WP/CWS/200/43

**WORKING PAPER**

# CLOUD COMPUTING AND THE WORLD TRADING SYSTEM: BLUE SKIES OR ROUGH WEATHER AHEAD?

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**SEPTEMBER 2017**

* All views and opinions expressed in this paper are personal, and do not necessarily reflect the views of the Centre, or the IIFT, or the Government of India. The author may be contacted at jayant@iift.edu

**TABLE OF CONTENTS**

*Cloud computing—like so much about the Internet—is a little bit like the Wild West, where the rules are made up as you go, and you hope for the best.*[1]

## I. INTRODUCTION

The internet is all around us. It is one gigantic entity. It is becoming bigger and bigger, everyday. The very medium it is, presents huge commercial potential for enterprises of all sizes and in all sectors. Indeed, along with computers, the internet serves as a very important tool for enabling connections between businesses and their customers. It also facilitates their operations to a major extent by allowing for the flow of ideas, concepts, information, product design, etc. This has advertently spurred the boom in ecommerce world over. Even the developing world has not been immune to the rapid growth of ecommerce, though it has its own socio-economic challenges. In fact, emerging economies such as India, China, Brazil and Indonesia are booming ecommerce markets. In many ways, ecommerce has revolutionized the way of conducting business for many players in these economies.

However, being able to use the internet and computing facilities for driving ecommerce can be an expensive and capital intensive affair. While scientific progress has definitely resulted in the creation of a host of technological and digital products, these products cost serious capital. However, as is typical with every problem, someone always finds a solution. Today, businesses no longer need to purchase their own equipment (hardware) and digital applications (software), and take the pain of installing, maintaining and operating the same. Instead, they can contract with technology majors to obtain a variety of related-technological services under the umbrella of what has come to be known as "cloud computing". As per this concept of "cloud computing", these inputs can instead be hired from technology corporations that have established themselves in the

[1] Eric Griffith, *What Is Cloud Computing?*, 3 May 2016, PCMagazine, <http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing>

business of providing a platform of technology and services to business entities for their particular use. To put it aptly, these services are now available at the click of a button!

Some of the technology majors who are providing cloud computing services are IBM, Microsoft, Google, Amazon, and Oracle. It would be pertinent to note that most of these corporations are located in developed countries. As a matter of fact, most developing countries, with the exception of China, lack a viable cloud computing sector. Given the burgeoning market for cloud computing services, developing countries, especially those with a growing demographic dividend, would want to catch up with the developed countries. In this regard, developing countries would be interested in framing economic policies to enable their domestic sector to "catch up" with their counterparts in the developed world.

Interestingly, while developing countries are taking steps or considering policies towards boosting their domestic cloud computing industry, developments are taking place in the opposite direction in the world trading system. Developed countries, at the behest of their home-grown technology majors, are pushing for the development of rules on ecommerce which may not seem favourable to the growth of the cloud computing sectors in the developing countries. Discussions at multilateral fora such as the WTO and rules in mega-regional FTAs such as the TPP seem to point in this direction. However, what is even more inimical about the nature of these issues is the point that many developing countries are yet to fully grasp the implications of these rules if they take shape as they are currently intended to. Under the promise of gains from ecommerce, developing countries run the risk of eroding their domestic policy space that they could instead use for developing their domestic cloud computing industry.

This paper is intended to serve as an information brief for those wishing to understand the concept of cloud computing and its interface with international trade and investment rules. Having briefly introduced the topic, section II presents a technical overview of the concept of cloud computing focusing on its definition, its types, models, and its application. In order to understand the political economy behind the drive for

cloud computing disciplines in the world trading system, it is essential to understand the relevant market statistics pertaining to the global cloud computing market. Section III provides a brief overview of the major cloud computing players, and the current and expected market revenue of the global cloud computing market. Sections IV and V constitute the heart of this paper. Section IV initially discusses the interface between domestic economic policies and the notion of cloud computing. It discusses the implications of different economic policies for the cloud computing sector. Section V then discusses the TPP's provisions on cloud computing and briefly discusses their implications for the cloud computing sector. Section V concludes while focusing on the implications of proposed cloud computing disciplines for developing countries.

## II. UNDERSTANDING THE CONCEPT OF CLOUD COMPUTING

Before we delve into a full discussion and analysis of the trade and investment issues pertaining to the subject of cloud computing, it becomes imperative to have a deeper understanding of the of the technical notion of cloud computing: its background definition; its scope; and its application.

### *A. Background*

Before discussing the finer aspects of cloud computing, it would be imperative to understand what necessitated the demand for cloud computing services. Under a traditional business model, end users such as corporations, universities, etc, could store all their data in their hard disk drive. A hard drive is an optical unit/device that can be used for storage and retrieval of data, applications, and software. It is primarily in the form of an in-built/internal device that is part of a computer unit such as a desktop or a laptop. However, these internal hard drives usually have limited storage space and can only be expanded upto a particular capacity.

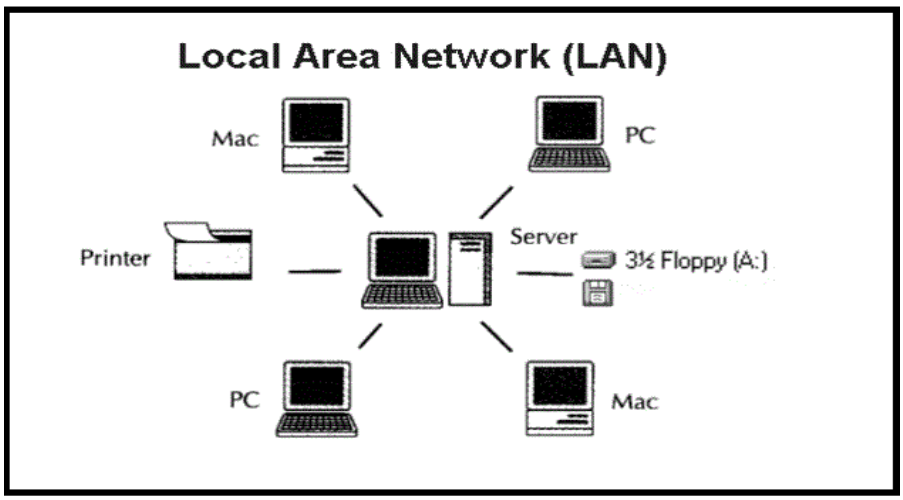


**Illustration 1: Simple Local Area Network Model**[2]

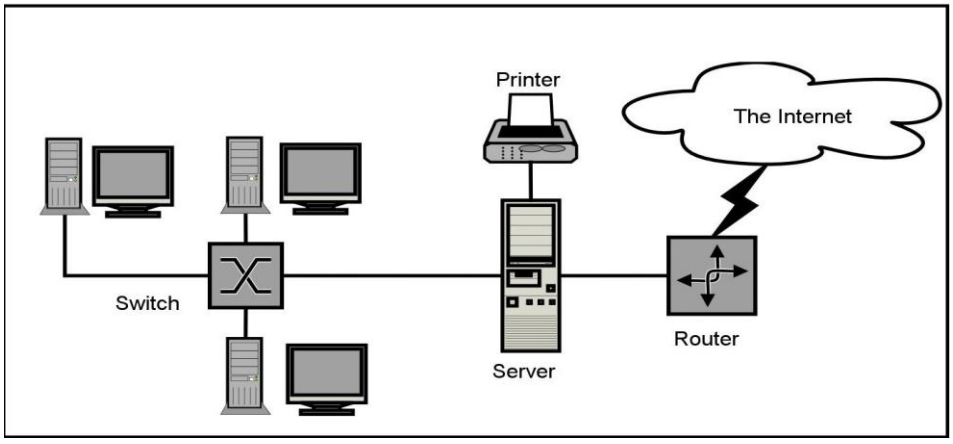


**Illustration 2: Simple Local Area Network Model**[3]

Then came the advent of external hard drives which had much bigger storage capacity, and could often serve as a backup for internal hard drives. However, given the huge data requirements of bigger end users such as corporations, universities, etc, these external hard drives would not be sufficient in their standard form. Also, there is also the need to make such data accessible to multiple users who may be spread over a bigger geographic area and may need to access them at different time of the day. Also, the needs of users

[2] Taken from https://mitzi199926.wordpress.com/

[3] Taken from http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing

would go beyond just data storage and would extend to being able to tap applications and software. Such needs would then require to be met by sophisticated technological devices such as Network Attached Storage devices or servers.

Servers can perform a variety of functions besides data storage. In fact, data storage is just *one* of the functions that is performed by servers these days. However, it is important to note that servers require huge capital and revenue expenditure. While large corporations may have the wherewithal to invest in installation and operation of servers, not all other end-users/entities may be in the same league. In such a case, it would make sense to *rent* these servers and utilize them via the internet. Even for large corporations who can afford to have their own servers, advantages such as cost effectiveness, focus on core operations, etc may persuade them to rent out servers. This is the concept of cloud computing.

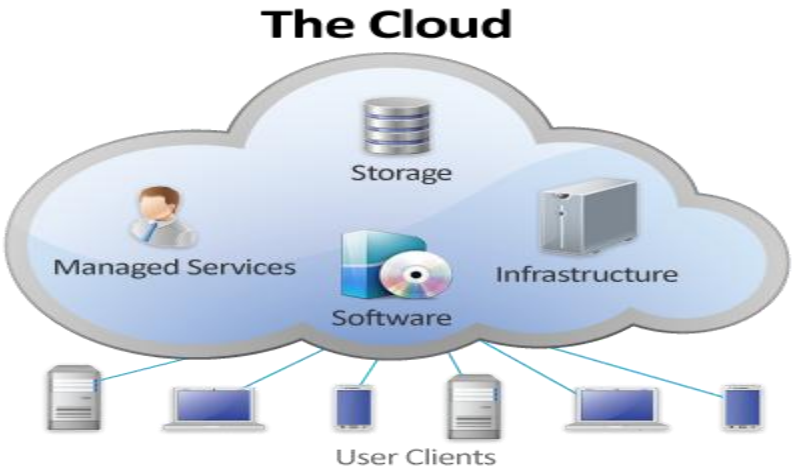


**Illustration 3: Simple Cloud Computing Model[4]**

### *B. Definition of "Cloud Computing"*

With a vibrant cloud computing industry already established in the developed world, there is no shortage of definitions for cloud computing. Therefore, much reliance is placed on the technical meanings provided by established cloud computing majors.

[4] Taken from https://www.supinfo.com/articles/single/4286-cloud-computing

According to Oracle:[5]

> The simple definition: It's a style of computing based on shared, elastic resources delivered to users in a self-service, metered manner using web technologies.

According to Microsoft:[6]

> Cloud computing is the delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet ("the cloud"). Companies offering these computing services are called cloud providers and typically charge for cloud computing services.

According to IBM:[7]

> Cloud computing is the delivery of on-demand computing resources—everything from applications to data centers—over the internet on a pay-for-use basis.

According to an article published in PCMag in 2013:[8]

> cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. The cloud is just a metaphor for the Internet.
>
> …
>
> ***What cloud computing is not about is your hard drive***. When you store data on or run programs from the hard drive, that's called local storage and computing. Everything you need is physically close to you, which means accessing your data is fast and easy, for that one computer, or others on the local network. (Emphasis supplied)

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[5] *Oracle Cloud*, Oracle, <https://www.oracle.com/cloud/index.html>

[6] *What is cloud computing? A beginner's guide*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

[7] *What is cloud computing?*, International Business Machines, <https://www.ibm.com/cloud-computing/learn-more/what-is-cloud-computing/>

[8] Eric Griffith, *What Is Cloud Computing?*, 3 May 2016, PCMagazine, <http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing>

On the basis of the above definitions, we can identify two primary stakeholders – the service provider and the consumer (end user). What cloud computing essentially does is, it eliminates the requirement on part of the end user to possess the requisite hardware (such as servers, processors, etc) and also the requisite software (programmes, applications, etc) for end use applications such as electronic mail. The cloud in fact is a metaphor, and represents a delivery model for computing resources in which various servers, applications, data and other resources are integrated and provided as unified service over the Internet.[9] The virtual resources constitute the cloud.[10] While there is no infrastructure or service up in the air to technically justify the use of the term cloud, the term "cloud" represents the cloud of servers, networks based in a remote location that can be accessed anytime and from anywhere.

The service provider bears the cost and takes the risk of installing the requisite hardware and software, and passes on the benefit of their utilization by an end user, who may be located in a different part of the world. The cloud service provider is free to charge the end user from a range of absolutely nothing to a handsome amount, depending on the nature of the service, and the end user's requirements. The benefit to the end user is that the costs and risks of installing the requisite hardware and software is borne entirely by the service provider.

### *C. Classification of Cloud Computing*

In the traditional cloud computing model, service providers mainly focused on providing digital storage space to entities who were facing shortage of digital space at their end. This model obviates the need for entities to purchase additional services, which besides the capital cost, requires physical space for hosting the servers, regular maintenance, technical team for managing the servers, etc. However, today, cloud computing has evolved into a much dynamic service model. Most cloud computing

[9] *Cloud computing terms*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/cloud-computing-dictionary/>

[10] *ibid*

services fall into three broad categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (Saas). These are discussed below.

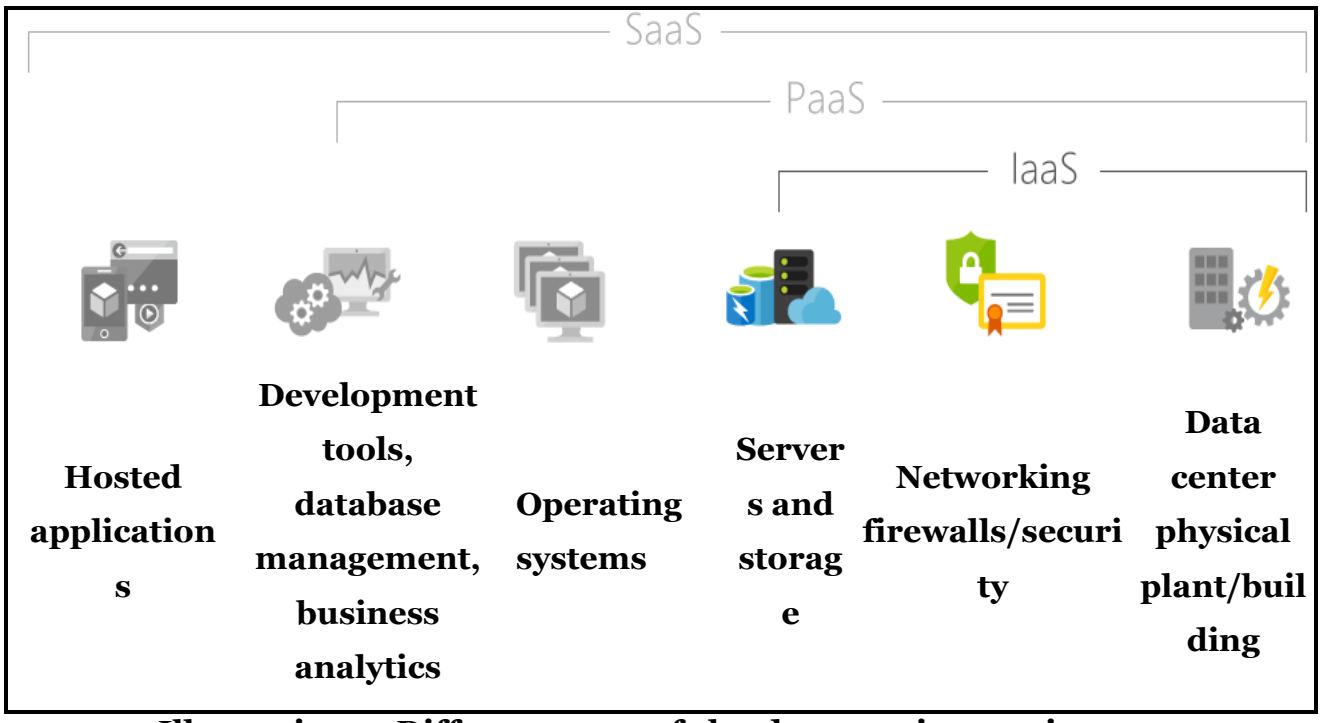


**Illustration 4: Different types of cloud computing services[11]**

1. Infrastructure as a service(Iaas)[12]

   Infrastructure as a service (IaaS) is an instant computing infrastructure, provisioned and managed by a cloud computing service provider, which can be accessed by an end user over the internet. IaaS helps avoid the expense and complexity of buying and managing your own physical servers and other datacenter infrastructure. The cloud computing service provider manages the infrastructure, while the end user purchases, installs, configures and manages its own software—operating systems, middleware and applications.

[11] Taken from: https://azure.microsoft.com/en-in/overview/what-is-iaas/

[12] *What is IaaS?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-iaas/>

2. Platform as a service (Paas)[13]

   Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable the end user to access either simple cloud-based applications or sophisticated, cloud-enabled enterprise applications. Unlike IaaS, PaaS includes not just the infrastructure (servers, storage and networking), but also the middleware, development tools, business intelligence (BI) services, database management systems, etc. It is designed to support the complete web application lifecycle: building, testing, deploying, managing and updating.

3. Software as a service (Saas)[14]

   Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring and office tools (such as MS Word, MS Excel, etc). SaaS provides a complete software solution which you purchase on a pay-as-you-go basis from a cloud service provider. In a Saas type, all of the underlying infrastructure, middleware, app software and app data are located in the service provider's data center, and the end user only has to rent the use of an application or software and connect to it over the Internet. The service provider manages the hardware and software and with the appropriate service agreement, will ensure the availability and the security of the app and your data as well.

[13] *What is PaaS?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-paas/>

[14] *What is SaaS?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-saas/>

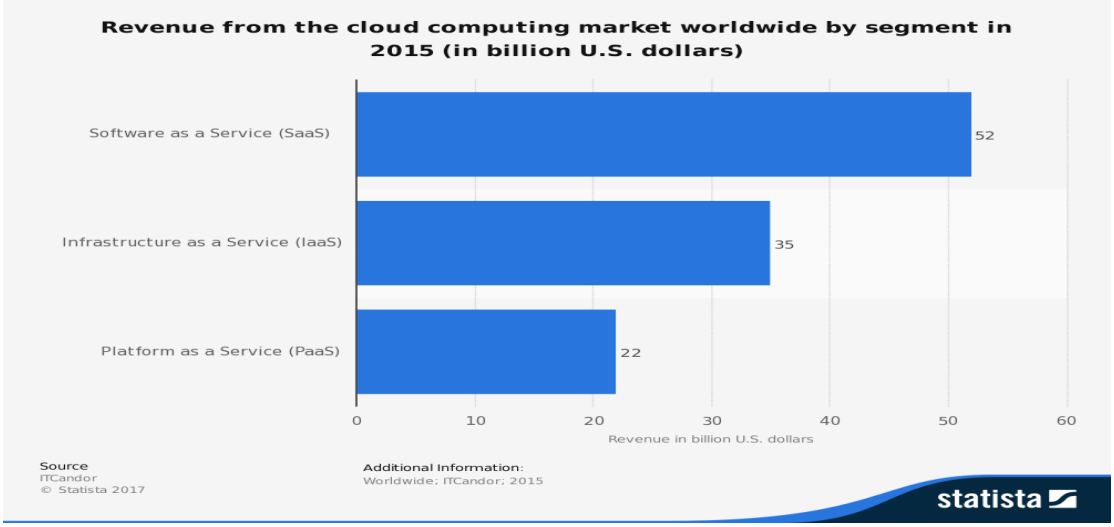


**Figure 1: Segment-wise revenue from the global cloud computing market**

The above graph shows that for the year 2015, Software as a Service (SaaS) was the leading segment of world cloud computing revenue at $52 billion, followed by IaaS at $35 billion and PaaS at $22 billion respectively.

### *D. Types of Cloud Computing Models*

1. Private Cloud[15]

   In private cloud model, also called as an internal or corporate cloud, cloud computing services are offered only to a select user/user group instead of the general public. The particular services and infrastructure are maintained on a private network. The user has the option of locating the cloud on its own on-site datacenter, or hiring a third-party service provider to host its private cloud.

   Apart from the benefits of a public cloud, a private cloud gives businesses the additional control and customisation available from dedicated resources over a computing infrastructure hosted on-premises. In addition, by virtue of being private, private clouds are generally more secure and private and ensure that operations and sensitive data are not accessible to third-party providers. One differentiating aspect is that the end user has the responsibility of managing its

[15] *What is a private cloud?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-a-private-cloud/>

cloud, thus entailing the same staffing, management and maintenance expenses as a traditional datacenter ownership.

2. Public Cloud[16]

   In a public cloud model, the computing services are offered by third-party providers over the public Internet, making them available to anyone who wants to use or purchase them. Unlike a private cloud, they are not just owned, but also operated by a third-party cloud service provider, which provides access to the requisite cloud computing resources like servers and storage over the Internet. All the hardware, software and other supporting infrastructure is owned, operated, managed, and maintained by the cloud provider. These are made available for access to an end user.

   They may either be free or sold depending on the requirements of the end user. Public clouds can also be deployed faster than a private cloud and with an almost infinitely scalable platform. Every employee of a company can use the same application from any office or branch using their device of choice as long as they can access the Internet.

3. Hybrid Cloud[17]

   A hybrid cloud model is one that combines a public cloud and a private cloud by allowing data and applications to be shared between them. In this particular model, the end user, while using its own private cloud system, has the flexibility of utilizing the public cloud system in case it needs to increase the scale of its requirements. The advantage of this model is that clients can segment their data and retain the choice of placing their data, giving them the option of retaining their sensitive and critical tasks on their systems.

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[16] *What is a public cloud?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-a-public-cloud/>

[17] *What is a hybrid cloud?*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-hybrid-cloud-computing/>

A hybrid cloud system gives end users the advantage of scalability of public models without the disadvantage of less secure and less private public model. From a financial point, this eliminates the need for dedicating disproportionate financial resources for installation and operation of additional cloud resources.

### *E. Applications of Cloud Computing*

According to Microsoft, "you are probably using cloud computing right now, even if you don't realise it."[18] It cites as examples: "if you use an online service to send email, edit documents, watch movies or TV, listen to music, play games or store pictures and other files, it is likely that cloud computing is making it all possible behind the scenes".[19]

Some of the things that can be done with the cloud include:[20]

- Create new apps and services
- Store, back up and recover data
- Host websites and blogs
- Stream audio and video
- Deliver software on demand
- Analyse data for patterns and make predictions

Some of the very simple, popular and easy-to-understand examples of cloud computing services are:

**Email**

Public email services such as Gmail, Yahoo!, Outlook, etc are some of the best examples of public cloud computing services. A typical email service would require particular applications, software, infrastructure, etc. While these can be set up by a private entity for its own requirements, in case of the common man, it may not be economically feasible to establish her own cloud computing services

[18] *What is cloud computing? A beginner's guide*, Microsoft Azure, <https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

[19] *ibid*

[20] *ibid*

for operating her email services. In case of public email services such as Gmail, Yahoo!, Outlook, the cloud computing services are owned, operated, managed and maintained by their respective parent corporations, viz., Google, Yahoo!, Microsoft, etc.

**Youtube**

Youtube is an interface where videos of songs, movies (and clips), documentaries, etc can be uploaded by anyone and accessed by anyone from anywhere in the world. The benefits of Youtube are that this interface helps in giving free publicity to the content and also free access to users. The interface runs on revenue generated through commercial advertisements. Some of the basic requirements to use Youtube are high-speed internet access, and an internet-enabled device such as a smart phone or a laptop or a desktop.

In fact, not just Youtube, but any online video hosting service such as Netflix, Amazon Prime, etc are typical examples of cloud computing services.

**Google Drive**

Google Drive is a popular interface where users can easily store on, access from and retrieve from any content such as audio tracks, video tracks, heavy-size documents, etc, which they may find difficult to share via email due to size-constraints on sending attachments through email.

**Apple iCloud**

Apple iCloud is a very popular interface similar to Google Drive that is available only for users of Apple devices such as iPad, iPhone, and Mac laptops. Similar to Google Drive, users can save their content and documents, and access them later on from any other Apple device.

## III. KEY STATISTICS PERTAINING TO CLOUD COMPUTING

In order to have a better understanding of the nature of cloud computing proposals, it would first be pertinent to discuss some of the relevant statistics pertaining to cloud computing. This section discusses market-relevant aspects such as the major firms present, the market share of these firms, and the revenue numbers in the global cloud computing market.

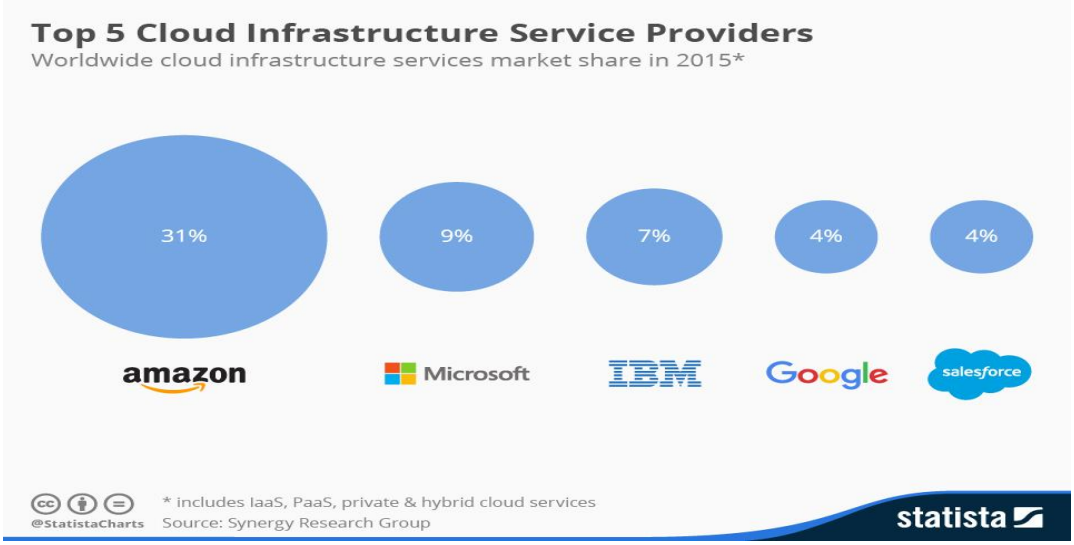


**Figure 2: Top 5 Cloud Infrastructure Service Providers**

According to the above statistics, in the year 2015, Amazon, Microsoft, IBM, Google and Salesforce constituted the top 5 providers of cloud computing services in terms of market share. The combined world market share of these entities totaled to a whopping 55% of the cloud computing market. It would be pertinent to note that *all* these corporations are based in the United States.

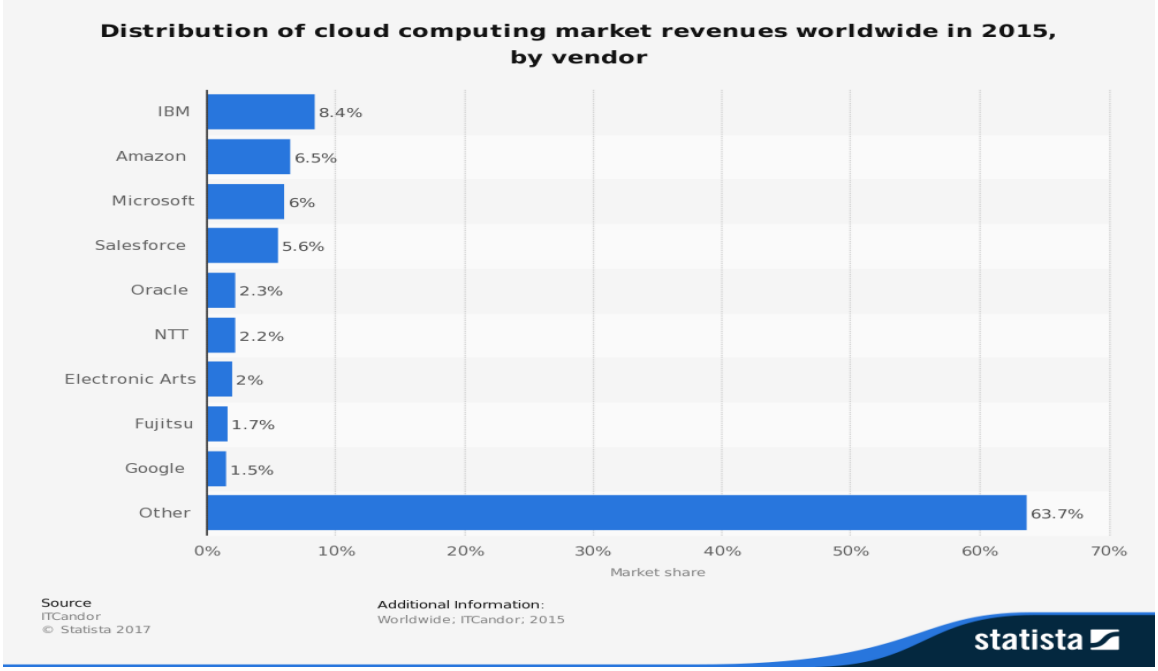


**Figure3: Vendor-wise distribution of cloud computing market revenues in 2015**

The above graph shows the distribution of revenues in the cloud computing on a worldwide basis for the year 2015. According to this data, the usual suspects of IBM, Amazon, Microsoft, Salesforce dominate the lot.

Having discussed the key players in the cloud computing market, it would be pertinent to discuss certain market statistics such as revenue.

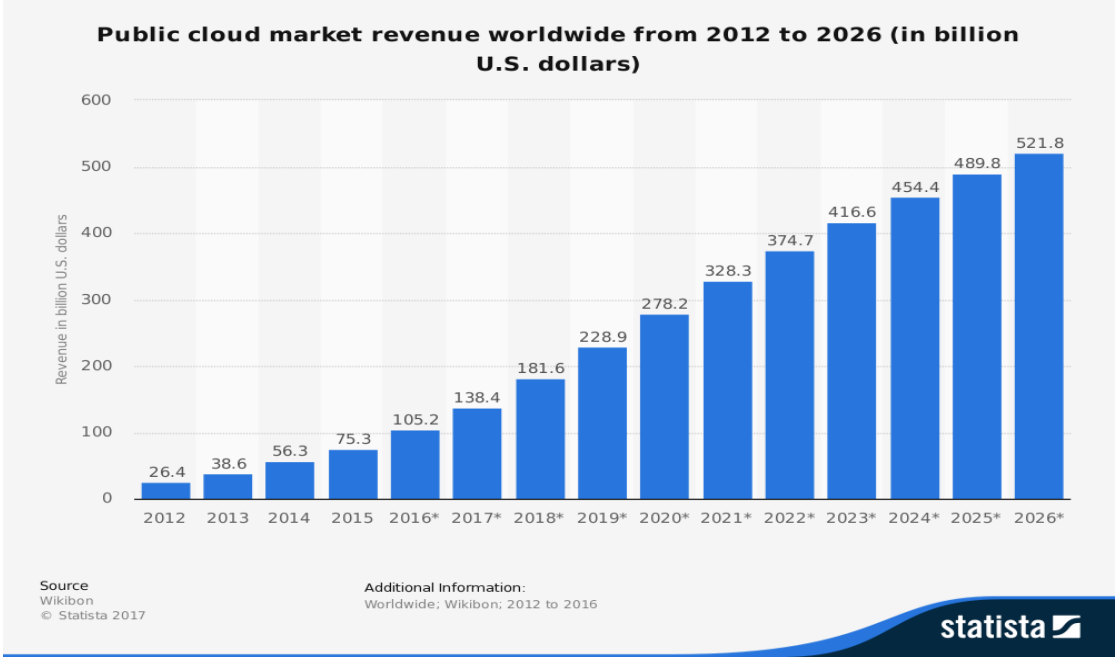


**Figure 4: Global cloud computing market revenue**

The above statistics on global cloud computing revenue are a telling fact. In 2012, the global revenue for the cloud computing sector was around $26 billion. It grew to $75 billion in 2015: reflecting a near three-fold jump in three years. Furthermore, global cloud revenue is expected to grow further by nearly 40% and 30% for the years 2016 and 2017.

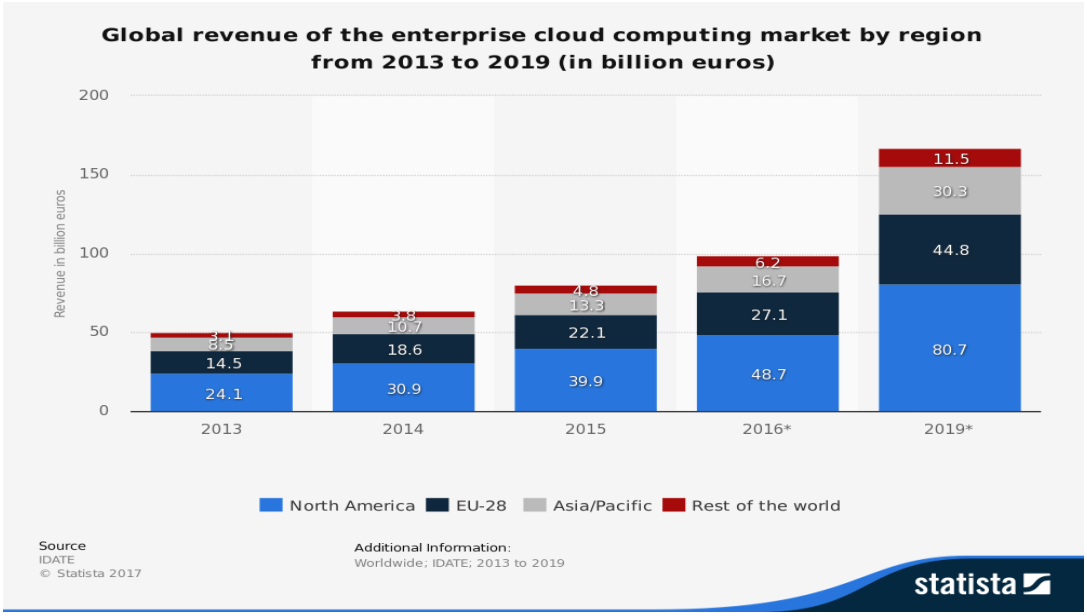


**Figure 5: Regionwise distribution of global cloud computing revenue**

It would also be relevant to have an understanding of the region-wise distribution of global enterprise cloud computing market. In 2015, North America dominated the segment contributing almost 40 billion euros in revenue, followed by the EU at 22.1 billion euros, and Asia-Pacific at 13.3 billion euros. For the year 2016, this is expected to growth to 48.7 billion euros for North America, 27 billion euros for the EU, and 16.7 billion euros for Asia-Pacific.

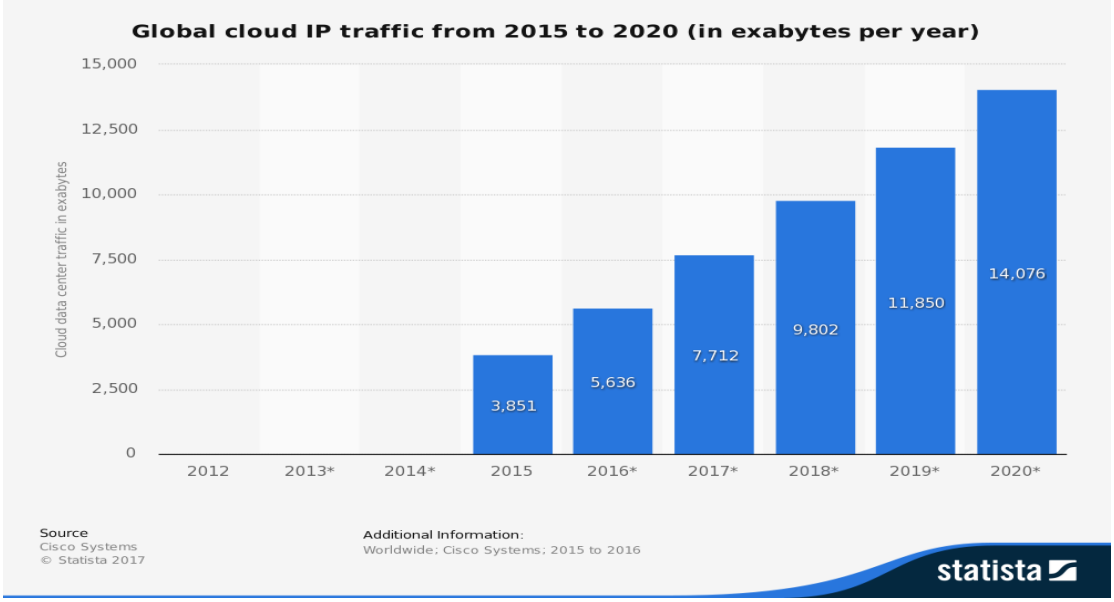


**Figure 6: Global Cloud IP (Internet) Traffic from 2015 to 2020**

Besides numbers on revenues and market share, it would also be relevant to note the increasing global cloud IP traffic. While data for the years 2012-14 are unavailable, the above graph shows the expected growth of data from the year 2015 onwards. While the global cloud IP traffic was 3,851 exobytes in the year 2015, it is expected to increase by over 50 per cent each year as per estimates upto the year 2020.

## IV. INTERFACE BETWEEN CLOUD COMPUTING SERVICES AND TRADE-RELATED ECONOMIC POLICIES

### *A. Cross-Border Flow of Data*

Cross bforder flow of data refers to the free flow of data across borders. In this context, it would be important to highlight that the main feature of cloud computing is that information and programs are stored on external servers, and large amounts of information are transferred back and forth over national boundaries.[21] Cross-border supply of electronic commerce such as cloud computing services inevitably involves the movement of information that may be of both personal and commercial nature, from one country to another.[22]

It has been argued that unrestricted flow of information is important from an economic perspective as it allows for the development of an optimal global service supply chain.[23] Cloud computing corporations can provide a multitude of services such as research and development, design, production, sales and support services.[24] In order to ensure a smooth flow of services across borders, cloud computing service providers state that it is imperative that information be able to flow freely across borders to the greatest extent possible. The importance of cross-border data flow for cloud computing services has been described in a report by the Business Software Alliance[25]:

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[21] *supra* note 25, *How Borderless Is The Cloud* – Kommerskollegium

[22] *Protection of Personal Information and the Development of Electronic Commerce*, Communication From The Separate Customs Territory Of Taiwan, Penghu, Kinmen And Matsu, World Trade Organization: Council For Trade In Services, S/C/W/360

[23] *Guide to Cloud Computing for Policymakers*, White Paper, Software & Information Industry Association, 2011, available at <http://www.siia.net/Portals/0/pdf/siia_cloudpolicy_062911.pdf/>

[24] Joshua P. Meltzer, *The Importance of the Internet and Transatlantic Data Flows for U.S. and EU Trade and Investment*, Global economy & Development(Brookings Institution), Working Paper 79, 2014, available at <https://www.brookings.edu/wp-content/2016/06/internet-transatlantic-data-flows-version-2.pdf>

[25] *Lockout*: *How a New Wave of Trade Protectionism Is Spreading through the World's Fastest-Growing IT Markets — and What to Do about It*, Business Software Alliance, 2012, available at

> *Rules restricting the free flow of data undermine the cloud computing model. While clouds can be located on premises or contained within a given jurisdiction, cloud computing often involves the storage and processing of data in multiple locations and even in multiple countries. Indeed, many of cloud computing's primary advantages — such as reliability, resiliency, economies of scale, and 24-hour service support — can require that data be stored in multiple markets. Confining data within a given country inhibits the ability of cloud service providers to offer these benefits.*

However, it is important to note that not all countries allow for the free cross-border flow of data; some countries such as China and Russia impose strict restrictions. Besides server localization discussed earlier, these restrictions may also be in the form of laws and regulations prohibiting the service providers' ability to send, access and manage data across borders.[26]

There are different motives for governments to restrict cross border flow of data. They are putatively done for achieving the twin objectives of data security and data privacy. The increasing scope of electronic services that can be offered means that more and more sensitive personal information such as financial data, medical records, social activities, etc will be vulnerable to cross-border scrutiny by state actors and non-state commercial actors.[27] This brings into light the issues of data privacy and data protection.[28]

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<techpost.bsa.org/2012/06/20/lockout-market-access-report> at page 12 (Hereinafter *Lockout,* Business Software Alliance)

[26] *Section 1377 Review On Compliance with Telecommunications Trade Agreements*, Office of the United States Trade Representative, 2015, available at <https://ustr.gov/sites/default/files/2015-Section-1377-Report_FINAL.pdf> at page 4

[27] Protection Of Personal Information And The Development Of Electronic Commerce, Communication From The Separate Customs Territory Of Taiwan, Penghu, Kinmen And Matsu, World Trade Organization: Council For Trade In Services, S/C/W/360

[28] *ibid*

However, some commentators have argued that the underlying objective of restricting cross-border flow of data is to provide a shield for the domestic industry from international competition in order to establish itself.[29] The classic example of how China was able to develop its local cloud computing industry base is often cited to highlight this point.[30]

### *B. Localisation of Servers*

The most fundamental and key component of cloud computing are the servers in which the data is located. Without the provision of servers, there can be no provision of cloud computing service. When it comes to most cloud computing majors such as Amazon, Oracle, etc, their servers are usually located in their developed home countries such as the United States. This implies the cross-border flow of data, which can be of either commercial or personal nature.

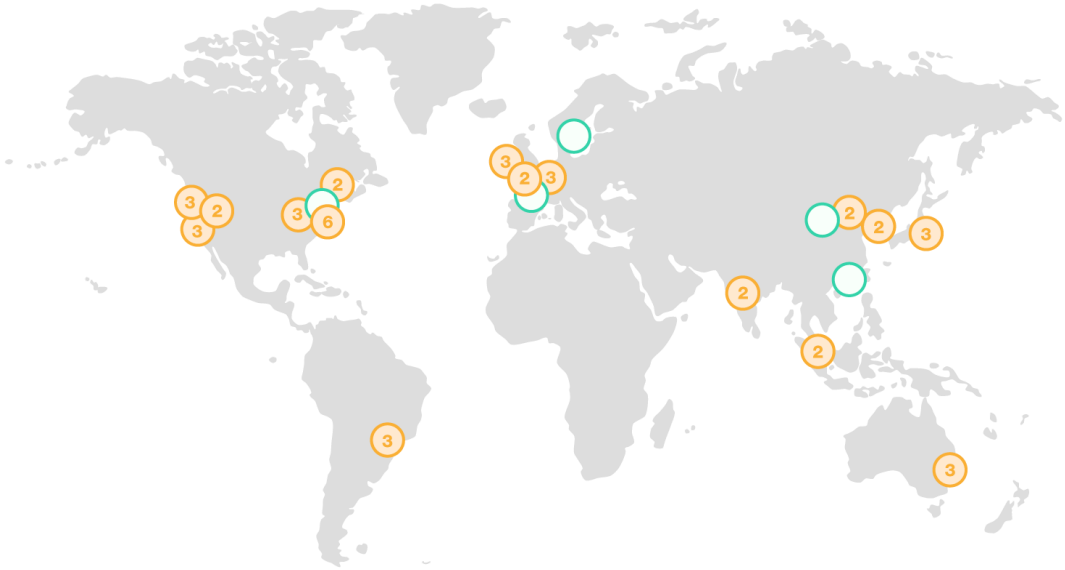

**Figure 7: Global map of Amazon's cloud server locations[31]**

[29] Joshua P. Meltzer, *Supporting The Internet As A Platform For International Trade: Opportunities For Small And Medium-Sized Enterprises And Developing Countries*, <https://www.brookings.edu/wp-content/uploads/2016/07/02-internet-international-trade-meltzer.pdf> (Hereinafter Meltzer – *Supporting The Internet*)

[30] *supra* note 26, Azmeh and Foster – *TPP And The Digital Trade Agenda*

[31] https://aws.amazon.com/about-aws/global-infrastructure/


**Figure 8: Global map of Microsoft Azure's cloud server locations[32]**


**Figure 9: Global map of Google's cloud server locations[33]**

[32] https://azure.microsoft.com/en-us/regions/

[33] https://cloud.google.com/about/locations/


**Figure 10: Global map of Oracle's cloud server locations[34]**

The above four diagrams show the location of cloud servers worldwide for three of the leading cloud computing service providers – Amazon, Oracle, Google, and Microsoft. It is apparent that the density of the location of cloud servers is high in the United States and in Europe, whereas the density is very low in developing regions as such South Asia and Africa.

Data Protection and Privacy Concerns

One of the key concerns for users of cloud computing services is the privacy and security of data. Given the flow of information, especially across the borders, there is always the concern that confidential information may end up in the wrong hands.[35] It is on account of this concern that some countries have mandated cloud computing service providers to compulsorily locate their servers within their territory.

[34] http://fortune.com/2017/01/17/oracle-cloud-data-centers/

[35] *How Borderless Is The Cloud: An Introduction To Cloud Computing and International Trade*, Kommerskollegium (Swedish National Board of Trade) at page 11 (*How Borderless Is The Cloud* – Kommerskollegium)

However, some commentators argue that data localization does not serve as the panacea for problems of data security breaches.[36] On the contrary, experts argue that forced data localization would make the data more vulnerable to both security attacks and physical disasters, as the data is no longer protected overseas.[37]

Technology Transfer

There is however another tacit aspect to the requirement of mandatory server localization. Server localization not only forces transnational cloud computing service providers to invest in the local economy but can bring with many other associated benefits such as transfer of technology which can eventually lead to building a competitive domestic industry.

Server localization would require transnational cloud computing corporations to train and skill a local workforce for operating the complex machinery, which can constitute an important factor for a local cloud computing industry. Apart from this, the local cloud computing industry can benefit from exposure to the relevant cloud computing technologies. A suitable industrial policy can spur the development of local innovations.

Concerns have been raised that if one country mandates server localization then it may force other countries to follow suit. In fact, in India, in response to a consultation paper

[36] Shamel Azmeh and Christopher Foster, *The TPP And The Digital Trade Agenda: Digital Industrial Policy And Silicon Valley's Influence On New Trade Agreements*, Working Paper No. 175, 2016, Department of International Development, London School of Economics, available at <www.lse.ac.uk/internationalDevelopment/pdf/WP/WP175.pdf> (Hereinafter Azmeh and Foster – *TPP And The Digital Trade Agenda*)

[37] Franz Heidt, *The Harms of Forced Data Localization*, 2015, <https://www.leviathansecurity.com/blog/the-harms-of-forced-data-localization/> cited in Neha Mishra, *Data Localization Laws In A Digital World: Data Protectionism?, The Public Sphere* , 2016, available at <publicspherejournal.com/wp-content/uploads/2016/02/06.data_protection.pdf>

on cloud computing released by the telecom regulator in 2016, one of the stakeholders raised the following issue[38]:

> *"Requirement of data localization is a reverse concept of cloud technology as it's features/ benefit lies on seamless cross border data flow. By mandating to have data centre for cloud services in India will have it's reciprocal effect from other countries as well that will lead to completely destroy the cloud services and it's related business. The growth of the Internet has also entailed the growing ability of people, businesses, and governments to collect, share, and use data across borders. The development of new technologies, products, and services in recent decades would never have been possible without the ability to freely move data across borders. Combining globalization with new technology and with new business models has dramatically accelerated the pace of change and innovation.*"

This is a typical concern which has been raised by many technology industry associations world over. It is unsurprising that these organizations have pushed for inclusion of localization prohibition requirements through FTAs and now are pushing for the same at the WTO. However, contrary to such concerns of protectionism, measures such as server localization would help in the development of a local industry. It would be pertinent to highlight how China has been able to establish a strong cloud computing industry on the back of a measure such as server localization.[39]

The mainstream, industry narrative against server localization measures is that they can affect the growth of the Information and Communications Technology (ICT) sector "and beyond, with the potential to cause companies to withdraw operations from key

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[38] *ACTO's Counter Comments to TRAI Consultation paper dated 10th June 2016 on Cloud*, 19 September 2016, Association of Competitive Telecom Operators, available at <www.trai.gov.in/sites/default/files/ACTO_10_06_2016.pdf>

[39] *supra* note 26, Azmeh and Foster – *TPP And The Digital Trade Agenda*

markets, harm Internet users, and further fragment the global Internet".[40] It has also been argued mandatory localization requirements, besides increasing costs, can also create servicing and technical inefficiencies, adding to the complexity and financial stress for cloud computer service providers based outside the country.[41]

### *C. Internet Exchange*

It is important to understand that the Internet is not one singular entity; rather it is an aggregate of INTERrnational NETworks. One of the main features of the Internet is the exchange of data/traffic between the many Internet Service Providers (ISP), through a technical process called "peering". The function of carrying the data packets is performed by the ISPs, who meet and network with other ISPs at junctions called Internet Exchange Points (IXP) for exchange of data traffic.

IXPs are carrier-neutral hubs that function as the meeting point for ISPs to exchange their data. IXPs run themselves as a business model by charging ISPs for providing a technical service called "switching" – the process of exchanging the data between the ISPs. In case of transnational internet connectivity, ISPs across the border exchange their data at International IXPs. For example, in the case of a cross-border internet based service such as cloud computing, if the service provider and user are located in different countries, and the servers are located in the home country of the service provider, ISPs in the user's country will have to depend on international IXPs.[42]

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[40] *Data Localization – A Challenge To Global Commerce And The Free Flow Of Information*, Albright Stonebridge Group, 2015, available at <www.albrightstonebridge.com/files/ASG_Data_Localization_Report - September_2015.pdf>

[41] *Top Markets Report*: *Cloud Computing – A Market Assessment Tool for U.S. Exporters*, U.S. Department of Commerce | International Trade Administration, 2016, available at <trade.gov/topmarkets/pdf/cloud_computing_top_markets_report.pdf>page 7

[42] *More on Cloud Computing…*, Internet Society, 16 September 2010, <https://www.internetsociety.org/blog/2010/09/more-cloud-computing%E2%80%A6>

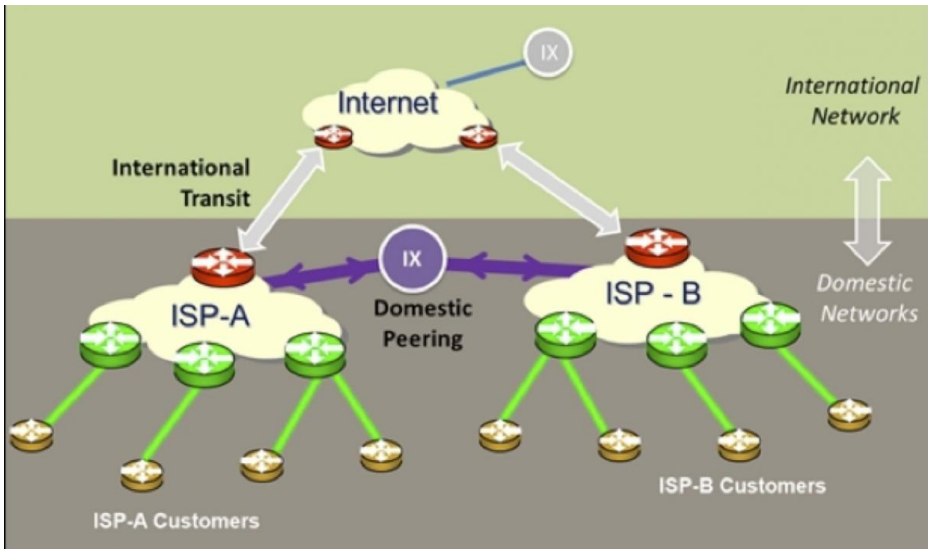


**Illustration 5: General Internet Exchange Model[43]**

Theoretically, the role of international IXPs should only kick in when the traffic that is being exchanged is across the border, i.e., between two cross-border ISPs. However, due to the financial costs of establishing a domestic IXP, many third world countries are unable to establish a sufficient number of IXPs within their territories.[44] As a result, ISPs in their countries have to rely on international IXPs for peering their traffic which is destined even for locations within their country. The national ISPs have to pay for the use of IXPs, and indirectly pass on the cost of usage to the end-users. Since the charges have to be paid to an international IXP, there can be considerable foreign exchange outflow.[45]

For developing countries, it is therefore imperative to promote the development of IXPs in their territory, so that there is no unnecessary peering of intra-country data traffic across the border. In the Indian context, the TRAI has recognized that 'the presence of

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[43] *What are IXPs?*, Internet Society, <https://www.ixptoolkit.org/content/what-are-ixps>

[44] *Promoting the Use of Internet Exchange Points (IXPs): A Guide to Policy, Management and Technical Issues*, March 2012, Internet Society, <https://www.internetsociety.org/sites/default/files/promote-ixp-guide_0.pdf>

[45] *Via Africa: Creating Local and Regional IXPs to Save Money and Bandwidth*, Discussion Paper, International Telecommunications Union, 2004, available at <http://www.itu.int/itudoc/gs/promo/bdt/report/86959.pdf>, at page 3

one or more IXPs in the country would ensure that domestic traffic does not use international bandwidth, thereby reducing the requirement of and expense on such bandwidth'.[46] In addition, routing of domestic traffic through international IXPs raises security and privacy issues, as they may be susceptible to surveillance by foreign governments. Reliance on local IXPs eliminates this risk. In order to encourage the use of local IXPs for domestic traffic, governments may mandate the routing of domestic traffic only through the local IXPs.

### *D. Digital Firewall/Content Filters*

The monitoring and regulation of internet traffic within and across borders is a sovereign right that is exercised by the government. The monitoring and regulation of internet traffic is performed under a set of technical and legal rules that constitute a "national firewall". Firewalls are components that are located at the border of two networks and inspect traffic going from one network to the other. They function as security tools that monitor the consistency of incoming traffic with a pre-defined set of norms before they can be let through. The objective of a firewall is to function as a filter that is mostly used for blocking sensitive digital content from being sent into the country.

[46] *Issues related to Telecommunications Infrastructure Policy*, Telecom Regulatory Authority Of India Consultation Paper, 2011, <http://www.trai.gov.in/sites/default/files/5-main.pdf>at page 32

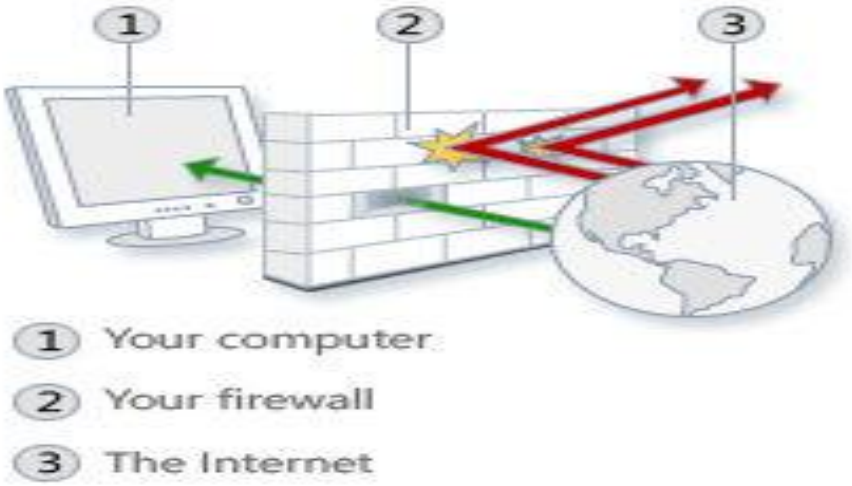


**Illustration 6: Simple internet firewall**[47]

While national content filters may serve the legitimate objectives of national security, there is however the possibility of abusing the firewall to keep transnational service suppliers out of the given country's market, particularly if the content filter regulations are cumbersome. From an economic perspective, this leads to the absence of competition, resulting in the development of the local industry.

According to Shamel Azmeh and Christopher Foster, "many of these policies have economic and technological motives as they promote technological catching-up and provide space for local digital firms to grow and learn".[48] They cite the example of the "Great Firewall of China" to show how Chinese government internet filtering policy, blocked access to the Chinese domestic market for a large number of Western firms, constituting an important factor in the emergence of Chinese digital firms such as Ali Baba, Baidu, Tencent, and TaoBao.[49] They highlight how these firms are rapidly catching-up with their global competitors.

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[47] *What Is A Firewall?*, Microsoft Corporation, <https://www.microsoft.com/en-us/safety/pc-security/firewalls-whatis.aspx>

[48] *supra* note 26, Azmeh and Foster – *TPP And The Digital Trade Agenda*

[49] *ibid* at page 4

### *E. Standards For Cloud Computing Services*

Given the dynamic nature of cloud computing services, and the proliferation of the number of cloud computing service providers, one of the key concerns for end-users is portability and interoperability of cloud computing service. According to the TRAI, interoperability is defined as 'the ability to communicate across different systems; that the communicated information is understood by the receiving system. In cloud computing, it means the ability to write code that works with more than one cloud service provider simultaneously, regardless of differences between the providers".[50]

The TRAI defines portability as "the ability to run components or system written for one environment in another environment, including both software and hardware requirements".[51] TRAI highlights the importance of portability by pointing out that consumers should be free to switch between cloud service providers if they are not satisfied.[52] Interoperability on the other hand would ensure seemless exchange of data between two or more users. Both interoperability and portability of cloud computing services would enforce competition between different service providers.[53]

### *F. Access to High-Speed Internet*

The nature of internet-based services such as cloud computing is that they require high-speed broadband connectivity for operation. Services such as cloud computing can function as a useful commodity only if they are facilitated by high-speed internet connectivity.[54] However, in many third world countries, the telecom infrastructure that is used for providing internet services is either underdeveloped or not sufficiently developed, with a state-owned incumbent usually dominating the landscape. The

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[50] *Cloud Computing*, Telecom Regulatory Authority Of India, Consultation Paper, 2016, <http://www.trai.gov.in/sites/default/files/5-main.pdf> at page 23

[51] *ibid*

[52] *ibid*

[53] *ibid*

[54] *Latest Trends in Cloud Computing in China*, Dechert LLP, *Special Alert*, 2012, available at <https://www.dechert.com/Latest_Trends_in_Cloud_Computing_in_China_06-01-2012/>

combined result of high prices and lack of availability leads to a situation of low internet penetration.

A common policy prescription for promoting the development of the sector is to promote competition in the telecom sector through adequate regulatory approaches. It has been argued that 'greater competition creates incentives for telecom service providers to lower costs, increase Internet access and expand broadband availability'.[55] It is on this premise that certain demandeurs at the multilateral trading system are backing proposals that are aimed at *safeguarding network competition* such as infrastructure sharing and local loop unbundling. However, as has been argued by the author of this paper and others, developing countries who do not have a mature telecom market should tread with caution against facilitating competition in their telecom markets. Since most of the leading telecom majors are based in the developed world, such measures would merely facilitate global telecom service providers to have access to local infrastructure. This can stymie the development of the indigenous telecom sector in the developing countries.

### *G. Market Access*

Form of Entity

Cloud computing services can be provided either by cross-border supply of service or by commercial presence. Commercial presence is achieved by setting up an establishment in the host country. However, commercial presence is usually subject to the applicable foreign investment laws of the host country. Accordingly, the applicable investment rules may either: prohibit the setting up of an establishment; or permit establishment in the form of a wholly owned subsidiary or as a joint venture with a local partner. The latter is often a choice of policy instrument used by developing countries for promoting their nascent domestic industry in a particular sector. This strategy has inherent benefits such as technology transfer from a technologically superior foreign corporation to a developing local partner.

[55] supra note 49, Meltzer – *Supporting The Internet*

In the context of cloud computing, it would be relevant to highlight that the strategy of mandating joint ventures as a condition for market access has been deployed effectively for developing the cloud computing industry in China.[56]

Technology Transfer

Another aspect of market access pertains to performance requirements. Country cloud computing majors such as Microsoft, Oracle, etc located in the developed world are technologically more competent than their counterparts in the developing world. Due to competition concerns, they might not be willing to transfer technology (including the know-how) voluntarily, or even if they did, it would be at a high cost. Governments may consider making market access for foreign cloud computing service providers contingent upon the transfer of technology to local cloud computing service providers. This strategy has been effectively deployed in China in developing the local cloud computing industry.[57]

## V. TPP PROVISIONS PERTAINING TO CLOUD COMPUTING

The previous section discussed trade-related economic policies which interface with cloud computing services but are intended to protect domestic interests and promote the development of a domestic cloud computing industry. This section identifies and discusses provisions of the TPP pertaining cloud computing. One of the latest and most prominent additions in the series of FTAs to incorporate trade-related provisions aimed at promoting e-commerce, and cloud computing in particular, is the Trans-Pacific Partnership.

While there have been many FTAs containing provisions on cloud computing, the TPP is by far the most significant given its geographical scope and comprehensive nature.

[56] *supra* note 26, Azmeh and Foster – *TPP And The Digital Trade Agenda*

[57] Leigh Ann Ragland, Joseph McReynolds, Matthew Southerland, and James Mulvenon, *Red Cloud Rising: Cloud Computing in China*, Research Report Prepared on Behalf of the U.S.-China Economic and Security Review Commission, 2013, available at <https://www.uscc.gov/sites/default/files/Research/DGI_Red_Cloud_Rising_2014.pdf>

Though the TPP has been condemned to a bleak future on account of the United States' withdrawal, it would be imperative to examine some of the normative provisions of the TPP, as like-minded demandeurs are pushing for these provisions at the WTO, and may even retain these provisions for future trade agreements.

The TPP contains provisions on e-commerce, what has been called the "*Digital 2 Dozen*". While the TPP has a separate chapter on ecommerce, it would be pertinent to note that provisions concerning cloud computing are not contained exclusively in the ecommerce chapter but are spread over various other chapters as well. In this section, the TPP's provisions relevant to international trade in cloud computing services are covered.

### *A. Prohibition of Restrictions Against Cross-Border Data Flow*

The previous section discussed the importance of cross-border data flow for transnational cloud computing service providers. In the context of regulatory framework, what is essential for the cross-border flow of data, is the absence of any restrictions, rather than any facilitation, in the legal framework of the country from where information is outbound. However, it is important to note that not all countries permit the free cross-border flow of data. Some countries particularly those in the European Union have legal restrictions on the cross-border flow of data.

The global cloud computing industry has argued that the nature of the cloud is such that it transcends national borders, and cloud computing will reach its full potential only if companies can, inter-alia, easily transfer data among jurisdictions.[58] It has therefore advocated for global trade rules that prevent unnecessary restrictions on cross-border data flows.[59]

In line with the aspirations of the global ecommerce industry, the TPP has provisions concerning cross-border data flow. Article 14.11 has provisions pertaining to cross-

[58] supra note 43 – *Lockout,* Business Software Alliance, at page 16

[59] *ibid*

border transfer of information by electronic means. According to paragraph 1 of Article, each party is permitted to have its own regulatory requirements concerning the transfer of information by electronic means. However, paragraph 2 unequivocally states that each party shall allow for the cross-border transfer of information by electronic means, including personal information, when this activity is for the conduct of the business of a covered person.

Legal provisions concerning cross-border data flow are also contained in the Chapter 11 on Financial Services. According to Section B of Annex B to Chapter 11, each party shall allow a financial institution of another Party to transfer information in electronic or other form, into and out of its territory, for data processing if such processing is required in the institution's ordinary course of business.

The section further states that it does not restricts the right of a Party to adopt or maintain measures to protect personal data, personal privacy and the confidentiality of individual records and accounts; or require a financial institution to obtain prior authorisation from the relevant regulator to designate a particular enterprise as a recipient of such information, based on prudential considerations. It however, further provides that this right should not be used as a means of avoiding the Party's commitments or obligations under the section.

### *B. Prohibition of Server Localization*

Article 14.13 of the TPP deals with location of computing facilities. Paragraph 1 recognises that "each Party may have its own regulatory requirements regarding the use of computing facilities, including requirements that seek to ensure the security and confidentiality of communications". While this particular provision seems to apparently preserve the policy space for countries to mandate server localization, the subsequent paragraph 2 expressly prohibits parties from "making market access contingent upon a cloud service provider to mandatorily use or locate computing facilities in that Party's territory".

The USTR contends that server localization requirements add unnecessary costs and burdens on providers and customers alike.[60] It further states that these provisions on server localization are would promote the freedom of access to networks and also efficient data processing.[61]

One important implication of the prohibition against mandatory server localization that can be understood against the backdrop of the global server location maps (in Figures 7-10) is that regions where local servers have already been established will be the least affected since a local server base has already been well established. On the other hand, in case of regions which do not have a well developed cloud server base, prohibition of mandatory server localization may be inimical to the development of the local cloud computing industry.

### *C. Prohibition of Forced Technology Transfer*

Chapter 9 of the TPP deals with general investment provisions, which cut across all sectors including electronic commerce services such as cloud computing. Article 9.10 contains provisions that are intended to prohibit performance requirements. A provision under Article 9.10 which is quite pertinent to cloud computing is the paragraph 1(f) which specifically prohibits the host country from requiring an investor to transfer a particular technology, a production process or other proprietary knowledge to a person in its territory.

### *D. Safeguarding Network Competition*

It is a common fact that the telecom service sectors of many third world countries are underdeveloped or are developing. This can inhibit the ability for cloud computing corporations to provide services to consumers in these countries. Riding on the back of this notion, the TPP's Telecom Chapter contains several provisions which are intended to promote competition in the target market through mandatory measures such as local

[60] *ibid*

[61] *ibid*

loop unbundling, infrastructure sharing, etc. However, to avoid repetition, these provisions are discussed by the author of this paper in another paper.

### *E. Ensuring Market Access*

Chapter 10 of the TPP contains provisions pertaining to cross-border trade in services. Article 10.5 contains prohibitions that are intended to ensure that cross-border suppliers of services such as cloud computing would not be constricted by restrictions on market access. Clause (a) of Article 10.5 prohibits parties from imposing within its territory limitations on:

(i) the number of service suppliers, whether in the form of numerical quotas, monopolies, exclusive service suppliers or the requirement of an economic needs test;

(ii) the total value of service transactions or assets in the form of numerical quotas or the requirement of an economic needs test;

(iii) the total number of service operations or the total quantity of service output expressed in terms of designated numerical units in the form of quotas or the requirement of an economic needs test;

(iv) the total number of natural persons that may be employed in a particular service sector or that a service supplier may employ and who are necessary for, and directly related to, the supply of a specific service in the form of numerical quotas or the requirement of an economic needs test

Further, clause (b) of Article 10.5 specifically prohibits parties from restricting or requiring a provider to supply services only though a specific type of legal entity such joint venture.

The TPP also seeks to eliminate the mandatory requirement that the cross-border service supplier have local presence in the territory where it is providing the service. Article 10.6 specifically prohibits parties from requiring service suppliers of another party to establish or maintain a representative office or any form of enterprise, or to be resident, in its territory as a condition for the cross-border supply of a service. The

implication of this proposal is that if a cloud computing service supplier such as Amazon, wishes to provide services outside of its home base to consumers, for example, in India, then it could do so without having any sort of office in India.

While prohibitions against mandatory LPRs would help transnational corporations save on establishment and operating expenses[62], these would have serious ramifications in the domestic context for the consumer. One of the main implications would be for the domestic judicial mechanism as the absence of a local entity would make instituting litigation a difficult process.[63-64]

In many countries, proceedings such as those for insolvency, can be initiated against the debtor, only if it has a local office in the country where proceedings are sought to be initiated.[65] In fact, the civil procedure and consumer protection mechanisms for many countries recognize local presence as one of the pre-requisites for establishing jurisdiction over a civil suit or a complaint. For example, according to India's Code of Civil Procedure, 1908 (which encapsulates the principles concerning domestic dispute settlement in India), section 20 lays down the rules regarding the territorial jurisdiction of a civil court. According to clause (a) of section 20, every suit shall be instituted in a court within the local limits of whose jurisdiction the defendant, or each of the

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[62] Ashley Friedman, *Going Global with a Click of the Button: What Local Presence Requirements Get Wrong About the 21st Century Economy*, 16 August 2016, Information Technology Industry Council, <www.itic.org/news-events/techwonk-blog/going-global-with-a-click-of-the-button-what-local-presence-requirements-get-wrong-about-the-21st-century-economy>

[63] Jack L. Goldsmith, *Against Cyberanarchy*, in Adam D. Thierer and Clyde Wayne Crews ed., *Who Rules the Net?: Internet Governance and Jurisdiction*, CATO Institute, 2003, Washington D.C., at page 65

[64] *Expanding Trade in Business Services in ASEAN*, REPSF Project 05/006, June 2013, ASEAN-Australian Development Cooperation Program, available at <aadcp2.org/file/05-006-FinalReport.pdf> at page 49

[65] Ann-Christine Halén, *"Centre of main interests" – a New Concept in European Insolvency Law*, Masters Thesis, 2002, Faculty of Law: Lund University, available at <lup.lub.lu.se/student-papers/record/1554574/file/1563372.pdf>

defendants where there are more than one, at the time of the commencement of the suit, actually and voluntarily resides, or carries on business, or personally works for gain.[66] Another important implication that anti-LPR provisions would have is for the internet governance policies of the host country. When a supplier is providing his services across the border in another country may wish to register a local domain name to host a local website in the host country, i.e., a website ending with the country domain name such as .IN (for India), .ID(for Indonesia), .AU (for Australia), etc. This would boost commercial visibility of the service provider. This is particularly important for service providers such as those in the global cloud computing sector who are seeking to access markets across the globe. However, some countries, in order for an entity to register a local domain name, it is mandatory to have a local presence, which is supposed to act as the administrator of the domain name.[67] For example: "*In some countries, such as Australia and Norway, local presence is a requirement in order to register a domain using the country's ccTLD (country code top level domain). For example, in Norway, you cannot register www.businessname.no if you are not a resident or if your business is not located in Norway. The same rule applies for countries like Australia and Brazil.*"[68]

## VI. CONCLUSION – PROPOSED CLOUD COMPUTING DISCIPLINES ARE CONCLUSIVELY NOT ABOUT DEVELOPMENT

Section III discussed economic policies that interface with the development of an indigenous cloud computing industry. Section IV discussed the TPP's provisions pertaining to trade in cloud computing service. This concluding section aims to serve as

[66] The other clauses are (b) and (c):

(b) Any of the defendants, where there are more than one, at the time of the commencement of the suit, actually and voluntarily resides, or carries on business, or personally works for gain, provided that in such case either the leave of the Court is given, or the defendants who do not reside, or carry on business, or personally work for gain, as aforesaid, acquiesce in such institution; or

(c) The cause of action, wholly or in part, arises.

[67] *See* https://www.nameisp.com/en/domain-services/local-presence

[68] https://support.marcaria.com/hc/en-us/articles/215527723-Why-do-I-need-local-presence-to-register-some-domain-extension-

an analytical between section III and section IV. It seeks to analyse the implications of the provisions discussed in section IV for the interest of developing countries whose cloud computing industries are either at a nascent stage or are yet to become as viable as their established counterparts in the developed country markets.

Section III discussed economic policies such as technology transfer, server localization, market access, which are important for the development of an indigenous cloud computing industry. The implications of such policies are that these would help the nascent domestic cloud computing industry in developing countries to catch up with established global cloud computing majors. Such policies would also enable the nascent domestic cloud computing industry to draw benefits from established global cloud computing majors. These policies would eventually support the growth of an indigenous cloud computing industry.

These policies are exactly what China has followed in order to support the development of its local cloud computing industry. Today the Chinese cloud computing industry has established itself as a major competitor to its counterparts in the developed countries by implementing policies that have enabled its domestic industry to "catch up".

However, by restricting competition for the domestic industry, these provisions have impacted the market share of global cloud computing majors. It is therefore no surprise that the digital trade agenda tops the list of demands as part of the 21st century trade issues. Outside the WTO, demandeur nations such as the United States pursued their ambitions by exploring bilateral routes including mega-FTAs such as the TPP. They have now expanded their reach by pushing for these disciplines at the WTO. Proposals for initiating discussions on e-commerce topics such as cloud computing are being strongly pushed for under the guise of promoting the interests of small and medium enterprises, and with the promise of untold gains for developing countries.[69]

[69] *MSMEs and E-Commerce*, Preliminary Report, International Chamber of Commerce, 2016, available at <http://www.worldsmeforum.org/wp-content/uploads/2016/10/ICC-WTO-MSMEs-and-E-commerce.pdf>

However, as has been discussed in this and various other papers, the disciplines on cloud computing that could be discussed at the WTO would severely constrict the policy space available for developing countries to promote their domestic cloud computing industry. The nature of these disciplines is that they would restrict the ability of developing nations to promote their indigenous cloud computing industry while simultaneously protecting the commercial interests of global cloud computing majors such as Amazon, Microsoft, Oracle, etc.

It would thus be in the best interests of developing countries to resist attempts to initiate discussions on these new issues. Developing countries must realize that the nature of the proposals on issues such as forced technology transfer, etc, are inimical to their interests. They must join the bandwagon of countries such as India who have rightly opposed the initiation of discussions on these issues at the WTO at this juncture.