her kindergartner broke his arm. She doesn't recognize the number, so she ignores it. With enhanced and certified Caller ID, she would have recognized the caller, answered the call, and dropped everything to attend to her child.

- A traveler is unaware that he dropped his wallet on the bus. His credit card company notices unusual charges, and the fraud department calls him to verify them. But not recognizing the 800 number of the calling party, he allows the call to go to voicemail while the thief takes advantage of the extra time to use the card. If the Caller ID had securely indicated it was the credit card company's fraud department, the traveler would have answered and signaled for the card to be blocked sooner. These capabilities are good for both the consumer and the credit card company.

NAME STANDARDIZATION AND OPTIMIZATION

- Eliminates awkward phrasing (Assoc vs. Ass)

- Differentiates BUSINESSES from Consumers

- Smartly truncates names for clean, consistent displays

Delivering these solutions requires several core capabilities and deep expertise in information services. Neustar is working with CSPs and industry regulatory bodies, including ANSI (American National Standards Institute) and ATIS (Alliance for Telecommunications Industry Standards) to develop and deploy anti-spoofing technologies to authenticate and verify Caller ID information. These features provide incremental functionality to our existing, yet extensive, Caller ID services architecture.

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Analytics and Insights

Caller ID solutions generate tremendous amounts of data that CSPs can leverage to identify trends and anomalies in activity that require attention or immediate action. Neustar's Subscriber Insights for Caller ID provides near-real-time analytics of Caller ID information, combined with data from Neustar's unique identity-based datasets, to equip providers with graphical views of Caller ID activity. For example, in addition to being a nuisance to subscribers, robocalls can easily flood and bring down an enterprise's IVR and call routing system. Neustar can detect these "high runner" queries with temporal views, spotting patterns indicative of robodialing and enabling providers to take preventive action (see Figure 4).
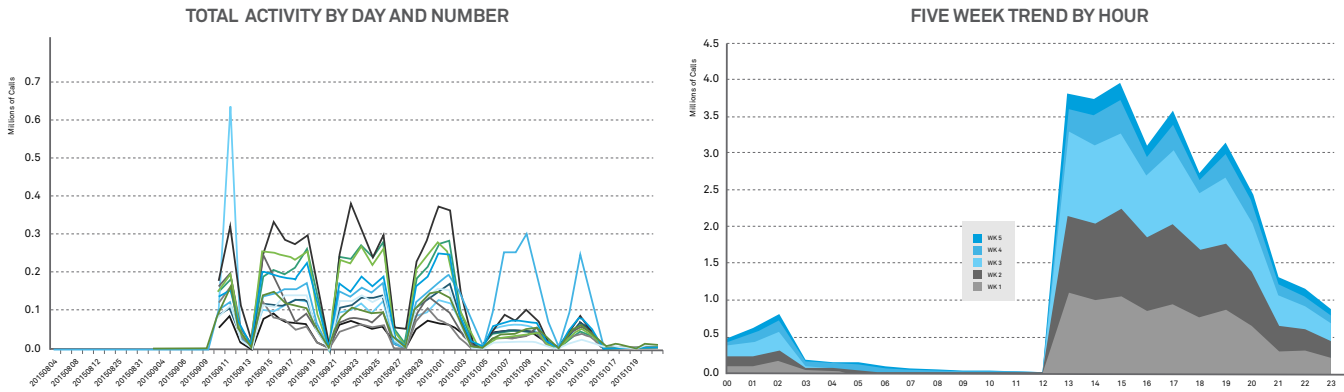

Figure 4: Neustar's Subscriber Insights for Caller ID leverages system activity, data relationships, and analytics to provide near real-time views of Caller ID activity

The solution accepts and consolidates multiple internal and external data sources for enriched insights that can be used to extend preventive capabilities to subscribers and can support blacklist curation. Through customizable dashboards or by intelligent APIs, Neustar data scientists deliver actionable insights for policy management and workflow drivers to support call treatment.

Figure 5: View system activity with customized tabs and role-based access to analytics.

The dashboards (Figure 5) offer customized tabs to support role-based access of baseline analytics derived from Caller ID query patterns, with multiple capabilities, including:

- Number of queries by unique telephone number

- Distribution across service type, customer type, business type, carrier, and geography

- Time interval parameters for day, week, month, quarter, and year

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Why Neustar

Proven Results in Caller Identification Services

With a 25-year track record of providing Caller ID services, Neustar:

- Stores over 225 million wireless records, with access to over 125 million additional records via interconnect agreements

- Delivers approximately 10 billion Caller ID queries each month, for the largest U.S. wireless, wireline, cable, and VoIP operators

- Sources information to the leading mobile app providers

Since changing the paradigm of delivery with its centralized repository model, Neustar has been a proven leader in highly accurate Calling Name delivery. Neustar's superior accuracy is regularly validated via independent audits. In its most recent July 2015 audit *(Neustar Caller Name Audit, Market in View, July 2015),* Neustar was found to provide overall superior results when compared to traditional Calling Name service. Notably, Neustar demonstrated considerably better name coverage, providing a business name or a consumer name at a rate 26% higher than traditional service. For overall matching—where Neustar and the network have the same or equivalent information —Neustar and network performance were equal.

As the leading Calling Name provider, Neustar delivers the industry's highest quality Calling Name coverage at a competitive cost and with minimal complexity. Our unique centralized data repository model streamlines implementation and lowers risk, allowing our customers to deliver high quality caller identification services with a highly extensible architecture. This is ideal for informing critical consumer decisions and deterring illegal and fraudulent calling activities.

Experience and Standards that Matter

Neustar is uniquely positioned with proven experience and performance in all of the key areas required to provide a comprehensive approach for expanding the trust and promise of calling information. Among our credentials we are:

- **A Neutral Service Provider.** Neustar is a trusted, neutral service provider to the communications industry, with origins as the administrator for the Number Portability Administration Center (NPAC) for over 18 years. These principles of neutrality are naturally extended to new and enhanced Caller ID services in support of the communications industry.

- **Data Security Experts.** Neustar's infrastructure is highly redundant, available, and resilient, with multiple geographically diverse, world-class data centers. We manage, secure, and enable billions of client- and syndicated-data records each day, executing a hardened security and privacy program that extends up, down, and across the organization.

- **High Performance Professionals.** Neustar excels at architecting, building, and operating fast, highly tokenized systems to support real-time business workflows and machine transactions to the tune of 200+ billion times per month. Our service levels across this architecture are among the best in the industry.

A Trusted Partner to the Communications Ecosystem

Neustar continues to build upon its position as a neutral, industry-leading information services provider with unparalleled expertise in internet domain registry, IT security, and web performance services. Neustar Distinguished Engineers and Neustar Fellows actively provide guidance and innovative leadership, writing the standards at IETF (Internet Engineering Task Force), ATIS and other industry standards bodies to address these critical issues. And Neustar is taking a broader view of the communications landscape to shape guidelines and develop long-term solutions and architecture that considers identity beyond telephone numbers, including the Internet of Things (IoT).

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Conclusion

With the accelerating shift in global communication to mobile devices, Caller ID has taken on a renewed and greater significance. More than ever before, consumers and enterprises want to know—and trust—who's calling or texting them. Trust in traditional Caller ID services, which is eroding from practices such as spoofing, is being renewed with robust solutions that benefit carriers, newer communications technology providers, subscribers, and regulatory agencies alike.

With our innovative platform, Neustar is uniquely positioned to deliver next-generation services that provide richer and more detailed information to the called party, along with a robust solution for authentication.

As the leading provider of caller identification services, Neustar delivers high-quality service and superior coverage, all at a competitive cost and with minimal complexity. Our unique centralized data repository model streamlines implementation and lowers risk, allowing providers to inform critical consumer decisions and deter illegal and fraudulent calling activities.

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