Equitable Cloud Access

This issue concerns the ability of individuals and organizations in developing economies and underserved communities to access cloud services and the ever more essential functions that are being hosted therein. This requires ensuring the wide availability of secure, reliable, and affordable lower latency broadband connections.

Key Considerations

- ***Cloud access is profit-driven***. Unimpeded, fast, and reliable access to cloud services will hugely affect the fortunes of individuals, communities, and nations. Yet the provision of such access may be profit-driven hence biased toward bigger or more affluent customers nationally and internationally. As a result, smaller/less-affluent customers might also enjoy fewer services and service providers that could increase the possibility of vendor lock-in, reducing consumer choice and potentially driving up costs.
- ***Government support may be necessary***. Promoting broad, equitable, and unbiased access to consumer and enterprise cloud services (including to all communities, vulnerable populations, and small and medium-sized enterprises in underserved regions) may require direct governmental financial and regulatory support. This may involve the development of domestic alternatives that might be more accountable to government and public wishes, but also be more limited in their ability to offer services that are comparable to their international competitors.
- ***Limited broadband availability***. The broadband infrastructure needed to access cloud services is not universally available.[1]
- ***High barriers to entering emerging markets***. Shortage of skills, lack of capital investment and business resources, regulatory constraints, and high prices may prevent providers from offering cloud services profitably, leading them to avoid expanding into developing economies altogether.[2]
- ***Limited benefits to local communities.*** The employment opportunities and other benefits associated with hosting cloud and related infrastructure may only moderately accrue to the communities in which they are physically located.[3]
- ***Discrimination at the behest of government***. Certain governments might restrict or deny cloud services to minorities and other vulnerable populations on the basis of security or political considerations, thereby unfavorably impacting their rights and well-being.[4]
- ***Convergence of cloud and telecommunications***. As cloud providers begin to play a role in core telecommunications infrastructure, it is unclear how existing regulatory regimes map onto these increasingly integrated sectors.[5]

Stakeholder Perspectives

Government

- Seek to spur national economic growth by enabling cloud access for their citizens at affordable prices but vary in their attitude toward an expansive government role in facilitating cloud access.
- Recognize the cloud's capacity to bolster national competitiveness by supporting the export of digital goods and services.
- Vary in their desire to attract foreign investment in cloud infrastructure and services.[6]
- Potentially wish to encourage the creation of domestic alternatives to foreign cloud providers.
- Support domestic providers in their efforts to compete for cloud service contracts abroad.

Providers

- Welcome governmental financial support for expanding and upgrading the cloud infrastructure supporting the digital economy. (Similar to Internet Service Providers' and Local Affected Communities' perspectives.)
- Wish to avoid onerous regulation and oversight of cloud services that drive up compliance costs and encroach on their flexibility in pursuing their commercial interests. (Similar to Internet Service Providers' perspective.)
- Are interested in extending cloud services to emerging markets and underserved communities.[7] (Similar to International

Customers

- Desire reliable, affordable, and secure access to cloud-based services.
- Seek expanded options and flexibility in their choice of service providers, typically associated with the availability of more than one cloud provider.[8]
- Want to avoid subsidizing access for customers in less affluent communities.

Others

- *Internet service providers:* Welcome governmental financial support for expanding and upgrading the cloud infrastructure supporting the digital economy. (Similar to Cloud Providers' and Local Affected Communities' perspective.)
- *Internet service providers:* Wish to avoid onerous regulation and oversight of broadband projects that drive up compliance costs and encroach on their flexibility in pursuing their commercial interests. (Similar to Cloud Providers' perspective.)
- *Local affected communities:* Some welcome the expansion of employment opportunities through the local

- Vary in their willingness to facilitate access to cloud services to traditionally underserved domestic populations
- Increasingly identify cloud services as a platform for delivering public services.

Organizations' perspective.)

development of cloud and broadband infrastructure.[9] Others wish to protect local businesses from being displaced by alternative, cloud-based companies.

- *Local affected communities:* Aim to protect their local area from adverse environmental and land-use impacts associated with large-scale cloud infrastructure.[10]
- *Local affected communities:* Welcome governmental financial support for expanding and upgrading the cloud infrastructure supporting the digital economy. (Similar to Cloud Providers' and Internet Service Providers' perspective.)
- *International organizations*: Pursue international development goals, which may involve working with cloud providers and enterprise

customers to extend cloud services to as many underserved populations as possible. (Similar to Cloud Providers' perspective.)

Tensions with Other Cloud Governance Issues

- ***Localization and Routing Requirements:*** Regional data localization laws might increase the costs of cloud services by complicating the global regulatory landscape, forcing cloud providers to develop local infrastructure where they may otherwise have not, potentially making cloud services less affordable to lower-income communities.
- ***Environment, Community, and Energy Market Impact:*** Providing equitable access to cloud services may involve the construction of new infrastructure, raising concerns about the potential environmental toll and adverse social effects,[11] deforestation, waste generation, and so on.[12]
- ***Cloud Access Restrictions and Content Moderation:*** Governments may not support infrastructure projects to particular communities, out of national security or political concerns. Both would contribute to existing inequities in access to cloud services.
- ***Digital Sovereignty:*** Governments may be interested in ensuring that data from their citizens and domestic enterprises remains within their jurisdiction and benefits their economy, leading them to promote domestic alternatives instead. While this may assuage some national security, employment, and competitiveness concerns, the reliance on less-experienced domestic providers may diminish the economic advantages offered by cloud services.
- ***Security and Privacy in Lawful Government Access***, ***Cloud Access Restrictions and Content Moderation***, and ***Privacy Protections***: While governmental financial support may be necessary for increasing access to cloud services, the possibility that such support is made conditional on increased government access to user data raises concerns about cloud security and functionality. In many jurisdictions, it also raises the possibility that this access will be used to infringe on personal freedoms and fundamental rights.

Recent Examples

- "Why data centers fail to bring new jobs to small towns," Tech Republic, September 19, 2019.
- "Expanding our global footprint with new cloud regions," Google Cloud, December 21, 2020.

Notes

[1] International Telecommunication Union, "ITU Broadband Maps," International Telecommunication Union, n.d., https://www.itu.int/en/ITU-D/Technology/Pages/InteractiveTransmissionMaps.aspx.

[2] Awais Ahmed, *Cloud Computing in Developing Countries: Opportunities and Challenges* (Washington, DC: Cybersecurity and Infrastructure Security Agency, March 1, 2017), https://www.isaca.org/resources/isaca-journal/issues/2017/volume-2/cloud-computing-in-developing-countries-opportunities-and-challenges#2.

[3] And as a small town in Virginia, USA experienced with Microsoft's opening of a large data center, even this may sometimes not be the case, with the operation of these data centers being carried out by outside technicians, and local talent being employed as administrative assistants and janitorial staff. See: Alison DeNisco Rayome, "Why data centers fail to bring new jobs to small towns," Tech Republic, September 19, 2019, https://www.techrepublic.com/article/why-data-centers-fail-to-bring-new-jobs-to-small-towns/.

[4] United Nations General Assembly, Human Rights Council, "Ending Internet shutdowns: a path forward," United Nations, June 15, 2021, https://undocs.org/A/HRC/47/24/Add.2

[5] AT&T "AT&T Moves 5G Mobile Network to Microsoft Cloud," AT&T, June 30, 2021, https://about.att.com/story/2021/att_microsoft_azure.html.

[6] Qatar Financial Centre, "Qatar Remains Open for Business," *Bloomberg*, https://sponsored.bloomberg.com/immersive/qatar-financial-centre/qatar-open-business

[7] Leila Hawkins, "Microsoft launches Tech for Social Impact for elderly care," Healthcare Global, July 23, 2021 https://healthcareglobal.com/technology-and-ai/microsoft-launches-tech-social-impact-elderly-care.

[8] Achieving and retaining an environment that may support the operation of more than one provider may not always be possible as the costs associated with establishing the requisite physical infrastructure to host multiple vendors may also be prohibitive or governments may wish to limit the number of foreign providers who are allowed to operate in-territory due to national security concerns (for example, refrain from granting operational licenses).

[9] Tanwen Dawn-Hiscox, "Virginia offered record tax breaks to attract data centers in 2020," Data Center Dynamics, December 24, 2020, https://www.datacenterdynamics.com/en/news/virginia-offered-record-tax-breaks-attract-data-centers-2020/.

[10] Olivia Solon, "Drought-stricken communities push back against data centers," NBC News, June 19, 2021, https://www.nbcnews.com/tech/internet/drought-stricken-communities-push-back-against-data-centers-n1271344.

[11] Dirk-Jan van de Ven, Iñigo Capellan-Peréz, Iñaki Arto, Ignacio Cazcarro, Carlos de Castro, Pralit Patel, and Mikel Gonzalez-Eguino, "The potential land requirements and related land use change emissions of solar energy," *Scientific Reports* 11, no. 2907 (2021), https://doi.org/10.1038/s41598-021-82042-5.

[12] Though submarine communication cables have not historically been found to adversely affect marine life, there do exist concerns over the increasing proliferation of these cables (as hyperscale cloud providers increasingly invest in the expansion of submarine cables globally. See: Yevgeniy Sverdlik, "How Hyperscale Cloud Platforms are Reshaping the Submarine Cable Industry," Data Center Knowledge, February 17, 2021, https://www.datacenterknowledge.com/networks/how-hyperscale-cloud-platforms-are-reshaping-submarine-cable-industry ; Drew FitzGerald, "Google Plans to Expand Huge Undersea Cables to Boost Cloud Business," *The Wall Street Journal*, January 16, 2018, https://www.wsj.com/articles/google-plans-to-expand-huge-undersea-cables-to-boost-cloud-business-1516098601). Moreover, as cloud providers experiment with alternative data center structures, such as underwater data centers, there remains a need to see how these structures may affect local marine ecosystems. (for example, Microsoft's Project Nantick. See: Peter Judge, "Project Natick: Microsoft's underwater voyage of discovery," Data Center Dynamics, January 5, 2021, https://www.datacenterdynamics.com/en/analysis/project-natick-microsofts-underwater-voyage-discovery/).