Episode Book

EPISODE #5754

Your Home Rack's Power Problem, Solved

PUBLISHED	7 October 2026 at 18:51 UTC
DURATION	23:16
LISTEN	myweirdprompts.com/episode/home-rack-power-distribution/
HOSTS	Corn, Herman, Hilbert
SCRIPT MODEL	deepseek-flash
VOICES	chatterbox-regular (chatterbox-local)
PIPELINE	V5.2
BOOK GENERATED	19 October 2026 at 17:39 UTC

SYNOPSIS

A data center converts AC to DC three times and still looks immaculate, while your home rack converts it once and looks like a raccoon got into a box of cables. So what's the actual difference? This episode walks through rack PDUs from basic strips to switched, outlet-metered units, the DC distribution thread that telecom solved a century ago, and the A+B dual bus redundancy that keeps half your capacity idle forever. Then it gets honest about the home: why a 12U rack is the awkward middle, why the bricks are the problem, and what "done well" actually looks like when you don't have a facilities team.

TRANSCRIPT



Corn

Daniel's been staring at the back of a rack again. He wrote us a whole thing about power distribution hardware — PDUs, DC distribution units, the stuff data centers run on.



Herman

The professional gear.



Corn

Right. And his question has a sting in it. He points out that a data center looks immaculate, and your average home with a pile of AC to DC adapters looks like a raccoon got into a box of cables. Same electricity, opposite results. So he wants the principles behind the professional setup, and then he wants to know which of them actually survive the trip into a home. Whether you're running a home lab or you just want the back of your desk to stop being a fire hazard.



Herman

Two questions in there, technically. What's the hardware, and why does it produce order. Then the third one, the interesting one — can you borrow any of it.



Corn

And a fourth, which I think is the one he actually cares about. He said "done well." Not "what products should I buy." What does done well look like when you don't have a facilities team.



Herman

That's the episode.



Corn

Okay. So the starting paradox. Data centers do more conversions than a home does.



Herman

Considerably more. Your laptop brick converts AC to DC once and you're done. A data center converts AC to DC at the UPS, back to DC to AC at the PDU, and then the server's own power supply converts AC back to DC at the board. Three conversions where the home has one.



Corn

And yet the data center floor is tidy and the home office is a nightmare. So the tidiness has nothing to do with fewer conversions.



Herman

Nothing at all. It comes from standardization and centralization. The hardware is just the physical instantiation of those two ideas.



Corn

Then let's start with the hardware. What is a rack PDU, actually, because I suspect a lot of people hear "PDU" and picture a metal power strip.



Herman

Raritan's own definition is a good place to start — "a device that can be fitted with multiple outlets to effectively control and distribute electricity." That's the floor of it. The ceiling is that it does intelligent things with the power going to your IT equipment.



Corn

So a power strip is a PDU the way a shed is a house. Same verb.



Herman

Roughly. And the taxonomy is where it gets fun, because the industry doesn't even agree on how to carve it up. Raritan splits the world into non-intelligent and intelligent. Non-intelligent is Basic and Monitored. Intelligent is Metered Input, Metered Outlet, Switched, and Switched-with-Outlet-Metering. Four rungs.



Corn

And Collaborate IT frames it as four types too, but they shuffle the deck — basic, metered, monitored, switched.



Herman

Which tells you something. The categories aren't handed down from a standards body. They grew out of what customers kept asking for. Capability-driven market, so the labels drift.



Corn

Walk me up the ladder. Bottom rung first.



Herman

Basic is the honest power strip. It distributes the correct voltage and current to the rack. That's the whole job. Next rung is Monitored — and this is the one that trips people up, because "monitored" sounds like it talks to you. It doesn't. It has a local ammeter. A little display on the face of the strip showing how many amps are flowing. You have to walk over and look at it.



Corn

So it's a bathroom scale, not a fitness tracker.



Herman

That's exactly the difference. It tells you the truth, but only if you're standing in front of it. No remote anything. Now above that, things get connected. Metered Input measures at the input level and reports it over the network — you can see the total draw of that PDU from anywhere. Metered Outlet goes a level finer and measures each outlet individually. Switched lets you turn individual outlets on and off remotely. And Switched-with-Outlet-Metering does both — you can see what each outlet draws and you can cut it.



Corn

Why would you want to cut a single outlet remotely?



Herman

The obvious answer is the one that matters least. Yes, you can power-cycle a hung server from your couch. But the real value is on the other end — you can see that outlet seven is pulling something it shouldn't be, and you know exactly which machine that is because you labeled it.



Corn

That's the difference between "the rack draws four kilowatts" and "the rack draws four kilowatts and six hundred of them are that one machine that's been flaky since March."



Herman

Precisely that. Metering granularity is the whole game. Eaton's Metered Input PDUs claim one percent billing-grade accuracy. That's the level where you can hand the number to finance. Raritan's PXE line meters current in amps, voltage, power in kilovolt-amps and kilowatts, energy in kilowatt-hours, and it'll take up to sixteen environmental sensors — temperature, humidity, door contact — and it alerts out over SNMP, email, SMS through a GSM modem, and SysLog.



Corn

Sixteen temperature sensors on one power strip.



Herman

Because heat is the thing that kills the gear, and the power distribution point is the natural place to hang the sensors. You're already running a network cable to the PDU. Panduit does the same thing with their G6 line — every model in the series, from Monitored Input up through Monitored and Switched per Outlet, includes environmental monitoring and rack access control.



Corn

Rack access control on a PDU.



Herman

Same logic. It's a device in the rack with a network connection and a processor. Once you've decided that, adding a door sensor is nearly free.



Corn

What about the physical range? Because I have a feeling these things come in sizes that would terrify a homeowner.



Herman

Raritan's PX series alone is hundreds of models. Outlet switching, individual outlet metering, high power, and four hundred volt three-phase distribution. That last one is the tell. Four hundred volt three-phase is a normal thing to find in a professional rack and it is not a thing that exists in your house.



Corn

My house has fifteen amps at a hundred and twenty volts and a breaker that trips when the kettle and the microwave have a disagreement.



Herman

Which is fine, because a data center is not a house. Different problem, different hardware. Now — the part of this I find interesting. The DC distribution thread.



Corn

Go on.



Herman

All IT equipment ultimately runs on DC. Every chip in every server on that floor wants direct current. So the data center is doing this dance — it takes AC from the grid, converts it to DC for the UPS batteries, converts it back to AC to send up to the rack, and then the server's power supply converts it to DC again at the board.



Corn

Three conversions to deliver a current the equipment wanted in the first place.



Herman

Server Technology put it well — data centers are "stuck with the ritual of converting AC to DC, DC to AC, and then from AC back to DC again." And then they went further. Waste at transformation, waste at conversion, and then waste again in the form of cooling the heat that the wasted energy produced. Their line was that this is why they've always chuckled at the phrase "green data center."



Corn

That's not a chuckle. That's a very polite grudge.



Herman

It's earned. And the telecom world solved this decades ago. Telephone exchanges have run on forty-eight volt DC power plants since the days of Alexander Graham Bell. Not as an experiment — as the standard. There are Server Technology PDUs that take minus forty-eight volt DC directly, model numbers and all. That's not exotic. That's the phone



Herman (continued)

network.



Corn

So the west wing of the industry has been DC-native for a century and the data center side is only now getting there.



Herman

Getting there for real, though. AC gets distributed at a hundred and twenty, two hundred eight, or two hundred thirty volts. DC at the telecom standard is forty-eight volts. But high-voltage DC in a data center is typically three hundred eighty volts, and that's where the interesting results are. A study out of Oak Ridge found that three hundred eighty volt DC data centers are more efficient than AC, with and without solar integrated. Same architecture at Tier Four standard showed higher reliability than AC in Monte Carlo simulations. And a two thousand sixteen study of a service provider that moved from forty-eight volts to three hundred eighty volts laid out the technical and financial case for going to the higher voltage.



Corn

So the direction of travel is up in voltage, down in conversions.



Herman

And it stopped being theoretical. Server Technology's own framing is that DC power went from an esoteric blip to something large operators were actually implementing — that shift happened around two thousand nineteen and it hasn't reversed.



Corn

Which brings us to the topology, because the hardware doesn't exist in a vacuum.



Herman

No. A PDU is the last mile of a deliberately staged chain. Utility feed, medium-voltage switchgear, transformer, low-voltage switchboard, UPS, PDU, rack. And each stage is sized for the next one down the line.



Corn

Sized for the next. That's the phrase I want to sit on, because nobody at home sizes anything for anything.



Herman

Your home equivalent of that chain is a wall outlet, a surge strip, and a pile of bricks. There's no staging. There's no stage that knows what the next stage will draw. It's a chain in the sense that a bowl of spaghetti is a chain.



Corn

Then there's the redundancy half of it, which is where the money goes.



Herman

The A plus B dual bus design — two power paths to every rack — keeps each path loaded at forty to fifty percent under normal operation. You're not running either one hot. Then there's 2N, sometimes called System plus System, which is two completely independent systems feeding the load, built on the assumption that every piece of IT equipment has two power cords. It's proven, it's the gold standard, and it's expensive, because at any given moment half your capacity is sitting idle.



Corn

Fifty percent of a very large number doing nothing.



Herman

Forever. That's the trade. And dual power path with dual-corded equipment is described as industry best practice, but single-corded devices are the awkward case — Schneider Electric has a whole paper on how you handle those in a dual path environment.



Corn

Because the device with one cord can only be plugged into one of your two beautiful independent paths.



Herman

And then it's a single point of failure no matter how much switchgear you bought. Which is why there are Automatic Transfer Switches and Static Transfer Switches. The static ones are semiconductor-based and switch in under sixteen milliseconds. Sub-cycle. Fast enough that the power supply's own hold-up capacitors carry the load through and nobody notices.



Corn

Sixteen milliseconds.



Herman

Roughly one cycle at sixty hertz.



Corn

So the equipment never knows. It's the electrical version of not mentioning something.



Herman

Now — the home. Let's be honest about this, because the honest version is more useful than the aspirational one. A twelve-unit rack is the awkward middle. It's too big for a power strip to handle well, and it's too small to justify a rack PDU in most people's budget.



Corn

So what actually happens?



Herman

What actually happens is zip-tied surge strips screwed to the back rails, wall warts hanging off them, laptop bricks dangling by their own cables, and the door stops closing. The back of the rack becomes a tangle and airflow turns into a maze.



Corn

I've seen this rack. I live near this rack.



Herman

The single biggest improvement, and this is the line I'd underline — decide where the bricks live before you decide anything else. Before cable management, before patch cables, before anything. The bricks are the problem. Everything else is downstream of the bricks.



Corn

So where do the bricks live?



Herman

A vented shelf. You herd them. One shelf, all the power supplies, arranged so they can breathe and so you can see the labels. Vented because a shelf of bricks in a closed cabinet is a small oven. Then mount the strips vertically on a rear rail so every cord drops to the nearest outlet instead of traveling the length of the rack to find one. Then separate the two worlds — mains and low-voltage power on one side, Ethernet on the other. Keeps the power cables from running parallel to the data cables for a meter and a half.



Corn

Inductive coupling.



Herman

It's rarely the thing that breaks you, but it's free to avoid. Leave one service loop per cable — one, not three. Buy patch cables in the lengths that actually fit. Fifteen centimeters, thirty, fifty. Not a meter of slack coiled up and velcroed into a ball. And use hook-and-loop, not zip ties.



Corn

Because zip ties are forever and racks are not.



Herman

Reusable beats tidy-once, which is exactly the right way to put it in a rack that's going to grow. And keep your blanking panels in. They're not cosmetic. They keep the hot aisle and cold aisle separated, which is the whole point of the cabinet.



Corn

Do the load math for me. Because I suspect the answer is going to make a lot of people feel silly about their shopping list.



Herman

A twelve-unit home lab rarely exceeds a few hundred watts total. One person on Hacker News reported a quarter-rack basement lab drawing a hundred and thirty-three watts. Hundred and thirty-three. For a whole rack. Meanwhile a fifteen amp, hundred and twenty volt circuit has an eighty percent continuous load guideline — so about fourteen hundred watts of headroom, and the practical advice is that past roughly a thousand watts you stop adding strips and start thinking about a second circuit.



Corn

A second circuit, not a second power strip.



Herman

A second power strip on the same circuit is one circuit with two decorations on it. The breaker doesn't care how many strips you bought.



Corn

What about the buying guidance, for the people who are past twelve U and need a PDU?



Herman

Get at least ten C13 outlets. The APC AP9568 has fifteen, which is a good number for a full-height rack strip. Budget two to four times what a standard power strip costs, and know what you're paying for — monitoring, remote management, outlet switching. And the rough planning figure is one PDU per fifteen to twenty units of rack space.



Corn

Then there's labeling, which is the least glamorous item on the list and probably the one with the best return.



Herman

Cable labeling can cut troubleshooting time by up to fifty percent. Color code as well as label — blue for networking, red for power is the convention a lot of people use. The point is that in eighteen months you will not remember which of forty identical black cables goes where, and a label costs you four seconds and saves you an hour.



Corn

And the metering question at home — is it worth it?



Herman

It's worth knowing your number even if you never buy an intelligent PDU. A plug-in power meter costs less than a meal and tells you what the whole rack draws. But for the person tempted to build dual feeds to a single NAS — don't. That's the second-order lesson of this whole episode. 2N redundancy leaves half the capacity idle for a reason that doesn't apply to one machine in a basement.



Corn

Redundancy is a bet that downtime costs more than capacity. For most homes that bet is wrong.



Herman

Badly wrong. A NAS that's down for twenty minutes while you reseat a cable is not a business continuity event.



Corn

So the principles transfer and the gear mostly doesn't.



Herman

Separation. Deliberate mounting. Load math. Reusable fasteners. Every one of those is free or nearly free and every one of them is the actual reason the data center looks the way it does. The switchgear is downstream of the principle, not the source of it.



Corn

There's one more thing I want to put on the table before Hilbert gets a word in, which is that a home could in principle beat a data center on this. Not match it. Beat it.



Herman

Because a home can be DC-native from the start.



Corn

USB-C power delivery is DC. Power over Ethernet is DC. If you built a rack around USB-C PD and PoE, you'd never do the AC to DC to AC to DC dance in the first place. You'd do the conversion once, in one big efficient supply, and distribute DC to everything that wants DC anyway.



Herman

And there's a small product category forming around that. There's an open source USB-C PDU kit for ten and nineteen inch racks, a five or ten port board built around a Mean Well supply. It's a kit, it's a niche, it's about a hundred and sixty New Zealand dollars. But it exists, and the fact that someone built it and published the designs says the demand is real.



Corn

Meanwhile the enterprise side spent twenty years proving that three hundred eighty volt DC is more efficient, and the home side is wandering into the same conclusion through USB-C chargers.



Herman

The difference is the home doesn't need a standard. The enterprise needs every vendor to agree on a voltage before anyone will build a power supply for it. The home just needs somebody to ship a board.



Corn

The home moves faster because it has nothing to standardize.



Hilbert

You keep saying "principles transfer, gear doesn't."



Corn

We do.



Hilbert

The word I'd argue with is "gear." It's not the gear that's the problem. It's the panel.



Corn

Say more.



Hilbert

I've been thinking about a job I had in the late eighties. Building services, small commercial sites — offices, a couple of light industrial units. My job was to walk the electrical drawings before anything got installed. And I had a rule that took me about two years to learn, which is that you count the bricks before you draw the cabinet.



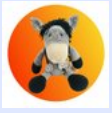
Corn

Count the bricks.



Hilbert

Wall warts, transformers, whatever came with the equipment. Every piece of kit somebody was going to install had one, and nobody ever put them on the drawing. So the cabinet would go in, everything would go in, and then somebody would be standing in front of it with four power supplies and nowhere to put them. And that's how you get a nest.



Herman

So the brick herd is a real planning category, not an aesthetic problem.



Hilbert

It's the first category. The circuits are easy. The circuits go on the drawing because somebody has to pull the cable and somebody has to sign off on it. The bricks never go on the drawing, because the bricks arrive in a box with the equipment and no one thinks of them as building services. So they land wherever there's a gap and then the gap closes.



Corn

And then the door stops closing.



Hilbert

The door was never going to close. It was just waiting for the bricks.



Herman

Did you ever get it wrong?



Hilbert

Twice. First one was a comms room, and I'd allowed one shelf for the power supplies. Measured it off the kit list. Got there on install day and three of the supplies were bigger than the ones in the spec sheet, because the client had changed the model of a router and nobody had told me. Shelf was full, floor had four warts on it.



Corn

What did you do?



Hilbert

Went out for a bigger shelf. Which meant coming back the next day, because the wholesaler had shut at half four.



Corn

The whole job waits a day for a shelf.



Hilbert

That's what I mean. It's not a technical failure. It's one person deciding the shelf was a detail.



Herman

So the lesson isn't "buy better strips."



Hilbert

The strips are fine. The lesson is that the thing nobody puts on the drawing is the thing that determines whether the room works. Every time.



Corn

Then the design principle isn't separation or standardization. It's that you design for the parts you're embarrassed to plan for.



Hilbert

That's the one.



Corn

Okay. Let's pull back, because Hilbert just moved the furniture on this and I want to look at the room.



Herman

Go ahead.



Corn

The whole episode we've been saying the data center's order is a byproduct of designing the chain. Hilbert's version is sharper. The chain gets designed because the cable pull and the breaker are the things that need sign-off. The bricks never need sign-off, so they never get designed around, and they're the thing that actually decides whether the room functions. The visible work is not the load-bearing work.



Herman

And that's the home version exactly. Everything on the drawing at home is the rack and the server and the switch. The bricks arrived in boxes and nobody drew them. So the rack is beautiful and the back of it is a disaster.



Corn

Which means the fix isn't a PDU. The fix is putting the bricks on the drawing.



Herman

And here's the forward-looking part I keep coming back to. DC power in the enterprise went from an esoteric blip to real implementation by the big operators around two thousand nineteen, and that trend hasn't reversed. So the question is whether that trickles down.



Corn

Does the home follow?



Herman

The home might get there first, on the small end, through USB-C and PoE, without ever calling it a DC data center. Ten years from now your rack might be one supply feeding DC to everything and the wall warts become a museum piece.



Corn

Or the home stays AC forever, because the grid is AC and the last conversion is cheap enough to ignore.



Herman

Honestly I don't know which one wins. The grid isn't moving.



Corn

Neither is the twelve-unit rack's awkward middle. Nobody makes a good product for that size and I don't think anyone's going to.



Herman

Probably not. It's the size where the principled answer is a vented shelf and a vertical strip, and that's not a product category. It's a decision.



Corn

Which is the whole episode, really. The order in a data center was never about the hardware. It was about deciding things on purpose. Most homes just never decided anything — the bricks arrived and the room absorbed them.



Herman

And you can borrow the deciding without borrowing the switchgear.



Corn

Right. That's the show. Thanks to Hilbert Flumingtop for producing, and Daniel — if you clean up that rack, send us a photo of the back of it. That's the side that tells the truth.



Herman

Send it to the show at my weird prompts dot com, or find everything else at my weird prompts dot com. Leave us a review if you've got a second — it helps people find us.



Corn

This has been My Weird Prompts, the human-AI collaboration podcast. We'll be back soon.



Herman

See you tomorrow.