Episode Book

EPISODE #5541

Re-terminating a Keystone Jack After a Bad Ethernet Run

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SYNOPSIS

A friend's DIY Ethernet run negotiated at 80 Mbps on a 2.5-gig fiber connection — and the termination was almost certainly to blame. This episode walks through why a link can come up and pass traffic at one-twentieth of its rated speed, what the negotiated speed actually tells you, and whether a punched-down keystone jack can be pulled out and redone. We cover the real failure causes — incomplete IDC seating, split pairs, excessive untwist, nicked conductors — and the bigger question underneath: which finicky jobs are worth learning yourself, and which are best left to someone who does them every day?

TRANSCRIPT



Corn

Yossi ran the cable. Yossi did not have a keystone jack on him.



Herman

Which is the whole problem in one sentence.



Corn

Right. Here's what Daniel sent us this week. His friend Yossi came out to do an Ethernet run into the room that's going to be his home office in the new apartment. Yossi did the pull, but he didn't have a keystone to terminate it with. He offered to come back. Daniel said no, hold on, this is something I actually want to learn. So he'd already bought supplies, a punchdown tool and one of those toolless keystone jacks where you just lay the wires in and close the lid, and he figured he'd try the toolless one first and fall back to the other method if it didn't work. He cut back a couple of centimeters of jacket, exposed the four twisted pairs, and got an AI tool to walk him through matching the pairs to the slots. There were these tiny triangles, he says, and his read was that the white wire of each pair goes in the triangle and the colored one goes in its corresponding color.



Herman

And it worked.



Corn

It worked. He clamped it shut, the connection felt solid, he plugged in his computer, and he was delighted, his word, to see functioning Ethernet. Then he ran a speed test. Eighty megabits.



Herman

On a two and a half gig fiber connection.



Corn

On a two and a half gig connection that in practice delivers about one and a half. And Claude told him there were dropped packets on top of it. The cable itself is fine, so he's ninety-nine percent sure the fault is the termination he did with his own hands. Which brings him to the questions. First, if you're running tight on slack, can you actually pull the wires back out of a punched-down jack and have another go? Second, what might have gone wrong, given that he followed the instructions carefully and is fairly sure he had all the right wires seated all the way? Third, how are you supposed to match the pairs to the slots, and what are those tiny triangles? And fourth, the one he clearly cares about most, is this a skill a person can get proficient at, or is it one of those jobs best left to the experts? He wanted to do it himself, not to save money, Yossi was happy to come back as part of the service fee. He wanted the skill. But he also thinks the finicky things are exactly the things not worth doing yourself.



Herman

That last part is the actual episode. Everything before it is the setup for it.



Corn

And before we get into any of it, if Yossi is listening, hello.



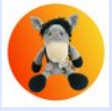
Herman

Hello, Yossi. You did nothing wrong. You left the room and the room got worse.



Corn

So where do we start. Because the thing that jumps out at me is that the link works. He has internet. He's typing this to us from a working connection.



Herman

That's the trap, and it's the reason this is worth a full episode. He did everything that looks correct. He matched colors, he seated wires, he clamped the jack, and he got a link that comes up and passes traffic at roughly one twentieth of what the run should carry. There's no error light. There's no obvious fault. The failure is invisible to the eye, which means the only way to find it is to know what the numbers are telling you.



Corn

So read the numbers for me.



Herman

The negotiated link speed is the first thing you read, before you touch anything. Gigabit Ethernet, 1000BASE-T, requires all four pairs. Eight wires. Ten and a hundred meg Fast Ethernet needs two pairs, four wires. So when a run that should negotiate at a gig or two and a half instead comes up at around a hundred, the almost universal explanation is that one pair is broken. Not a config issue, not a power issue, not a driver. One pair is not carrying signal, and the link has fallen back to the slower standard that only needs the other two.



Corn

And eighty is close enough to a hundred to count.



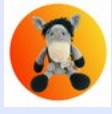
Herman

Eighty is a degraded hundred. It's the same signature. The link negotiated down to Fast Ethernet because it couldn't see all four pairs, and then it's still dropping packets on top of that, which tells you the pairs it can see aren't clean either. So you've got one pair down and at least one more pair marginal. That's a termination problem, full stop. The cable is almost never the culprit.



Corn

Over seventy percent of Cat6 certification failures trace to termination errors rather than cable defects. That number is from AMPCOM's field data, and a separate analysis of five hundred plus failed tests put it above ninety percent.



Herman

And the breakdown of causes is the useful part. Excessive untwist accounts for about forty percent. Incomplete punch-down seating, about twenty-five. Nicked conductors from stripping too aggressively, fifteen. Split pairs from misread color codes, twelve. Category mismatch, the rest. So the single biggest thing people do wrong is untwist the pairs too far before they terminate them.



Corn

Which is invisible. You can't see a split pair. You can't see an under-seated contact. The wire looks like it's in the slot.



Herman

It looks perfect. That's the whole problem. So let's take Daniel's questions in order, because the first one has a clean answer and it's good news. Yes, you can pull the wires back out and redo it.



Corn

Even after they've been punched down.



Herman

That's the defining feature of these connectors. A keystone jack isn't crimped, it uses insulation displacement contacts, IDC. The contact blade cuts through the insulation and cold-welds to the copper. Nothing is permanently deformed in the process, so the connector can be reused. trueCABLE's guide puts it at up to twenty times. CRXCONEC cites the TIA testing standard for a minimum of twenty insert and remove cycles.



Corn

Twenty reuses on a three dollar piece of plastic.



Herman

The jack outlives your patience with the project. Though there's a caveat worth stating plainly, because the two numbers people quote are different and both are true. Twenty cycles is the connector's rated life. AMPCOM's guidance is that the IDC contacts realistically withstand two to three re-punch cycles before the blades lose tension. So the jack will survive twenty insertions, but the contact quality degrades faster than the cycle count suggests. If you look at the contacts and they're visibly worn or deformed, replace the jack. Three dollars versus a hundred and fifty dollar service call.



Corn

What does the actual re-termination look like, mechanically, for the toolless jack he used.



Herman

Different from a punch-down jack, and the difference matters. On a punch-down jack you release the transparent cover by squeezing the thumb latches, then you grip the cable and pull it straight up and out of the prongs. The same channels that guided the conductors in guide them back out, which is what stops you from bending the prongs sideways. On a toolless jack, which is what Daniel has, you snip any zip tie holding the hinged cover closed, you open the lid, and then you remove the plastic lacing cap. That cap is held on tight and it's easy to damage, so you rock it back and forth to work it out of the IDC prongs, and the conductors come out with it. Then you use a small flat-blade screwdriver or needle-nose pliers to pry the wires out of the cap two at a time. Cut off the used end of the cable, re-terminate.



Corn

So the wires come out attached to a piece of plastic, not individually.



Herman

They come out as a set, which is actually a mercy, because it means you're not fighting eight loose conductors in a wall box.



Corn

Now the slack anxiety, because that's the part he's actually worried about. He said he's slightly worried he doesn't have enough slack to re-terminate.



Herman

This is where the standard saves him, if Yossi did his job. The recommendation is a ten to fifteen centimeter service loop inside every wall box, four to six inches, specifically so you can re-terminate without pulling new cable. If the conductors are cut too short to reach the IDC slots, you pull a little more loop out of the box and re-strip. Now, if there's no service loop, then the calculus changes and you're into pulling new cable territory, which is a different job.



Corn

But the failure mode he should actually fear isn't the jack. It's the scissors.



Herman

Correct, and this is the real risk. The jack is reusable. The cable is not. Every re-termination costs you a few centimeters of jacket and conductor. Do it three or four times and you've eaten your service loop, and now you're pulling a new run. So the play is to practice on a scrap piece first, get the technique right on cable that doesn't matter, and then do the real one once.



Corn

Which is a nice segue, because that's exactly what didn't happen here. He practiced on the real thing. So what went wrong. He followed the instructions. He's pretty sure all the wires were in all the way.



Herman

Let's take the most likely failure first, and it's the one that matches his symptoms best. Incomplete IDC seating. The conductor sits partially in the slot. The insulation gets displaced, so it looks seated, but the copper isn't fully cold-welded to the contact. What you get is a high-resistance contact, tens of milliohms instead of single digits. And that's exactly the signature he's seeing. It passes basic connectivity. It comes up. It moves traffic. But it fails under load and it drops packets, because a marginal contact is fine at idle and falls apart when you push throughput through it.



Corn

So the link is technically up and functionally useless.



Herman

It's a connection that would pass a continuity test. All eight lights. And it's not good enough to carry a gigabit.



Corn

What's the second candidate.



Herman

Split pairs, and this is the sneaky one, and it's directly connected to his color code question. Here's how it works. If both wires of a pair get terminated to the correct pin numbers, but using pins that belong to different physical pairs, you've split the pair. A basic continuity tester passes, all eight lights, because every pin has a wire on it. But the pair no longer has its twist, and the twist is what makes the cable work. The signal that's supposed to travel as a differential pair on a tightly twisted set of two conductors is now traveling on two conductors that aren't twisted together, so it radiates and picks up noise instead of cancelling it. The link either won't come up or negotiates at severely reduced speed.



Corn

And a continuity tester can't see it.



Herman

A continuity tester can't see it. A wiremap tester can. A certification tester definitely can. Which is why the wiremap tester matters so much in this story, and we'll come back to that.



Corn

Third candidate.



Herman

Excessive untwist. The spec is a maximum of thirteen millimeters, half an inch, of untwisted conductor at the termination point per TIA-568. For Cat6 running at two hundred and fifty megahertz, you want to aim for ten millimeters or less, four tenths of an inch. And this is the one that catches careful people, because untwisting feels like it makes the job easier. You untwist to get the wires into position, and if you untwist more than you need, you've degraded the cable's noise performance right at the point where it matters most.



Corn

Forty percent of failures.



Herman

Forty percent. It's the single biggest cause, and it's the one that feels like nothing.



Corn

And the fourth.



Herman

Nicked conductors from over-aggressive stripping. If the stripper cuts into the copper, you've created a weak point that can fail under thermal cycling or just fail outright. Fifteen percent of failures. And then the category mismatch, which is the least likely here since he bought Cat6 cable and a Cat6 jack.



Corn

Let me put the pieces together the way he'd experience it. He has a run that should do one and a half gig. It does eighty meg. He's ninety-nine percent sure it's his termination. Is he right.



Herman

He's right, and the number tells us more than that. Eighty meg with dropped packets isn't a clean one-pair-down. A clean one-pair-down gives you a solid hundred. Eighty with drops says one pair is dead and at least one more is marginal. So he's probably got two problems, or one problem that's affecting two contacts. Either way, it's in the jack, not in the cable.



Corn

Now the color code, because this is where his story gets interesting, and I want to be careful here because I think he's going to feel bad about this part.



Herman

He shouldn't. His recollection is almost right. Almost right is exactly how you get a split pair.



Corn

Walk me through what he said. He said there were tiny triangles, and his read was the white cable of each pair goes in the triangle and the colored one goes in its corresponding color.



Herman

So the idea he's describing is real. Every quality Cat6 keystone jack prints the color sequence on the IDC housing, and it prints it twice, in two rows. One row is labeled A, which is T568A. The other is labeled B, which is T568B. You pick one row and you follow it for all eight conductors. The order matters, and the row is the authority.



Corn

And the triangles.



Herman

The triangles are almost certainly the jack's printed guide marks. Some jacks use small triangle or arrow symbols to indicate which slot each wire goes into, with the striped or white conductor of each pair on one side and the solid color on the other. So his instinct, white on one side, color on the other, is the right shape. The problem is that he was reading a general description from an AI tool rather than reading the label on the jack in his hand.



Corn

And the label is the ground truth.



Herman

The label is the ground truth. AMPCOM's guidance is blunt about it. Do not mix and match. If you read the B row for green and the A row for blue, you produce a split pair. And that's the exact failure pattern we just described, the one that passes a continuity test and fails the link.



Corn

So an AI describing the wiring from memory, generically, without seeing his specific jack, is exactly the kind of guidance that could produce a split pair.



Herman

That's the irony of the whole story, and I don't think it's an anti-AI point, it's a point about what the AI can and can't see. A language model can tell you the general principle. It cannot read the label on the jack in your hand. The jack is the authority, not the AI, and not your memory of what the AI said.



Corn

Give me the actual wire orders, because I want listeners to have them.



Herman

T568B first, because it's the most common in North America, more than ninety percent of commercial installs in the US and Canada. The order is white orange, orange, white green, blue, white blue, green, white brown, brown. T568A swaps the orange and green pairs, so pins one and two and pins three and six change places. Pins four and five, the blue pair, and pins seven and eight, the brown pair, are identical in both standards.



Corn

So the difference between A and B is just which pair sits where.



Herman

Electrically identical. The difference is convention. Both work. The critical rule is that both ends of a run must use the same standard. If you put T568A on the jack and T568B at the patch panel, you've created a crossover, and the link tests as a wiremap failure. It's not a subtle degradation, it just doesn't work right.



Corn

Now the toolless jack itself, because I think there's a piece of this story Daniel doesn't know, and it's going to annoy him.



Herman

It's going to annoy him a lot. The toolless jack is marketed as the beginner-friendly option. It's the one that says, no special tool needed, just lay the wires in and close the lid. And AMPCOM's own guidance is that toolless jacks give inconsistent IDC penetration, because the cap applies pressure based on how firmly you close it, not a calibrated spring mechanism. Penetration depth can vary between conductors on the same jack. Which is why most professional installers prefer traditional 110 punch-down jacks for paid work.



Corn

So he chose the harder-to-get-right option while thinking it was the easier one.



Herman

He did. And to be fair to the toolless jack, it's rated as adequate for one gig and two and a half gig. It's at five gig and ten gig that AMPCOM says go with punch-down. So it's not that toolless jacks are bad. It's that they're marketed as foolproof and they're not. They trade a calibrated tool for your hand pressure, and your hand pressure is not calibrated.



Corn

Which is a theme. The tool that feels like it removes the skill is the tool that removes your feedback.



Herman

The punch-down tool gives you a consistent, repeatable force. Your hand doesn't.



Corn

Let's do the case study, because there's a real one that's almost exactly his situation.



Herman

Eugene Ivanov wrote this up in June. Cat6 run stuck at a hundred meg. He ran the diagnostic sequence in order. Read the negotiated link speed first. Wiremap the run. Re-terminate both ends. Swap the cable. Ring out the bare copper to isolate whether it's the cable or the termination. And the actual fix was none of those. A copper offcut was wedged in the crimper die, blocking the seven and eight contacts. The brown pair. So the tool itself was the fault.



Corn

The tool was sabotaging every termination he made with it.



Herman

And he wouldn't have found it without the wiremap tester, because the wiremap is what told him pins seven and eight were open. Without that, he's re-terminating blind, guessing, and probably making it worse.



Corn

Which brings us to the tester, and I think this is the real answer to Daniel's fourth question, so let me set it up. He wants to know if this is a skill people can get proficient at, or a job best left to experts.



Herman

The consensus is that it's a learnable skill. It's not a talent. It's a technique with a handful of failure pattern, and the failure pattern are invisible to the eye. So the question isn't whether you can learn it, it's whether you have a feedback loop. A wiremap tester runs



Herman (continued)

thirty to sixty dollars. That's the minimum. Without one, you're guessing, and guessing at an invisible failure pattern is how you end up re-terminating the same jack five times and making it worse each time.



Corn

So the barrier isn't the skill. It's the tooling.



Herman

The barrier is the tooling, and that's the interesting economic point. Because the moment you buy the tester, you've spent more than the cost of having Yossi do it. So the DIY case isn't a money case. Daniel says that himself, he wasn't doing it to save money. The DIY case is that you want to own the skill and you want to be able to fix it at eleven at night without calling anyone.



Corn

There's a Hacker News thread that captures the other side, and it's worth quoting because it's the honest pro-lean position. Your time is too valuable to make Ethernet cables. Either punch down to a keystone jack or a patch panel, or buy patch cables.



Herman

That's a real position and it's not wrong. But the same thread is full of people who did exactly this successfully. One commenter on a ten gig thread said anytime he had a link issue, it was because he didn't do the best job on the keystone termination. And another re-terminated a whole house's phone-line punch-down panel to Ethernet and got ten gig working over Cat5e. So a determined amateur can do this at scale.



Corn

Ten gig over Cat5e is a flex.



Herman

It's a flex, and it's also the point. The cable was fine. The terminations were the work.



Corn

So let me put the whole answer together for him, because he asked four questions and I want to make sure we've answered all four. Can you pull the wires back out and redo it. The IDC connector is designed to be reused, up to twenty cycles rated, realistically two to three before the contacts lose tension. What went wrong. Most likely an incomplete IDC seating, possibly combined with a split pair from reading a generic description instead of the jack's own label. How do you match the pairs. Read the printed A or B row on the jack and follow one row for all eight conductors, both ends the same standard. Is this learnable. Yes, but only with a wiremap tester, because the failure pattern are invisible.



Herman

That's the whole episode in four sentences.



Corn

Which means we've earned the right to ask the harder question. If the failure is invisible and the feedback loop costs fifty dollars, is the real barrier to entry the skill or the tooling?



Herman

The tooling. And I'd go further. The tooling is the skill. Knowing you need a wiremap tester is the actual expertise. The punch-down technique is thirty minutes of practice. Knowing that a hundred meg link means a dead pair, and that a continuity tester will lie to you, that's the knowledge that separates someone who can do this from someone who thinks they can.



Corn

That's a good line.



Herman

I'll take it.



Hilbert

I did three weeks of keystone jacks in a hospital renovation. Hundreds of them.



Corn

Go on.



Hilbert

Low-voltage apprentice, one summer. Patient rooms, nurse call, the whole floor. I got fast. I was doing a jack in about four minutes by the end. Thought I was good.



Herman

And.



Hilbert

The nurse's station kept dropping packets. Foreman went looking. Turned out I'd been seating the conductors about half depth on the last two pairs, because I was rushing the close on the cap. Every jack I'd done had to come out and get redone. Two hundred and something of them.



Corn

Two hundred.



Hilbert

He made me do them all again with a punch-down tool. Not the toolless ones I'd been using. He said if I was going to waste his time, I was going to waste it learning the right way.



Herman

So the punishment was the education.



Hilbert

It was. I did about two hundred before I stopped making the same mistake. And the thing I'd say to your listener is that a tester tells you it's wrong. It doesn't tell you why. The only way to get good at this is to do it wrong, figure out exactly what you did wrong, and do it again. The tester is the start of the feedback loop, not the whole of it.



Corn

You still have the tool.



Hilbert

I still have the punchdown tool. A beat-up Klein. It's in a drawer. I've never used it since that summer and I've never thrown it out.



Herman

So the foreman's gift was the repetition.



Hilbert

The foreman's gift was the repetition. And the toolless jacks, for what it's worth, are the devil's lego. I've never seen one pass a certification test on the first try. Not once.



Corn

So the tool matters less than the reps.



Hilbert

The tool matters less than the reps. And the reps only work if you know what you did wrong, which is why the tester matters, and why doing it two hundred times matters more.



Herman

Which reframes the whole DIY question. It's not about whether you can learn it. It's about whether you're going to put in enough reps to know what right feels like.



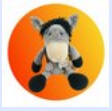
Corn

And the foreman knew that. He didn't fix the jacks himself. He made you do them again.



Hilbert

He made me do them again. And I've never made that mistake since.



Herman

Here's the thing that Daniel's story actually shows, and it's not really about the jack. It's about the gap between it works and it's correct. He got a link. He was delighted. And the link was wrong, and the only thing that told him was a speed test.



Corn

Which most people don't run.



Herman

So the practical takeaway isn't don't do it yourself. It's that if you're going to do it yourself, you need the instrument that tells you when you're wrong. Otherwise you're not learning a skill, you're performing a ritual and hoping.



Corn

The margins are shrinking. A jack that works fine at a gig might fail at two and a half. Daniel's eighty meg link is a preview of what happens when the physical layer can't keep up with the gear on either end of it. The fiber is doing one and a half gig. The switch is doing a gig. The cable is doing eighty meg, and nobody knows why, because everything looks fine.



Herman

That's the cutting room floor detail, actually. The one I couldn't fit. AMPCOM rates toolless jacks as adequate for one gig and two and a half gig, but recommends punch-down for five and ten. So the toolless jack Daniel bought is fine for what he's doing right now. The moment he upgrades to ten gig, the same jack that's marginal today becomes a hard fail.



Corn

The thing he bought for this project has a shelf life he doesn't know about.



Herman

It has a ceiling. And he won't find out until he upgrades and the link drops to a hundred meg again, and he'll be back in the same wall box, with the same eighty meg mystery, except now he'll know to bring a tester.



Corn

The open question, and I'll leave it here. If the failure pattern are invisible to the eye and the feedback loop needs a tester most DIYers don't own, is the real barrier to entry the skill or the tooling? And if it's the tooling, what does that say about the economics of doing it yourself versus paying Yossi to come back?



Herman

It says the money case for DIY is weaker than people think, and the skill case is stronger. You're not saving money. You're buying a skill, and the skill comes with a fifty dollar entry fee and a willingness to do it wrong a few times.



Corn

Which is a fine trade, if you know you're making it.



Herman

Which is the whole point.



Corn

This has been My Weird Prompts. Thanks to our producer, Hilbert Flumingtop.



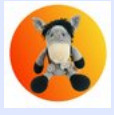
Herman

If you've ever terminated a keystone jack and wondered why your speeds didn't match your gear, leave us a review. It helps.



Corn

We'll be back soon.



Herman

See you tomorrow.