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How to Regulate the Cloud: A Blueprint to Address the Market Failures and National Security Risks of Cloud Computing

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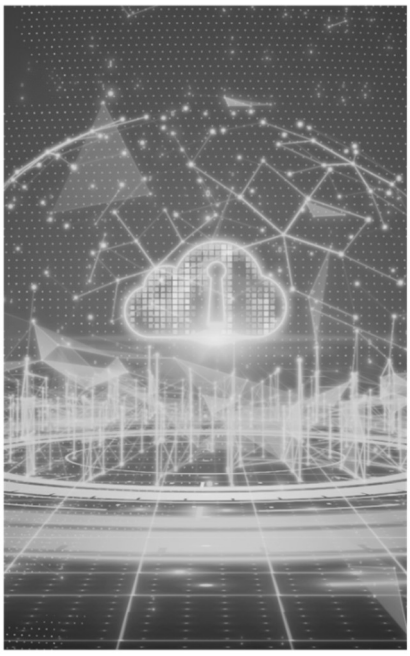

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ABOUT THE AUTHOR

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I. Introduction and Summary

Today's AI systems are largely built and accessed using cloud computing, a $600 billion market dominated by Amazon, Microsoft, and Alphabet that is unregulated and underanalyzed. In this blind spot is a looming crisis of an industry that lacks the competitive forces necessary for a healthy market. Because so much of society depends on the cloud, well beyond today's AI boom, these market failures create significant national security risks.

The problems of the cloud computing market are now well understood. This knowledge is built on investigations, studies, and analyses from governmental organizations, such as the Federal Trade Commission[1] and the House Judiciary Committee's Antitrust Subcommittee[2] in the U.S., along with agencies in the United Kingdom, [3] France,[4] the Netherlands,[5] Japan,[6] and other countries[7]; national security

[1] Nick Jones, *Cloud Computing RFI: What We Heard and Learned*, FED. TRADE COMM'N (Nov. 16, 2023), https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/11/cloud-computing-rfi-what-we-heard-learned.

[2] *Investigation of Competition in Digital Markets: Majority Staff Report and Recommendations*, H. COMM. ON THE JUDICIARY (Oct. 2020), https://www.congress.gov/committee-print/117th-congress/house-committee-print/47834 (hereinafter "H. Antitrust Subcomm. ").

[3] *Cloud Services Market Study*, OFCOM (U.K.) (Oct. 5, 2023), https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-3-4-weeks/244808-cloud-services-market-study/associated-documents/cloud-services-market-study-final-report.pdf?v=330228 (hereinafter "U.K. Ofcom Cloud Study").

[4] *Opinion 23-A-08 of 29 June 2023 on Competition in the Cloud Sector (Eng.)*, AUTORITÉ DE LA CONCURRENCE (FR.) (June 29, 2023), https://www.autoritedelaconcurrence.fr/sites/default/files/attachments/2023-09/23a08_EN.pdf (hereinafter "Fr. Competition Auth. Cloud Op.").

[5] *Market Study Cloud Services*, AUTH. FOR CONSUMERS & MKTS. (NETH.) (May 9, 2022), https://www.acm.nl/system/files/documents/public-market-study-cloud-services.pdf (hereinafter "Dutch ACM Study").

[6] *Report on Trade Practices in Cloud Services Sector*, FAIR TRADE COMM'N (JAPAN) (June 2022), https://www.jftc.go.jp/en/pressreleases/yearly-2022/June/221102EN.pdf (hereinafter "Japanese FTC Cloud Report").

[7] For a summary of recent findings, see, *Competition in the Provision of Cloud Computing Services*, 323 *in* OECD ROUNDTABLES ON COMPETITION POLICY PAPERS (May 20, 2025), https://doi.org/10.1787/595859c5-en (hereinafter "OECD Cloud Paper"); *KFTC Announces Results of Cloud Service Market Study*, FAIR TRADE COMM'N (S. KOR.) (Dec. 28, 2022), https://www.ftc.go.kr/eng/downloadBbsFile.do?atchmnflNo=17414 (hereinafter "S. Kor. FTC Cloud Study"); *La CNMC Inicia Un Estudio Sobre Los Servicios de Nube*, LA COMISIÓN NACIONAL DE LOS MERCADOS Y LA COMPETENCIA (SPAIN) (Nov. 23, 2023), https://www.cnmc.es/prensa/estudio-cloud-20231123.

leaders;[8] academics;[9] experts in think tanks like the Open Markets Institute[10] and AI Now Institute;[11] and even investors at firms like Andreessen Horowitz.[12]

As described in this paper, five market features impede competition in the cloud computing market:

- Market Concentration: Three hyperscalers—Amazon Web Services, Microsoft Azure, and Google Cloud Platform—represent two-thirds of the market, hindering innovation and acting as gatekeepers.
- Vertical Integration: Hyperscalers' parent companies are simultaneously suppliers, customers, competitors, and investors of their cloud customers, creating conflicts of interest.
- Conglomerate Effects: Hyperscalers' parent companies offer many products, enabling bundling and tying and incenting surveillance of customers' businesses.
- Opaque and Differential Pricing: Hyperscalers use private "committed spend" discounts and "cloud credits" to create customized pricing.
- High Switching Costs: Customers wanting to switch clouds or implement a multi-cloud (i.e., interoperable) architecture confront vendor lock-in.

In addition to market failures, there are two primary national security risks associated with cloud computing. First, companies, government agencies, critical infrastructure

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[8] Mark Montgomery, *America Needs to Treat 'the Cloud' as Critical Infrastructure*, THE HILL, Apr. 25, 2024, https://thehill.com/opinion/cybersecurity/4621718-america-needs-to-treat-the-cloud-as-critical-infrastructure/.

[9] Gary Biglaiser, Jacques Crémer & Andrea Mantovani, *The Economics of the Cloud (TSE Working Paper, No. 24-1520)*, TOULOUSE SCH. OF ECON. (Mar. 29, 2024), https://www.tse-fr.eu/publications/economics-cloud; Bruce Schneier & Trey Herr, *Russia's Hacking Success Shows How Vulnerable the Cloud Is to Cyberattacks*, FOREIGN POL'Y, May 24, 2021, https://foreignpolicy.com/2021/05/24/cybersecurity-cyberattack-russia-hackers-cloud-sunburst-microsoft-office-365-data-leak/; Tejas N. Narechania & Ganesh Sitaraman, *An Antimonopoly Approach to Governing Artificial Intelligence*, 43 YALE L. & POL'Y REV. 95 (2024).

[10] Max von Thun & Claire Lavin, *Engineering the Cloud Commons: Tackling Monopoly Control of Critical Digital Infrastructure*, OPEN MKTS. INST. (May 13, 2025), https://www.openmarketsinstitute.org/publications/report-rethink-regulatory-approach-to-essential-cloud.

[11] Jai Vipra & Sarah Myers West, *Computational Power and AI*, AI NOW INST. (Sep. 27, 2023), https://ainowinstitute.org/publications/compute-and-ai.

[12] Sarah Wang & Martin Casado, *The Cost of Cloud, a Trillion Dollar Paradox*, ANDREESSEN HOROWITZ (May 27, 2021), https://a16z.com/the-cost-of-cloud-a-trillion-dollar-paradox/; Matt Bornstein, Guido Appenzeller & Martin Casado, *Who Owns the Generative AI Platform?*, ANDREESSEN HOROWITZ (Jan. 19, 2023), https://a16z.com/who-owns-the-generative-ai-platform/.

providers, and others rely on cloud computing for many aspects of their operations. This dependency means that cloud outages have grounded flights and halted government services. Second, cloud computing is necessary for AI and other technologies central to the U.S.'s geopolitical competition with the People's Republic of China. If the cloud market is inefficient, that impacts the U.S.'s AI leadership.

Many have outlined solutions to improve market competition and mitigate national security risks, but few have detailed specific actions policymakers might take. After providing background on cloud computing and relevant public policy problems, this Blueprint discusses federal legislative solutions, including by demonstrating how these policies could be adopted via sample legislative text.

To improve competition and mitigate security risks in the cloud computing market, this paper recommends federal legislation to institute pro-competition and pro-national security policies: **(A) structural separation, (B) neutrality requirements, (C) data portability and interoperability requirements**, **(D) designating cloud as a critical infrastructure sector, (E) restricting foreign adversary ownership or control of U.S. providers, and (F) instituting "know-your-customer" requirements**. Combined, these policies will lead to a more competitive and secure market that serves American public policy priorities.

Finally, recent debates have focused on the energy,[13] water,[14] environmental,[15] and health[16] effects of cloud computing and data centers. These are significant but beyond the scope of this paper. *Comprehensive* legislation to regulate cloud computing should include provisions dealing with these issues.[17]

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[13] See, e.g., Costa Samaras, Emma Strubell & Ramayya Krishnan, *AI's Energy Impact Is Still Small—but How We Handle It Is Huge*, MIT TECH. REV., May 2025, https://www.technologyreview.com/2025/05/20/1116274/opinion-ai-energy-use-data-centers-electricity/.

[14] See, e.g., Felicity Barringer, *Thirsty for Power and Water, AI-Crunching Data Centers Sprout across the West*, & THE WEST, Apr. 2025, https://andthewest.stanford.edu/2025/thirsty-for-power-and-water-ai-crunching-data-centers-sprout-across-the-west/.

[15] See, e.g., Noman Bashir et al., *The Climate and Sustainability Implications of Generative AI*, MIT EXPLORATION OF GENERATIVE AI (Mar. 27, 2024), https://mit-genai.pubpub.org/pub/8ulgrckc/release/2.

[16] See, e.g., Yuelin Han et al., *The Unpaid Toll: Quantifying the Public Health Impact of AI*, ARXIV.ORG (Dec. 9, 2024), https://arxiv.org/abs/2412.06288v1.

[17] For a recent proposal on environmental issues, see, Clean Cloud Act of 2025, S. 1475, 119th Cong. (2025).

II. Background

A. Technology Background

(1) AI Technological Stack

One common way to understand the supply chain for AI is as a technological stack,[18] where each layer depends on the one(s) beneath it while retaining some operational independence. As shown in Figure 1,[19] the layers of the stack are (1) applications built using (2) AI models, with training and inference happening in (3) cloud computing data centers that use (4) high-performance AI-specialized chips.

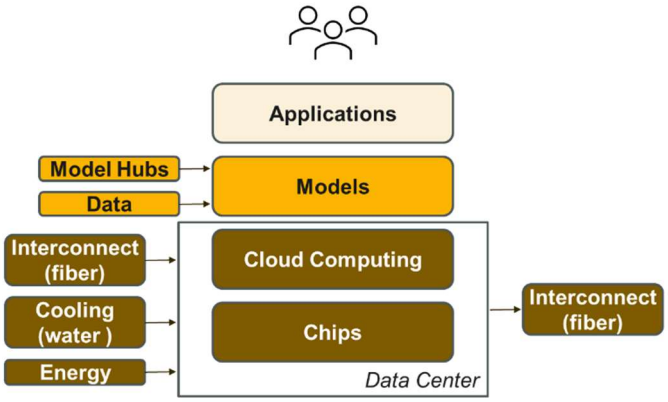

Figure 1. AI Technology Stack

The cloud computing layer has received less policy and press attention than other parts of the AI tech stack and digital issues more broadly.[20] For example, at the chips layer, Congress passed significant legislation to support domestic manufacturing and

[18] See, e.g., Meredith Whittaker et al., *AI Now Report 2018*, AI NOW INST., 5–6 (Dec. 2018), https://ainowinstitute.org/publications/ai-now-2018-report-2; Andrew W. Moore, Martial Hebert & Shane Shaneman, *The AI Stack: A Blueprint for Developing and Deploying Artificial Intelligence*, in Proc. SPIE Vol. 10635, GROUND/AIR MULTISENSOR INTEROPERABILITY, INTEGRATION, AND NETWORKING FOR PERSISTENT ISR IX, 106350C–2 (2018), https://doi-org.proxy.library.vanderbilt.edu/10.1117/12.2309483; Nat'l Sec. Comm'n on Artificial Intelligence, *Final Report*, 31 (2021), https://reports.nscai.gov/final-report/; Bornstein, Appenzeller, and Casado, *supra* note 12; Narechania and Sitaraman, *supra* note 9, at 108–127; *Partnerships Between Cloud Service Providers and AI Developers*, FED. TRADE COMM'N, 9 (Jan. 2025), https://www.ftc.gov/system/files/ftc_gov/pdf/p246201_aipartnerships6breport_redacted_0.pdf (hereinafter "FTC 6(b) Cloud-AI Report"); Written Testimony of Brad Smith, in *Winning the AI Race: Strengthening U.S. Capabilities in Computing and Innovation*, S. Hrg. 119-143, before the S. Comm. on Commerce, Sci. & Transp., 119th Cong., 24 (May 8, 2025), https://www.govinfo.gov/content/pkg/CHRG-119shrg61426/pdf/CHRG-119shrg61426.pdf; *America's AI Action Plan*, WHITE HOUSE, 20 (July 2025), https://www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf.

[19] Written Testimony of Asad Ramzanali, in *AI in the Everyday: Current Applications and Future Frontiers in Communications and Technology,* H. Hrg. 119-23, before the H. Comm. on Energy & Com., 119th Cong., 63 (June 4, 2025), https://www.govinfo.gov/content/pkg/CHRG-119hhrg60730/pdf/CHRG-119hhrg60730.pdf.

[20] TUNG-HUI HU, A PREHISTORY OF THE CLOUD 81 (2016).

research and development (R&D).[21] At the application layer, states have enacted laws responding to specific harms, such as deepfakes in elections,[22] and press attention is focused on companies operating in the AI model layer, like OpenAI.

(2) Cloud Computing

Cloud computing allows organizations to store and process data using software to control hardware in data centers operated by cloud service providers (CSPs). While the idea of distributed computing and component technologies (e.g., time-sharing, virtualization, service-oriented architectures) trace further back,[23] Amazon Web Services (AWS) launched modern cloud computing in 2006, followed by Google entering the market in 2008, and Microsoft launching Azure in 2010.[24] Cloud computing is usually more cost-effective, efficient, and flexible than an organization operating its own servers.[25]

> *Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.*

Figure 2. Commonly used formal definition of cloud computing[26]

The cloud computing sector is composed of several service and deployment models.[27] Cloud computing is commonly broken down into: infrastructure as a service (IaaS),

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[21] CHIPS and Science Act, Pub. L. No. 117-167, div. A, 136 Stat. 1372 (2022); *William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021*, Pub. L. No. 116-283, div. H, tit. XCIX, 134 Stat. 3388 (2021) (codified at 15 U.S.C. § 4652 et seq.).

[22] *New Analysis: List of State AI and Tech Protections Impacted by Cruz Moratorium*, PUBLIC CITIZEN (June 25, 2025), https://www.citizen.org/news/new-analysis-list-of-state-ai-and-tech-protections-impacted-by-cruz-moratorium/.

[23] See generally HU, *supra* note 20.

[24] Biglaiser, Crémer, and Mantovani, *supra* note 9, at 9–10.

[25] Formal distinctions for an organization operating outside of commercially available cloud services available for public use include "private cloud," "hybrid cloud," and "community cloud." For additional detail, see, Peter Mell & Timothy Grance, *The NIST Definition of Cloud Computing (NIST Special Publication 800-145)*, NAT'L INST. OF STANDARDS AND TECH. (Sep. 2011), https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf; see also Nayan B. Ruparelia, *Types of Cloud Computing*, in CLOUD COMPUTING (revised and updated ed. 2023).

[26] Mell and Grance, *supra* note 25, at 2.

[27] Mell and Grance, *supra* note 25.

platform as a service (PaaS), and software as a service (SaaS).[28] IaaS is the core computing hardware that CSPs offer as a service, like servers and network equipment.[29] The practical boundary between IaaS and PaaS has long been blurry, and the two are often combined in market analysis, policy discussions, and even industry marketing.[30]

Today, each CSP operates an ecosystem of hundreds of products and services, in addition to third-party products and services offered as integrations.[31] These include offerings for storage, computational capacity (i.e., compute), databases, networking, analytics, AI training, and cybersecurity. Many but not all of these products are similar across CSPs with differing programming languages, technical interfaces, tooling, levels of support, and cost. CSPs provide the compute, memory, storage, and networking needed for customers to perform computational tasks and processes (i.e., workloads).[32]

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[28] *Id.* at 2–3; *What Is A Cloud Computing Stack?*, MONGODB, https://www.mongodb.com/resources/basics/cloud-explained/cloud-computing-stack (last visited May 16, 2025); Ashley Watters, *What Is AI Cloud Computing?*, COMPTIA (Jan. 3, 2025), https://www.comptia.org/blog/what-is-ai-cloud-computing; H. Antitrust Subcomm., *supra* note 2, at 91–93; *Types of Cloud Computing*, AMAZON WEB SERVICES, INC., https://aws.amazon.com/types-of-cloud-computing/ (last visited May 12, 2025); *Comment of NetChoice (Re: FTC RFI on Business Practices of Cloud Computing Providers, FTC-2023-0028)*, at 2 (June 20, 2024), https://www.regulations.gov/comment/FTC-2023-0028-0043; See also Methun Raj Mani, *Public Cloud: Market Data & Analysis*, STATISTA, 6–7 (Dec. 2024), https://www.statista.com/study/85676/public-cloud-report/ (Also includes Business Process as a Service, Desktop as a Service, and Disaster Recovery as a Service).

[29] Dutch ACM Cloud Study, *supra* note 5, at 9; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 23.

[30] OECD Cloud Paper, *supra* note 7, at § 3.1; U.K. Ofcom Cloud Study, *supra* note 3, at 3; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 24; Dutch ACM Cloud Study, *supra* note 5, at 9; Chris Tozzi, *IaaS vs. PaaS Options on AWS, Azure and Google Cloud Platform*, TECHTARGET (Jan. 18, 2023), https://www.techtarget.com/searchcloudcomputing/tip/IaaS-vs-PaaS-options-on-AWS-Azure-and-Google-Cloud-Platform; *Gartner Forecasts Worldwide Public Cloud End-User Spending to Total $723 Billion in 2025*, GARTNER (Nov. 19, 2024), https://www.gartner.com/en/newsroom/press-releases/2024-11-19-gartner-forecasts-worldwide-public-cloud-end-user-spending-to-total-723-billion-dollars-in-2025.

[31] U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 4.61.

[32] *What Is a Workload?*, PALO ALTO NETWORKS, https://www.paloaltonetworks.com/cyberpedia/what-is-workload (last visited June 18, 2025).

Some CSP customers maintain "multi-cloud" or interoperable architectures, enabled by recent technical standards,[33] to increase redundancy and resilience,[34] to avoid vendor lock-in,[35] or for moving workloads based on CSP product quality or cost differences[36]. Such architectures cover many CSP core offerings but are far from comprehensive. Additionally, interoperability as a concept in the cloud market faces some technical limits (e.g., moving large datasets is time-consuming) and company practices (e.g., CSPs charge fees to move data out)[37].

B. Market Features and Economic Harms

The cloud computing market is immense. It represented $632 billion of revenue worldwide in 2023, with $320 billion, or just over half of the worldwide total representing U.S. revenue.[38] For context, the cloud computing market exceeds adjacent markets, such as smartphones,[39] search engines,[40] broadband,[41] and even AI applications[42].

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[33] *IEEE Approves Cloud Computing Standard, Aided by NIST*, NAT'L INST. OF STANDARDS & TECH. (Dec. 21, 2021), https://www.nist.gov/news-events/news/2021/12/ieee-approves-cloud-computing-standard-aided-nist.

[34] Japanese FTC Cloud Report, *supra* note 6, at 26; *DoD Enterprise DevSecOps Reference Design: CNCF Multi-Cluster Kubernetes*, DEP'T OF DEF., ¶ 1.1 (July 2022), https://dodcio.defense.gov/Portals/0/Documents/Library/DoDReferenceDesign-CNCFMulti-ClusterKubernetes.pdf.

[35] Dutch ACM Cloud Study, *supra* note 5, at 5; Japanese FTC Cloud Report, *supra* note 6, at 26; Kate Brennan, Amba Kak & Sarah Myers West, *Artificial Power: 2025 Landscape Report*, AI NOW INSTITUTE, 45 (June 3, 2025), https://ainowinstitute.org/wp-content/uploads/2025/06/FINAL-20250609_AINowLandscapeReport_Full.pdf.

[36] Japanese FTC Cloud Report, *supra* note 6, at 26; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 73.

[37] Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶¶ 514, 525.

[38] Mani, *supra* note 28, at 9, 15.

[39] *Smartphones - Worldwide*, STATISTA (June 2025), http://frontend.xmo.prod.aws.statista.com/outlook/cmo/consumer-electronics/telephony/smartphones/worldwide ($485 billion in estimated 2025 global revenues).

[40] Alex Petridis, *51913A Search Engines in the US*, IBISWORLD (Oct. 2024) ($288 billion in 2024 U.S. revenues).

[41] Alex Petridis, *51711D Internet Service Providers in the US*, IBISWORLD (Apr. 2025) ($169 billion in 2024 U.S. revenues).

[42] Julia Hoffmann & Dev Mehta, *Artificial Intelligence: In-Depth Market Analysis*, STATISTA, 7 (Apr. 2024), https://www.statista.com/study/50485/in-depth-report-artificial-intelligence/ ($538.1 billion in global 2023 revenues).

(1) Market Concentration

Governments, analysts, scholars, and others have recognized that the cloud computing market is significantly concentrated.[43] Three large American CSPs (commonly called hyperscalers)—AWS, Azure, and Google Cloud Platform (GCP)—represent two-thirds of market share of the combined IaaS, PaaS, and private cloud market, as illustrated in Figure 3.[44] These three companies also operate approximately six of ten AI data centers worldwide.[45] For comparison, the market share of the top three U.S. commercial banks is 35%,[46] U.S. fixed broadband providers is 68%,[47] and U.S. passenger airlines is 63%.[48]

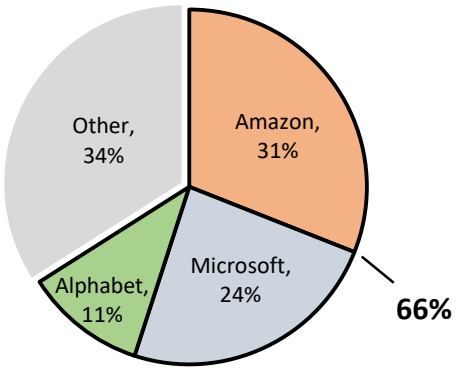

Figure 3. Global CSP Revenues, 2024 Q4 (SYNERGY RSCH. GRP.)

While these rates are not as concentrated as, for example the search engine market where Google accounts for 90% of the market, this concentration still leads to hyperscalers being able to maintain a substantial profit margin, significantly above

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[43] OECD Cloud Paper, *supra* note 7, at § 3.3.1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 1.6; Dutch ACM Cloud Study, *supra* note 5, at 4–6; S. Kor. FTC Cloud Study, *supra* note 7, at 2; *La CNMC Inicia Un Estudio Sobre Los Servicios de Nube*, *supra* note 7; *The Financial Services Sector's Adoption of Cloud Services*, DEP'T OF THE TREASURY, 6 (Feb. 8, 2023), https://home.treasury.gov/news/press-releases/jy1252; Narechania and Sitaraman, *supra* note 9, at 101; Mani, *supra* note 28, at 53–56.

[44] *Cloud Market Gets Its Mojo Back; AI Helps Push Q4 Increase in Cloud Spending to New Highs*, SYNERGY RSCH. GRP. (Feb. 1, 2024), https://www.srgresearch.com/articles/cloud-market-gets-its-mojo-back-q4-increase-in-cloud-spending-reaches-new-highs; OECD Cloud Paper, *supra* note 7, at § 3.3.1 (Concentration rates are higher in many other countries.).

[45] Adam Satariano & Paul Mozur, *The A.I. Race Is Splitting the World Into Haves and Have-Nots*, N.Y. TIMES, June 21, 2025, https://www.nytimes.com/interactive/2025/06/23/technology/ai-computing-global-divide.html; Zoe Hawkins, Vili Lehdonvirta & Boxi Wu, *AI Compute Sovereignty: Infrastructure Control Across Territories, Cloud Providers, and Accelerators*, SSRN (June 20, 2025), https://papers.ssrn.com/abstract=5312977.

[46] Calculated based on consolidated assets, a more common market share metric for banks. *Large Commercial Banks*, FEDERAL RESERVE BOARD (Mar. 31, 2025), https://www.federalreserve.gov/releases/lbr/current/.

[47] *Fixed Broadband in the United States*, STATISTA, 14 (2024), https://www.statista.com/study/173219/fixed-broadband-in-the-united-states/.

[48] Calculated for "Revenue Passenger Miles," a more common metric for airlines. *Airline Quarterly Financial Review: First Quarter 2025*, OFFICE OF AVIATION ANALYSIS, U.S. DEPARTMENT OF TRANSPORTATION (2025), https://www.transportation.gov/sites/dot.gov/files/2025-07/2025q1_Quarterly_Financial_Review_Majors.pdf.

what regulators would expect to see in a competitive market, even as the cost of compute has decreased.[49]

The hyperscalers are also part of a broader corporate "AI arms race," where outsized profits from cloud computing enable their parent companies to steer the AI market.[50] AI is responsible for approximately 75% of the growth in data centers,[51] and each company depends on cloud computing financially in slightly different ways: [52]

- AWS comprises approximately 60% of the company's operating income.[53]
- Azure's 33% revenue growth in the last year is driving overall Microsoft results.[54]
- GCP growth was double the growth of Alphabet as a whole.[55]

While segments are not perfectly comparable across companies' financial reports, revenues for cloud computing were over $100 billion for both Amazon and Microsoft and over $40 billion for Alphabet, according to each company's most recent annual report.[56]

Other notable CSPs with smaller market shares include large U.S. companies IBM and Oracle, large Chinese companies Alibaba and Huawei, and AI-specialized cloud

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[49] U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 1.7; Narechania and Sitaraman, *supra* note 9, at 130.
[50] von Thun and Lavin, *supra* note 10, at 14.
[51] Jesse Noffsinger & Pankaj Sachdeva, *Data Centers: The Race to Power AI*, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/data-centers-the-race-to-power-ai (last visited June 22, 2025).
[52] See generally Cloud Market Gets its Mojo Back; AI Helps Push Q4 Increase in Cloud Spending to New Highs, *supra* note 44; Gartner Forecasts Worldwide Public Cloud End-User Spending to Total $723 Billion in 2025, *supra* note 30; FTC 6(b) Cloud-AI Report, *supra* note 18, at 12; von Thun and Lavin, *supra* note 10, at 13.
[53] Amazon.com, Inc., *Q1 2025 Financial Results Conference Call Slides*, 3, 11 (2025), https://s2.q4cdn.com/299287126/files/doc_financials/2025/q1/Webslides_Q125-FINAL.pdf (Figures calculated based on trailing 12-month period); see also von Thun and Lavin, *supra* note 10, at 13.
[54] Microsoft Corp., *Earnings Release FY25 Q3: Microsoft Cloud and AI Strength Drives Third Quarter Results* (2025), https://www.microsoft.com/en-us/investor/earnings/fy-2025-q3/press-release-webcast.
[55] Alphabet Inc., *Alphabet Announces First Quarter 2025 Results*, (2025), https://abc.xyz/assets/34/fa/ee06f3de4338b99acffc5c229d9f/2025q1-alphabet-earnings-release.pdf.
[56] Amazon.com, Inc., *Annual Report (Form 10-K)*, 24 (2025), https://www.sec.gov/Archives/edgar/data/1018724/000101872425000004/amzn-20241231.htm; Microsoft Corporation, *Annual Report (Form 10-K)*, 93 (2024), https://www.sec.gov/Archives/edgar/data/789019/000095017024087843/msft-20240630.htm; Alphabet Inc., *Annual Report (Form 10-K)*, 36 (2025), https://abc.xyz/assets/59/ff/66de11a3bfa7db6cb929ba12a01b/6b3f31ad08de72f11d32f2b4f712b918.pdf.

providers Coreweave and Nvidia. Coreweave, despite recent press attention, has a market capitalization approximately 40 times smaller than the hyperscalers.[57]

Market concentration is caused, in part, by inherent market features, like the high barriers to entry (e.g., expensive and scarce specialized chips, costs of sufficient energy and water),[58] economies of scale related to data center construction,[59] and high technical switching costs (discussed later).[60]

Concentration hinders innovation both in the cloud computing market and in markets that rely on cloud computing (e.g., AI). Within the cloud market, concentration in the cloud market has "almost certainly stifled the rise of potential cloud rivals."[61] As a layer of the AI stack, the concentrated cloud market has centralized AI R&D and commercialization and has left startups vulnerable to anticompetitive practices.[62] Wang and Casado (Andreessen Horowitz) have started discussing "repatriation" from the cloud (i.e., bringing computing in house) for the first time recently because market capitalizations of software companies are weighed down by cloud costs.[63]

(2) Vertical Integration Across AI Tech Stack

The three hyperscalers are vertically integrated across every layer of the AI tech stack,[64] with a non-exhaustive list of their products and services illustrated in Figure 4 and in Appendix B. They are suppliers of an essential infrastructure (compute) and

[57] Jeremy Bowman, *2 Artificial Intelligence (AI) Stocks That Could Turn $10,000 Into $100,000*, THE MOTLEY FOOL, May 22, 2025, https://www.fool.com/investing/2025/05/22/x-ai-stocks-that-could-turn-10000-into-100000/ (CRWV has a market capitalization of $48 billion as of close of market on May 23, 2025.).
[58] Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶¶ 198-202.
[59] U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 6.16-25; Dutch ACM Cloud Study, *supra* note 5, at 43–45; Japanese FTC Cloud Report, *supra* note 6, at 38–41; Fr. Competition Auth. Cloud Op., *supra* note 4, at 203–209.
[60] OECD Cloud Paper, *supra* note 7, at § 3.3.3; U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 5.4 et seq.; Narechania and Sitaraman, *supra* note 9, at 115–116; von Thun and Lavin, *supra* note 10, at 12–14.
[61] von Thun and Lavin, *supra* note 10, at 6, 22.
[62] Max von Thun & Daniel A. Hanley, *Stopping Big Tech from Becoming Big AI: A Roadmap for Using Competition Policy to Keep Artificial Intelligence Open for All*, OPEN MKTS. INST., 10 (Oct. 17, 2024), https://www.openmarketsinstitute.org/publications/report-stopping-big-tech-big-ai-roadmap; Jack Corrigan, *Promoting AI Innovation Through Competition*, CTR. FOR SEC. & EMERGING TECH., 10 (May 2025), https://cset.georgetown.edu/publication/promoting-ai-innovation-through-competition/.
[63] Wang and Casado, *supra* note 12.
[64] OECD Cloud Paper, *supra* note 7, at § 3.4.2; Narechania and Sitaraman, *supra* note 9, at 124–125, 151.

simultaneously investors, customers, and competitors of their customers.[65] This creates conflicts of interest among businesses these companies own and competitors of each of those businesses. Notably, much of this cross-AI tech stack business activity is based on prior acquisitions. In the decade through 2023, Microsoft acquired 21 and Alphabet acquired 18 AI companies, the second and third most of any company in that period.[66]

	aws	Microsoft Azure	Google Cloud
Applications	Amazon.com, Alexa/Echo, Perplexity	Bing (Copilot, using OpenAI models), Office suite	standalone (e.g., Gemini, Canvas), software (e.g., Search, Maps, Gmail, Ads), hardware (e.g., Android, Fitbit, Waymo),
Models	Nova Act, Anthropic, ScaleAI, Hugging Face, Stability AI; cloud marketplace and API access to many models	Inflection AI, GitHub (Copilot, Models, and Sparks), OpenAI; cloud marketplace and API access to many models	Gemini (based on DeepMind), Anthropic; cloud marketplace and API access to many models
Cloud Computing	AWS	Azure	Google Cloud
Chips	Annapurna Labs (Trainium, Inferentia, and Graviton)	Azure Maia 100 and Cobalt 100	Tensor Processing Units

Figure 4. Products and services offered by hyperscalers' parent companies across the AI technological stack. See, also, Appendix B.

The hyperscalers have further vertically integrated through investments, acquisitions, and other acquisition-like partnerships.[67] In particular, while OpenAI and Anthropic seem like competitors to companies considered "Big Tech," they represent some of the largest investments and customers of those same companies. Microsoft invested nearly $14 billion in OpenAI for a claim to 49% of future OpenAI profits up to a certain

[65] FTC 6(b) Cloud-AI Report, *supra* note 18, at 30; Narechania and Sitaraman, *supra* note 9, at 131; von Thun and Hanley, *supra* note 62, at 23.
[66] Jack Corrigan, Ngor Luong & Christian Schoeberl, *Acquiring AI Companies: Tracking U.S. AI Mergers and Acquisitions*, CTR. FOR SEC. & EMERGING TECH., 14 (Nov. 2024), https://cset.georgetown.edu/publication/acquiring-ai-companies-tracking-u-s-ai-mergers-and-acquisitions/.
[67] OECD Cloud Paper, *supra* note 7, at § 3.4.2; Brennan, Kak, and West, *supra* note 35, at 45.

threshold.[68] Amazon invested $8 billion in Anthropic.[69] Alphabet invested at least $2 billion in Anthropic, equating to a 14% stake.[70] A recent Federal Trade Commission (FTC) investigation found that these three "partnerships" share features of acquisitions and investments, including equity, revenue-sharing, control, exclusivity rights, spend commitments, and information sharing.[71] Overall, hyperscalers are investing in startups at rates comparable to the largest venture capital firms.[72]

Hyperscalers limit which AI models are offered to their customers in their AI offerings (e.g., AWS Bedrock, Azure AI Foundry, GCP Vertex AI) and marketplaces, such that the three leading foundation AI model providers (i.e., OpenAI, Anthropic, Google) are natively available only with hyperscalers that have a financial stake in that company. For example, OpenAI's GPT-5 is only available *natively* via Azure, Anthropic's Claude 4 series is available via AWS and GCP, and Alphabet Gemini Pro is only available natively via GCP.[73] Each hyperscaler also offers other closed-weight models (e.g., Mistral Large)

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[68] FTC 6(b) Cloud-AI Report, *supra* note 18, at 4; Berber Jin & Corrie Driebusch, *The $14 Billion Question Dividing OpenAI and Microsoft*, WALL ST. J., Oct. 18, 2024, https://www.wsj.com/tech/ai/the-14-billion-question-dividing-openai-and-microsoft-71cf7d37; Aaron Holmes, *OpenAI Wants Microsoft to Accept 33% Stake in Business*, THE INFORMATION, June 2025, https://www.theinformation.com/briefings/openai-wants-microsoft-accept-33-stake-business.

[69] Reed Albergotti, *The Tiny Chips behind Amazon's Big AI Investment*, SEMAFOR, Mar. 2025, https://www.semafor.com/article/03/14/2025/amazons-trainium-chips-to-be-tested-by-anthropic; FTC 6(b) Cloud-AI Report, *supra* note 18.

[70] Cade Metz, Nico Grant & David McCabe, *Inside Google's Investment in the A.I. Start-Up Anthropic*, N.Y. TIMES, Mar. 11, 2025, https://www.nytimes.com/2025/03/11/technology/google-investment-anthropic.html.

[71] FTC 6(b) Cloud-AI Report, *supra* note 18, at 6–7; von Thun and Hanley, *supra* note 62, at 12; Corrigan, *supra* note 62, at 27; Clare Y. Cho, Laurie Harris & Ling Zhu, *Competition and Antitrust Concerns Related to Generative AI (IF12968)*, CONG. RSCH. SERV., 2 (Apr. 16, 2025), https://www.congress.gov/crs-product/IF12968.

[72] David Gray Widder & Nathan Kim, How Big Cloud Becomes Bigger: Scrutinizing Google, Microsoft, and Amazon's Investments (July 31, 2025), https://papers.ssrn.com/abstract=5377426.

[73] *Amazon Bedrock Model Choice*, AMAZON WEB SERVICES, INC., https://aws.amazon.com/bedrock/model-choice/ (last visited Aug. 15, 2025); *Supported Foundation Models in Amazon Bedrock*, AMAZON WEB SERVICES, INC., https://docs.aws.amazon.com/bedrock/latest/userguide/models-supported.html (last visited Aug. 15, 2025); *Azure AI Foundry Models*, MICROSOFT AZURE, https://azure.microsoft.com/en-us/products/ai-model-catalog (last visited Aug. 15, 2025); *AWS Marketplace*, AMAZON WEB SERVICES, INC., https://aws.amazon.com/marketplace (last visited Aug. 15, 2025); *Microsoft Azure Marketplace*, MICROSOFT AZURE, https://azuremarketplace.microsoft.com/en-us/ (last visited Aug. 15, 2025); *Models Supported by Model Garden | Generative AI on Vertex AI*, GOOGLE CLOUD, https://cloud.google.com/vertex-ai/generative-ai/docs/model-garden/available-models (last visited Aug. 15, 2025); *Google Cloud Marketplace*, GOOGLE CLOUD, https://cloud.google.com/marketplace (last visited Aug. 15, 2025).

and open-weight models (e.g., Meta Llama 4 series, DeepSeek R1, OpenAI gpt-oss).[74] Virtually any AI model can be deployed outside of the easier interface of native integrations.

Even outside of the dominant hyperscalers, competitor CSPs have conflicting business relationships across layers of the AI stack:

- Stargate, a multi-billion-dollar joint venture to build AI-specific data centers, has Oracle and OpenAI as investors and will exclusively serve OpenAI.[75]
- Nvidia, the dominant AI chip designer, has entered the cloud computing market.[76]
- Coreweave's investors include Nvidia and OpenAI,[77] and its customers include Microsoft, OpenAI, and Alphabet.[78]
- Nebius has Nvidia as an investor[79] and has co-invested with Jeff Bezos's venture fund in an AI data company that is a supplier to Amazon, Anthropic, and Microsoft.[80]

Conflicts from vertical integration can lead to self-preferencing and discriminatory prices and terms. Hyperscalers provided preferential pricing to business partners,

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[74] *Id*.

[75] Madhumita Murgia, George Hammond & Tabby Kinder, *Stargate Artificial Intelligence Project to Exclusively Serve OpenAI*, FIN. TIMES, Jan. 24, 2025, https://www.ft.com/content/4541c07b-f5d8-40bd-b83c-12c0fd662bd9.

[76] Anissa Gardizy, *Nvidia Muscles Into GPU Cloud Market, Rankling New Rivals*, THE INFORMATION, June 2025, https://www.theinformation.com/articles/nvidia-muscles-gpu-cloud-market-rankling-new-rivals.

[77] Ben Cohen, *A Startup in the New Jersey Suburbs Is Battling the Giants of Silicon Valley*, WALL ST. J., Aug. 25, 2023, https://www.wsj.com/tech/ai/nvidia-gpu-chips-coreweave-c8782435; Julie Bort, *In Another Chess Move with Microsoft, OpenAI Is Pouring $12B into CoreWeave*, TECHCRUNCH (Mar. 10, 2025), https://techcrunch.com/2025/03/10/in-another-chess-move-with-microsoft-openai-is-pouring-12b-into-coreweave/.

[78] Krystal Hu & Kenrick Cai, *CoreWeave to Offer Compute Capacity in Google's New Cloud Deal with OpenAI, Sources Say*, REUTERS, June 11, 2025, https://www.reuters.com/business/coreweave-offer-compute-capacity-googles-new-cloud-deal-with-openai-sources-say-2025-06-11/; Cory Weinberg & Anissa Gardizy, *Microsoft Is a CoreWeave Rival. It's Also a Big Customer*, THE INFORMATION, Nov. 2024, https://www.theinformation.com/articles/microsoft-is-a-coreweave-rival-its-also-a-big-customer; Brennan, Kak, and West, *supra* note 35, at 39.

[79] Alexander Marrow, *Nvidia among Investors in $700 Mln Capital Raise by AI Firm Nebius Group*, REUTERS, Dec. 2, 2024, https://www.reuters.com/technology/nvidia-among-investors-700-mln-capital-raise-by-ai-firm-nebius-group-2024-12-02/.

[80] Nebius, *Nebius Welcomes Bezos Expeditions as Lead Investor in AI Data Business Toloka* (2025), https://group.nebius.com/newsroom/nebius-welcomes-bezos-expeditions-as-lead-investor-in-ai-data-business-toloka.

especially AI model companies in which they invest.[81] Another manifestation of hyperscalers' conflicts of interest shows up in discriminatory service quality. For example, one hyperscaler was found to be deprioritizing supply of scarce chips for a startup to serve a large AI model partner.[82]

(3) Conglomerate Effects

Amazon, Microsoft, and Alphabet are conglomerates that own many businesses, providing each with "deep pockets"[83] and providing anchor tenants that help scale their cloud businesses.[84] The following are non-exhaustive lists of businesses they own:

- Amazon - Amazon.com, Prime, Zappos, Whole Foods, PillPack, One Medical, MGM, Twitch, Audible, IMDb, Echo, Kindle, and Ring.
- Microsoft - Windows, Office and Office365 suite (Outlook, Word, Excel, PowerPoint), Bing, GitHub, Xbox, Activision Blizzard, and LinkedIn.
- Alphabet - Search, Maps, Gmail, Chrome, AdWords, AdSense, YouTube, Android, Pixel, Fitbit, Waymo, Wing, Verily, Nest, Google Fiber.

Many of the businesses under each broader corporate umbrella are "complement goods" in an economic sense, in that demand for one increases demand for another (e.g., increased demand for Google Search increases demand for Google Ads). This is especially true for the relationship between cloud computing and AI. The more demand for a hyperscaler's AI models or applications, the more demand for their cloud computing businesses. Corporate combinations of complementary goods tend to raise similar concerns as vertical integration mergers and can lead to "higher prices, lower product quality, or reduced investment and innovation that otherwise would occur absent the merger."[85]

While the three conglomerates benefit from their CSP financially through profits and subsidized cloud costs for their non-cloud businesses, each CSP is its own business with relative autonomy to be seen as a standalone business. Each conglomerate

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[81] FTC 6(b) Cloud-AI Report, *supra* note 18, at 21.
[82] *Id.* at 31.
[83] Dutch ACM Cloud Study, *supra* note 5, at 49–50; see also Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶¶ 282-285.
[84] U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 6.32; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 287.
[85] Dep't of Justice & Fed. Trade Comm'n, *Conglomerate Effects of Mergers – Note by the United States*, OECD, ¶¶ 3-4 (June 10, 2020), https://www.ftc.gov/system/files/attachments/us-submissions-oecd-2010-present-other-international-competition-fora/oecd-conglomerate_mergers_us_submission.pdf.

breaks out revenue from cloud computing in its public financial disclosures.[86] The heads of AWS and GCP have the title "CEO."[87]

Being part of a conglomerate creates an incentive for CSPs to bundle and tie their CSP offerings with unrelated businesses.[88] For example, Amazon reportedly conditioned WarnerMedia launching HBO Max on Amazon Fire TV on WarnerMedia extending its AWS contract.[89] Similarly, Microsoft nudges customers of Microsoft 365 towards Azure.[90]

Additionally, hyperscalers can surveil their customers' businesses and copy successful businesses that are in adjacent markets. Companies have long complained that AWS copies products of their customers that use AWS services,[91] mirroring complaints about Amazon copying products sold on its e-commerce platform[92].

(4) Opaque Pricing

Customers of hyperscalers find it difficult to compare actual, effective prices due to private discounts and systems of cloud credits.[93] Hyperscalers liberally provide "committed spend discounts" (i.e., volume discounts) to keep customers from moving to competitors.[94] While volume discounts are common in many industries, hyperscalers use private and opaque means of providing these discounts that severely increase switching costs.[95]

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[86] Amazon.com, Inc., *supra* note 56, at 24; Microsoft Corporation, *supra* note 56, at 93; Alphabet Inc., *supra* note 56, at 36.

[87] *Andy Jassy Makes AWS Leadership Announcement*, AMAZON (May 14, 2024), https://www.aboutamazon.com/news/company-news/leadership-update-aws-adam-selipsky-matt-garman; *Leadership*, GOOGLE CLOUD PRESS CORNER, https://www.googlecloudpresscorner.com/leadership (last visited Aug. 11, 2025).

[88] OECD Cloud Paper, *supra* note 7, at § 4.4.2; Department of Justice and Federal Trade Commission, *supra* note 85, at ¶ 29; Dutch ACM Cloud Study, *supra* note 5, at 62.

[89] von Thun and Lavin, *supra* note 10, at 18.

[90] *Id.* at 14.

[91] Narechania and Sitaraman, *supra* note 9, at 135; von Thun and Lavin, *supra* note 10, at 18; H. Antitrust Subcomm., *supra* note 2, at 272; Lina M. Khan, *Amazon's Antitrust Paradox*, 126 YALE L.J., 783 (Jan. 2017), https://www.yalelawjournal.org/note/amazons-antitrust-paradox.

[92] H. Antitrust Subcomm., *supra* note 2, at 230.

[93] *Id.* at 99; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 137.

[94] Jones, *supra* note 1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 1.26-1.28, 4.65, 5.174 et seq.; von Thun and Lavin, *supra* note 10, at 15.

[95] U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 5.257.

Similarly, while free trials are otherwise common in many industries, hyperscalers have developed an opaque system of offering cloud credits of varying amounts to new customers, startups,[96] computer science students,[97] government-supported researchers,[98] and even government agencies[99]. One foundational issue with the practice is that "Cloud credit[s] target customers at a time when they are making long-term structural choices."[100] More cloud credits are often offered to portfolio companies of hyperscalers' partner investors and accelerators,[101] have been included in major investment in AI companies,[102] and sometimes include exclusivity restrictions. Additionally, small CSPs are less able to offer cloud credits.[103] Some observers argue these credits resemble anticompetitive "loyalty rebates"[104] and are part of a "lock-in strategy."[105]

(5) High Switching Costs

Positive market pressures from competition are blunted when customers cannot credibly threaten switching to another provider, as is the case in the cloud market.[106] High switching costs exist at two levels—customers of hyperscalers switching cloud ecosystems and customers implementing a multi-cloud architecture.

Hyperscalers' bespoke ecosystems of hundreds of products and services lead to low ecosystem switching levels.[107] High switching costs are due to technical barriers and

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[96] JYP_Scouter, *Getting Cloud Credits — A Short Guide for Bootstrapped AI Startups*, R/SaaS (2024), https://www.reddit.com/r/SaaS/comments/1g25hmp/getting_cloud_credits_a_short_guide_for/.
[97] See, e.g., *Get and Redeem Education Credits*, Google Cloud, https://cloud.google.com/billing/docs/how-to/edu-grants (last visited Aug. 11, 2025).
[98] *National Artificial Intelligence Research Resource Pilot*, Nat'l Sci. Found., https://www.nsf.gov/focus-areas/ai/nairr (last visited Aug. 11, 2025).
[99] Annie Palmer, *Amazon's Cloud Business Giving Federal Agencies up to $1 Billion in Discounts*, CNBC, Aug. 2025, https://www.cnbc.com/2025/08/07/amazon-aws-federal-discounts.html.
[100] Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 412.
[101] See, e.g., Ina Fried, *Exclusive: Google Announces a Non-Exclusive Cloud Computing Deal with Sequoia Capital*, Axios, Oct. 9, 2024, https://www.axios.com/2024/10/09/google-cloud-deal-sequoia-capital; Widder and Kim, *supra* note 72, at 4–5.
[102] Reed Albergotti, *OpenAI Has Received Just a Fraction of Microsoft's $10 Billion Investment*, Semafor, Nov. 18, 2023, https://www.semafor.com/article/11/18/2023/openai-has-received-just-a-fraction-of-microsofts-10-billion-investment.
[103] Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 415.
[104] OECD Cloud Paper, *supra* note 7, at §§ 2.3.4, 4.3.2; U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 4.66-4.67, 6.97 et seq.; Jones, *supra* note 1.
[105] Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶¶ 421-423.
[106] U.K. Ofcom Cloud Study, *supra* note 3, at 4.
[107] *Id.* at ¶ 4.61; Dutch ACM Cloud Study, *supra* note 5, at 5.

company policies.[108] Barriers include customers having to retrain staff on CSP-specific interfaces and programming languages, refactoring software code, and realigning differing third-party integrations.[109]

Specific company practices also raise barriers to switching. For example, hyperscalers charge excessive "egress fees" when customer transfer data out of the hyperscaler's infrastructure, directly increasing switching costs.[110] While some hyperscalers have announced phasing out these fees, the actual impact may be limited due to other anticompetitive practices (e.g., Microsoft increasing licensing costs for Office if transferring data out of Azure).[111] Microsoft also generally makes using its products more difficult on other cloud services compared to Azure.[112] There are real costs associated with moving data, but hyperscalers do not charge separate ingress fees to bring data into a cloud offering.

Barriers—based again on technical realities and company choices—also hinder implementing interoperability at the level of individual cloud workloads. Today, many CSP customers maintain some version of a multi-cloud architecture, but none has frictionless workload interoperability.[113] Significant inherent technical limits include latency (i.e., lags) and networking costs involved in moving large amounts of data from one CSP to another.[114] Company polices that hinder workload interoperability include the fact that while technical standards for multi-cloud have emerged[115] including Kubernetes (an open-source container orchestration system), they are still generally

[108] Dutch ACM Cloud Study, *supra* note 5, at 59–60; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶ 514.
[109] OECD Cloud Paper, *supra* note 7, at § 4.1.1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 5.16; S. Kor. FTC Cloud Study, *supra* note 7, at 5; Dutch ACM Cloud Study, *supra* note 5, at 55–56.
[110] Jones, *supra* note 1; OECD Cloud Paper, *supra* note 7, at §§ 2.3.3, 4.3.1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 1.18-1.20, 5.106 et seq.; Dutch ACM Cloud Study, *supra* note 5, at 57–59; H. Antitrust Subcomm., *supra* note 2, at 98; von Thun and Lavin, *supra* note 10, at 16–17; Narechania and Sitaraman, *supra* note 9, at 116; Fr. Competition Auth. Cloud Op., *supra* note 4, at ¶¶ 424-425.
[111] von Thun and Lavin, *supra* note 10, at 16–17; Alex Hawkes, *The Truth About Cloud Data Egress Fees: They're Not Going Away Yet*, CONSOLE CONNECT (Apr. 5, 2024), https://blog.consoleconnect.com/the-truth-about-cloud-data-egress-fees; Arash Massoudi et al., *US Regulators Plan to Investigate Microsoft's Cloud Business*, FIN. TIMES, Nov. 14, 2024, https://www.ft.com/content/62f361eb-ce52-47c1-9857-878cfe298d54.
[112] OECD Cloud Paper, *supra* note 7, at § 4.4.1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 1.44-1.45; von Thun and Lavin, *supra* note 10, at 17.
[113] Dutch ACM Cloud Study, *supra* note 5, at 5.
[114] U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 5.5; Dutch ACM Cloud Study, *supra* note 5, at 56.
[115] IEEE Approves Cloud Computing Standard, Aided by NIST, *supra* note 33.

not "widely adopted" in fully integrated ways.[116] Additionally, CSPs design new products and features with varying degrees of cross-CSP compatibility (e.g., degree to which open standards are incorporated),[117] which can sometimes cause architectural lock-in.

C. National Security Risks

Cloud computing impacts national security in two major ways: First, it has become essential for many aspects of society, and vulnerabilities to adversarial attacks and even benign technical failures are risks to national security. Second, because cloud computing underpins AI and other technologies that are core to today's technological geopolitical competition, a functioning cloud computing market is essential for national security.

(1) Societal Dependence on Cloud Computing

Today, society is highly dependent on cloud computing.[118] In 2019, a journalist tried to completely block her usage of Amazon services, including all websites reliant on AWS. She found it impossible.[119] Nearly all Fortune 500 companies use cloud computing, as do a growing number of government agencies, including the Department of Defense (DOD).[120] Cloud computing is embedded within critical infrastructure sectors like healthcare, energy and water systems, and financial services.[121] For financial services, the interagency Financial Stability Oversight Council determined banks' use of hyperscalers is "a potential risk to financial stability" of the country.[122] Collectively, this creates a form of "systemic risk."[123]

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[116] OECD Cloud Paper, *supra* note 7, at § 4.2.
[117] Biglaiser, Crémer, and Mantovani, *supra* note 9, at 14.
[118] H. Antitrust Subcomm., *supra* note 2, at 91; *Review of the Summer 2023 Microsoft Exchange Online Intrusion*, CYBER SAFETY REVIEW BOARD, ii (Mar. 20, 2024), https://www.cisa.gov/sites/default/files/2025-03/CSRBReviewOfTheSummer2023MEOIntrusion508.pdf; Jones, *supra* note 1; U.K. Ofcom Cloud Study, *supra* note 3, at ¶¶ 2.2, 8.2-8.3; OECD Cloud Paper, *supra* note 7, at 9, 14; Montgomery, *supra* note 8; Tianjiu Zuo et al., *Critical Infrastructure and the Cloud: Policy for Emerging Risk*, ATL. COUNCIL, 6 (July 10, 2023), https://www.atlanticcouncil.org/in-depth-research-reports/report/critical-infrastructure-and-the-cloud-policy-for-emerging-risk/.
[119] Kashmir Hill, *I Tried to Block Amazon From My Life. It Was Impossible*, GIZMODO, Jan. 2019, https://gizmodo.com/i-tried-to-block-amazon-from-my-life-it-was-impossible-1830565336.
[120] Zuo et al., *supra* note 118, at 4.
[121] *Id.* at 6.
[122] *2022 Annual Report*, FINANCIAL STABILITY OVERSIGHT COUNCIL, 70–72 (2022), https://home.treasury.gov/system/files/261/FSOC2022AnnualReport.pdf; see also The Financial Services Sector's Adoption of Cloud Services, *supra* note 43.
[123] Zuo et al., *supra* note 118, at 6.

The federal government started centralizing the authorization of cloud services in 2011 with the creation of the Federal Risk and Authorization Management Program (FedRAMP), which encouraged cloud adoption.[124] Today, every major federal agency is using FedRAMP to varying but largely increasing degrees, though adoption, data, and other aspects of the program still present some challenges.[125] More importantly, even with sophisticated processes in place, security challenges also persist. Investigations recently revealed that Microsoft provided customer service for a FedRAMP-approved cloud product used by many agencies, including the DOD, through personnel based in China for nearly a decade, creating a long-standing potential security vulnerability.[126]

Society's dependence on cloud computing, coupled with market concentration, means that hyperscalers' outages—caused by adversarial cyberattacks, technical issues, or natural disasters—can significantly impact key aspects of modern life. For example, cyber issues involving hyperscalers have grounded flights, impacted hospital operations, caused breaches of bank accounts, and degraded essential services used by businesses and government agencies.[127]

While cloud computing may be generally more secure than bespoke individual computing architectures,[128] widespread societal reliance on cloud computing makes hyperscalers attractive targets for cyberattacks.[129] Malicious actors have exploited hyperscalers and other digital infrastructure providers "to carry out criminal activity,

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[124] See generally *Cloud Security: Federal Authorization Program Usage Increasing, but Challenges Need to Be Fully Addressed*, GOV'T ACCOUNTABILITY OFF. (Jan. 18, 2024), https://www.gao.gov/products/gao-24-106591.
[125] *Id.* at 13.
[126] Renee Dudley, *Microsoft Used China-Based Support for Multiple U.S. Agencies, Potentially Exposing Sensitive Data*, PROPUBLICA (July 25, 2025), https://www.propublica.org/article/microsoft-tech-support-government-cybersecurity-china-doj-treasury; Renee Dudley, *A Little-Known Microsoft Program Could Expose the Defense Department to Chinese Hackers*, PROPUBLICA, July 2025, https://www.propublica.org/article/microsoft-digital-escorts-pentagon-defense-department-china-hackers.
[127] Adam Satariano et al., *Chaos and Confusion: Tech Outage Causes Disruptions Worldwide*, N.Y. TIMES, July 19, 2024, https://www.nytimes.com/2024/07/19/business/microsoft-outage-cause-azure-crowdstrike.html; Rob McLean, *A Hacker Gained Access to 100 Million Capital One Credit Card Applications and Accounts*, CNN, July 2019, https://www.cnn.com/2019/07/29/business/capital-one-data-breach; Zuo et al., *supra* note 118, at 7.
[128] *Report of the Cyberspace Solarium Commission*, CYBERSPACE SOLARIUM COMMISSION, 84–85 (Mar. 2020), https://www.solarium.gov/report.
[129] Zuo et al., *supra* note 118, at 4.

malign influence operations, and espionage against individual victims, businesses, and governments."[130]

The 2019 SolarWinds cyberattack was worsened through adversaries' subsequent exploitation of vulnerabilities in Azure,[131] allowing Russian actors to compromise networks at the DOD, Homeland Security, Energy (including the National Nuclear Security Administration), Treasury, and other agencies.[132] As cybersecurity experts noted at the time, the incident "wasn't the first time cloud services were the focus of a cyberattack, and it certainly won't be the last," further observing that hyperscalers lack incentives to compete on cybersecurity due to the fundamental market structure of cloud computing.[133]

(2) Cloud Computing Role in Current Technological Geopolitical Competition

Eric Schmidt, former CEO of Google who has also advised the U.S. government, put it bluntly when he stated that a kinetic attack from a U.S. adversary on an American data center is probably an act of war.[134]

This gravity reflects formal government work. The federal government considering AI as a "critical and emerging technology area[] of particular importance to the national security of the U.S."[135] As shown earlier, cloud computing underpins AI[136] since compute is one part of the "AI Triad" of inputs for AI, along with data and algorithms.[137]

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[130] *National Cybersecurity Strategy*, WHITE HOUSE, 16 (Mar. 2023), https://bidenwhitehouse.archives.gov/wp-content/uploads/2023/03/National-Cybersecurity-Strategy-2023.pdf.

[131] Vijay A. D'Souza, *SolarWinds Cyberattack Demands Significant Federal and Private-Sector Response*, GOVERNMENT ACCOUNTABILITY OFFICE (Jan. 22, 2025), https://www.gao.gov/blog/solarwinds-cyberattack-demands-significant-federal-and-private-sector-response-infographic; see also von Thun and Lavin, *supra* note 10, at 6–7.

[132] Sara Wilson, *SolarWinds Recap: All of the Federal Agencies Caught up in the Orion Breach*, FEDSCOOP (Dec. 22, 2020), https://fedscoop.com/solarwinds-recap-federal-agencies-caught-orion-breach/.

[133] Schneier and Herr, *supra* note 9.

[134] JEAN MESERVE, *Episode 75: Dr. Eric Schmidt on AI, Biotech, and Global Competition* (2025), at 28:30, https://scsp222.substack.com/p/episode-75-dr-eric-schmidt-on-ai.

[135] *Critical and Emerging Technologies List Update*, NAT'L SCI. & TECH. COUNCIL, 2 (Feb. 2024), https://www.govinfo.gov/content/pkg/CMR-PREX23-00185928/pdf/CMR-PREX23-00185928.pdf.

[136] OECD Cloud Paper, *supra* note 7, at § 3.4.1.

[137] Ben Buchanan, *The AI Triad and What It Means for National Security Strategy*, CTR. FOR SEC. & EMERGING TECH., iii (Aug. 2020), https://cset.georgetown.edu/publication/the-ai-triad-and-what-it-means-for-national-security-strategy/.

AI developers generally rely on CSPs for compute.[138] For this reason, cloud computing itself is seen as critical for national security and the technological geopolitical competition between the U.S. and the People's Republic of China (PRC).[139]

Countries including U.S. adversaries (e.g., PRC's Digital Silk Road[140]) and allies (e.g., EU's Digital Decade[141]) are viewing investments in cloud computing as critical for their role in today's geopolitical environment.[142]

III. Blueprint for Federal Legislation

This section proposes a set of pro-competition and pro-national security policies.[143] The policies would be most effective collectively, but each works on its own. For each policy, this Blueprint includes a description of the policy and its history, discussion of proposals for applying the policy to cloud or related markets, and key legislative design choices.

These policies build on the American history of regulating networks, platforms, and utilities.[144] As the Congressional Research Service has noted, cloud computing is "analogous to the way electricity, water, and other utilities are provided to most customers."[145] Relatedly, these recommendations build on the recent revival of

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[138] See generally Ling Zhu, *Data Centers and Cloud Computing: Information Technology Infrastructure for Artificial Intelligence*, CONG. RSCH. SERV. (Feb. 5, 2025), https://www.congress.gov/crs-product/IF12899.
[139] See generally *Workshop on Cloud, Data Centers, and Great Power Competition*, IN-Q-TEL (Nov. 2023), https://assets.iqt.org/pdfs/Workshop-Report_Data-Centers_Nov-2023.pdf/web/viewer.html.
[140] Stefan Lukas & Manuel Langendorf, *Cloud Competition Is Heating up in MENA and China Expands Its Presence*, WILSON CTR. (Oct. 29, 2024), https://www.wilsoncenter.org/article/cloud-competition-heating-mena-and-china-expands-its-presence.
[141] *Cloud Computing*, EUR. COMM'N, https://digital-strategy.ec.europa.eu/en/policies/cloud-computing (last visited July 29, 2025).
[142] See also Workshop on Cloud, Data Centers, and Great Power Competition, *supra* note 139, at 4–5; Paris Marx, *Why Canada Needs to Build a Public Cloud*, DISCONNECT (Feb. 2, 2025), https://www.disconnect.blog/p/why-canada-needs-to-build-a-public.
[143] For a discussion of how national security is bolstered by strong antitrust policies, see, Ganesh Sitaraman, *The National Security Case for Breaking Up Big Tech*, KNIGHT FIRST AMEND. INST. (Jan. 30, 2020), http://knightcolumbia.org/content/the-national-security-case-for-breaking-up-big-tech.
[144] MORGAN RICKS ET AL., NETWORKS, PLATFORMS, AND UTILITIES: LAW AND POLICY (2022).
[145] Patricia Moloney Figliola, *Cloud Computing: Background, Status of Adoption by Federal Agencies, and Congressional Action*, CONG. RSCH. SERV., summary (Mar. 25, 2020), https://www.congress.gov/crs-

antitrust policy. Most relevant, the House Antitrust Subcommittee's 2020 investigation of digital markets included study of the cloud computing industry.[146] While the Subcommittee considered several bipartisan bills, Congress did not pass them.[147]

The recommendations in this section are distinct from and not in conflict with other policies that can have pro-competition effects in the cloud computing market.[148] And while this Blueprint focuses on federal legislation, similar outcomes could be pursued via litigation[149] or agency rulemaking[150].

General Legislative Principles

Each recommendation in this Blueprint corresponds to its own section of the sample legislative text in the Appendix. In addition to using existing legislative or regulatory definitions where possible, the policies assume the following for scope:

- Focus on infrastructure- and platform-as-a-service (IaaS and PaaS): These parts of cloud computing are most commoditized and act as a bottleneck for other technologies.[151] Separating IaaS from PaaS products is not feasible today.[152] While software-as-a-service (SaaS) offerings are sometimes integrated with and

product/R46119; for an informal account of AWS's culture for creating platforms, see Steve Yegge, *Stevey's Google Platforms Rant*, GITHUB GIST (Oct. 12, 2011), https://gist.github.com/chitchcock/1281611; for a more formal definition, see, RICKS ET AL., *supra* note 144.

[146] H. Antitrust Subcomm., *supra* note 2.

[147] Cecilia Kang & David McCabe, *House Lawmakers Are Considering 6 Bills Aimed at Big Tech*, N.Y. TIMES, June 23, 2021, https://www.nytimes.com/2021/06/23/technology/big-tech-antitrust-bills.html.

[148] Additional cloud computing policy proposals worthy of consideration include Joel Dodge, *Creating a Public Cloud through the Defense Production Act*, VANDERBILT POLICY ACCELERATOR (Sep. 2024), https://cdn.vanderbilt.edu/vu-URL/wp-content/uploads/sites/412/2024/09/27135238/VPA-Paper-DPA-Public-Cloud.pdf; *National Strategic Computing Reserve: A Blueprint*, NAT'L SCI. & TECH. COUNCIL (Oct. 2021), https://www.nitrd.gov/pubs/National-Strategic-Computing-Reserve-Blueprint-Oct2021.pdf; several bills target digital markets broadly, see, e.g., Kang and McCabe, *supra* note 147.

[149] See, e.g., Renee Dudley, *Microsoft Bundling Practices Focus of Federal Antitrust Probe*, PROPUBLICA, Dec. 2024, https://www.propublica.org/article/ftc-investigating-microsoft-antitrust-cloud-computing.

[150] See, e.g., *Generative AI Raises Competition Concerns*, FEDERAL TRADE COMMISSION (June 29, 2023), https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/06/generative-ai-raises-competition-concerns; Shalanda D. Young (Director of the Office of Management and Budget), *Memorandum for the Heads of Executive Departments and Agencies (OMB M-24-18)*, (2024), https://bidenwhitehouse.archives.gov/wp-content/uploads/2024/10/M-24-18-AI-Acquisition-Memorandum.pdf.

[151] H. Antitrust Subcomm., *supra* note 2, at 97; Fr. Competition Auth. Cloud Op., *supra* note 4, at 216.

[152] von Thun and Lavin, *supra* note 10, at 29.

sold alongside IaaS and PaaS offerings, the SaaS market is less concentrated.[153]

- Threshold for a covered cloud service provider (CSP): Regulatory schemes sometimes include a minimum company size based on various measures (e.g., users, revenue). For CSPs, setting such a threshold is unnecessary. The cloud market today doesn't include meaningful participation from small businesses and new entrants should be held to the same standards.

- Excludes private clouds: The policies here do not apply to fully private clouds (i.e., a company using its own computing infrastructure). This has the benefit of administrability since companies of all sizes still have on-premises computing and do not present market distortions requiring policy responses. However, this has the effect of policies not eliminating vertical integration where developers vertically integrate by using in-house compute (e.g., Meta building its own AI data centers[154]).

A. Structural Separation

Structural separation is an economic regulatory tool to limit the lines of business of a particular firm or an industry that was common until the 1970s.[155] It has been a remedy in antitrust cases,[156] a limit in corporate charters,[157] enacted via statute, and applied as regulations[158] to respond to or prevent self-preferencing and conflicts of interest.[159]

As Lina Khan has described in an academic paper, there are six justifications for structural separations. They are: (1) eliminating conflicts of interest, (2) preventing cross-financing to extend existing dominance, (3) preserving resiliency, (4) promoting diversity, (5) preventing excessive concentration of power, and (6) prioritizing administrability.[160] Others have noted that antitrust actions seeking separations

[153] Mani, *supra* note 28; OECD Cloud Paper, *supra* note 7, at 12.
[154] Dustin Chambers, *Their Water Taps Ran Dry When Meta Built Next Door*, N.Y. TIMES, July 14, 2025, https://www.nytimes.com/2025/07/14/technology/meta-data-center-water.html.
[155] RICKS ET AL., *supra* note 144, at 28–29; Lina M. Khan, *The Separation of Platforms and Commerce*, 119 COLUM. L. REV. 973, 973, 1015 (2019); von Thun and Lavin, *supra* note 10, at 8.
[156] von Thun and Lavin, *supra* note 10, at 30; Khan, *supra* note 155, at 1049–1051.
[157] Khan, *supra* note 155, at 1016.
[158] *Id.* at 1044–1045; see also Computer Inquiries proceedings as described in *id.* at 1045–1049.
[159] Khan, *supra* note 91, at 1015; Narechania and Sitaraman, *supra* note 9, at 159.
[160] Khan, *supra* note 155, at 1052.

against IBM, AT&T, and Microsoft have "positively impacted innovation and competition in the computer industry."[161] Each of these justifications is relevant in the cloud computing market.

Structural separation has been pursued legislatively in several industries, including statutes separating railroads from owning coal mines,[162] steamboat operators,[163] and trucking companies[164]; banks from anything but "the business of banking,"[165] securities,[166] nonbank financial institutions,[167] and speculative trading;[168] and other regulated industries (e.g., telecommunications, energy).

Recently, policymakers have proposed bipartisan structural separation in digital markets,[169] including:

- The *Ending Platform Monopolies Act* prohibits large platforms from operating businesses that use the platform to sell or gives rise to a conflict of interest.[170]

[161] Giovanna Massarotto, *Driving Innovation with Antitrust*, PROMARKET, Apr. 2024, https://www.promarket.org/2024/04/10/driving-innovation-with-antitrust/.
[162] An Act To amend an Act entitled "An Act to regulate commerce," approved February fourth, eighteen hundred and eighty-seven, and all Acts amendatory thereof, and to enlarge the powers of the Interstate Commerce Commission (commonly, Hepburn Act), Pub. L. No. 59-337, § 1, 34 Stat. 584, 585 (1906).
[163] An Act To provide for the opening, maintenance, protection, and operation of the Panama Canal, and the sanitation and government of the Canal Zone (commonly, Panama Canal Act of 1912), Pub. L. No. 62-337, § 11, 37 Stat. 560, 566-567 (1912).
[164] Motor Carrier Act, 1935, Pub. L. No. 74-255, enacting clause, 49 Stat. 543, 555 (1935); Transportation Act of 1940, Pub. L. No. 76-785 § 7, 54 Stat. 898, 905 (1940).
[165] Private national banks were first chartered under the regime established in 1863. An Act to provide a national Currency, secured by a Pledge of United States Stocks, and to provide for the Circulation and Redemption thereof (commonly, the National Bank Act of 1863 or National Currency Act), Pub. L. No. 37-58, § 5, 12 Stat. 665, 666 (1863). Keeping the business of banking separate traces to the original 1694 charter for the Bank of England. An Act for granting to theire Majesties severall Rates and Duties upon Tunnage of Shipps and Vessells and upon Beere Ale and other Liquors… (commonly, Bank of England Act), 6 Statutes of the Realm 483, § XXVI (1694) (emphasis added).
[166] Banking Act of 1933, Pub. L. No. 73-66, § 20, 48 Stat. 162, 188 (1933).
[167] Bank Holding Act of 1956, Pub. L. No. 84-511, § 4(a), 70 Stat. 133, 135 (1956).
[168] Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 619, 124 Stat. 1376, 1620 (2010) (codified at 12 U.S.C. § 1851(a)(1)) (Volcker Rule).
[169] Jay B. Sykes, *Antitrust Reform and Big Tech Firms*, CONG. RSCH. SERV. (Nov. 21, 2023), https://www.congress.gov/crs-product/R46875.
[170] Ending Platform Monopolies Act, H.R. 3825, 117th Cong. § 2 (2021).

- The *Digital Consumer Protection Commission Act* (*DCPCA*) creates an agency to regulate digital platforms, including by prohibiting dominant platforms from engaging in actions that create conflicts.[171]
- The *Advertising Middlemen Endangering Rigorous Internet Competition Accountability (AMERICA) Act*, which prohibits large platforms from operating in more than one aspect of the digital ads market (i.e., ad exchanges, sell-side brokerages, buy-side brokerages).[172]

A range of scholars and experts have discussed or called for structural separation in the cloud computing market in particular, including Narechania and Sitaraman (Vanderbilt Policy Accelerator, VPA),[173] von Thun and Lavin (Open Markets Institute, OMI),[174] Vipra and Meyers[175] and Brennan et al.[176] (AI Now), Corrigan (Center for Security and Emerging Technology, CSET),[177] Widder and Kim,[178] and Cory Doctorow,[179] among others.[180]

The *Ending Platform Monopolies Act* and the *DCPCA* both prohibit certain digital platforms from owning businesses that create conflicts of interest for the platform, but both allow for platform-by-platform adjudication by the Federal Trade Commission

[171] Digital Consumer Protection Commission Act (DCPCA) of 2023, S. 2597, 118th Cong. § 101(3) (2023).
[172] Advertising Middlemen Endangering Rigorous Internet Competition Accountability (AMERICA) Act, S. 1073, 118th Cong. § 2 (2023).
[173] Narechania and Sitaraman, *supra* note 9, at 159–163; See also Ganesh Sitaraman & Tejas N. Narechania, *Antimonopoly Tools for Regulating Artificial Intelligence*, VAND. POL'Y ACCELERATOR (2024), https://cdn.vanderbilt.edu/vu-sub/wp-content/uploads/sites/281/2023/12/19183408/Policy-Brief-2023.10.08-.pdf; Ganesh Sitaraman & Tejas N. Narechania, *It's Time for the Government to Regulate AI. Here's How.*, POLITICO, Jan. 2024, https://www.politico.com/news/magazine/2024/01/15/sitaraman-artificial-intelligence-regulation-00134873.
[174] von Thun and Lavin, *supra* note 10, at 8; von Thun and Hanley, *supra* note 62, at 35.
[175] Vipra and West, *supra* note 11, at 44–45.
[176] Brennan, Kak, and West, *supra* note 35, at 83.
[177] Corrigan, *supra* note 62, at 31.
[178] Widder and Kim, *supra* note 72, at 5.
[179] Cory Doctorow, *Maintaining Monopolies with the Cloud*, PLURALISTIC (Sep. 28, 2022), https://pluralistic.net/2022/09/28/other-peoples-computers/.
[180] For a discussion of the need for structural separation in digital markets generally, see HAROLD FELD, CASE FOR THE DIGITAL PLATFORM ACT 101–104 (2019), https://www.digitalplatformact.com/; H. Antitrust Subcomm., *supra* note 2, at 319–322.

(FTC). These bills would likely apply to Amazon, Microsoft, and Alphabet's ownership of Amazon Web Services (AWS), Azure, and Google Cloud Platform (GCP) respectively.[181]

While forced divestments may seem like a financial penalty to shareholders, the opposite may be true. Mechanically, a divestment requires an exchange of one asset type for another. That is, a parent company (i.e., Amazon) would sell shares of a subsidiary (i.e., AWS). For years, some business and finance experts have posited that Amazon, Microsoft, and Alphabet voluntarily breaking up would be financially accretive to both the parent companies and CSPs.[182] This is in part due to the "conglomerate discount" for unrelated businesses being combined,[183] but potential financial benefits include attracting CSP customers that are hesitant doing business with a competitor in another line of business,[184] CSPs exploring growth strategies that may be at odds with another line of business of their parent company,[185] giving investors a "pure play" cloud investment opportunity,[186] and allowing firms to trade at their highest value.[187]

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[181] Anna Lenhart, *Federal AI Legislation: An Analysis of Proposals from the 117th Congress Relevant to Generative AI Tools*, INST. FOR DATA, DEMOCRACY & POL. (GEO. WASH. U.), 40 (June 2023), https://iddp.gwu.edu/sites/g/files/zaxdzs5791/files/2023-06/federal_ai_legislation_v3.pdf; Anna Lenhart, *Senators Propose a Licensing Agency For AI and Other Digital Things*, TECH POLICY PRESS, Aug. 2023, https://techpolicy.press/senators-propose-a-licensing-agency-for-ai-and-other-digital-things.

[182] Troy Wolverton, *The Business School Prof Who Predicted Amazon Would Buy Whole Foods Now Says an AWS Spinoff Is Inevitable — and the Standalone Company Could Be Worth $600B*, BUS. INSIDER, Dec. 2018, https://www.businessinsider.com/scott-galloway-amazon-will-spin-off-amazon-web-services-ignition-2018-12; Annie Palmer, *Former Amazon Vice President Calls for the Company to Split Its Retail and Cloud Businesses*, CNBC, July 24, 2020, https://www.cnbc.com/2020/07/24/former-amazon-senior-engineer-calls-for-aws-spinoff.html; *Can Amazon Keep Growing like a Youthful Startup?*, THE ECONOMIST, June 2020, https://www.economist.com/briefing/2020/06/18/can-amazon-keep-growing-like-a-youthful-startup; Joe Lonsdale, *The Case for Splitting Amazon in Two*, WALL ST. J., Feb. 7, 2022, https://www.wsj.com/opinion/split-amazon-in-two-prime-web-services-aws-logistics-third-party-earnings-report-consumers-antitrust-11644249482; Jordan Novet, *Microsoft Should Sell Office and Windows to Boost Cloud Business, Former Executive Says*, CNBC, Jan. 11, 2022, https://www.cnbc.com/2022/01/11/microsoft-should-sell-office-and-windows-to-boost-cloud-former-exec.html; David Streitfeld, *What If Google Just Broke Itself Up? A Tech Insider Makes the Case.*, N.Y. TIMES, June 2, 2025, https://www.nytimes.com/2025/06/02/technology/google-antitrust-breakup.html.

[183] Hillary Chabot, *Why Conglomerates Are Breaking Up*, BABSON THOUGHT & ACTION (July 19, 2022), https://entrepreneurship.babson.edu/conglomerates-breaking-up/.

[184] Palmer, *supra* note 182.

[185] Novet, *supra* note 182; von Thun and Lavin, *supra* note 10, at 30.

[186] Wolverton, *supra* note 182.

[187] Streitfeld, *supra* note 182.

Legislative Design

Structural separation legislation generally prohibits common ownership of distinct lines of business. The core exercise for structural separation is where to draw the separating line. The most logical separating line of cloud computing is prohibiting (1) covered CSPs' IaaS and PaaS offerings from (2) AI models, AI applications, and SaaS products that depend on IaaS and PaaS. As discussed earlier, the IaaS and PaaS product categories are most commoditized and are usually analyzed and marketed together. They are also necessary for today's AI market and for the development and operation of SaaS offerings.

Structural separations also often include a restriction on shared staff or board members from the former parent company and the new divested company. For example, a standalone AWS should not be permitted to have shared staff or board members with Amazon. This requirement prevents corporate information sharing that could inhibit competition.

Because CSPs offer hundreds of products across dozens of categories,[188] a legislative structural separation would benefit from direction to an agency to determine which product categories require separation, though the requirement to separate should not depend on agency action.

B. Neutrality

Neutrality rules and their adjacent policy levers (e.g., common carriage), can have two provisions: (1) an equal access obligation to "serve all comers," sometimes called a duty

[188] Amazon Web Services, Inc., *Cloud Services - Build and Scale Securely*, https://aws.amazon.com/products/ (last visited May 23, 2025) (356 products); Microsoft, *Directory of Azure Cloud Services*, https://azure.microsoft.com/en-us/products (last visited May 23, 2025) (showing over 300 products); Google Cloud, *Products and Services*, https://cloud.google.com/products (last visited May 23, 2025) (advertising over 150 products); Google Cloud, *Compare AWS and Azure Services to Google Cloud*, https://cloud.google.com/docs/get-started/aws-azure-gcp-service-comparison (last visited May 23, 2025) (maps competitive products across 29 service categories); see also U.K. Ofcom Cloud Study, *supra* note 3, at ¶ 6.44; Dutch ACM Cloud Study, *supra* note 5, at 40.

to deal;[189] and (2) nondiscrimination requirements to treat customers equally.[190] These provisions generally prohibit a business from denying service or using price or service discrimination to harm competitors.

Neutrality rules trace to at least the Roman Empire[191] and applied widely in medieval Europe.[192] In the U.S., nondiscrimination rules have been a "mainstay for governing network intermediaries"[193] through statutes,[194] regulations,[195] and in antitrust cases[196] (though courts have disfavored neutrality in recent decades[197]).

Nondiscrimination was a focal point of the Interstate Commerce Act of 1887 (ICA),[198] one of the first laws to regulate railroads. The ICA required "reasonable and just" pricing, prohibited discriminatory practices (e.g., short-haul / long-haul pricing), and mandated pricing transparency.[199] Half a century later, the 1934 Communications Act mirrored the ICA for telecommunications.[200] In recent years, the Federal Communications Commission (FCC) has variously applied and repealed the application of the 1934 statue to institute net neutrality,[201] which prohibited broadband providers

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[189] RICKS ET AL., *supra* note 144, at 26; Biden v. Knight First Amend. Inst., 593 U.S. ___, 4, 11 (2021) (Thomas, J., concurring); Erik Hovenkamp, *The Antitrust Duty to Deal in the Age of Big Tech*, 15 YALE L.J. 1483, 1487 (Mar. 2022).

[190] RICKS ET AL., *supra* note 144, at 24–25; Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 142 (Jan. 1, 2003).

[191] Paul Stephen Dempsey, *Transportation: A Legal History*, 30 TRANSP. L.J. 235, 242 (2003).

[192] *Id.*; John Bergmayer, *What Makes a Common Carrier, and What Doesn't*, PUBLIC KNOWLEDGE (Jan. 14, 2021), https://publicknowledge.org/what-makes-a-common-carrier-and-what-doesnt/.

[193] H. Antitrust Subcomm., *supra* note 2, at 323.

[194] Hepburn Act, *supra* note 162.

[195] Khan, *supra* note 155 at 1044–1049 (regarding certain FCC regulations).

[196] von Thun and Hanley, *supra* note 62, at 46.

[197] Hovenkamp, *supra* note 189, at 1488; Khan, *supra* note 155, at 1027–1030.

[198] Interstate Commerce Act, ch. 104, 24 Stat. 379 (1887); James M. MacDonald, *Railroads and Price Discrimination: The Roles of Competition, Information, and Regulation*, 43 REV. INDUS. ORG. 85, 86 (2013); Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1331–1332 (1998).

[199] Interstate Commerce Act, *supra* note 198 at §§ 1, 4, 6.

[200] *Id.* at § 1 et seq.; Communications Act of 1934, Pub. L. No. 73-416, § 201 et seq. (codified at 47 U.S.C. § 201 et seq.).

[201] For the origin of the concept of net neutrality, see, Wu, *supra* note 190. Safeguarding and Securing the Open Internet, 39 FCC Rcd 4975, ¶ 2 (2024); more recently, a court struck the FCC's legal basis for applying Title II's statutory framework for broadband services. See Ohio Telecom Ass'n v. FCC, No. 24-3449 (6th Cir. 2025).

from interfering with lawful content; prohibited blocking, throttling, and paid prioritization; and required transparency.[202]

More recently, lawmakers have proposed a neutrality rule for digital markets. The *American Choice and Innovation Online Act* would (i) prohibit advantaging a platform's services over another platform user's, disadvantaging services of a platform user's, and discriminating among users; (ii) prohibit ten specific types of business practices, including conditioning access to a platform on the purchase of other services offered by the platform;[203] and (iii) instruct the FTC and the Department of Justice to "jointly issue guidelines outlining policies and practices…with the goal of promoting transparency and deterring violations."[204]

With respect to the cloud computing market, Narechania and Sitaraman (VPA),[205] Vipra and Meyers[206] and Brennan et al.[207] (AI Now), von Thun and Lavin (OMI),[208] Simpson and Coner (Center for American Progress, CAP)[209], and others[210] have discussed the need for neutrality or nondiscrimination rules both recently and as far back as at least 2008.[211]

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[202] Safeguarding and Securing the Open Internet, *supra* note 201 at ¶¶ 516, 492, 548.
[203] American Choice and Innovation Online Act, H.R. 3816, 117th Cong., § 2(b) (2021).
[204] *Id.* at § 5(a).
[205] Narechania and Sitaraman, *supra* note 9, at 162.
[206] Vipra and West, *supra* note 11, at 45.
[207] Brennan, Kak, and West, *supra* note 35, at 83.
[208] von Thun and Lavin, *supra* note 10, at 26–28; von Thun and Hanley, *supra* note 62, at 46–49.
[209] Erin Simpson & Adam Conner, *How To Regulate Tech: A Technology Policy Framework for Online Services*, CTR. FOR AM. PROGRESS, at 32 (Nov. 16, 2021), https://www.americanprogress.org/article/how-to-regulate-tech-a-technology-policy-framework-for-online-services/.
[210] For the need for neutrality in digital markets generally, see, FELD, *supra* note 180, at 104–116; Tom Wheeler, Phil Verveer & Gene Kimmelman, *New Digital Realities; New Oversight Solutions: The Case for a Digital Platform Agency and a New Approach to Regulatory Oversight*, SHORENSTEIN CENTER (Aug. 2020), https://shorensteincenter.org/wp-content/uploads/2020/08/New-Digital-Realities_August-2020.pdf; H. Antitrust Subcomm., *supra* note 2, at 322–324.
[211] Andrew Odlyzko, *Network Neutrality, Search Neutrality, and the Never-Ending Conflict between Efficiency and Fairness in Markets*, 8 REV. NETWORK ECON. 1 (2009) (preprint published in 2008 to SSRN); see also Molly Wood, *We Need to Talk About 'Cloud Neutrality,'* WIRED, Feb. 2020, https://www.wired.com/story/we-need-to-talk-about-cloud-neutrality/; Sirish Raghuram, *Is Cloud Neutrality The Next Net Neutrality?*, FORBES, Jan. 2022, https://www.forbes.com/councils/forbestechcouncil/2022/01/31/is-cloud-neutrality-the-next-net-neutrality/.

Legislative Design

As shown above, legislative analogs generally include (i) a general conduct rule, (ii) prohibitions on specific practices, and (iii) transparency mechanisms. This translates to legislation that

- Prohibits CSPs from discriminating access, pricing, or service quality among similarly situated customers seeking lawful and reasonable use of their services;
- Prohibits observed anticompetitive behaviors, including providing committed spend discounts and cloud credits, prioritizing limited supply for preferred customers, charging egress fees, bundling cloud and unrelated products, copying customers' products based on non-public data, and restricting interoperability; and
- Requires CSPs to disclose policies on denying service, pricing (including discounts), and service quality (including resource prioritization).

C. Data Portability and Interoperability

Data portability allows a user to move data from one provider to another, while interoperability requires systems to exchange data interactively.[212] Both can lower switching costs[213] and prevent vendor lock-in.[214]

Data portability is a newer concept, recently codified in European Union (EU) and California privacy laws and in many U.S. privacy proposals,[215] while interoperability has a longer history.[216] The 1996 Telecommunications Act requires companies to port customer phone numbers to other providers when requested[217] and to interconnect

[212] Sukhi Gulati-Gilbert & Robert Seamans, *Data Portability and Interoperability: A Primer on Two Policy Tools for Regulation of Digitized Industries*, BROOKINGS INST. (May 9, 2023), https://www.brookings.edu/articles/data-portability-and-interoperability-a-primer-on-two-policy-tools-for-regulation-of-digitized-industries-2/.
[213] CORY DOCTOROW, THE INTERNET CON: HOW TO SEIZE THE MEANS OF COMPUTATION 2 (2023); Gulati-Gilbert and Seamans, *supra* note 212.
[214] Gulati-Gilbert and Seamans, *supra* note 212.
[215] Sasha Hondagneu-Messner, *Data Portability: A Guide and a Roadmap*, 47 RUTGERS COMPUT. & TECH. L.J. 240, 246 (2021).
[216] See generally DOCTOROW, *supra* note 213.
[217] Telecommunications Act of 1996, Pub. L. No. 104-104, § 101(a) (codified at 47 U.S.C. § 251(b)(2)); see also First Report and Order and Further Notice of Proposed Rulemaking, FCC 96–286, 11 FCC Rcd 8352, ¶ 1 (1996), 61 Fed. Reg. 38605.

networks with other carriers.[218] In banking, Dodd-Frank requires a hybrid portability-interoperability requirement related to banking information, sometimes called "open banking."[219] The Biden Administration completed required regulations for the provision.[220]

Congress has considered instituting data portability and interoperability in proposals to increase digital markets competition. The *ACCESS Act* would require data portability and interoperability for online platforms, with only the broader House bill likely to apply to cloud computing.[221] Recent comprehensive privacy bills require platforms to allow portability of personal information (unlikely to apply to CSPs).[222] These bills rely on an agency to implement regulations, with broad direction provided in legislation. The *Multi-Cloud Innovation and Advancement Act* encourages agencies to use multi-cloud technologies,[223] and the *Protecting AI and Cloud Competition in Defense Act* requires the Department of Defense to "consider[] multi-cloud technology where feasible and advantageous."[224] Both represent important pro-competition policies.

With respect to the cloud computing market, interoperability and data portability requirements have been discussed by experts from Narechania and Sitaraman

[218] Telecommunications Act of 1996, *supra* note 217 at § 251(a)(1) (codified at 47 U.S.C. § 251(a)(1)).
[219] Dodd-Frank Act, *supra* note 168, at § 1033 (codified at 12 U.S.C. § 5333).
[220] Required Rulemaking on Personal Financial Data Rights, CFPB-2023-0052, 89 Fed. Reg. 90838; the second Trump Administration has signaled potentially letting this rule fall, see *CFPB's Move to Rescind Rule 1033 Creates Uncertainty*, PYMNTS, May 25, 2025, https://www.pymnts.com/digital-first-banking/2025/cfpbs-move-to-rescind-rule-1033-creates-uncertainty-in-open-banking/.
[221] Compare Augmenting Compatibility and Competition by Enabling Service Switching (ACCESS) Act of 2023, S. 2521, 118th Cong. § 2(9)(A)(ii) (2023) (limiting "user data" to "information that is…linked, or reasonably linkable, to a specific person," which is similar to formulations for "personal information" and similar terms in privacy legislation, *supra* note 222); with ACCESS Act of 2021, H.R. 3849, 117th Cong. § 5(9)(B) (2021) (the term "data" includes "information…that is linked, or reasonably linkable, to a specific user, user device, or customer of the covered platform or a competing business or a potential competing business").
[222] See, e.g., American Data Privacy and Protection Act, H.R. 8152, 117th Cong. § 203(a)(4)(B) (2022); American Privacy Rights Act, H.R. 8818, 118th Cong. § 105(a)(4) (2024); Online Privacy Act of 2023, H.R. 2701, 118th Cong. § 104 (2023); Data Accountability and Transparency Act of 2020 (discussion draft, not introduced), § 201(4), https://www.banking.senate.gov/imo/media/doc/Brown%20-%20DATA%202020%20Discussion%20Draft.pdf.
[223] Multi-Cloud Innovation and Advancement Act of 2023, S. 2871, 118th Cong. (2023).
[224] Protecting AI and Cloud Competition in Defense Act of 2024, S. 5436, 118th Cong. § 2(b)(3)(C) (2024).

(VPA),[225] von Thun and Lavin (OMI),[226] Corrigan (CSET),[227] Vipra and West (AI Now),[228] Simpson and Coner (CAP),[229] and Stoltz and Trendacosta (Electronic Frontier Foundation)[230].

CSP data portability is most relevant when customers need to port large amounts of data (i.e., measured in gigabytes, terabytes, and petabytes). These will often occur when a CSP customer switches providers, either partially or fully, which can require code rearchitecting, product refactoring, and systems retooling over weeks or months. The transfer of data might take days and could cost the CSP and the customer significant administrative costs. As discussed earlier, CSPs charge customers significant egress fees to port data today.

CSP interoperability applies most in cases of CSP customers needing to move specific workloads and associated data (i.e., measured in megabytes and gigabytes) regularly and on an ongoing basis. CSP customers would benefit from interoperability based on CSPs offering (1) unique services, tooling, or interfaces; and (2) differing prices for specific features. For example, a life science company using AWS could run business analysis on Azure for its specialized tooling, train genomic AI models on CoreWeave for cheaper access to chips, and later deploy them on GCP.

Legislative Design

Legislative analogs tend to (1) require companies to provide mechanisms for portability and interoperability, (2) require a process for agencies to determine what is portable and interoperable and the formats for those data transfers, and (3) include principles for agency regulations. Legislation should include some amount of instruction for principles relating to data that should be portable or product types that should be interoperable, along with timeliness, cost, and format of transfers.

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[225] Narechania and Sitaraman, *supra* note 9, at 163–164.
[226] von Thun and Lavin, *supra* note 10, at 8.
[227] Corrigan, *supra* note 62, at 30.
[228] Vipra and West, *supra* note 11, at 45.
[229] Simpson and Conner, *supra* note 209, at 57.
[230] Mitchell L. Stoltz & Katharine Trendacosta, *Comment of the Electronic Frontier Foundation (Re: FTC RFI on Business Practices of Cloud Computing Providers, FTC-2023-0028)* (2023), https://www.regulations.gov/comment/FTC-2023-0028-0090.

For data portability, legislation should require:

- CSPs to allow customers to port "data provided knowingly and actively by the [customer] as well as the[] data generated by [the customer's] activity," as under the EU's General Data Protection Regulation (GDPR);[231]
- CSPs to transfer data within a reasonable time frame and without undue delay;
- CSPs offer portability at no cost to customers (though customers may incur costs in transferring data to another CSP); and

For interoperability, legislation should require:

- an agency to periodically determine which product categories require interoperability, based on product category popularity and technical feasibility;
- CSPs to offer real-time interoperability;
- CSPs to internalize the cost of building and maintaining necessary interfaces (e.g., APIs);
- the use of open-source standards (e.g., Kubernetes) that exist for many but not all CSP product types.

D. Critical Infrastructure Sectoral Designation

Since at least World War II, militaries have considered attacking industrial infrastructure in war.[232] Thus, the formal definition of critical infrastructure (CI) includes "systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters."[233]

Currently, there are 16 sectors designated as CI. While a CI designation is directly associated with non-regulatory policies (e.g., voluntary information sharing on threats), the list of sectors includes many that are separately subject to robust regulatory

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[231] Hondagneu-Messner, *supra* note 215, at 254–255; Article 29 Data Protection Working Party, *Guidelines on the Right to Data Portability*, at 3 (2017), https://ec.europa.eu/newsroom/dae/redirection/document/44099 (interpreting Article 20 of the General Data Protection Regulation (Regulation (EU) 2016/679)). More complex privacy issues involving data portability are less relevant for CSPs that deal in organizational rather than personal data.

[232] Brian E. Humphreys, *Critical Infrastructure: Emerging Trends and Policy Considerations for Congress*, CONG. RSCH. SERV., 2 (July 8, 2019), https://www.congress.gov/crs-product/R45809.

[233] Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT) Act § 1016(e).

schemes (e.g., telecommunications, energy, financial services, transportation).[234] Many of the CI sectors are subsets of others (e.g., nuclear and energy, dams and water, emergency services and government services). So while information technology is a CI sector, the scale and systemic role of cloud computing justify a standalone designation.

Designation would enable: (i) greater threat intelligence sharing, (ii) Department of Homeland Security (DHS) tracking of critical assets (e.g., data centers), (iii) enhanced interagency and law enforcement coordination, and (iv) use of Defense Production Act authorities (e.g., allocating cloud capacity for defense).[235]

Recent proposals to expand the list of CI sectors include bills to designate "space systems, services, and technology"[236] and "the business of importing, manufacturing, or dealing firearms, or importing or manufacturing ammunition"[237] as CI sectors. DHS has considered designating the space and bioeconomy sectors.[238] Rear Adm. (Ret.) Montgomery (Cyberspace Solarium Commission),[239] Tianjiu Zuo et al. (Atlantic Council),[240] and others[241] have discussed how cloud computing meets various definitions for CI.

Legislative Design

Because this authority comes from a presidential memorandum[242] and is also codified in law,[243] the president or Congress could also expand the list. For the purposes of legislative design, designations generally do not include details, definitions, or further information about sectors besides a high-level description.

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[234] Humphreys, *supra* note 232.
[235] *Id.;* Defense Production Act of 1950, Pub. L. No. 81-774, §§ 301(a)(1), 302(a), 702(14), 708(c)(3) (codified at 50 U.S.C. §§ 4531(a)(1), 4532(a), 4552(14), 4558(c)(3)).
[236] Space Infrastructure Act, H.R. 1154, 119th Cong. (2025).
[237] Second Amendment is Essential Act of 2021, H.R. 4060, 117th Cong. (2021).
[238] *FY 2021 National Defense Authorization Act Section 9002(b) Report*, CYBERSECURITY AND INFRASTRUCTURE SECURITY AGENCY (Nov. 12, 2021), https://www.cisa.gov/resources-tools/resources/section-9002b-report.
[239] Montgomery, *supra* note 8.
[240] Zuo et al., *supra* note 118.
[241] OECD Cloud Paper, *supra* note 7, at 1–2.
[242] National Security Memorandum on Critical Infrastructure Security and Resilience, National Security Memorandum-22 (Apr 30, 2024), https://www.govinfo.gov/content/pkg/DCPD-202400358/pdf/DCPD-202400358.pdf.
[243] Homeland Security Act of 2002, Pub. L. No. 107-296, § 2001(3) (codified at 6 U.S.C. § 601(3)).

E. Foreign Ownership and Control Restrictions

Congress has long restricted foreign ownership and control in industries important to national security, a logic that applies directly to CSPs.

As Ganesh Sitaraman shows in an article on the topic, the history of restrictions on foreign ownership and control in regulated industries dates back to Alexander Hamilton's plans for the First Bank of the U.S.[244] Statutory prohibitions on foreign ownership have existed for banks, broadcasters, undersea cable operators, airlines, nuclear power plants, and other industries.[245] Most recently, Congress prohibited foreign ownership of TikTok.[246]

The Committee on Foreign Investment in the United States (CFIUS) has the authority to review foreign entity acquisitions, mergers, takeovers, and investment, especially involving critical technologies, CI, or sensitive personal data.[247] CFIUS operates case by case, while bright-line ownership prohibitions are common in certain industries.

Legislative Design

Sitaraman finds that many foreign ownership and control restrictions are conditions of market entry (e.g., broadcast licenses, bank charters).[248] Since CSPs face no entry restriction today, legislation should directly limit CSPs from knowingly allowing meaningful ownership by establishing (i) a bright-line threshold (i.e., 25% of shares, profits, assets, or board seats) for citizens of, entities controlled by, or the government of a foreign adversary of the U.S.; and (ii) prohibition of those entities based on their functional ability to influence meaningful organizational decisions, as required for CFIUS review. Legislation should also require directors on boards of CSPs to be U.S. citizens, prohibit citizenship of a foreign adversary to the U.S., and prohibit concurrent employment by an entity controlled by a foreign adversary.

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[244] Ganesh Sitaraman, *The Regulation of Foreign Platforms*, 74 STAN. L. REV. 1073, 1079 (May 2022).
[245] *Id.*
[246] Protecting Americans from Foreign Adversary Controlled Applications Act, Pub. L. No. 118-417 div. H (codified at 15 U.S.C. § 9901 note).
[247] Cathleen D. Cimino-Isaacs & Karen M. Sutter, *Committee on Foreign Investment in the United States (CFIUS)*, CONG. RSCH. SERV. (May 29, 2025), https://www.congress.gov/crs-product/IF10177.
[248] Sitaraman, *supra* note 244, at 1127–1135.

F. Know-Your-Customer Requirements

Know-your-customer (KYC) requirements, sometimes known as customer identification programs, obligate firms to verify and document the identities of their customers in order to reduce risks from misuse of their services.

KYC is most common in financial services. The basic concept has roots in common-law fiduciary duties but gained prominence in the 1990s and 2000s as an effort to curb money laundering and financing terrorism.[249] During the Biden Administration, the Bureau of Industry and Security (BIS) applied KYC requirements to certain semiconductor exporters.[250] Applying KYC requirements to CSPs is a logical extension, given a similar threat risk.

In 2024, BIS proposed a regulation to require IaaS providers and their foreign resellers to verify the identity of each foreign person associated with each account.[251] The second Trump Administration has suggested support for this provision.[252] The proposal implemented requirements from two executive orders, one from the first Trump Administration on cybersecurity[253] and a second from the Biden Administration on AI[254]. The former included core KYC requirements for IaaS providers,[255] while the latter included reporting requirements related to training of large AI models.[256] Civil society groups argued the proposal's AI model training transparency requirement

[249] See generally Genci Bilali, *Know Your Customer - Or Not*, 43 U. TOL. L. REV. 319 (2011).
[250] 15 C.F.R § 732 Supplement No. 3 (BIS's "Know Your Customer" Guidance and Red Flags), 89 Fed. Reg. 96809, https://www.ecfr.gov/current/title-15/subtitle-B/chapter-VII/subchapter-C/part-732/appendix-Supplement%20No.%203%20to%20Part%20732.
[251] Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities (Docket No. 240119–0020; RIN 0694–AJ35), 89 Fed. Reg. 5698 (2024).
[252] Mariam Baksh, *Kratsios Suggests KYC Requirements Will Be Part of 'AI Diffusion Rule' Replacement*, Inside AI Policy, July 31, 2025, https://insideaipolicy.com/ai-daily-news/kratsios-suggests-kyc-requirements-will-be-part-ai-diffusion-rule-replacement.
[253] Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities, Exec. Ord. No. 13757, 86 Fed. Reg. 6837 (2021).
[254] Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, Exec. Ord. No. 14110, 88 Fed. Reg. 75191 (2023).
[255] Exec. Ord. No. 13757, *supra* note 253, at § 1.
[256] Exec. Ord. No. 14110, *supra* note 254, at § 4.2(c).

neither reflected proven risks nor administrable.[257] Some commenters argued that the proposal raised questions about the legal authority of both executive orders.[258]

Legislative Design

Congress should simply direct BIS to finalize the proposal while removing the AI model reporting requirement. This would strengthen statutory authority, similar to Congressional action in recent legislation banning certain foreign telecommunications providers.[259]

IV. Conclusion

Cloud computing is indispensable for society, especially in an age where AI is central to domestic economics and geopolitical competition. As shown in this paper, cloud computing today presents market failures and national security risks. The history of regulated industries and the recent revival of antitrust policy offer several methods for addressing these issues. This paper recommends how Congress can respond with proven regulatory tools: structural separation, neutrality, portability and interoperability, critical infrastructure designation, foreign ownership restrictions, and know-your-customer requirements. These policies offer a practical path toward a cloud market that is competitive, secure, and aligned with America's national priorities.

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[257] See, e.g., *Comment from Center for Security and Emerging Technology (CSET) (Re: BIS NPRM Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities, 89 Fed. Reg. 5698)* (Apr. 29, 2024), https://www.regulations.gov/comment/DOC-2021-0007-0499; *Comment from Center for Democracy & Technology (CDT) (Re: BIS NPRM Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities, 89 Fed. Reg. 5698)*, (Apr. 29, 2024), https://www.regulations.gov/comment/DOC-2021-0007-0506.

[258] Kevin Allison & Paul Triolo, *Know-Your-Customer Is Coming for the Cloud—The Stakes Are High*, LAWFARE (Apr. 29, 2024), https://www.lawfaremedia.org/article/know-your-customer-is-coming-for-the-cloud-the-stakes-are-high.

[259] Secure Equipment Act of 2021, Pub. L. No. 117-55 (codified at 47 U.S.C. § 1601 note).

Appendix A: Annotated Sample Legislative Text

This appendix provides sample legislative text in the format of a federal bill with footnotes that offer additional information and background. The aim of this section is to show that the recommendations detailed in Section III of this paper can be implemented. While some commenters have said that legislating in the domain of fast-moving digital products is infeasible or too technically complex, this appendix demonstrates that legislation can indeed be drafted to address the market failures and national security risks of the cloud computing industry.

A BILL

To promote competition and security in the market for cloud computing and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLES; TABLE OF CONTENTS.

(a) SHORT TITLES.—This Act may be cited as the "Competitive and Secure Computing Leadership under Utility-style Data centers" or the "Competitive and Secure CLOUD Act".

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

SEC. 2. DEFINITIONS.

In this Act:

(1) ARTIFICIAL INTELLIGENCE.—The term "artificial intelligence" has the meaning given the term in section 5002 of the National Artificial Intelligence Initiative Act of 2020 (15 U.S.C. 9401).[260]

(2) ARTIFICIAL INTELLIGENCE APPLICATION.—The term "artificial intelligence application" means any software application or system or hardware application or device that operates in whole or in part by utilizing an artificial intelligence model or the outputs of an artificial intelligence model.

(3) ARTIFICIAL INTELLIGENCE MODEL.—The term "artificial intelligence model" means a component of an information system that implements artificial intelligence technology and uses computational,

[260] Congress commonly cites this definition (excerpted below). See, e.g., James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, Pub. L. No. 117-263, § 6701(1), 50 U.S.C. § 3024 note; CHIPS and Science Act, *supra* note 21, at § 10002(1) (codified at 42 U.S.C. § 18901(1)); see also Content Origin Protection and Integrity from Edited and Deepfaked Media Act of 2025, S. 1396, 119th Cong. § 3(1) (2025); TEST AI Act of 2025, S. 1633, 119th Cong. § 2(1) (2025); Protecting AI and Cloud Competition in Defense Act of 2024, S. 5436, 118th Cong. § 2(a)(1) (2024); Exec. Ord. No. 14110, *supra* note 254, at § 3(b).

> The term "artificial intelligence" means a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. Artificial intelligence systems use machine and human-based inputs to—
>
> (A) perceive real and virtual environments;
>
> (B) abstract such perceptions into models through analysis in an automated manner; and
>
> (C) use model inference to formulate options for information or action.

statistical, or machine-learning techniques to produce outputs from a given set of inputs.[261]

(4) BENEFICIAL INTEREST.—The term "beneficial interest" means with respect to a person, having access to competitively sensitive information or the ability to affect the person's strategic decisions.[262]

(5) CLOUD COMPUTING.—The term "cloud computing" has the meaning given the term in Special Publication 800-145 of the National Institute of Standards and Technology, or any successor document.[263]

(6) CLOUD SERVICE PROVIDER.—The term "cloud service provider" means a person using interstate or foreign communications to offer cloud computing.[264]

(7) COMMISSION.—The term "Commission" means the Federal Trade Commission.

(8) CONTROL.—The term "control" means, with respect to a person—

(A) holding 25 percent or more of the stock of the person;

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[261] Congress has started using this definition (excerpted below), originally based on Exec. Ord. No. 14110, *supra* note 254. See, e.g., Artificial Intelligence Environmental Impacts Act of 2024, S. 3732, 118th Cong., § 3(2) (2024); TRAIN Act, S. 5379, 118th Cong. § 2(a) (2024); One Big Beautiful Bill Act, H.R. 1, 119th Cong. § 43201(d)(2) (as engrossed in House) (2025).

[262] Based on Ending Platform Monopolies Act, *supra* note 170.

[263] Congress commonly cites this definition (excerpted below). For the underlying definition, see Mell and Grance, *supra* note 25. See, e.g., Information Technology Modernization Centers of Excellence Program Act, Pub. L. No. 116-194, § 2(a)(1), 40 U.S.C. § 11301 note; National Defense Authorization Act for Fiscal Year 2018, Pub. L. No. 115-91, § 1076(3) (codified at 40 U.S.C. § 11301 note); NDAA for FY2023, *supra* note 260, at § 5921(b) (codified at 44 U.S.C. § 3607(b)(4)); see also Protecting AI and Cloud Competition in Defense Act of 2024, S. 5436, 118th Cong. § 2(a)(1) (2024).

> Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

[264] Congress has used a similar definition in various laws and bill. See, e.g., NDAA for FY2023, *supra* note 263, at § 5921(b) (codified at 44 U.S.C. § 3607(b)(5)); Consolidated Appropriations Act, 2022, Pub. L. No. 117-103, § 103(a)(1)(C), 136 Stat. 49, 1039.

(B) having the right to 25 percent or more of the profits of the person;

(C) having the right to 25 percent or more of the assets of the person, in the event of the person's dissolution;

(D) if the person is a corporation, having the power to designate 25 percent or more of the directors of the person;

(E) if the person is a trust, having the power to designate 25 percent or more of the trustees; or

(F) otherwise exercises control over the person as described in section 800.208 of title 31, Code of Federal Regulations, or successor regulation.[265]

(9) CONTROLLED BY A FOREIGN ADVERSARY.—The term "controlled by a foreign adversary" means, with respect to a company or other entity, that such company or entity is—

(A) a foreign person that is domiciled in, is headquartered in, has its principal place of business in, or is organized under the laws of a foreign adversary country;

(B) an entity with respect to which a foreign person or combination of foreign persons described in subparagraph (A) have control; or

(C) a person subject to the direction or control of a foreign person or entity described in subparagraph (A) or (B).[266]

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[265] Subparagraphs (A) – (E) are adapted from common definitions used in digital platform legislation. See, e.g., Digital Consumer Protection Commission Act, *supra* note 171, at § 2002(6); American Innovation and Choice Online Act, S. 2992, 117th Cong. § 2(a)(4) (2021); Ending Platform Monopolies Act, *supra* note 170, at § 5(4). Similar definitions (using a 25% threshold) exist in multiple parts of law. See, e.g., Consolidated Appropriations Act, 2023, Pub. L. No. 117-328, § 501(a) (codified at 15 U.S.C. § 78o(b)(13)(E)(ii)). Subparagraph (F) references a functional test to determine control for the purposes of the Committee on Foreign Investment in the United States (CFIUS).

[266] Adapted from Protecting Americans from Foreign Adversary Controlled Applications Act, *supra* note 246, at § 2(g)(1) (codified at 15 U.S.C. § 9901 note).

(10) COVERED CLOUD SERVICE PROVIDER.—The term "covered cloud service provider" means—

(A) a cloud service provider that offers—

(i) an infrastructure as a service product; or

(ii) a platform as a service product; or

(B) a person that owns, controls, or has a beneficial interest in a person described in subparagraph (A).

(11) CRITICAL INFRASTRUCTURE.— The term "critical infrastructure" has the meaning given the term in section 1016(e) of the Critical Infrastructures Protection Act of 2001 (42 U.S.C. 5195c(e)).[267]

(12) DIRECTOR.—The term "Director" means the Director of the National Institute of Standards and Technology.

(13) FOREIGN ADVERSARY.—The term "foreign adversary" has the meaning given the term in section 8(c)(2) of the Secure and Trusted Communications Networks Act of 2019 (47 U.S.C. 1607(c)(2)).[268]

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[267] Congress commonly cites this definition (excerpted below). See, e.g., National Defense Authorization Act for Fiscal Year 2024, Pub. L. No. 118-31, § 1517(f)(1) (codified at 10 U.S.C. § 2224 note); NDAA for FY2023, *supra* note 260, at §§ 1511(c), 7302(4) (codified at 10 U.S.C. § 394 note and 6 U.S.C. § 821(4)); FAA Reauthorization Act of 2024, Pub. L. No. 118-63, § 912(h)(1) (codified at 49 U.S.C. § 44802 note).

> In this section, the term "critical infrastructure" means systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

[268] Congress has cited and used many different lists of countries and definitions. This definition (excerpted below) is used by a similar statute on the topic. It has been cited in, e.g., Open App Markets Act, S. 2153, 119th Cong. § 7(6)(B).

> The term "foreign adversary" means any foreign government or foreign nongovernment person engaged in a long-term pattern or serious instances of conduct significantly adverse to the national security of the United States or security and safety of United States persons.

Given the overlapping definition Exec. Ord. No. 13873 § 3(b), the Secretary of Commerce's determination of foreign adversaries in 15 C.F.R. § 791.4 (or its successor) would apply: (1) The People's Republic of China, including the Hong Kong Special Administrative Region and the Macau Special Administrative Region (China); (2) Republic of Cuba (Cuba); (3) Islamic Republic of Iran (Iran); (4) Democratic People's

(14) INFRASTRUCTURE AS A SERVICE PRODUCT.—The term "infrastructure as a service product" means any product or service that provides Infrastructure as a Service, as such term is defined in Special Publication 800-145 of the National Institute of Standards and Technology, or any successor document.[269]

(15) PERSON.—The term "person" has the meaning given the term in subsection (a) of section (1) of the Clayton Act (15 U.S.C. 12).[270]

(16) PLATFORM AS A SERVICE PRODUCT.—The term "platform as a service product" means any product or service that provides Platform as a Service, as such term is defined in Special Publication 800-145 of the National Institute of Standards and Technology, or any successor document.[271]

Republic of Korea (N. Kor.); (5) Russ. Federation (Russ.); and (6) Venez. politician Nicolás Maduro (Maduro Regime).

[269] The term "Infrastructure as a Service Product" is similarly defined in an executive order without reference to a NIST definition but substantially incorporating its contents. See, Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities, Exec. Ord. No. 13984, 86 Fed. Reg. 6837, § 3(q) (2021). Underlying definition:

> The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

[270] Similar definitions have been used in several antitrust and competition laws. See, e.g., Charitable Gift Annuity Antitrust Relief Act of 1995, Pub. L. No. 104-63, § 3(4) (codified at 15 U.S.C. § 37a(4)); National Cooperative Research Act of 1984, Pub. L. No. 98-462, § 2(a)(4) (codified at 15 U.S.C. § 4301(a)(4)); see also American Innovation and Choice Online Act, *supra* note 265, at § 2(a)(1); Platform Competition and Opportunity Act, H.R. 3826, 117th Cong. § 3(i) (2021). Underlying definition:

> The word "person" or "persons" wherever used in this Act shall be deemed to include corporations and associations existing under or authorized by the laws of either the United States, the laws of any of the Territories, the laws of any State, or the laws of any foreign country.

[271] Underlying definition (citations omitted):

> The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

(17) SOFTWARE AS A SERVICE PRODUCT.—The term "software as a service product" means any product or service that provides Software as a Service, as such term is defined in Special Publication 800-145 of the National Institute of Standards and Technology, or any successor document.[272]

(18) STATE.—The term "State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, and any other territory or possession of the United States.

(19) UNDER SECRETARY.—The term "Under Secretary" means the Under Secretary of Commerce for Industry and Security.

TITLE I—MARKET COMPETITION REGULATIONS

SEC. 101. STRUCTURAL SEPARATION[273].

(a) COMMON OWNERSHIP PROHIBITED[274].—

(1) IN GENERAL.—On the date that is 12 months after the date of enactment of this Act, it shall be unlawful for a covered cloud service provider to own, control, or have a beneficial interest in a line of business that develops, sells or otherwise makes available for use by individuals or organizations, or utilizes an AI model, AI application, or a software as a service product.

(2) EXCEPTIONS.—The prohibition in paragraph (1) shall not prohibit a covered cloud service provider from developing or using AI models or AI applications used solely to improve operations of the covered cloud

[272] Underlying definition (citations omitted):

> The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user- specific application configuration settings.

[273] For background, see *supra* Section III.A.

[274] Modeled on Ending Platform Monopolies Act, *supra* note 170, at § 2(a).

service provider but are not otherwise made available for sale or offered to customers.

(b) LIMITATIONS ON SHARED LEADERSHIP OR STAFF[275].—On the date that is 12 months after the date of enactment of this Act, an individual who is an officer, director, employee, including an agent, representative, or contractor, of a covered cloud service provider or who has control over the covered cloud service provider may not serve at the same time as an officer, director, employee, or other institution-affiliated party, including as an agent, representative, or contractor, of an entity from which such covered cloud service provider is prohibited from affiliating as described in subsection (a).

(c) IMPLEMENTATION BY NIST.—Not later than 6 months after the date of enactment of this Act the Director shall publish a report on its website that describes common categories of infrastructure as a service products and platform as a service products and services.

SEC. 102. CLOUD NEUTRALITY[276].

(a) NONDISCRIMINATION.—

(1) IN GENERAL.—It shall be unlawful for a covered cloud service provider to discriminate among similarly situated users—

(A) access to the provision of an infrastructure as a service product or a platform as a service product;

(B) prices, including charges, rates, fees, discounts, trials, or other any other practice substantially impacting charges paid by a user; or

(C) quality of service.

(2) COVERED AFFILIATIONS.—The prohibition in paragraph (1) applies to all users including those—

[275] *Id.* at § 4.

[276] For background, see *supra* Section III.B.

(A) that are owned or operated by the covered cloud service provider;

(B) in which the covered cloud service provider has a beneficial interest or an investment; or

(C) with which the covered cloud service provider has a partnership or other affiliation.

(b) SPECIFIC PRACTICES PROHIBITED .—A covered cloud service provider may not—

(1) offer—

(A) committed spend or other volume discounts;

(B) cloud credits, or other trials practices (including credits, trials, and other new customer acquisition mechanisms); or

(C) a bundle that includes an infrastructure as a service product or a platform as a service product with a product not related to the provision of cloud computing;

(2) prioritize limited supply of an infrastructure as a service product or a platform as a service product (or any feature or component thereof) in a manner that favors any person with a covered affiliation described in subsection (a)(2);

(3) charge egress fees or other charges associated with transferring data or other information out of services or facilities of the covered cloud service provider;

(4) restrict or impede the capacity of a user to access portability or interoperability interfaces;

(5) use information related to customer use of cloud computing that is not otherwise publicly available to inform business decisions other than providing or improving operations of cloud computing products or services; or

(6) condition access to the products or services of the covered cloud service provider based on a practice otherwise prohibited in this subsection.

(c) TRANSPARENCY.—A covered cloud service provider must post in an easily accessible and public location on its website—

(1) policies related to denial of service;

(2) all prices, including charges, rates, fees, discounts, trials, or other practice substantially impacting charges paid by a user; and

(3) all policies related to quality of service, including prioritization of an infrastructure as a service product or a platform as a service product (or any feature or component thereof).

SEC. 103. DATA PORTABILITY AND INTEROPERABILITY[277].

(a) DATA PORTABILITY.—

(1) IN GENERAL.—A covered cloud service provider shall maintain a mechanism for a customer of the covered cloud service provider to request a transfer of portable data to the customer or another person specified by the user (to include another cloud service provider).

(2) PORTABLE DATA DEFINED.—In this section, the term "portable data," means data maintained by a covered cloud service provider that—

(A) includes data—

(i) provided to a covered cloud service provider by a customer;

(ii) generated by a customer;

(iii) generated by a covered cloud service provider related to customer or activity of the customer;

[277] For background, see *supra* Section III.C. Modeled on the Augmenting Compatibility and Competition by Enabling Service Switching (ACCESS) Act of 2023, S. 2521, 118th Cong. (2023).

(B) may exclude nonpublic data about the covered cloud service provider's products and services, such as server configuration options and internal application programming interface documentation.

(3) TIMELINESS.—A covered cloud service provider must initiate and complete a request for data portability within a reasonable time frame and without undue delay.

(4) COST.—A covered cloud service provider may not charge a user directly or indirectly for the data portability requirement described in paragraph (1) or for any other transfer of data from the covered cloud service provider.

(5) FORMAT.—At a minimum, a covered cloud service provider must make available data portability in the format most used by the user to transfer data to the covered cloud service provider. If an electronic format is used and an open source standard exists, a covered cloud service provider shall use such open source standard.

(b) INTEROPERABILITY.—

(1) IN GENERAL.—A covered cloud service provider shall maintain a mechanism for interoperability with other cloud service providers for interoperable product categories.

(2) INTEROPERABLE PRODUCT CATEGORIES.—Not later than 6 months after the date of enactment of this Act, and not less frequently than once every year after the initial definition, the Director shall publish a list of "interoperable product categories" as a subset of infrastructure as a service products and platform as a service products. The Director shall make determinations primarily based on product categories that—

(A) most used; and

(B) for which interoperability is technically feasible.

(3) TIMELINESS.—A covered cloud service provider must maintain mechanisms, including through application programming interfaces, for timely interoperability.

(4) COST.—A covered cloud service provider may not charge a user directly or indirectly for access to or use of interoperability features described in paragraph (1) or for any other interoperability of product categories from the covered cloud service provider.

(5) FORMAT.—A covered cloud service provider must make interoperability available via an electronic interface (including standard application programming interfaces) as defined by the Director. The Director shall require the use of open source standards unless not technically feasible.

TITLE II—NATIONAL SECURITY PROTECTIONS

SEC. 201. CRITICAL INFRASTRUCTURE DESIGNATION[278].

(a) IN GENERAL.—Not later than 30 days after the date of enactment of this Act, the Secretary of Homeland Security shall designate cloud computing as a critical infrastructure sector.

(b) GUIDANCE.—Not later than 180 days after the date of enactment of this Act, the Secretary of Homeland Security, in consultation with the Director and relevant heads of agencies, shall issue guidance with respect to designating cloud computing as critical infrastructure.

(c) CONFORMING AMENDMENTS.— Section 2001(3) of the Homeland Security Act of 2002 (6 U.S.C. 601(3)) is amended—

(1) redesignating subparagraphs (D) through (Q) as (E) through (R), respectively; and

(2) by inserting after subparagraph (C) the following new subparagraph:

"(D) Cloud computing.".

SEC. 202. RESTRICTIONS ON FOREIGN OWNERSHIP AND CONTROL[279].

[278] For background, see *supra* Section III.D. Modeled on Space Infrastructure Act, H.R. 1154, 119th Cong. (2025); and Second Amendment is Essential Act of 2021, H.R. 4060, 117th Cong. (2021).
[279] For background, see *supra* Section III.E.

(a) RESTRICTION ON FOREIGN SHAREHOLDERS OF UNITED STATES CLOUD SERVICE PROVIDERS.—Not later than 6 months after the date of enactment of this Act, it shall be unlawful for a covered cloud service provider to knowingly permit control of such covered cloud service provider by—

(1) a foreign adversary country;

(2) an entity controlled by a foreign adversary;

(3) a citizen of a foreign adversary country; or

(4) any combination of paragraphs (1) to (3).

(b) CITIZENSHIP REQUIREMENT FOR DIRECTORS[280].—Every director of a covered cloud service provider must, during his whole term of service, be a citizen of the United States. No director of a covered cloud service provider may be, during their whole term of service—

(1) a citizen of foreign adversary country; or

(2) an officer, director, employee, including an agent, representative, or contractor, of an entity controlled by a foreign adversary.

SEC. 203. KNOW-YOUR-CUSTOMER REQUIREMENTS.[281]

(a) FINALIZING PROPOSED RULE.—Not later than 90 days after the date of the enactment of this Act, the Under Secretary shall promulgate regulations finalizing the proposed rule entitled "Taking Additional Steps To Address the National Emergency With Respect to Significant Malicious Cyber-Enabled Activities" (Docket No. 240119–0020; RIN 0694–AJ35), published on January 29, 2024, requiring certain providers of infrastructure as a service products to verify the identity of certain foreign customers.

(b) UPDATE REQUIRED.—In the regulations promulgated under subsection (a), the Under Secretary shall remove provisions related to the training of large AI models, including those in section 7.308 of the proposed rule.

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[280] Based on the primary requirement for certain federal banks in 12 U.S.C. § 72 that require U.S. citizenship.

[281] For background, see *supra* Section III.G. Modeled on the Secure Equipment Act, *supra* note 259.

TITLE III—GENERAL PROVISIONS

SEC. 301. ENFORCEMENT.

(a) ENFORCEMENT BY THE COMMISSION, DEPARTMENT OF JUSTICE, AND STATES[282].—

(1) IN GENERAL.—Except as otherwise provided in this Act—

(A) the Commission shall enforce this Act in the same manner, by the same means, and with the same jurisdiction, powers, and duties as though all applicable terms of the Federal Trade Commission Act (15 U.S.C. 41 et seq.) were incorporated into and made a part of this Act;

(B) the Attorney General shall enforce this Act in the same manner, by the same means, and with the same jurisdiction, powers, and duties as though all applicable terms of the Sherman Act (15 U.S.C. 1 et seq.), Clayton Act (15 U.S.C. 12 et seq.), and Antitrust Civil Process Act (15 U.S.C. 1311 et seq.) were incorporated into and made a part of this Act; and

(C) any attorney general of a State shall enforce this Act in the same manner, by the same means, and with the same jurisdiction, powers, and duties as though all applicable terms of the Sherman Act (15 U.S.C. 1 et seq.) and the Clayton Act (15 U.S.C. 12 et seq.) were incorporated into and made a part of this Act.

(2) UNFAIR METHODS OF COMPETITION.—A violation of this Act shall also constitute an unfair method of competition under section 5 of the Federal Trade Commission Act (15 U.S.C. 45).

(3) COMMISSION INDEPENDENT LITIGATION AUTHORITY.—If the Commission has reason to believe that a person violated this Act, the Commission may commence a civil action, in its own name by any of its attorneys designated by it for such purpose, to recover a civil penalty and seek other appropriate relief in a district court of the United States.

[282] Adapted from Platform Competition and Opportunity Act, *supra* note 270, at § 5.

(4) PARENS PATRIAE.—Any attorney general of a State may bring a civil action in the name of such State for a violation of this Act as parens patriae on behalf of natural persons residing in such State, in any district court of the United States having jurisdiction of the defendant, and may secure any form of relief provided for in this section.

(5) INJUNCTIVE RELIEF.—The Assistant Attorney General of the Antitrust Division, the Commission, or the attorney general of any State may seek, and the court may order, relief in equity as necessary to prevent, restrain, or prohibit violations of this Act.

(6) REMEDIES.—Remedies provided in this subsection are in addition to, and not in lieu of, any other remedy available under Federal or State law.

(7) COMMON CARRIERS AND NONPROFIT ORGANIZATIONS[283].—Notwithstanding any jurisdictional limitation of the Commission, the Commission shall enforce this Act and the regulations promulgated under this Act, in the same manner provided in this subsection, with respect to common carriers subject to the Communications Act of 1934 (47 U.S.C. 151 et seq.) and all Acts amendatory thereof and supplementary thereto and organizations not organized to carry on business for their own profit or that of their members.

(b) SUITS BY PERSONS INJURED[284].—

(1) IN GENERAL.—Except as provided in paragraph (3), any person injured by reason of anything forbidden in this Act may sue therefor in any district court of the United States in the district in which the defendant resides or is found or has an agent, without respect to the amount in controversy, and shall recover threefold the damages by the person sustained and the cost of suit, including a reasonable attorney's fee. The court may award under this paragraph, pursuant to a motion by such person promptly made, simple interest on actual damages for the period beginning on the date of service of the pleading of the person

[283] To ensure coverage of telecommunications companies that may enter the cloud computing business, as some have considered. Adapted from American Data Privacy and Protection Act, *supra* note 222, at § 401(c)(4).

[284] Adapted from Open App Markets Act, *supra* note 268, at § 5(b).

setting forth a claim under this Act and ending on the date of judgment, or for any shorter period therein, if the court finds that the award of such interest for such period is just in the circumstances. In determining whether an award of interest under this paragraph for any period is just in the circumstances, the court shall consider only—

(A) whether the person or the opposing party, or either party's representative, made motions or asserted claims or defenses so lacking in merit as to show that such party or representative acted intentionally for delay or otherwise acted in bad faith;

(B) whether, in the course of the action involved, the person or the opposing party, or either party's representative, violated any applicable rule, statute, or court order providing for sanctions for dilatory behavior or otherwise providing for expeditious proceedings; and

(C) whether the person or the opposing party, or either party's representative, engaged in conduct primarily for the purpose of delaying the litigation or increasing the cost thereof.

(2) INJUNCTIVE RELIEF.—Except as provided in paragraph (3), any person shall be entitled to sue for and have injunctive relief, in any court of the United States having jurisdiction over the parties, against threatened loss or damage by a violation of this Act, when and under the same conditions and principles as injunctive relief against threatened conduct that will cause loss or damage is granted by courts of equity, under the rules governing such proceedings, and upon the execution of proper bond against damages for an injunction improvidently granted and a showing that the danger of irreparable loss or damage is immediate, a preliminary injunction may issue. In any action under this paragraph in which the plaintiff substantially prevails, the court shall award the cost of suit, including a reasonable attorney's fee, to such plaintiff.

(3) ENTITIES CONTROLLED BY A FOREIGN ADVERSARY.—An entity controlled by a foreign adversary may not bring an action under this subsection.

SEC. 302. RULES OF CONSTRUCTION[285].

Nothing in this Act shall be construed to limit any authority of the Attorney General or the Federal Trade Commission under the antitrust laws, the Federal Trade Commission Act (15 U.S.C. 45), or any other provision of law or to limit the application of any law.

SEC. 303. SEVERABILITY[286].

If any provision of this Act, or the application of such provision to any person or circumstance, is held to be unconstitutional, the remainder of this Act, and the application of the remaining provisions of this Act, to any person or circumstance, shall not be affected.

[285] Standard provision.
[286] Standard provision.

Appendix B: CSPs' Conflicts Across AI Tech Stack

illustrative, non-exhaustive

Chips

- Amazon acquired Annapurna Labs for $350 million and now uses that business to design AI-specific chips: Trainium, Inferentia, and Graviton.[287]
- Microsoft designed its own chips, Azure Maia 100 and Cobalt 100, with the former designed in partnership with OpenAI.[288]
- Alphabet designed its own chips, Tensor Processing Units (TPUs).[289]

Models

- Amazon invested $8 billion in Anthropic, which made Amazon Web Services (AWS) its "primary cloud provider" and uses Amazon-designed chips.[290] Amazon launched Nova Act, an AI agent platform, from "essentially reverse acquihires" of startups Adept and Covariant.[291] Amazon invested in AI data company ScaleAI.[292] Amazon has revenue-sharing

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[287] Reed Albergotti, *The Tiny Chips behind Amazon's Big AI Investment*, SEMAFOR, Mar. 2025, https://www.semafor.com/article/03/14/2025/amazons-trainium-chips-to-be-tested-by-anthropic; Belle Lin, *Amazon Announces Supercomputer, New Server Powered by Homegrown AI Chips*, WALL ST. J., Dec. 3, 2024, https://www.wsj.com/articles/amazon-announces-supercomputer-new-server-powered-by-homegrown-ai-chips-18c196fc; Eugene Kim, *This Chart Shows One Potential Advantage AWS's AI Chips Have over Microsoft and Google*, BUS. INSIDER, Sep. 26, 2024, https://www.proquest.com/docview/3109701784/citation/9DDFED951FA74880PQ/1.

[288] Tom Warren, *Microsoft Is Finally Making Custom Chips — and They're All about AI*, THE VERGE, Nov. 15, 2023, https://www.theverge.com/2023/11/15/23960345/microsoft-cpu-gpu-ai-chips-azure-maia-cobalt-specifications-cloud-infrastructure.

[289] Ryan Whitwam, *Google Unveils Ironwood, Its Most Powerful AI Processor Yet*, ARS TECHNICA, Apr. 9, 2025, https://arstechnica.com/gadgets/2025/04/google-unveils-ironwood-its-most-powerful-ai-processor-yet/.

[290] Albergotti, *supra* note 260, at 6; FTC 6(b) Cloud-AI Report, *supra* note 18.

[291] Alex Heath, *This Is Big Tech's Playbook for Swallowing the AI Industry*, THE VERGE, July 2024, https://www.theverge.com/2024/7/1/24190060/amazon-adept-ai-acquisition-playbook-microsoft-inflection; see also Erin Griffith & Cade Metz, *The New A.I. Deal: Buy Everything but the Company*, N.Y. TIMES, Aug. 8, 2024, https://www.nytimes.com/2024/08/08/technology/ai-start-ups-google-microsoft-amazon.html; Maxwell Zeff, *Amazon Unveils Nova Act, an AI Agent That Can Control a Web Browser*, TECHCRUNCH, Mar. 31, 2025, https://techcrunch.com/2025/03/31/amazon-unveils-nova-act-an-ai-agent-that-uses-a-web-browser/; FTC 6(b) Cloud-AI Report, *supra* note 18, at 7–8.

[292] Paul Sawers, *Data-Labeling Startup Scale AI Raises $1B as Valuation Doubles to $13.8B*, TECHCRUNCH, May 21, 2024, https://techcrunch.com/2024/05/21/data-labeling-startup-scale-ai-raises-1b-as-valuation-doubles-to-13-8b/.

deals with model hub Hugging Face and open-source image generation model Stability AI.[293]

- Microsoft invested nearly $14 billion in OpenAI.[294] Microsoft completed a "reverse acquihire" of Inflection AI for $650 million.[295] GitHub, a developer platform Microsoft acquired for $7.5 billion, launched Copilot, Models, and Sparks for AI programming.[296]
- Alphabet has invested at least $2.25 billion in Anthropic, giving it a 14% stake.[297] Alphabet's models, now branded Gemini, are based in part on the work of DeepMind, which Alphabet acquired for $650 million.[298]

Applications

- Amazon owns Alexa, a voice assistant that uses various AI services through its Echo devices, which are based on acquisitions of several AI startups including Ivona and Evi and now integrate various AI models.[299] Amazon's founder Jeff Bezos also invested in AI search startup Perplexity.[300]

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[293] Kevin McLaughlin & Anissa Gardizy, *After Years of Resistance, AWS Opens Checkbook for Open-Source Providers*, THE INFORMATION, May 24, 2023, https://www.theinformation.com/articles/after-years-of-resistance-aws-opens-checkbook-for-open-source-providers.

[294] Berber Jin & Corrie Driebusch, *The $14 Billion Question Dividing OpenAI and Microsoft*, WALL ST. J., Oct. 18, 2024, https://www.wsj.com/tech/ai/the-14-billion-question-dividing-openai-and-microsoft-71cf7d37; FTC 6(b) Cloud-AI Report, *supra* note 18, at 4.

[295] Heath, *supra* note 264; Jin and Driebusch, *supra* note 267; Krystal Hu & Harshita Mary Varghese, *Microsoft Pays Inflection $650 Mln in Licensing Deal While Poaching Top Talents, Source Says*, REUTERS, Mar. 21, 2024, https://www.reuters.com/technology/microsoft-agreed-pay-inflection-650-mln-while-hiring-its-staff-information-2024-03-21/; FTC 6(b) Cloud-AI Report, *supra* note 18, at 32.

[296] Tom Warren, *Microsoft Confirms It Will Acquire GitHub for $7.5 Billion*, THE VERGE, June 4, 2018, https://www.theverge.com/2018/6/4/17422788/microsoft-github-acquisition-official-deal; Tom Warren, *GitHub Copilot Will Support Models from Anthropic, Google, and OpenAI*, THE VERGE, Oct. 29, 2024, https://www.theverge.com/2024/10/29/24282544/github-copilot-multi-model-anthropic-google-open-ai-github-spark-announcement.

[297] Cade Metz, Nico Grant & David McCabe, *Inside Google's Investment in the A.I. Start-Up Anthropic*, N.Y. TIMES, Mar. 11, 2025, https://www.nytimes.com/2025/03/11/technology/google-investment-anthropic.html.

[298] Corrigan, Luong, & Schoeberl, *supra* note 66.

[299] Brad Stone, *The Secret Origins of Amazon's Alexa*, WIRED, May 11, 2021, https://www.wired.com/story/how-amazon-made-alexa-smarter/.

[300] *Report: Perplexity Closed $500 Million Funding Round in Early December*, PYMNTS, Dec. 18, 2024, https://www.pymnts.com/news/investment-tracker/2024/report-perplexity-closed-500-million-funding-round-in-early-december/.

- Microsoft launched Copilot, a chatbot based on OpenAI models, and has integrated it into Bing, Office applications, and other Microsoft products.[301]
- Alphabet's increasingly offers AI applications as a standalone products (e.g., Gemini, Canvas) that "graduate" when successful into integration in core Google software products (e.g., Search, Maps, Ads) and Alphabet-owned hardware products (e.g., Android, Fitbit, Waymo), though those also use separate AI models.[302] Many of these features, offerings, and products are based on the hundreds of acquisitions Alphabet has made over many years, including much of Google's core AI team.[303] Google Ventures is the most active corporate venture firm and invests heavily in AI applications.[304]

[301] Austin Carr, *Microsoft's Copilot Plays Coy About OpenAI Partnership*, BLOOMBERG, May 19, 2025, https://www.bloomberg.com/news/newsletters/2025-05-19/why-microsoft-copilot-doesn-t-market-its-openai-and-chatgpt-use.
[302] Corrigan, Luong, & Schoeberl, *supra* note 66; Ina Fried, *Google Is Putting More AI in More Places*, AXIOS, May 20, 2025, https://www.axios.com/2025/05/20/google-ai-io-announcements-2025; David Pierce, Nilay Patel & Alex Heath, *Vergecast: OpenAI and Jony Ive's AI Super-Gadget*, THE VERGE (podcast, May 2025), at 47:00, https://www.theverge.com/the-vergecast/673453/openai-jony-ive-io-gadget-google-io-vergecast.
[303] *Google's Biggest Acquisitions*, CB INSIGHTS, Mar. 20, 2025, https://www.cbinsights.com/research/google-biggest-acquisitions-infographic/.
[304] *State of CVC Q1'25 Report*, CB INSIGHTS (April 29, 2025), https://www.cbinsights.com/research/report/corporate-venture-capital-trends-q1-2025/.