

Episode Nine: Smoke and Mirrors

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Chasing the Wind, Part Nine: Smoke and Mirrors

by Robert G. Ferrell

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Jake sat at his assigned terminal and looked over the scenario for the morning's exercise. He was in the third day of a five-day training class on hacking techniques. Today's lesson was the Distributed Denial of Service attack, or DDoS. His mission was to block access to a dummy Web server by compromising as many of the other students' boxes as possible and using them to saturate the target server's HTTP daemon. The Web server was running a variety of logging utilities so that the class could conduct an extensive postmortem of the attacks and observe firsthand the mechanics and resulting signature of this trendy form of entertainment.

First things first, however. He needed to get his exploit script into someone else's machine while fending off attempts to do the same to his own. He did an `arp -a` to get a feel for the network neighborhood, then looked at his own IP address. It was 192.168.1.15. Made sense so far. The 192.168.0.0 address block was reserved for local use on networks not directly connected to the Internet. His `arp` showed him that the other machines were in the same subnet, ranging up to 192.168.1.24. He glanced down the ARP table at the hardware addresses of the network interface cards. There was a little bit of heterogeneity, but for the most part the cards were identical. Something about one of them rang a far, faint bell, but he didn't have time to sort out what it meant right now. Besides, knowing his psyche, it was probably part of some old girlfriend's telephone number. That train of thought segued smoothly into reveries about his recent dinner date with Deanna. Just as he was getting to the best part, the CPU usage meter in the lower right hand corner of his screen jumped up to near 100% and yanked him back into the here and now.

Jake managed to evict the intruder, who had been rather clumsily searching his drives for something, and spent a few minutes locking down his system as Deanna had taught him to do. This time he managed to keep his mind on business, and so the process went fairly quickly. After he felt relatively safe from basic attack, he started doing some probes of his own. He portmapped everyone on the local segment, and put his network interface into promiscuous mode for a couple of megs of packet capture, just to get the lay of the land.

Between the results of the portmapping and the network traffic profile he built up from sniffing, Jake now had a pretty good idea of what ports were being used by which machines. He used his browser to hit the target page. It came up very rapidly, which meant that no one had succeeded in affecting it yet. Well, the morning was young.

Ian struggled to a sitting position. He'd come down with strep throat and spent the last eight days in bed. He was desperate to get back to his computers. There was only so much TV he could stand to watch, and the local cable offerings were none too swift even in the best of circumstances. He sat on the edge of his bed feeling dizzy and extremely weak, but determined to get online. He wished fervently he'd had enough sense to get a laptop; he would make that and an 802.11 network a priority in the future. After a few minutes of gathering strength, Ian stood up gingerly and shuffled with agonizing slowness over to his command chair. He felt sure that parts of him would break off and shatter on the floor if he weren't very, very careful.

He had a ton of email. He scanned it; most of it was either spam or stuff from various hacker mailing lists. One of them caught his eye; it was a forwarded news story about a hacker who called himself f00m4nchU who Ian recognized as a member of the BroadBandits. He'd been indicted on several counts of identity theft and computer fraud after being caught breaking into a popular online commerce site during an undercover sting operation. Ian was expecting himself to be outraged, but instead he just shrugged. He'd never liked f00m4nchU (whose real name, honest to goodness, was Dingle) much anyway. He was loud, brash, and far too sure of his own invulnerability.

If there's one thing that Ian had learned along his tortuous path to hackerdom, it was to be cautious and never give away how much you really know. Act a little stupid, a little naive. Watch, listen, learn, survive. That was his mantra. You go sticking your arm down every drainpipe that comes along, sooner or later something's going to bite you, and bite you hard. Hey, that was just Darwin in action. The feds were like wolves: they cut the weak, injured, and stupid out of the herd, leaving the strong and smart to graze another day. Ian had spent a lot of time thinking while he was flat on his back in bed. He was determined to be a survivor, and that meant staying alert and not taking foolish risks.

Realizing that he was drifting off, Ian forced himself awake and plugged into his favorite chat room on DALnet. Time to see what the monkeys in the zoo were up to.

Douglas paused with his finger on the "enter" key. He wasn't a melodramatic person by nature, not at all. It was just that this was something of an occasion, being both the first simulation in the new building using the new supercomputer, and also the first ever *in situ* trial of the cryogenic pulse lasers that were supposed to induce the microeddy necessary for the quantum computer components to function. Deep down, he was a little afraid of what might (or might not) happen when he pushed that key.

He'd been in a sour mood since the Web site incident, and the failure of his boss to have even a smidgen of sympathy for his position certainly hadn't done anything to improve it. He definitely had plans for the unpleasant Mr. Asworthy, but they would have to wait. Right now he was feeling an old familiar uncertainty about just what in the heck he was really doing on this project. Uncertainty made him a little woozy, and it occurred to him that he must look faintly comical standing there with his finger poised above a computer keyboard while he swayed ever so gently like a sapling in the breeze. He'd probably even chuckle at himself if he weren't afraid it would make him sick.

Douglas had no problem with the physics of the lasers, their supercoolant systems, the little polarizing mirrors through which their beams passed, or even the shielded chamber full of thick translucent goo into which they fired. What he found difficult to contemplate was the assertion that the computer would operate on different quantum channels simultaneously, some of which would produce their answers effectively *before* he pushed the button, but not until *after* he had done so. This sounded like drunken nonsense to Douglas, yet the mathematics describing the effect, at least that part of them he could truly grasp, seemed to support this insane conjecture.

The purpose of this initial series of test runs, apart from simply verifying the experimental electronics and architecture, was to establish the correlation between the thermal and energetic parameters of the test environment and the number of quantum channels generated. Theory held that as the thermal background approached the asymptotic limit of 0 degrees Kelvin, the number of functional quantum channels in existence within the n-dimensional singularity where the laser beams met would increase logarithmically. The beams did not actually meet, but were aimed at one another in such a way as to leave a tiny gap between them. As the photons streamed past one another heading in opposite directions, they induced a tiny rotational current in the highly viscous Bose-Einstein condensate filling the chamber. This eddy supposedly existed in multiple dimensions at once, and had the weird effect of exchanging linear distance

with time. Movement perpendicular to the rotational axis of the eddy moved particles back and forth in time, instead of in space. When photons of a known state were introduced into the eddy through inductive coupling, they could be deflected in and out of the singularity by very slight modulations of current, which changed their attitude to the opposite state. In other words, they could be designated as "ones" or "zeros"--binary information. With every pulse of the laser, a new calculation could be carried out in each of the dimensional "niches" in the chamber. To speed things up even more, some of the calculations would be carried out in a quantum state that, when the current laser pulse ended, would collapse far enough along the temporal vector that from the point of view of an observer they would appear never to have existed at all (having been created in the now but destroyed in the past), yet information about the states of the photons contained in them would still be available.

The trick to doing anything useful with quantum information is to gather it intact. The nature of quantum mechanics is such that, as Schrödinger and his cat so vividly illustrated, the very act of observing quantum states changes them. How, then, could this quantum computer ever be used to generate meaningful and, more to the point, accurate computations? The answer lay in another nifty magic trick of physics called entanglement. As it turns out, under very special circumstances a pair of photons may be "synchronized" so tightly that their states remain identical, even when separated by trillions of miles or millions of years.

The explanation for this is quite frankly unknown, but it makes for some dramatic parlor tricks. There had been a method for producing these tightly coupled pairs published in a public journal, so that technology wasn't really new. What made Bellatrix such a bombshell breakthrough is that it employed the same basic mechanism that created the quantum singularity to produce the entangled pairs. It was a two-for-one bonus, and it made the quantum computer a viable idea for the first time. The theoretical limit for calculation speed was a number with a whole slew of zeros in it per second, but no one really knew how that would work out in practice. Douglas and his team were about to be the first people to know the answer to that question. Taking a deep breath, Douglas pressed the fateful key.

Baseball Cap smiled cheerfully at his laptop. He was just pleased as punch to see those liquid crystal letters and numbers appearing on the screen. The laptop was connected to a little black box with a popup antenna that looked for all the world like some transistor radio from the 1960s. There was no tuning dial, however, for this radio only received one station, whose

transmitter was a small cylinder attached to a fiber optic cable buried deep beneath the floor tiles of the building across the street. If you were to listen to that station, all you would hear would be what sounded like intense bursts of static at random intervals of a few seconds to a few minutes. The station was Acme Ailerons, and the static was top secret project Bellatrix data that belonged to the United States Department of Defense--and *that* was why Baseball Cap was smiling. Everything was going exactly according to plan.

Some people believe that every action in the universe, down to the last collision between random dust grains in deep intergalactic space, is part of some grand overall plan. Some believe, on the other hand, that virtually every action is the result of incomprehensible forces of chaos and entropy that cannot be predicted or controlled, even temporarily, on any but the most local scale. Still others see the universe as a careful balance between order and chaos, a balance which is perpetually maintained by equal but opposite events. Baseball cap, for his part, saw the universe as a giant playground for his personal use. All plans were therefore ultimately constructed for his eventual benefit. Questions of loyalty, honor, ethics, and morality were mere philosophical banter--interesting as topics for discussion over a few beers in the tavern, but not applicable to everyday life--at least not his life, anyway. Only those things that directly contributed to the good of Baseball cap were of any lasting significance. Only those plans which furthered his interests were worth bothering with, and these were the only plans Baseball cap would pursue. So far, this had been quite a successful philosophy for him. His organization was large, well-supported, and highly profitable. He was operating with impunity right under the noses of people who considered themselves the smartest and most technically advanced military force on the planet. Life was good.

Over a thousand miles from Baseball cap and his static-collecting laptop, however, a extraordinarily unlikely sequence of events was coming to pass that would prove unequivocally that the universe doesn't give a wet slap about your plans.

To read **Episode Ten: The Road Less Travelled** , click [here](#).

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