Tracey: [00:00](https://www.rev.com/transcript-editor/Edit?token=Bf5Z6zmGNWYuZM6SpeNsPX68AWN7D53_b7Zuh93ISzoMqgS2UY1xy5M9KtizWulFvNriOOesD7v17FUQqZ1Aaq08yXI&loadFrom=DocumentDeeplink&ts=0.79) Hello, and welcome to NC State's Audio Abstract. I'm your host. Tracey Peake. Robocalls are one of modern lives annoyances, and we've all heard that answering them only leads to receiving more, but is that true? A year long study from NC State looked at how robocalls actually work and debunked a few myths along the way. We're speaking today with Brad Reaves Assistant Professor of Computer Science here at NC State and co-author of the robocall study. Welcome Brad.

Brad: [00:31](https://www.rev.com/transcript-editor/Edit?token=WVBIkZhF60sFSxNSt2_86Z_Pz_D13f92iMyXeutn8sUABcmcKnhcAU6KZ0xpilPAR7AUrl7orMZ194RWRasElIZy6Fk&loadFrom=DocumentDeeplink&ts=31.63) Hi, glad to be here.

Tracey: [00:33](https://www.rev.com/transcript-editor/Edit?token=eunYrInNCfSpjS3sIPaCFrfxBmUuMVNR5Mk_xIO4AU03KdkQQ6LtcCEf_SS4OUEi28Ka6t7bq6Zdh8LbDAx68v6nyUo&loadFrom=DocumentDeeplink&ts=33.22) Let's start with some basic background on robocalls. How do these companies manage to get around FCC regulations concerning robocalls? How did we get to this point?

Brad: [00:44](https://www.rev.com/transcript-editor/Edit?token=TBWHfO_1ITPO10OtLZlnObJKXCMT9DelrBz6371NUedjquct1LJ-_kEMQRkODNpFNAylJmTaTquH03xn7KlrQaEDOnQ&loadFrom=DocumentDeeplink&ts=44.09) Well, that is a great question and like all really hard problems there's a lot of facets to it. On the one hand, there is the technical side of the issue. The network went from being operated by a single entity, the Bell System to having first a few major players who all could continue to trust each other to having now, there's over 700 licensed telecommunications carriers in the United States alone. And so the reason that this expansion creates the robocall problem is that the technical side of the network was never designed to operate in a place where you had so many operators that you couldn't necessarily feel like you could trust anymore.

 The network had a built in trust assumption that all calls were going to be originated carefully and lawfully. And so you asked the question about the legal side, how do these robocallers, especially the scams operate without being prosecuted or sued. And there's a couple of answers to that as well. And so the first of them is technical. It's simply incredibly hard to figure out where these calls are actually originating from. So there's one particular social security number scam that I think we probably all have received at some point. Certainly, we saw a lot of it in our data about, you get a call that says your social security number has been canceled. The question is, where did that call come from? It probably came from one call center, some place, but because of the way the phone network actually works, the call that you receive didn't just come from your provider, it came from another provider who delivered it on behalf of another provider who delivered it on behalf of another provider. And this is what makes the phone network work.

 And the ability to be flexible with call routing is one of the reasons why telecommunication costs have declined over the years. But at the same time, it makes it harder to even identify who should be prosecuted or targeted. On the back end of the problem, once you do identify one of these operations, the FCC or FTC, depending on which regulatory body is actually pursuing a case, has to build a mountain of evidence. And that takes a lot of manpower. Similarly, it costs a lot to bring these cases to judgment. And when they're successful, the shell companies that operate these robocall scams evaporate and the judgments, the government just simply can't collect on them.

Tracey: [04:42](https://www.rev.com/transcript-editor/Edit?token=8iehZRcuguBoiN6Kd26DXIBsBGZ_REZJ4sO-J-8lR2PfoMuTYNJahVGLetiJdzg6ir1__bAZAYdFHaO2-DnOCGOUykQ&loadFrom=DocumentDeeplink&ts=282.63) So there is no one there to sue, to collect from, they just vanish.

Brad: [04:47](https://www.rev.com/transcript-editor/Edit?token=sTk9CrWHWOKr0m4yLE7nB0WHQEuKT2s8M7Ec5yt4dH9i1-xoAMK1Nbf6ZVNGAePJFECJWtC2HevSIG5iK6oBOqzsunY&loadFrom=DocumentDeeplink&ts=287.96) Essentially. And that's in the case where they're actually operating domestically. There was a famous case a couple of years ago in 2018, where there was a single operation operating in Bangalore, India that took up two stories of an office building. And they were perpetrating IRS scams and to actually prosecute that because the operation was happening internationally, it took a large and coordinated efforts of American law enforcement and law enforcement agencies in India to actually do the take down. And so you can imagine the level of work that it took just to even have the meetings between the relevant parties for that to happen much less to actually accomplish it.

Tracey: [05:41](https://www.rev.com/transcript-editor/Edit?token=oDLgYamElCEiUqHDWV08YRAFe5IjJFe7IYe2w1Wui0Q3eTuFA3Lp1B12gvSvCFrNvHOz8Ea0FCOkVGU-c-P0be3BMVY&loadFrom=DocumentDeeplink&ts=341.28) Yeah, that's amazing. And it brings me to a related question, which is obviously there's a profit here. Do we have any idea, how much money are people making off of these? I know for myself personally, I just don't answer the phone anymore, but I guess not everyone is me. So how does this work?

Brad: [06:11](https://www.rev.com/transcript-editor/Edit?token=W1jOaKlx7w6T5sfIVf6jl5auo990jTxRPYGXGRSm2MXtvRaBmx43dXdWv8JvlLgK2H9TswGCrHB2-tK0PAUdEPkhwzA&loadFrom=DocumentDeeplink&ts=371.43) So that's a great question. And by the way, you're not alone. Most people have stopped answering the phone with these scams and there's been a lot of side effects of that. One of the problems is that now COVID-19 contact tracers, can't reach people because they don't answer numbers they don't recognize. So there's a lot of consequences of that. But coming back to your question of the financial incentives, these are always perpetrated with a business model. And it's one that seems to be reasonably successful. If it weren't, we wouldn't have seen relatively flat volume over the course of our study. We also know from cases that have actually been successfully prosecuted, that the perpetrators do walk away with millions of dollars. And that's because these are long running operations and most people don't answer these. And if you do answer and you hear that your social security number has been canceled, you laugh and you hang up. But there are some people, and they're often vulnerable populations, elderly people who may be easily confused or maybe more trusting.

 And another very popular target population is immigrants. People who have recently arrived to this country who don't quite understand the norms of how our government agencies work, may not know that the IRS doesn't call you to demand payment in iTunes gift cards. And so there's a very small population of people that are susceptible. But when you get a hit, you can make thousands of dollars on that one entity. And the scams are fairly cheap to pull off, and that's another reason why they're so prolific is, the drastic reduction in costs of both telecommunications' equipment, pretty much all of it is software now, that most of it you could download yourself. It wouldn't be that hard for you to set up a robocalling operation if you were technically savvy.

 And the other is that the actual cost of telecommunication service also has gotten so much cheaper, relative to what it would be, that it can be financially profitable to do these scams in ways that they weren't in the past. And I made a comment earlier about the carriers that these robocallers use. And I want to say that there are a lot of carriers out there that are actively working on trying to stop this. And as soon as they identify that someone is violating the law, using their service, they terminate them. And of course that includes most carriers that certainly you've heard of, and that we've worked with, especially our partner in this research, bandwidth. And so the scammers are making money off of this, but it's really not helping the telephone companies any.

Tracey: [10:00](https://www.rev.com/transcript-editor/Edit?token=gJf5e3sq7s1TcdP3E4YlTShW3CNsuvoXpuCwzzCyaVmr8yi5P3XR26qjrc-q4u9rN4jkUIGTqBPh_epkpcBPXQSPP0s&loadFrom=DocumentDeeplink&ts=600.38) Well, it's like, whack-a-mole basically, because every time you knock one down, you get three or four more that will just pop up and take their place.

Brad: [10:08](https://www.rev.com/transcript-editor/Edit?token=5WDnYRUvKOLQSDZ7rGqu6RYf-u7JfFMENOR4N-ORk_KUxGo3C9eK7qZQ6vFkWQScS76dsoQ_ubp7jMBKTZj6XpfdfyU&loadFrom=DocumentDeeplink&ts=608.02) Exactly, and I do want to say my digression on the phone companies, one of the points I was trying to come back around to is that because there are so many carriers that you could potentially purchase service from, as soon as you get knocked off one network, you just go and join another one. Yeah, you can do it in a matter of hours.

Tracey: [10:29](https://www.rev.com/transcript-editor/Edit?token=EwV1n_e6OkpsNZsBrI3Wix8-tV6IaXK5k1zjY1AqDgPZunKiQuhrKXdmpkbeMelHoc2_L7jEL9bNeSjrdzZTIyKvuP0&loadFrom=DocumentDeeplink&ts=629.51) Wow. So if you actually do fall for it, the number on the screen looks familiar and you pick up the call, what happens? The popular conception of that is that somehow all of the other robocall companies out there just know, we've got a live one and they just all descend upon you like locusts. So what actually happens?

Brad: [10:56](https://www.rev.com/transcript-editor/Edit?token=wnejceurzwRx5t4Xn4iGkt-6r7S2Udp4AB4z01gDxFEEc9EddrPdzAZubMezqcSXUaH5oZdv5468xYBHaB3ShaHT9E8&loadFrom=DocumentDeeplink&ts=656.02) So that's a great question. And it depends on who's calling you. So we saw in our data that some campaigns are going to try to call you back more than once, no matter what. We saw that something like 60% of our robocalls, when we answer, there's nobody there, there's nothing on the other end. And I think everybody has had this experience where you answer the phone and it's just silence on the other end. And so what's actually happening there is kind of interesting, for a long time the community assumed that this was robocallers scanning the phone space to try to build a list of people who are going to answer the phone, that they can then resell. And there may be some of that going on. We didn't see a lot of evidence for it in our study, but it probably does happen a little bit.

 Most of the time though, when you get answer one of those silent calls, what's actually happening is that the robocallers, what they do is because placing a phone call is so cheap and so easy, and they actually don't pay for it unless the call is actually connected, meaning somebody answers. They will use their software to, say for each representative they have in the call center, they will send 10 or 15 calls at once and at the exact same time, knowing that most people like you, aren't going to answer. But in the event that two people answer at the same time, whoever answered first is who gets their attention and the other one just sits silent until they hang up.

Tracey: [12:46](https://www.rev.com/transcript-editor/Edit?token=KLaluXhLdeyf1ZRITChnrvzOFFAI_78xQNRUMmRRZ9PUJjwh2QIZiQqSkt5gDo-DR1XWXD9WmJlN9AvSOxTGS2Ks6xE&loadFrom=DocumentDeeplink&ts=766.79) When you hear that silence, you can just offer good wishes to the poor soul who just answered a robocall somewhere else in the world.

Brad: [12:57](https://www.rev.com/transcript-editor/Edit?token=Xqfe_9M30eT__PGYUiS3ee9UWqkGlJ734xw-CZu6l7lwgnhwovb0k2FQr3_OImGh1yqd52ybX0fA_kDUpu830ECO3Mc&loadFrom=DocumentDeeplink&ts=777.65) Yeah, say a little prayer for the person who got hit that day.

Tracey: [13:00](https://www.rev.com/transcript-editor/Edit?token=cdyuOQ4F8SNsS65_0AedQHelwmBkssRe5OvRN_zrOrD2oVJ-FfW3QuUTDoexWPq6aKZ3w6QP4Uo7o5esGGdcAfWwuxs&loadFrom=DocumentDeeplink&ts=780.83) Oone of the more annoying aspects of robocalls is the fact that they can spoof numbers and this can lead to something that in your survey of robocalls, you've dubbed a storm of calls. It sounds terrible. Can you walk me through what this is and how it happens?

Brad: [13:24](https://www.rev.com/transcript-editor/Edit?token=vcu1LzEWCZmr7LZCf0ZQVi7Ew1yYK0GfScV369Ez1e9A2DED4V_Vl_Jc8oOjCakI5hprD0swCQREo5xhBQz8yAlEF0o&loadFrom=DocumentDeeplink&ts=804.51) Yeah, absolutely. So the spoofing issue by the way is probably one of the most important reasons why this problem is hard to solve. Because if robocallers, if it weren't possible for them to spoof their caller ID, to place any number that they wanted, we'd have a lot easier time finding out who is responsible. And their ability to do this is actually built into the phone network because it's a feature that lots of legitimate businesses use. For example, say, you call an airline customer service hotline, and maybe you speak to Alice there, and perhaps you get disconnected and Alice calls you back. The airline doesn't want you to see Alice's desk line because if you needed to contact them again, you shouldn't call Alice, you should call their global 1-800 number. And so they will, for lack of a better term, spoof their own phone number to show that it was coming from their customer service line rather than Alice's desk. And that's an important feature, but robocallers are abusing it.

 Now, one of the consequences of this is that it makes the problem just very hard to solve, but another consequence was these storms that you mentioned. And so to preface the explanation, I've been working on robocalls for about five years now. And along the way, when people ask what I do, and I say, oh, I work on robocalls. The first thing I hear is, oh my God, I hate those, I get so many of them. But the second thing I would sometimes hear is, I would hear these stories, it was almost urban legend, but everybody had one where somebody's cousins, neighbors, dog walker got hit with so many robocalls in one day that they couldn't even answer the phone. And I always chalked this up to some weird urban legend because I never heard or met anyone who it happened to firsthand.

 And so when we were doing this study, we were monitoring 66,000 phone lines. In the process, this happened to us, not once, but hundreds of times when we started looking at the data. And we were curious about what was happening, why is this one number getting hit with so many robocalls out of the blue? It turns out that when robocallers spoof a phone number, they don't check to see if anyone else is using it. And so what happens is that they will place tens of thousands of calls claiming that particular number all at the same time. Now, in some fraction of those numbers are going to see a missed call and try to call back. And so what happens is the technical term for this in computer security, is a reflected denial of service attack, where this is not intended by the robocallers, this is just kind of, it's almost funny, unless it happens to you, side effect of robocall spoofing.

 And I mentioned at the beginning of this, that I had been hearing this urban legend that, three or four connections away, somebody had heard this story. And shortly after we discovered this phenomenon in our data, I got a message from one of our students in the lab that said, "Hey, Brad I'm getting hundreds of calls right now and a lot of people are asking me why I called them, do you have any idea what's going on?" And this is what had happened to him. Now, the good news is that this phenomenon is fairly short lived. It's a matter of hours or maybe a day or two. And it's terrible that it happens, but there's really very little that we can do about it right now.

Tracey: [18:08](https://www.rev.com/transcript-editor/Edit?token=y1gx2Dz1d3u_swMSfkw5N_cMwqU_2UdbkIzBoT7-_MMWPAYJZKHTELGRclVe4ahIg6ep2l91o-kuwcTke13_lgxz1Fs&loadFrom=DocumentDeeplink&ts=1088.94) That brings me to a related follow on question, is there any way that a human being can protect their phone number from being spoofed by these companies? It appears that the answer is no.

Brad: [18:22](https://www.rev.com/transcript-editor/Edit?token=t_w7JxPgcGQPjx1x2yUNJrO1LULMqpIltkBkiHWuHP4hLZtwnvDVZHogdMnaeaf3oFaH_-Tp_keRyzCqfbIlbmlDl5o&loadFrom=DocumentDeeplink&ts=1102.48) No, there's absolutely nothing you can do. If I wanted to, by this afternoon, I could be spoofing calls from the White House. There's nothing technical to, that you as a phone owner can do about this. Now, that does lead me to a related idea though and that is that because spoofing is such an important part of the problem carriers and regulators are working on technical solutions to this problem. And so one of these is called stir and shaken. It's actually going to be mandated to be deployed by summer of next year in I believe July 2021. And so what this is going to do is make it so that if a carrier originates a call, if they start a call, what they do is append what's called a cryptographic signature. And so this is something that is completely unspoofable, that says, I originated this call and it actually came from this number, they're not spoofing.

 And so say AT&T or Verizon or a partner bandwidth would send this information along with the call through the network and so that when it gets to your carrier, they can ensure that it wasn't spoofed. And so there is hope coming down the line, unfortunately, this technique isn't going to work for some of the older telephone infrastructure that is still in place and so it's unclear how much of an effect this will have, but people are working on it.

Tracey: [20:17](https://www.rev.com/transcript-editor/Edit?token=PQO5gflrceyl9TpIQHMkPt--faYglC0Un1dcYM0VmCJLNuq6IUseGHthq8f-GmwuCzELiiNmfR0SVBctdH76LkmM4Gs&loadFrom=DocumentDeeplink&ts=1217.56) Finally, my last question for you, what is the most interesting or the weirdest thing that you discovered about robocalls while you were working on this project?

Brad: [21:09](https://www.rev.com/transcript-editor/Edit?token=KYH33P_CeNJHGR5CmntF2SzefMwSHSh6RObG_nNjvQQZ51S1cCE_bZxlyi9n9MRqPMj7DG_rouWfxB5WtmaADG86JxM&loadFrom=DocumentDeeplink&ts=1269.15) Oh, that's such a great question. So there's a few of these. And so the first one was the storms. That was something that we had no expectation of ever discovering. And it felt like real validation that having done this study that we could actually say, this is a real thing that happens to people. Probably the next most surprising thing was we did this study and as part of it, one of the things that we did was we took two groups of 3000 phone numbers chosen completely at random and we assigned them to two test conditions. One group was going to not answer any calls and the other was going to answer every single call that they received. And we did this test for six weeks. And what we were curious about is whether or not we could actually get more calls by answering them. We're robocall researchers, the more robocalls we get the better. But what we found was that there was no difference in the two groups.

 And so what we're telling people, and this is practice I'm living by myself with no ill effect is, if you really think it's a robocall, don't answer it. If you do answer it, don't be upset and don't worry that you're going to suddenly get thousands more robocalls. It probably won't make a difference. And of course, if there's a scammer on the other end, don't engage, but that's good life advice in all settings.

Tracey: [23:10](https://www.rev.com/transcript-editor/Edit?token=EXM3A77jfH_vlydrTemKkCjK-6wHdQOmFyv0S6TRmKT51Oqm3pzwna3BbijtTtGT97Kq5z-Kd4M2dEHl7RgDA2ONZCU&loadFrom=DocumentDeeplink&ts=1390.47) I believe so. Well, thank you so much for being here today, Brad, that was simultaneously depressing and uplifting. No matter what we do, we're going to get the robocalls, but maybe, if you answer it, it doesn't mean you're doomed. So that's good to know.

Brad: [23:41](https://www.rev.com/transcript-editor/Edit?token=LVop3ZpnhrT7PDtqE3sLb0RDBaG9IJwfAfanAHVC2oSLtYJZ5CBrOKVkPG0joAFE9RUoMyzW_AWseLF2LwG8NL5pVuk&loadFrom=DocumentDeeplink&ts=1421.59) Yeah. Look for the positive in all things.

Tracey: [23:47](https://www.rev.com/transcript-editor/Edit?token=ZEzc7eHSzGzYeAsQv4coPnKbpg_y3CI8F9xn-_rWfHa5I9UZFNsJXI10mCfKK-H8ROWjaL2Bm2P1_-qtae04WLG1xQo&loadFrom=DocumentDeeplink&ts=1427.49) That is good life advice. We have been speaking today with Brad Reaves Assistant Professor of Computer Science here at NC State. This has been Audio Abstract. I'm your host, Tracey Peake. Thank you so much for listening.