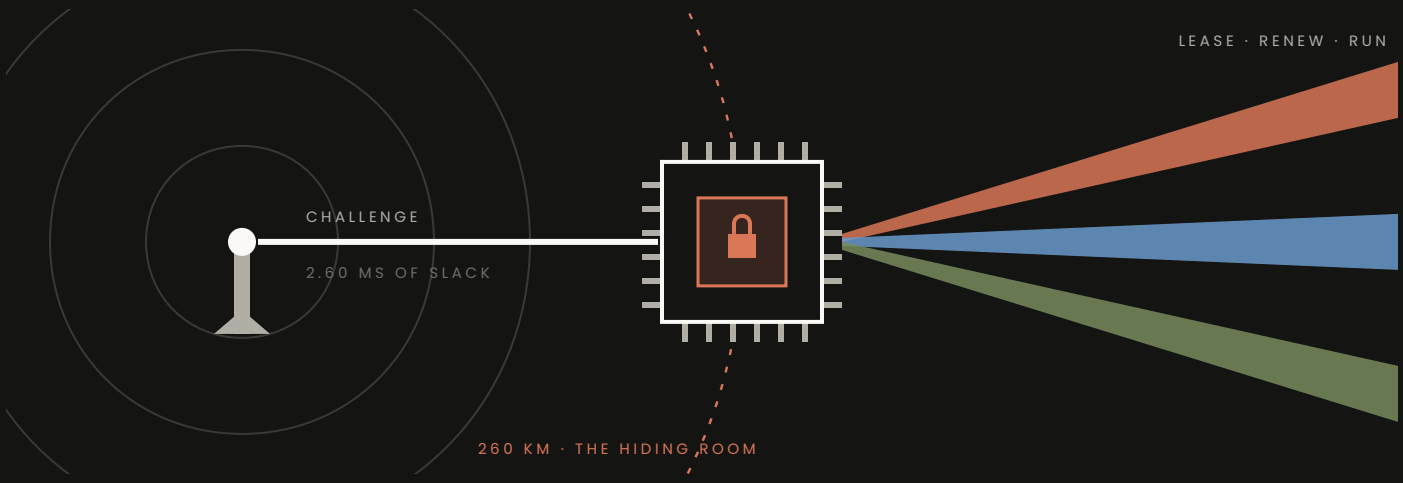
INFLECTION.

THE WEEKLY MAGAZINE OF INNOVATION

ISSUE 06 · FRIDAY, 20 NOVEMBER 2026 · DEEP DIVE — VERIFIABLE COMPUTE



THE DEEP DIVE

The Chip That Asks *Permission*

In one week, engineers showed how to put a border inside a GPU package, and Washington decided borders were the wrong thing to check. The idea that survives both is stranger: compute with an expiry date.

- Why 2.6 milliseconds of jitter buys 260 km of hiding room, and how a lease beats a kill switch
- Against the Grain: the off switch regulators want is the collateral lenders have been missing
- Signals: a spacecraft flying rectangles round an asteroid · fossil CO_2 dips, the total does not · a blood thinner without the usual bleed

01	**Permission to Compute**	*The feature: a border inside the package*	3–5
02	**Against the Grain**	*The Contrarian: the off switch as collateral*	6
03	**Signals**	*Space · climate · medicine*	7
04	**By the Numbers**	*Seven figures worth remembering*	8
05	**The Long View**	*What the issue adds up to · sources*	9
06	**Next Issue**	*Back cover and the Lens question*	10

THE DISPATCH

A border is a stand-in for something else.

> *Ask what the rule is really measuring.*

A nightclub that checks the address of the building instead of the age of its guests has a rule that is easy to enforce and beside the point. For three years, AI chip controls have worked a little like that. They asked where the hardware was, because location fits on a customs form. This week the US government said plainly that location was a stand-in. What it cares about is who gets to use the compute.

In the same week, engineers showed how to measure location far better than before, using a radio and the speed of light. That looks like bad timing: a sharper answer arriving as the question changes. We read it the other way. Inside their design is a small idea that outlasts the geography, a machine that needs a fresh permit to keep running.

So this issue's lens is to ask what a rule is really measuring. It fits a spacecraft checking a model against an asteroid, a climate number that fell while the thing it stood for rose, and a blood thinner aimed at a subtler target than its predecessors.

— THE EDITORS

Sources for every figure are listed on page 9. The 5G CATS results are simulations in a preprint that has not been peer reviewed. The export rule is described from the agency's text and a law-firm summary; nothing here is legal or investment advice. Page 6 contains a proposal of our own, labelled as such.

THE FEATURE

Permission to Compute

Export control was built to track boxes. AI chips broke it twice: the boxes move, and the work crosses borders without them. This week brought an answer to each problem.

BY THE INFLECTION DESK · RESEARCH DRAWN FROM THE TEXAS A&M PREPRINT, THE BIS RULE TEXT, GIBSON DUNN AND SEMICONDUCTOR ENGINEERING

On 16 November the US Commerce Department released a rule with a dry title, “Addressing Remote Access to Advanced Semiconductors,” and a sharp idea inside it: where an AI chip sits matters less than who is using it. A few days earlier, five engineers at Texas A&M University had posted the most careful answer yet to the question the rule was leaving behind. Their design, called 5G CATS, puts a radio, a cryptographic engine and a hardware interlock inside the GPU package, so a chip can prove where it is running and stop when it cannot. Two answers in one week, pointing in different directions.

The old question: where is it?

Export control was designed for objects. A licence says a box may go to one country and not another, and customs checks the box. But boxes move. Singapore opened an inquiry in February 2025 into suspected false declarations on server purchases. One company it examined, the data-centre firm Megaspeed, saw its assets grow from $33 million to $3 billion in a year, Reuters reported. Megaspeed denies wrongdoing.

The industry’s own fix was soft. In December 2025 Reuters reported that Nvidia had built software that estimates where a GPU is from the delay in its messages to Nvidia’s servers. The customer chooses whether to install it. The Texas A&M objection is simple: software that runs under the operator’s control can be switched off by the operator.

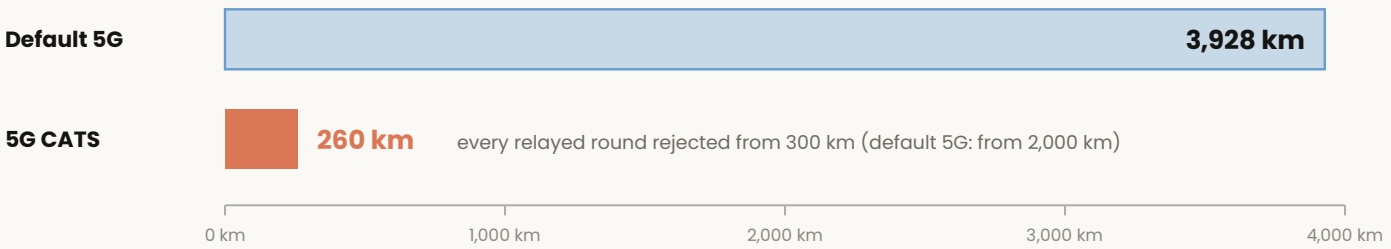
The new question: who is using it?

The rule goes after a different leak. A chip can sit lawfully in Malaysia or Brazil while a company headquartered in China rents it over the internet. So the rule sets a threshold. Shipping advanced chips to a data centre that supplies more than 12,000,000 “aggregate TPP” of compute to such companies now needs a licence. TPP is the rule’s yardstick of chip power; Gibson Dunn estimates the threshold at roughly 200 top-end GPUs.

It also requires licences for advanced chips bound for Indonesia, Malaysia, Singapore, Thailand and Brazil, unless the end user is US-headquartered and the exporter files monthly reports. What the rule does not contain is any technology. Its tools are customer checks, notices and paperwork. The physics was left to the engineers.

How a chip proves where it is

HOW FAR AWAY CAN A RELOCATED CHIP HIDE? · KM OF FIBRE RELAY THAT TIMING CANNOT SEE



Source: Rajaraman et al., arXiv:2611.13437. Simulation of one device on an unloaded cell. Hideable distance is estimated from the spread of honest round-trip times; the authors call it an empirical estimate, not a security guarantee.

Light is the ruler

A signal can be delayed but never hurried. So if a verifier sends a fresh random challenge and the chip's signed reply comes back within a few milliseconds, the chip cannot be far away. Light in optical fibre covers about 200 km each millisecond. The cheat is a relay: keep the chip in a banned country and pipe its radio traffic down a fibre to an approved cell tower.

Jitter is the hiding place

Honest replies do not all take the same time. Software stacks, drivers and network cards add random delay, so the verifier must set a loose deadline or it will reject honest chips. That looseness is the smuggler's room. On a default 5G link, the simulated gap between the fastest reply and the deadline was 39.28 ms, enough to hide 3,928 km of fibre. 5G CATS ends the radio link inside the package, which "removes the host software, PCIe fabric, and baseboard management controller from the verification path," and uses 5G's low-latency mode. The gap fell to 2.60 ms, or 260 km.

> *"Every millisecond of slack gives an attacker about 100 km of fiber relay to hide behind."*
>
> RAJARAMAN ET AL. · TEXAS A&M UNIVERSITY, ARXIV:2611.13437

What the simulation showed

Relays were rejected 1 percent of the time at 50 km, 27 percent at 150 km, 99 percent at 250 km and every time from 300 km. A verifier up to 1,410 km from the chip still caught an attacker relaying from 3,000 km. On default 5G it never did.

The lease, not the lock

Older schemes punish a failed check by erasing the chip's keys for good. Replayed on the simulated rounds, a permanent lock disabled 11 of 20 honest chips, victims of ordinary bad luck. 5G CATS issues a short-lived signed lease after each passed round. Compute runs only while a lease is unexpired. With leases, no honest chip stopped for more than one round.

A second witness

The chip also seals its cell tower's identity into each reply, and the verifier checks it against the carrier's own records. The authors specify this step but did not simulate it.

FROM LAB TO MARKET

What it means, and what it does not

Shown: in simulation, a radio inside the package shrinks the hiding room for a relocated chip about fifteen-fold, and leases remove the worst failure of kill switches. **Not shown:** anything in silicon. The paper reports no power, area or cost. It models one device on an empty cell. The authors write: “We therefore do not claim that our numbers bound a real URLLC cell in either direction.”

Deployment depends on carriers. Public networks, the paper notes, “almost always run default 5G,” so the tight timing needs low-latency service provisioned around every data centre that hosts a controlled chip. That is a telecoms rollout, not a tape-out.

The rule that arrived this week asks for none of it. It takes effect on publication in the Federal Register, scheduled for 19 November. Markets read it as friction: TSMC’s US-listed shares closed down 3.68 percent on 17 November.

Pressure for tighter controls comes from Congress, at an unsettled moment: Nvidia’s board announced on 12 November that Jensen Huang had resigned as chief executive. The prize being guarded is large. The Lowy Institute estimates US data centres hold nearly 40 times China’s AI processing power.

For the CTO. Treat permission as a dependency. If you rent accelerators outside the US, ask this quarter who else is on the cluster and whether the operator can prove it. Further out, expect hardware that must phone home for the right to run. Design for a lease that fails to renew as you would for a region that goes dark.

Timeline: rule effective on Federal Register publication, scheduled 19 Nov 2026; comments due 60 days later; 90-day window for existing data-centre arrangements.

FIELD NOTES · HOW A CHIP PROVES WHERE IT IS

1. **Challenge.** A verifier sends a fresh random number over 5G. Because it is new each time, an old answer cannot be replayed.
2. **Reply.** The chip seals its answer inside its own package and sends it straight back. The clock is running.
3. **Lease.** An on-time reply earns a signed permit that lasts a short while. No reply, no renewal, and the chip idles until one arrives.

Try it. How much fibre does 5 ms of slack hide? Light covers 5 × 200 = 1,000 km, but the signal goes out and back, so halve it: 500 km. The paper’s 2.60 ms gives 260 km.

GLOSSARY

TPP. Total processing performance, the export rules’ measure of a chip’s power.

Relay attack. Forwarding a device’s signals so it appears to be somewhere it is not.

URLLC. Ultra-reliable low-latency communication, 5G’s mode for millisecond-grade links.

Execution lease. A signed, expiring permit to compute. It must be renewed for the chip to keep running.

THE CONTRARIAN

The Off Switch Is a Credit *Instrument*

Chipmakers call it a backdoor. Regulators call it enforcement. The party with most to gain from compute that can expire is neither of them. It is the lender.

The unfashionable read

The argument over on-chip controls has two sides. Washington wants proof of where chips are. Chipmakers answer that any remote off switch is a weakness; Nvidia's chief security officer wrote in August 2025 that kill switches and backdoors "would be a gift to hackers and hostile actors." Both sides treat the mechanism as a cost paid for security.

Look at what 5G CATS builds, though. Take away the geography and it is a permit that must be renewed for a machine to keep working. Finance has reason to want that. Lenders advance money against GPUs at an estimated 60 to 70 percent of their value. If a borrower defaults, the lender must find, seize and resell hardware that may have moved. The Financial Times reported in September that Nvidia has sounded out insurers about covering lenders when seized chips fetch less than the debt. A chip that will not run without a fresh lease is collateral that cannot walk away.

What follows (our proposal)

Here is an idea to test, not a finding. Call it a lease covenant. A neutral utility co-signs each execution lease on a financed fleet. While the loan performs, leases renew and nobody notices. On default, renewals stop, the hardware idles intact, and the lender recovers a working asset instead of chasing a missing one. Car lenders already do this with starter-interrupt devices. If it cut expected losses it would cut the price of GPU debt, and buyers would ask for the feature instead of resisting it. Export control would then ride on a mechanism the market had paid for.

WHY THE CONSENSUS DISAGREES

01 **An off switch is a target.** Nvidia's objection stands. Whoever holds the lease-signing key can halt a fleet, and so can whoever steals it. A covenant adds a second keyholder.

02 **It is a simulation.** One device, an empty cell, and no power, area or cost figures. Nothing here has met a real data hall, which is a metal room full of electrical noise and an unkind place for a radio.

03 **Location is not use.** The new rule targets who rents the compute. A perfectly located chip can still serve a forbidden customer, and no timing check sees that.

04 **Buyers have a vote.** A chip that needs a foreign permission slip is a hard sell to any government that wants control of its own compute. China's cybersecurity regulator has already questioned Nvidia about back doors.

SPACE

12 cm/s

Hera reaches the asteroid NASA hit, and circles it in rectangles

In September 2022 NASA's DART probe, 580 kg moving at about 6.1 km/s, struck the 151-metre asteroid Dimorphos and shortened its orbit around its larger partner Didymos by about 33 minutes, more than simulations predicted. ESA's Hera has now arrived to find out why. It sits 25 to 30 km away and moves at roughly 12 cm/s, an insect's crawl. Hera flies nearly straight legs and fires its thrusters every three to four days to turn 90 degrees. The shape is a safety feature: if a burn fails, the craft drifts away from the rocks, not into them. Closer passes begin next month. "Hera will reveal which forecast was the correct one - if any!" said mission scientist Michael Kueppers.

SOURCE · European Space Agency via ScienceDaily, 17 Nov 2026 · sciencedaily.com/releases/2026/11/261115085545.htm

CLIMATE

−0.4%

Fossil emissions dip. The total keeps climbing.

The Global Carbon Budget 2026, released as a preprint on 10 November, projects fossil CO_2 emissions of 38.2 billion tonnes this year, down 0.4 percent. Oil falls 1.9 percent; coal still rises 0.6 percent. Yet total emissions rise to 43.3 billion tonnes from 42.8, because land-use emissions climb to 5.1 billion, which the release attributes to peat fires and forest degradation in Southeast Asia. Atmospheric CO_2 reaches 427.7 ppm. The remaining budget for 1.5°C is about 150 billion tonnes, roughly four years at this rate. "A drop in emissions in one year is not a peak unless it is driven by structural change," said researcher Glen Peters.

SOURCE · University of Exeter via ScienceDaily, 10 Nov 2026 · sciencedaily.com/releases/2026/11/261109205358.htm · Earth System Science Data preprint, doi:10.5194/essd-2026-895

MEDICINE

26%

The first blood thinner built to spare the bleed

Anticoagulants have always carried one bargain: fewer clots, more bleeds. On 9 November Bayer announced US approval of asundexian (Sunharbo), the first approved drug to block factor XIa, a clotting protein. In the OCEANIC-STROKE trial, 50 mg once a day on top of antiplatelet therapy cut ischaemic stroke by a relative 26 percent, or 2.2 percentage points over two years, with no increase in major bleeding on the standard ISTH definition. It is not free: gastrointestinal bleeding ran at 2.7 against 2.1 per 100 patient-years. Approval covers adults after a non-cardioembolic stroke or high-risk TIA, not atrial fibrillation. List price is $748.50 for 30 days.

SOURCE · TCTMD, 10 Nov 2026 · tctmd.com/news/asundexian-first-factor-xia-inhibitor-gain-fda-approval

12M TPP

Compute a data centre may supply to China-headquartered firms before the new US rule requires a licence. Roughly 200 top-end GPUs, by one law firm's estimate.

2.60 ms

Gap between the fastest honest reply and the deadline in the 5G CATS simulation. On default 5G it was 39.28 ms.

260 km

Fibre relay that gap can hide. Default 5G hides 3,928 km, about fifteen times more.

11 of 20

Honest chips permanently disabled by false alarms when a failed check erases keys. With expiring leases, none stopped for more than one round.

40×

US lead over China in data-centre AI processing power, per the Lowy Institute's November snapshot.

5

Countries that now need a US licence for advanced chips: Indonesia, Malaysia, Singapore, Thailand and Brazil.

33 min

How much NASA's DART impact shortened the orbit of the asteroid Dimorphos in 2022. ESA's Hera is now 25 to 30 km away, working out why it was more than predicted.

The stand-in and the thing itself

Four stories this week turn on the gap between what is easy to measure and what matters. Chip controls measured location when the worry was use. The carbon ledger's best-known line, fossil emissions, fell while total CO_2 rose. Anticoagulants were long judged as if stopping clots and causing bleeds were one dial; the asundexian trial suggests they can be pulled apart. And Hera exists because a 33-minute change in an orbit did not match the models, so someone had to go and look.

The warning labels: the chip result is a simulation in an unreviewed preprint, with no hardware behind it. The carbon figure is a projection, and its lead author says a reduction driven partly by shocks is not a lasting fix. Asundexian's clean result holds for major bleeding and not for gastrointestinal bleeding. Our lease covenant on page 6 is a proposal nobody has tried.

What to watch: comments on the BIS rule, due 60 days after publication, and whether any ask for technical verification. Whether a chip vendor or a carrier builds a package-level radio. Whether GPU lenders start asking for expiring leases. Hera's closer passes from December. And whether next year's carbon budget shows the dip was structural.

SOURCES & FURTHER READING

1. **S. Rajaraman, D. Ladd, N. Heinrich-Barna, S. Shakkottai, J. Rajendran**, "5G CATS: 5G-Based Cryptographic Authorization Against Trafficking of Semiconductor Devices," arXiv:2611.13437, Texas A&M University, Nov 2026 (preprint) — https://arxiv.org/html/2611.13437
2. **Semiconductor Engineering**, "Hardware-Based Location Checks Target AI Chip Smuggling (Texas A&M)," 11 Nov 2026 — https://semiengineering.com/hardware-based-location-checks-target-ai-chip-smuggling-texas-am/
3. **US Bureau of Industry and Security**, "Addressing Remote Access to Advanced Semiconductors," interim final rule, RIN 0694-AK50, released 16 Nov 2026 — https://www.bis.gov/media/documents/rin-0694-ak50.pdf
4. **Gibson Dunn**, "BIS Expands Advanced Computing Controls to Address Data Center Remote Access and Third Country Diversion," client alert, 18 Nov 2026 — https://www.gibsondunn.com/bis-expands-advanced-computing-controls-to-address-data-center-remote-access-and-third-country-diversion/
5. **GoTrade News**, "TSMC Stock (TSM) Falls 3.7% on New US Chip Export Rule," 18 Nov 2026 — https://heygotrade.com/en/news/tsmc-tsm-stock-news-november-18-2026
6. **Nvidia**, Form 8-K exhibit, "NVIDIA Announces CEO Transition," 12 Nov 2026 — https://www.sec.gov/Archives/edgar/data/0001045810/000104581026000082/nvidiaannounceseotransiti.htm
7. **CBS News**, "Timeline of a scandal: How Jensen Huang's abrupt resignation unfolded at Nvidia" (Megaspeed, Singapore inquiry, Reuters asset figures) — https://www.cbsnews.com/news/jensen-huang-nvidia-resignation-scandal-timeline/
8. **Semiconductor Engineering**, "Chip Industry Week In Review," 13 Nov 2026 (Senate and House requests) — https://semiengineering.com/chip-industry-week-in-review-164/
9. **Lowy Institute**, J. Sato and H. Marston, "Asia Power Snapshot: China, the United States and the race for AI dominance," 8 Nov 2026 — https://www.lowyinstitute.org/publications/asia-power-snapshot-china-the-united-states-and-the-race-for-ai-dominance
10. **Nvidia**, D. Reber Jr., "No Backdoors. No Kill Switches. No Spyware.," 5 Aug 2025 — https://blogs.nvidia.com/blog/no-backdoors-no-kill-switches-no-spyware
11. **South China Morning Post / Reuters**, "Nvidia builds location verification tech that could help fight chip smuggling," Dec 2025 — https://www.scmp.com/tech/big-tech/article/3335985/nvidia-builds-location-verification-tech-could-help-fight-chip-smuggling
12. **Let's Data Science**, summary of Financial Times, "Nvidia turns to insurers to spread risk of AI build-out," 29 Sep 2026 (loan-to-value estimates) — https://letsdatascience.com/blog/nvidia-asking-insurers-cover-what-happens-if-gpus-dont-resell
13. **European Space Agency**, via ScienceDaily, "ESA's Hera Spacecraft Is Flying Rectangles Around NASA's Asteroid Crash Site," 17 Nov 2026 — https://www.sciencedaily.com/releases/2026/11/261115085545.htm
14. **University of Exeter**, via ScienceDaily, "Global Fossil Fuel Emissions Set to Fall in 2026, but Total CO2 Keeps Rising," 10 Nov 2026 — https://www.sciencedaily.com/releases/2026/11/261109205358.htm
15. **P. Friedlingstein et al.**, "Global Carbon Budget 2026," Earth System Science Data (preprint), 10 Nov 2026 — https://doi.org/10.5194/essd-2026-895
16. **TCTMD**, "Asundexian Is the First Factor XIa Inhibitor to Gain FDA Approval," 10 Nov 2026 — https://www.tctmd.com/news/asundexian-first-factor-xia-inhibitor-gain-fda-approval

INFLECTION.

THE WEEKLY MAGAZINE OF INNOVATION

THE LENS · A QUESTION FOR YOUR WEEK

Which of your controls measures a stand-in, and what would it cost to measure the real thing?

NEXT ISSUE · FRIDAY, 27 NOVEMBER 2026

A fresh deep dive from a different domain, three new Signals, and another read that looks wrong until it is explained.



TOP: CHALLENGES ANSWERED, LEASES RENEW, COMPUTE RUNS. BOTTOM: THE ANSWERS STOP, THE LEASE LAPSES, THE CHIP IDLES.

RESEARCHED, WRITTEN & DESIGNED WITH CLAUDE. TYPESET IN POPPINS & LORA ON THE ANTHROPIC PALETTE.
ISSUE 06 · 20 NOVEMBER 2026