

Voice Telephony Fraud Survey

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We believe that if fraud is better understood, it will be easier to fight it. Therefore as academics, we are trying to systematize knowledge on telecom fraud, focusing on voice telephony. For this purpose, we created a high level picture that summarize and organize the fraud ecosystem in different layers, ranging from the inherent flaws in the roots of the system to the final goals of the fraudster.

We are now looking for feedback from the industry experts of the field through this survey.

The responses to this survey will be anonymous and only be used aggregated for research purposes. We will publish a research paper using the results of this study, making this work helpful for both academia and industry.

Thank you for supporting our work with your valuable insights.

Wholesale Billing Related Fraud

- **Arbitrage fraud:** A wholesale operator's tariff below the market value is manipulated by other operators (eg. abuse of flat rates)
- **Tromboning:** Sending domestic fixed to mobile calls via international routes
- **Re-origination:** Sending international traffic over another country or tampering with the caller ID information, to reduce call termination prices
- **Cherry picking:** Manipulating the LCR process to pick the erroneously set cheapest route
- **Traffic pumping:** Abuse of inter-carrier compensation rules (also called 'access stimulation')
- **Route blending:** Pushing part of traffic to low quality route
- **Location Routing Number fraud:** Insertion of fake LRNs in SIP messages
- **Fraudulent transit and partnering operators:** Unreliable operators, long firm fraud
- **Call looping:** Routing calls back to originator
- **Interconnect bypass fraud:** Use of illegal gateway exchanges
- **Whipsawing:** Pressure by monopoly carriers over smaller carriers to reduce accounting rates
- **False Answer Supervision:** A transit operator fakes the state of the call and charges other operators for incomplete and terminated calls

Retail Billing Related Fraud

- **Slamming:** Changing customer's service provider without notice
- **Cramming:** Adding small, unauthorized charges to customers' bills
- **Negative option notice:** Subscribing customer to a service without notice
- **False answer supervision:** An operator fakes the call state and charges extra costs to the customers (eg. charging the call while ringing)
- **Dialback fraud:** Unauthorized call resale by 3rd party services. Customers trigger a call request and they are called back to connect with the destination.
- **Traffic brokering:** Selling low cost calls obtained through fraudulent SIM cards or phone lines
- **Arbitrage:** An operator's tariff below the market value is manipulated by customers
- **Tariff plan abuse by customers:** Manipulation of tariff plans and campaigns by customers (eg. traffic inflation for credits/bonus)

Toll Evasion Fraud

- **Clip-on fraud:** Fraudsters connecting to someone else's phone line
- **Subscription fraud:** Subscribing with no intention to pay
- **Superimposed fraud:** Fraudsters take over a legitimate customer's subscription by cellular cloning, phone theft etc.
- **Internal fraud:** Fraud committed by employees of an operator
- **Toll fraud (PBX dial through):** Abuse of hacked PBX to route calls at no cost
- **Top-up related fraud:** Abuse of top-up cards and related services
- **Payphone fraud:** Bypassing the charging mechanism of payphones

Revenue Sharing Fraud

- **Callback (Wangiri) fraud:** Fraudsters leave missed calls to get a call back
- **International Revenue Share Fraud:** Fraudulent SIM cards used in roaming to call premium rate numbers or high cost destinations for revenue sharing
- **Call forwarding fraud:** Fraudsters setting up call forwarding on a phone or PBX to make calls to high cost numbers
- **Call hijacking (short-stopping):** A transit operator hijacks the calls and routes them somewhere else.
- **Toll free number fraud:** (i) Fraudsters partnering with carriers to share revenue from the artificially inflated traffic to toll free numbers of big companies. (ii) Fraud involving high cost numbers that look like they belong to the toll free number range.

Voice Spam

- **Telemarketing:** Unwanted and unpermitted marketing calls
- **Robocalling:** Generating nuisance calls using computerized systems to leave pre-recorded messages

Targeted Fraud

- **Impostering:** Account takeover and identity theft
- **Tracking and eavesdropping:** Location tracking and eavesdropping on phone calls
- **Blackmailing:** Fraudster blackmails a person or company by disrupting the phone service
- **War dialing:** Scanning the telephone network to locate vulnerable machines and launch further attacks

Social Engineering Based Fraud

- **Voice Phishing:** Phishing over phone calls
- **Advanced Fee Fraud:** Nigerian (419) scams

1. What is your first impression about the picture?

(It will be very useful if you can briefly explain your opinions in the additional comments section.)

- I like it and I can use it as a reference.
- I see mistakes and missing points. (Please tell us more about the mistakes in the comment box.)
- This picture does not make any sense to me.

Additional comments (We really appreciate if you can explain your positive and negative opinions and point out the mistakes you see.)

2. Please rate the usefulness of the picture from 1 to 5.

Not useful at all

Very useful

○○○○○

3. Please rate the comprehensibility of the picture from 1 to 5.

Very difficult to understand

Very easy to understand

4. For each fraud type in the 'Wholesale billing related fraud' category, select the options that apply to this fraud type.

(For the questions 4 - 10:

***Incorrectly named* means the name of the fraud type is not correct.**

***Incorrectly categorized* means the fraud type does not belong to this category.**

***Frequently detected* means the fraud type is one of the most frequently encountered fraud types.**

***Rising threat* means the popularity of this fraud type has increased recently.)**

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Arbitrage fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tromboning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic pumping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Route blending	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location Routing Number fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fraudulent transit and partnering operators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call looping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interconnect bypass fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-origination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whipsawing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cherry Picking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
False Answer Supervision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

5. For each fraud type in the 'Retail billing related fraud' category, select the options that apply to this fraud type.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Slamming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cramming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Negative option notice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
False answer supervision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dialback fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic brokering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arbitrage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tariff plan abuse by customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

6. For each fraud type in the 'Toll evasion fraud' category, select options that apply.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Clip-on fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subscription fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Superimposed fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PBX dial through fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Top-up related fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Payphone fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

7. For each fraud type in the 'Revenue sharing fraud' category, select the options that apply to this fraud type.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Callback (Wangiri) fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
International Revenue Share Fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call forwarding fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call hijacking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toll free number fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

8. For each fraud type in the 'Voice Spam' category, select the options that apply to this fraud type.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Telemarketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robocalling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

9. For each fraud type in the 'Targeted fraud' category, select the options that apply to this fraud type.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Impostering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tracking and eavesdropping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blackmailing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
War dialing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

10. For each fraud type in the 'Social engineering based fraud' category, select the options that apply to this fraud type.

	Incorrectly named	Incorrectly categorized	Frequently detected	Rising threat
Voice phishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced fee fraud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

11. For each of the fraud enabling techniques, select options that apply to this technique. (Frequently detected means the technique is one of the most frequently encountered techniques. Rising threat means the popularity of this technique has increased recently.)

	Frequently detected	Rising threat
Manipulation of call signalling	<input type="checkbox"/>	<input type="checkbox"/>
Illegal billing practices	<input type="checkbox"/>	<input type="checkbox"/>
LCR (Least Cost Routing) manipulation	<input type="checkbox"/>	<input type="checkbox"/>
Fraudulent adjustments by employees (internal)	<input type="checkbox"/>	<input type="checkbox"/>
PBX hacking	<input type="checkbox"/>	<input type="checkbox"/>
Voicemail hacking	<input type="checkbox"/>	<input type="checkbox"/>

	Frequently detected	Rising threat
SS7 Tampering	<input type="checkbox"/>	<input type="checkbox"/>
Attacks to VOIP protocols	<input type="checkbox"/>	<input type="checkbox"/>
Premium Rate Services related attacks	<input type="checkbox"/>	<input type="checkbox"/>
Value Added Services related attacks	<input type="checkbox"/>	<input type="checkbox"/>
Artificial inflation of traffic	<input type="checkbox"/>	<input type="checkbox"/>
Use of conference calling and multiple call transfers	<input type="checkbox"/>	<input type="checkbox"/>
Fake GSM base stations	<input type="checkbox"/>	<input type="checkbox"/>
SIM Boxes	<input type="checkbox"/>	<input type="checkbox"/>
Cellular cloning	<input type="checkbox"/>	<input type="checkbox"/>
Mobile malware	<input type="checkbox"/>	<input type="checkbox"/>
SIM card, calling card related techniques	<input type="checkbox"/>	<input type="checkbox"/>
Caller ID related techniques (ex. Caller ID and ANI spoofing)	<input type="checkbox"/>	<input type="checkbox"/>
Social engineering attacks	<input type="checkbox"/>	<input type="checkbox"/>
Telephony Denial of Service attacks	<input type="checkbox"/>	<input type="checkbox"/>
Phreaking	<input type="checkbox"/>	<input type="checkbox"/>
Payphones	<input type="checkbox"/>	<input type="checkbox"/>
Telecommunications Relay Service	<input type="checkbox"/>	<input type="checkbox"/>

Additional comments (optional)

12. Are there any fraud types or techniques that are missing?

13. What are your recommendations to improve this work?

A large, empty rectangular box with a thin black border, intended for the user to write their recommendations to improve the work. It occupies the upper portion of the page below the question.

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Questions Related to Your Fraud Experience

NB: From this point, answering is not mandatory but would help us to better understand your comments.

The responses are anonymous and will be only used for statistics.

14. Your company is a

- Tier 1 Operator
- Tier 2 Operator
- Tier 3 Operator
- Tier 4 Operator
- 3rd Party Service Against Fraud
- Other (please specify)

15. Which services does your company provide or work on?

- Landline
- Mobile
- VOIP
- Data services and broadband

16. In which region(s) does your company operate?

- North America
- Central and South America
- Europe
- Asia
- Africa
- Ocenia

17. Does your company collaborate with any of the following associations?

- GSMA
- CFCA
- ITU
- TMForum
- i3Forum
- M3AAWG
- ETNO
- FIINA
- TIA
- TUFF
- SATA
- AICEP
- ATFRA
- Other (please specify)

18. Which of the following statements best indicate your company's attitude and experience about telephony fraud?

- A certain level of fraud is acceptable and unavoidable.
- No need to take precautions if the cost of precautions exceeds the cost of fraud.
- We should focus on the most problematic fraud types.
- We should do our best to avoid all types of fraud.
- We do not experience a significant amount of fraud.
- We experience a huge amount of fraud.
- Other (please specify)

19. What is the average time passing between the occurrence and detection of a fraud case in your company?

- less than 4 hours
- between 5 and 24 hours
- between 2 and 7 days
- greater than 1 week

20. Fraud is mainly detected by

- Internal fraud detection system
- Other telecom operator complaint
- User complaints
- Law enforcement
- Other third party
- Other (please specify)

21. Which countries are the most problematic ones in terms of the origination or termination of fraudulent calls?

Please list the top five countries according to you experience.

22. What is the average number of fraud cases that your company detect per month?

A fraud case can be a defrauded customer, a fraudulent operator or a fraudulent 3rd party service that you discover.

- <25
- 26-50
- 51-100
- 101-250
- 251-500
- 501-1000
- 1000+
- I don't know
- Other (please specify)

23. Which of the following factors are the most significant obstacles against combating fraud cases?

- Inconsistent terminology on fraud methods and countermeasures
- Variety of operators
- Variety of technologies
- Poor regulatory and legal practices
- Convergence with IP networks
- Pressure on increasing revenue
- Pressure on decreasing prices and customer churn rate
- Dealing with big data and automatization of tasks
- High cost of commercial fraud management solutions
- Lack of visibility on fraud
- Some of the fraud is not significant enough to fight it
- Regulatory obstacles

Additional comments (optional)

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Operator specific questions

24. How many employees does your company have?

- 0-500
- 501-1,000
- 1,001-5,000
- 5,001-10,000
- 10,001-50,000
- 50,001-100,000
- 100,000+
- Other (please specify)

25. How many subscribers does your company have?

- <1,000,000
- 1,000,001-10,000,000
- 10,000,001-25,000,000
- 25,000,001-50,000,000
- 50,000,000+
- Only wholesale customers
- Other (please specify)

26. How many partners does your company have for international transition or termination of calls?

- 0-50
- 51-100
- 101-150
- 151-200
- 200+

27. Do you share your data related to fraud cases with your partners?

- Yes
- No

28. Which department is responsible from fraud management in your company?

29. Which techniques do you use to combat fraud?

- Commercial software and tools
- Inhouse tools
- Both
- Other (please specify)

30. Notify me at the following email address when the results of the study are available

**31. We may contact you if we need further clarifications on your answers. Do you agree with that?
(Your email address will not be used for any other purpose.)**

Yes

No