

How Borderless is the Cloud?

An introduction to cloud computing
and international trade



Kommerskollegium
National Board of Trade

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Over the past few decades, the digital development has fundamentally changed the way in which we communicate trade and conduct business. Data is transferred over the internet at ever-increasing speeds and the demand for information regardless of time and place is constantly increasing, at the same rate as technology is pushing the boundaries of what is possible. A term which has appeared on the covers of all IT magazines in recent years is “cloud computing”.

This report provides a short introduction to the international trade aspects of cloud computing. A few areas which may comprise potential barriers for international trade in cloud services are identified and discussed.

1. What are Cloud Services and Cloud Computing?

The term *cloud computing* is used in slightly different ways and there is no uniform view on how it should be defined. Expressed quite generally, cloud computing can be said to be a way of providing IT functions such as information storage, processing power and computer programmes as *services* over the internet, through the usage of external (often remote) servers. This means that as opposed to storing information and programmes on a home or company computer, they are stored on external servers which are accessed via the internet. In this way, the cloud user can reduce costs of both hardware and software. The storage location is commonly unknown to the user, and the hosting location does not need to be static. It can therefore be perceived as though the information is kept somewhere in “the clouds”.

A few of the most common private cloud services are e-mail programmes, e.g., Hotmail and Gmail, where both information and functions can be stored and accessed regardless of where you are located, provided that there is an internet connection. Other private cloud services which have become increasingly common are social networks (e.g., Facebook, Twitter), mobile applications, file hosting services (e.g., Dropbox), music and photo programmes (e.g., Spotify, Flickr) on the internet, etc.

The term “cloud computing” comes from the early days of the Internet when the network was often drawn as a cloud. Today, the term has developed into a broader designation for the servers, applications, data and services which exist around the world and which users gain access to via the internet. Concepts which are reminiscent of cloud services have been tried in the past, but under other names at the time such as “grid computing”, “utility computing” and



“Application Service Providers” (ASP). The development of cloud services has been driven and enabled by several technological advances such as high-speed broadband and programmes with open-source code. Cloud computing is in itself not new technology, but a way to make use of increasingly advanced technology.

Even though there is some disagreement surrounding the definition of cloud computing, there is a definition, developed by the American standardization body NIST (National Institute of Standards and Technology) which is often used:

“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”

This definition has received criticism for being both technical and insufficient. Since cloud computing today encompasses a number of different types of services which can be supplied in a number of different ways, the concept is becoming increasingly stratified and complex.

2. Properties of Cloud Computing

Cloud computing can be said to be scalable or *elastic*, which means that it is possible to adapt the acquisition of cloud space according to need.

Cloud services are often described as “computing as a utility”, which can be compared with other utilities such as electricity or water. In the same way that we pay for the energy we consume, it is possible to have a payment model where we only pay for the cloud space which we need at that moment. This makes it possible to use storage resources and computer capacity more efficiently. In addition, cloud services are in general much faster to implement and cheaper than other traditional applications and computer models. It can in particular be a great advantage for smaller companies, as they may not have the resources for the initial fixed costs that are often associated with purchasing software and hardware such as accounting programmes or computers with large storage capacity.

In NIST’s description of cloud services the term is also divided into three different *categories*, or service models:

- Software as a service (SaaS) provides finished or configurable applications as services over the internet (Hotmail, Gmail, Facebook etc.). This type of cloud service is by far the most common, and is often aimed directly at the end user.
- Platform as a service – (PaaS) – provides the customers access to a development environment or platform in the cloud where the user installs their own applications (Google App Engine, Microsoft Azure). This type of service is directed towards programme and application developers.
- Infrastructure as a Service (IaaS) – means the provision of infrastructural IT services, such as networks and servers where the customer can distribute and run software including operating systems and applications. Users of this service are, among others, network architects who can build both platforms and applications on the infrastructure.

In addition to these three categories, a number of other possible types of *as-a-service (-aas)* categories have appeared. Common aas categories include: Applications-as-a Service, Backup-as-a-Service, Desktop-as-a-Service and Business-Processes-as-a-Service.

NIST further divides cloud services into four different types of cloud: private, public, hybrid and community clouds. In a private cloud, the cloud service is supplied on an infrastructure that belongs to only one customer (organization or company) and is managed by the customer themselves or by the supplier. The infrastructure can be located on either a shared server (often where a certain amount of space is dedicated to a particular customer) or on a private server. If a cloud is *public*, this means that the cloud service is owned and managed by a supplier that sells resources to multiple customers on the same infrastructure. A *hybrid* cloud is a combination of public and private. The fourth cloud type, *community* cloud, entails providing the infrastructure for a specific consumer group from organizations with common interests and needs.

3. The Usage and Development of Cloud Services

Anyone with an internet access can use cloud computing. Cloud computing can also be used for both commercial and non-commercial purposes. It is perhaps primarily the private usage of cloud computing which the majority of people think of, i.e. the private usage of e-mail programmes, storage programmes, social networks etc. But the development of cloud services for the corporate market is growing at an ever-increasing rate as companies try to find ways to reduce costs. It is becoming more common for companies trying to reduce IT and administration costs to choose to relocate programmes and data onto external servers which are administered by a third party. This may include everything from office and time tracking software, travel expenses, client registers etc. It is not unusual for companies to choose to provide their customer services via social networking sites. One further step in this development which is influencing companies' business systems to an even larger extent is when companies choose to provide all of their business processes via cloud computing (Business Processes as a Service, i.e., BPaaS). Since this generally means that more confidential and key company information is stored on cloud servers, this is a step which many companies are still unwilling to take. According to estimates made by the global IT analysis company Gartner, it is in the manufacturing industry and financial sector that cloud services are used to the greatest extent, followed by the communications and high technology sectors as well as the public sector (Rennee and Reisman, 2012).

Essentially all communication and transactions made via the internet would be able to make use of

cloud computing in some way. For example, there are many e-commerce companies which utilize a "hosted shopping cart", i.e., a type of web application which can be classified as a cloud service. This service means that the software for the virtual shopping cart is not downloaded, but is provided to the e-commerce company by a cloud supplier and paid for on a monthly or yearly basis.

Cloud computing services can be particularly beneficial for small and medium-sized companies, where high initial IT costs can constitute an obstacle to establishment. There is however nothing at present to indicate that smaller companies use cloud services to a larger degree than large companies.

Authorities, municipalities and other public organizations are also using cloud services to an ever-increasing extent. As the public sector is a large user of information technology, there is potential for saving large amounts of government spending in this area. For example, it has become common for Swedish municipalities to use cloud services in public procurement. As cloud computing can be accessed at a distance and when necessary, cloud computing can help to overcome the need to be based in one location, which means that countries will be able to more easily procure services internationally, for example. The use of cloud services by public authorities may give rise to issues of data integrity and the security of personal information.

Companies and authorities in developing countries potentially have a lot to gain from cloud services. The increased usage of mobile telephones in developing countries has already had a considerable effect on economic development. With cloud

services, another developmental stride can be taken as small businesses and individuals can gain direct access to both computer capacity and the latest cutting edge expertise via a mobile phone (or other devices). One prerequisite is of course access to electricity and a network connection.

Another example of an area in which cloud computing could have a significant impact is in the world of research. Cloud computing can provide individual researchers with the storage capacity and computer power that is required to perform extensive computer simulations and analyses. Since access to the research results of others can be gained directly through cloud computing, international research collaboration is facilitated and access to basic research is increased. Access to cloud computing for researchers in developing countries can be of particular importance for participation in different international and national research projects.

There is in general a certain resistance within many organizations to the move towards cloud services. Companies have often made large investments in IT systems and platforms, which creates a “lock-in effect”. This resistance among existing companies may provide a competitive advantage for new companies which can purchase cloud services directly (pay as you go) and avoid the high initial costs. Estimations by Gartner show that as much as 80% of all start-up companies in the USA do not have their own IT department or IT director, but solely utilize cloud computing services instead. In addition to this lock-in mechanism, there is also some concern about the reliability and security of cloud computing, which is preventing companies from providing

functions and storing information on cloud servers. It is therefore common for the transition to cloud services to occur gradually and for the company to begin by providing less confidential services via cloud computing. Furthermore, the market has developed in order to satisfy these different needs. Today, companies can tailor their usage of cloud services, and choose what they place in private and public clouds and the variants of these.

In the same way that the development within the manufacturing industry has led to a global division of the production chain into several steps known as “*global value chains*”, the development of cloud computing has contributed to facilitating the division of IT-based services into smaller tasks which can be performed in different parts of the world. In this way, companies can specialize on what they do best, and contribute as a part of a longer production chain. For example, companies that were previously responsible for entire IT systems (including development, operation etc.) can subcontract the operational part to a cloud company and focus on providing IT platforms to other cloud companies which have in turn found their niche in the development of mobile applications to private customers. In contrast to the development in the manufacturing industry, the development of global value chains in cloud computing is facilitated by being less geographically anchored. There are no direct costs for relocating a certain part of the “production” of a cloud service to another country. Under the right conditions, a company can focus on the areas where they have competitive advantages, and the services can be provided more efficiently.

4. Race to the Clouds

The cloud sector has grown despite the economic and financial crises of recent years. As with all new technology, there is a great interest, both from companies and governments, to be at the forefront and thus gain competitive advantages on the international market. It is also in the best interests of governments to attract larger international cloud suppliers, as this can entail extensive financial investment for an individual country and region. In a number of countries around the world, investment is now being made in the development of cloud computing and in designing special strategies for how to be competitive in the area. Large investment is also being made in the expansion of high speed broadband in order to increase availability, as well as more general investment in the IT area such as in research and development.

In general, countries which have a strong, developed IT sector have an advantage in the area, and many of the large IT companies are located, for example, in the USA, EU and Japan. But the cloud sector is also expanding rapidly in fast growing economies such as China and India.

Large IT companies are, in general, established in several locations around the world, and often have servers on a number of different continents. This is done to satisfy the needs of certain companies to be close to the market (to have shorter lead times), for political reasons (servers must be located in a certain country) or for strategic reasons (low costs, reliable electricity network etc.). Since these data centres often require large financial investments, countries are interested in attracting this business.



Cloud investment in the EU...

The EU Commission has initiated a process to develop strategies for cloud services within the framework for the EU's Digital Agenda. The strategies shall encompass financial, legal and institutional aspects, with particular focus on administration and research. The first stage has involved turning to companies and users of cloud services in order to examine their experiences in this area, regarding central issues such as data security, responsibility questions in cross-border situations, legal and technical barriers as well as standardization. The Commission is expected to present a proposal for the strategy in 2012. Considering the scope of the EU market, there are great potential financial gains in this area. According to a British study from 2011, the macroeconomic gains from cloud services in the EU could lead to 2.4 million new jobs and profits of up to USD 1,000 billion over the next 5 years (CEBR, 2011). National invest-

ments in various European countries are also being made. In France, for example, the sector has been backed up by a state investment programme which entails the support of a number of different projects and network creation in the cloud area.

There is at present no specific strategy for cloud services in Sweden. There is, however, a more general investment in information technology through a digital agenda for Sweden, and furthermore, Invest Sweden and others are working to attract large cloud investors to Sweden. The social networking company Facebook is locating its first European data centre in Luleå, which will be the largest centre of its kind in Europe. The entire structure is expected to be finished in 2014.

As data centres generate a large amount of energy and must be located in cool environments, more attention is being paid to the environmental aspects of cloud computing. Sweden, with its cold climate and deep rock foundations, provides good conditions for housing servers in both a cost-efficient and environmentally effective manner. Sweden also has a high level of education with established knowledge in IT and the telecommunications industry, well-functioning infrastructure, great reliability in electricity distribution as well as political stability.

...and in other countries

USA is presently the largest market for cloud services in the world and its development is generally ahead of the EU's, especially in terms of private usage. For example, four times as many legal downloads of music are made in the USA via cloud-based applications and programmes than in Europe, as a result of the lack of legal supply in Europe and because the EU in a sense consists of 27 different markets instead of one. The USA also invests to a larger extent in research and development with



regards to information and communication technology (ICT).

The US government has also produced a strategy for the use of cloud services in the federal government infrastructure. According to their calculations, this could lead to savings of 75% of current expenses, reducing them from USD 80 billion to USD 20 billion (Kundra, 2011).

Japan is one of the leading actors in the cloud area. The Japanese cloud market is expected to grow exponentially during the next three years, and Gartner predicts that cloud usage in Japan will represent 12% of global cloud service revenue (Gartner, 2010). The country has also made large investments in expanding high speed broadband with the aim of providing all households with broadband within the next three years (BSA, 2012).

China is the country with the largest number of internet users, and large investments are currently being made in the development of the cloud sector. According to a study based on interview with IT managers in China, 20% responded that they already use cloud services, and 46% indicated that they are either evaluating cloud solutions for their companies or that they have already initiated pilot projects for cloud solutions (Forrester, 2011). China's market for cloud services is estimated to have reached USA 14.8 billion in 2012 (APAC Insights, 2012). In order to attract foreign investors and increase market shares for cloud technology, special "cloud districts" have been established (International Offshore Cloud Computing Special Management District). These cloud districts are located in connection to *special economic zones* (SEZ) and mean that users can gain access to the internet outside of the traditional Chinese censorship. In this way, foreign computer centres for cloud services can be accommodated in these districts without affecting the extensive net censorship that otherwise exists within the country.

In India, which has the world's second largest software industry behind the USA and is an important centre for the outsourcing of IT services, the market for cloud services is also currently growing, in technological centres such as Bangalore and Delhi in particular. According to an assessment by EMC, the Indian market for cloud services is growing by 60% per year, and the size of the market is expected to rise from today's USD 400 million to USD 4.5 billion by 2015 (EMC 2011).

The importance of underlying rules and regulations

Economic investment is however not sufficient for a country to create favourable conditions for cloud services. A set of rules and regulations which supports the development must also exist. The international IT group BSA (Business Software Alliance) presented a report in February 2012 on the future of a global cloud market. Examined in the report was the legal environment which affects the global integration of cloud computing services in 24 countries on the basis of seven relevant areas: 1) data privacy 2) security 3) cyber crime 4) intellectual property rights, 5) data portability (i.e., the possibility of moving data and identities between different systems) and harmonizing of international laws 6) promotion of free trade and 7) required IT infrastructure. Not unexpectedly, the more developed countries are placed high up in this ranking, with Japan at number one, while countries such as China and Brazil are located in the lower section of the scale. The study emphasizes the significance of international solutions in order to be able to benefit from the potential that cloud computing offers, and the importance of reducing the impediments that can arise when cloud services are traded over national boundaries.

5. Impediments to International Trade of Cloud Services

Cloud computing and cloud services have the potential to develop and increase international trade. Above all, the trade of services such as IT support, administration, customer service etc. can be developed and increased with the assistance of cloud computing. Even if these services could partly have been provided from a distance or through foreign establishments, cloud computing means that these services can be supplied across national boundaries, more simply and cheaply.

What distinguishes cloud services from other internet-based services is that which has been previously emphasized: information and programs are stored on external and often indefinable servers, and large amounts of information are transferred back and forth over national boundaries. The main impediments for cloud services are therefore often the rules and laws which exist in different countries regarding how information may be handled and stored. For example, confidentiality legislation, data security laws, personal information laws as well as licensing and copying rules. These rules exist for legitimate reasons, and do not need to comprise impediments at a national level to the usage of cloud services. But even if national legislation is designed to benefit a domestic market, this is not sufficient for a well-functioning international market for cloud services. International differences in legislation in different areas and the uncertainty concerning which legislation is applicable are common impediments for cross-border trade.

Uncertainty regarding the applicable legal system

Since cloud suppliers want to optimize their capacity, data is often moved between different servers, depending on where storage space is available. When cloud services are being used for the processing of data it is also common for the information to be moved between servers. This means that even if there is an agreement with the customer about where the information shall be stored, it may be moved to another location during processing (i.e., even another country or continent) and then be returned and stored in the agreed location. The results are that, without being aware of it, a customer can be exposed to another country's legal system, regardless of whether the storage location is stated in the agreement. These types of technical aspects of how cloud computing functions are therefore of vital importance for the legal aspects. Situations can also arise where information stored in a certain country is by legal obligation made available to that country's authorities, such as police or intelligence authorities (Cloud Sweden 2010). As it is often ambiguous as to which country's legal system is applicable, two legal systems may end up in conflict with one another. There are currently no international agreements which regulate this.

Security in cloud computing

It is most likely that the most common concern for users of cloud services is the issue of *security* in cloud computing. This encompasses everything from server reliability (i.e., not being affected by disruptions to the service or collapsing) to data security, i.e., that confidential information does not end up in the wrong hands.

For an individual, *data security* may be a matter of personal information and other information that is stored on the internet (e.g., ownership rights to information and images on photo websites and social networks). For companies, it may concern both confidential company information and personal information (client register etc.). In particular, public authorities and institutions that make use of cloud computing can have large amounts of data pertaining to individuals which may be confidential and require protection.

The issue of the sovereignty of national data, *data sovereignty*, is central for states. This term is broader than confidentiality, for example, since it relates to the actual ownership rights to the information. When public data and systems are stored or processed in a server in a foreign country, central issues can arise such as the potential consequences of the information being exposed to another country's set of rules and regulations and its legal system. Public organizations and authorities are in general under extremely strict obligations to ensure that public IT systems as well as public information are protected.

Data protection and confidentiality legislation

In order to protect the individual, the majority of countries have some form of data protection and confidentiality legislation. It is common that geographical limitations exist in such legislation regarding the storage and processing of personal information. Something else that is not unusual is that requirements exist, in certain EU countries among others, for the registration of data transfers as well as for data controllers. These types of limitations and requirements can constitute impediments for trade in cloud services. In many cases, the legislation of particular countries in this area is based on international principles of data protection such as the OECD's or APEC's guidelines. However, substantial data protection laws are lacking in a few large economies including China, Indonesia and Singapore (BSA, 2012). But even in the USA, there is no comprehensive obligatory trans-sector regulation of data protection. Collection and usage of personal information in sectors which can be considered to be especially sensitive, such as the health and financial sectors, is regulated instead (Berry and Reisman, 2012).

Regulated in the EU's 1995 Data Protection Directive, among other things, is how personal data may be gathered and handled, how long it may be kept, and the applicable rights for access to the information. In order for it to be permissible to send personal information to a third country (i.e., countries outside the EU/EEA), the recipient country

must have laws which correspond to the sending EU country's own laws for the handling of personal data. The responsibility for checking this lies with the particular EU country, but the EU Commission has approved the following countries in order to facilitate the process for member countries: Argentina, Canada, Switzerland, the British Channel Islands Guernsey, Jersey and the Isle of Man, as well as companies in the USA which follow the principle of *Safe Harbour*. Safe Harbour is a certification process developed by the EU and USA which means that American companies can apply for a certificate which guarantees that personal data is handled in a way that fulfils the EU's Data Protection Directive. To rely on the *Safe Harbour* principle as a company, however, is not entirely unproblematic, as it may be in violation of the American anti-terrorist legislation, the Patriot Act. This act was passed after the terror attacks in September 2001, and means that American authorities have the right to confiscate information if suspicion of a crime exists, regardless of where it is stored, without authorization. This means that if foreign companies store data in the USA or with a company abroad which has some form of contact with the USA ("minimum contact"), the American authorities have the right to confiscate it, in accordance with American law. The Patriot Act therefore not only violates the *Safe Harbour* principle, but also the national laws of the majority of countries regarding data protection and integrity.

Since the EU's legislation is a directive, it has been implemented and modified for national legislation in the different EU countries. In Sweden, the Directive has been implemented as the Personal

Data Act (PUL). The EU Commission recently made a proposal for updated regulations in the area with the aim of, among other things, making the rules and regulations within the EU more uniform and to simplify data transfer over national borders. The proposal has however been questioned and criticized for limiting the possibilities for data transferal outside of EU borders. The new proposal is built partly on a regulation for data protection, which means that after it has been negotiated and approved in the member countries, it will be implemented directly in every member country. When the EU's new data protection regulation gains legal force, the PUL will cease to be valid in Sweden.

To design appropriate data protection laws is one of the biggest challenges for decision-makers in order to facilitate cross-border trade with cloud services.

Internet censorship

A number of countries have implemented internet filters or censorship regulations which can function as an impediment for cloud services and the expansion of the digital economy. This is partly done in order to restrain criminality and the spread of illegal material, but it is not unusual that more political material is also censored. A number of countries, for example, block certain websites that express political opinions which do not correspond with the government's views. An example of this is China's extensive censorship of the internet, often called *the great wall of China*, but referred to by the Chinese government itself as *the golden shield*. This

system limits access to content on the internet under an extremely comprehensive and complex judicial and technical regime which means, among other things, that access to foreign websites and cloud services are arbitrarily blocked and censored. It is common that foreign cloud services such as social media, blogs and search engines are blocked.

Political censorship of the internet is also a common occurrence in other dictatorships. But even democracies can use some type of political censorship. In France and Germany, web pages with Nazistic messages are blocked, and in South Korea, websites which sympathise with North Korea are blocked.

Intellectual property rights issues

Another legal area which is often the focus when legislation and the internet are discussed is *intellectual property rights*, i.e., issues that can be connected to copyright, patent, protection of company secrets and brand protection. Many of the companies which provide cloud computing services are, in similarity to other highly innovative companies, extremely dependent on different types of intellectual property rights protection. Examples of this are companies which build their services on patented technological solutions or strong brand names. Considering the cross-border nature of cloud computing, there is interest for this protection to also apply internationally. A company that makes use of cloud services may also be dependent on the rights to the service being guaranteed in all countries in which the company conducts its operations.



Strong intellectual property rights protection can simultaneously constitute an impediment for other cloud computing providers. Companies which act as intermediaries for supplying film and music on the internet, for example, could benefit from lower protection levels. Examples of this are companies whose business concepts are built on making copyright protected material available through licensing rights on the internet (e.g., Spotify, Voddler). National licensing systems can be problematic for this type of company. The European market is often perceived as an impediment as every country has its own individual licensing and regulatory framework. The result can be that a company chooses instead to turn to the USA, which is a large and more homogenous market. For companies who have entered a market with complicated rules and regulations, however, there can be an interest in maintaining the status quo, which becomes a competitive advantage in these cases.

There are also other copyright problems which can arise when information and data is stored on

cloud servers. An example is the issue of making *copies* of copyright protected material within cloud computing, and which rules apply in this instance. For example, if you own a software programme or music file, this is in general not ownership *per se*, but rather a license to an individual copy. In accordance with the law in many countries, it is possible for individuals to make copies of music and film files for private use, as well as to a close circle of friends and family. When files are saved on cloud servers, it is difficult to interpret what this means, and uncertainty often exists regarding what distribution is permissible, i.e., the ways in which material may be spread and to how many. Furthermore, it is often unclear what responsibility intermediaries, who are often suppliers of cloud services, have in the supply of copyright protected material. Since copyright protected material is protected in certain countries but not in others, this can lead to geographical limitations and uncertainty regarding licensing rights, for both companies and private customers.

This type of cloud-related problem is perhaps not primarily a cross-border barrier, but complicated and unclear national rules can mean that it becomes even more difficult to become established in new markets.

Traditional trade barriers

Similar to the traditional trade in goods, physical goods that is ordered via a cloud service or goods required for using a cloud service can also meet several trade barriers at the border, such as customs, complicated trade procedures or certificate of origin requirements. Requirements can also exist for specific technical rules and standards to be fulfilled. However, customs for *software* and *applications* on the internet are extremely rare.

In addition, cloud services can, like other services, meet different types of national regulations

and requirements. Examples of this can be laws which discriminate against foreign IT companies or give domestic suppliers preferential treatment in the procurement process. There may also be requirements for local establishment to be able to supply services or goods over the internet or to establish top-level domain. Even if there are no distinct legal requirements for establishment, existing rules can in certain cases result in a company having to establish itself in a country. Localization requirements are problematic for cloud suppliers, since the geographic independence is a central aspect of cloud computing as a supplier model. This requirement for local establishment is particularly common in the financial and public sectors (Berry and Reisman, 2012).

Absence of harmonized standards for cloud services

Considering that cloud computing and cloud services are relatively new concepts and that internationally accepted definitions are presently lacking, a conceptual confusion may arise and make it difficult for companies and consumers to know what they are purchasing. The emergence of national and regional definitions can lead to the international trade of cloud services becoming more difficult.

International standards are also lacking in other cloud-related areas. For example, in order to benefit from cost-effective improvements and new innovative services and products, it must be made simple for cloud customers to change suppliers. Cloud suppliers presently utilize different interfaces for managing information, which means that it can be difficult to move data between different cloud suppliers. It can also be difficult to integrate information from different types of cloud services. It is to

some extent possible to remedy this through technological solutions, but these will create an extra cost and burden for the customer.

Other areas which can constitute impediments for trade in cloud services

VAT taxation in cloud computing

It can often be unclear where a transaction takes place in cloud computing, and therefore also which tax rules and regulations are applicable. When, for example, a computer game is purchased and downloaded from a site on the internet, which can be located on a server anywhere in the world, uncertainty arises regarding the country in which the purchase should be taxed for VAT. This can in some cases lead to double taxation. An example of when this happened was when the much discussed application Stardoll, which sells digital cut-out dolls, was obliged to pay Swedish VAT on their sales even when VAT was already paid in another EU country. The company appealed the Swedish Tax Agency's decision and the Government eventually ruled in favour of Stardoll. There are presently no common rules for how this type of problem shall be handled, but new EU legislation in this area will be introduced in 2015.

Consumer-related impediments

The differences in consumer legislation in different countries could also constitute an impediment to the cross-border trade in cloud services. This is a problem both within and outside of the EU. Issues relating to the right to cancel a purchase, resolving disputes and information to consumers are problems that are often mentioned as an impediment to international e-commerce.

Payment and e-signature

It is not unusual for difficulties to arise concerning payment and ordering of merchandise and services over the internet. Since this is an area which is encompassed by national security requirements, problems can arise when purchases take place across borders. The problems can be associated with both the regulatory framework and to national or regional standards. Examples of this are that different technological security solutions exist for e-signatures and different national requirements for e-invoices or paper invoices etc.

Even though a lot has been done to facilitate the internal digital market in the EU, less than one in ten e-commerce transactions today are cross-border, and it is often perceived to be easier to conduct a cross-border transaction with an American company than with a company from another EU country. Technical and legal reasons, such as foreign credit cards not being accepted, have led to as much as 60% of attempts at cross-border internet trade failing (European Commission, 2010).

Roaming and the app market

Another area which can be a problem for the cross-border trade of cloud services is the high costs of *roaming*. This cost is created when a mobile telephone is used outside the local operator's network, i.e., when you call or surf on your mobile phone in another country. Agreements concerning roaming fees are made between mobile operators, and often the final cost becomes quite high for the customer. This is a problem common to all internet access via mobile telephones in foreign countries. The high fees particularly limit the usage of cloud-based mobile applications known as "*apps*".

6. The Road to a Global Cloud Market

Many of the legal problems which have been made topical by cloud computing, such as the protection of personal information and copyright, are the same as those which governments have tussled with in the internet area for the last two decades. As cloud technologies and cloud applications are developing at a rapid rate, laws and rules must be flexible, adaptable and appropriately designed whilst not hindering development. It is also important that laws in the area are not designed prematurely, i.e., before sufficient experience has been gained in how the technology will be used and where the main benefits can arise. In order to increase the legal security and safety in cloud computing, it is desirable for the legal system to provide an effective mechanism to ensure compliance with the law.

There is currently no collective international framework for the management of issues related to cloud computing. Different aspects of cloud computing are instead managed by different organizations in different contexts. At the World Economic Forum in 2011, the strong requirement for the creation of an international framework for cloud services was expressed from several directions, but the central issue concerning the management of data sovereignty appears to be difficult to resolve. The proposal for the establishment of a new global body for monitoring the development of cloud services was therefore met with great concern, as it may lead to inappropriate regulation.

Harmonization of guidelines and standards for data protection and security

A number of international attempts have been made to reach agreements about more harmonized rules in the data protection area. Just over 30 years ago, the Organization for Economic Cooperation and Development, OECD, produced a number of guidelines for data and confidentiality protection which were adopted by all members. The guidelines are voluntary and non-binding, and encompass eight fundamental principles about private data protection in the public and private sectors. The purpose of the guidelines is to protect the individual's right to confidentiality and data protection without overly limiting the cross-border flow of data. The OECD is now examining these guidelines for prospective updating.

The Asia-Pacific Economic Cooperation, APEC, has developed guidelines for managing confidentiality, The APEC Privacy Framework. APEC's framework consists of nine principles for the management of personal information, including limitation to the gathering of personal information, user limitation of personal data etc. Similar to OECD's guidelines, application of APEC's framework is voluntary which means that some countries including China have indicated that they do not intend to apply the framework. In contrast to OECD's guidelines, which focus on the individual's rights and the state's responsibility, APEC's framework focuses more on the responsibility of companies and organizations in



the collection and storage of personal information (Berry and Reisman, 2012).

Another initiative to facilitate cross-border information flow was presented by the EU and USA in spring 2012. The agreement included 10 trade-related principles, which support the expansion of information and communications technology, of which one specifically relates to facilitating the transfer of information over national borders by companies.

There is also an ongoing process within the international standardizing organ ISO to develop common standards for data security and confidentiality in cloud computing. This process is managed by two different sub-committees. The first sub-committee (ISO/IEC 27017), for which Cloud Security Alliance (CSA) has a central role, manages security in cloud computing. The other committee (ISO/IEC 27018) focuses on protection of personal information and confidentiality.

The existing patchwork of national and regional data protection rules and regulations creates uncertainty regarding what is applicable in a global environment. In order for individuals and companies to feel safe on the global market for cloud services, it is desirable to strive for the harmonization of these rules and regulations, and create globally accepted standards.

International rules and regulations related to trade and cloud services

The World Trade Organization, WTO, is the central institution for the multilateral trade system, and presently consists of 153 countries. The organization was formed in 1994 and is based on two fundamental principles: 1) Most-Favoured-National Principle (MFN), which entails that the rights which are given by one member country to another shall automatically be given to other member countries;

and 2) Non-Discrimination and National Treatment, which entails foreign merchandise and services receiving the same treatment as domestic merchandise and services. WTO's agreement contains the possibility of making certain exceptions to this principle if it can be considered that the measures are necessary for public order and moral, or for national security. Furthermore, actions taken to achieve these goals shall disrupt trade as little as possible. If a country violates the commitments made in WTO, another member country can report that country to WTO's Dispute Settlement Body.

WTO's service agreement, GATS

WTO's General Agreement on Trade in Services (GATS), regulates and negotiates the rules which may apply to the international trade in services within different sectors and to the different ways of supplying services. When countries join the WTO, they make certain national commitments to providing other countries with market access. Up until this point, no member countries have made any commitments which are specific to cloud services, but cloud services can be affected by general commitments for internet services (*computer and related services*) and for services which can be supplied with the use of cloud computing. WTO commitments in the area of telecommunications can also be important for cloud services. As cloud services are supplied over telecommunications networks, regulation of these networks can be important. In addition, some countries have made commitments to a special type of telecommunication, "online information and/or data processing", which also relates to cloud services to some extent (Berry and Reisman, 2012).

As mentioned in the previous chapter, it is not unusual that foreign suppliers of cloud services are discriminated against in countries such as China, through e.g., censorship or blocking foreign websites

and applications. These actions may thereby violate WTO's agreement (Hindley and Hosuk, 2009). Even if the Chinese authorities make reference to the exceptions which are permitted in accordance with the WTO regulatory framework in order to maintain general order and national security, China is able to implement more selective censorship, which would be considerably less disruptive. The possibility of entering a dispute with China in this area is perhaps more theoretical than realistic, since a foreign company that is subject to censorship must first convince its government to report China to WTO's Dispute Settlement Programme. Furthermore, it is unlikely that such a dispute would lead to reduced censorship, even if the dispute tribunal should rule in favour of the exporting country. In addition, China has the same opportunity as other WTO members to withdraw commitments in the WTO. This has previously been done by the USA, as a consequence of losing a WTO dispute about their prohibition of network games (Hindley and Hosuk, 2012). The dispute itself and a prospective withdrawal of commitments would, however, centre focus on China's extensive censorship as well as its implications for trade.

The issue about trade in cloud services in the WTO is primarily discussed within the framework of the *work programme for e-commerce* under the Council for Trade in Services. The work programme was established in 1998 with the purpose of examining all trade-related issues which arise with e-commerce. In the Ministerial Declaration which formed the basis for the programme, it was also established that a moratorium for tariffs on electronic transfers would be introduced, which has considerable importance for global digital trade. This moratorium was renewed at the following ministerial meetings, most recently in December 2011. The issue of cloud services has also been raised within the scope of the

work programme. The USA presented a proposal for widening the framework of e-commerce and having a dialogue about cloud services in this context in autumn 2011. In addition, the 10 principles relating to the expansion of ICT which the USA and EU have agreed upon were also presented in this forum as basis for continuing discussions within WTO.

Considering that cloud services encompass a number of different types of services, these may be located in different sectors in GATS. A consistent liberalized trade in services for the relevant sectors is therefore desirable, and in particular for the central sectors such as computer and related services, distribution, telecommunication and audio visual services.

The international trade in software supplied in physical units such as CD-ROM or DVD discs has to date been characterized by a liberal trade policy. This has been beneficial to the world economy and for technological development. It would therefore also be beneficial if software supplied via cloud computing also received full market access and non-discriminatory treatment in the future. In order to preserve a liberal attitude to trade in cloud and other IT services, it may be desirable to secure this through international agreements in the area.

Free trade agreements

Up until this point it has been unusual that the cross-border data flows have been managed within the framework of bilateral and regional Free Trade Agreements (FTAs) which today are to an ever-increasing extent established between countries. In the free trade agreement reached between the USA and South Korea in 2010, however, many more references were made to cloud services than was previously the case in American trade arrangements (Berry and Reisman, 2012). Among other things, it is stated that the parties shall not introduce or maintain unnecessary barriers to electronic data flows

across borders. Even if this wording does not entail any binding commitments for the parties, it does indicate an increased interest in the question in these contexts as well.

Even in the negotiations now being conducted with regard to a Trans-Pacific Partnership (TPP) – which includes the USA, Australia and New Zealand – the issue of facilitating cross-border data transfer has been discussed. How such an agreement could be designed without conflicting with national data protection laws is also a crucial issue in this context.

International cooperation on intellectual property rights and internet-related criminality

Intellectual property rights are important in different ways for many companies that supply cloud services. An increased harmonization of intellectual property rules and licensing systems, both within the EU and internationally, would probably be favourable for the majority of suppliers and customers of cloud services. Since some suppliers benefit from stronger protection and others by weaker protection, the actual level of protection is a question of pros and cons.

Within the framework for WTO there is also a regulatory framework for trade-related intellectual property issues, the TRIPS agreement (Trade-Related Aspects of Intellectual Property Rights). This agreement is binding for all countries that are members of WTO, and includes certain minimum rules with regard to protection levels for intellectual property rights and requirements for the protection to be guaranteed (through the legal system) as well as a prohibition against discrimination, as in other WTO agreements. The fact that more and more countries are signing the agreement is a step towards more harmonized global rules. In order to improve inter-



national cooperation against the violation of intellectual property rights, a selection of WTO countries have also signed a more comprehensive agreement within the framework for TRIPS: ACTA (Anti-Counterfeiting Trade Agreement). The agreement was signed in 2010, but has not yet taken effect.

Since internet-based services are cross-border, it is also necessary to have a cross-border approach to dealing with internet-based crime. A number of countries have signed an international convention for combating internet-related crime, *Convention on Cybercrime*. This convention was designed by the Council of Europe in 2001, and it is the first international agreement which treats computer and internet crime through a harmonization of national legislation and increased cooperation among the nations. The convention manages, among other things, violation of intellectual property rights, internet-related fraud, child pornography and violation of network security.

International standards for cloud computing

The standards can potentially facilitate both the purchase and usage of cloud services, as well as reduce the risk of problems with security, laws and compatibility. It is however important that the standards do not lock in the “wrong technology” and restrain development; instead they should be favourable for competition and lead to the development of new and innovative services and products. The work to develop new standards for cloud services is currently being carried out around the world. The International Organization for Standardization, ISO, established a sub-committee to the IT committee in 2009 (JTC 1/SC 38). This includes a study group for the standardization of *cloud computing*. The purpose of the study group is to create terminology relating to the concept as well as to have dialogue and examine the relevant challenges for the

upcoming work, through workshops and other activities. A working group will then be created, based on the study group's results. The Swedish Standards Institute, SIS, is also working actively on this issue. They are primarily aiming to influence the international work in the area.

More standardized methods of exchanging information between different systems would also facilitate the portability and integration between different cloud services. This should entail increased competition, both nationally and internationally, and lead to reduced costs for the customer.

In order to avoid the emergence of national and regional standards and definitions that make global cloud trade more difficult, international harmonization in this area is desirable. Similar to other areas of the economy, companies in the cloud industry are most suitable for developing standards and definitions. States can contribute in this context by facilitating this type of work and creating incentives for companies to reach agreements regarding common standards.

Additional examples of measures which may facilitate trade

Measures in areas such as payment, taxes and consumer rights can also facilitate trade in cloud services. For example, the development of internationally accepted methods for payment over the internet would likely reduce impediments for companies that want to sell cloud services over national

borders. In this context, rules concerning confidentiality and data security are also important for reducing the risks associated with international transactions. With regard to VAT taxation, clearer rules for what applies in cross-border trade would be desirable in order to avoid double taxation.

In terms of differences in consumer law between countries, it is difficult to see any harmonization at a global level, even if guidelines in some areas could be designed internationally. In the EU, work for harmonization has been carried out for a longer time and a new directive was introduced in the area in 2011. The purpose of the directive is full harmonization of certain parts of consumer law, while other aspects shall remain partly harmonized. An increased transparency and clarity regarding which rules are applicable in different countries would facilitate trade for individuals and companies both within the EU and on a global level, by making information easily available on the internet, for example. Considering the difficulties in finding international legal solutions for consumer law, another more flexible solution may be for the market itself to produce guidelines for *best practice*, which could be developed and adapted concurrently with technological development.

Within the EU, the issue of high fees for roaming has been handled by the setting of a price ceiling. It should be possible to solve this matter internationally through agreements concerning international guidelines in the area. The problem with roaming has been discussed in both OECD and WTO.

7. Concluding Discussion

The provision of computer power, programmes and storage as services over the internet encompasses great potential for development of the trade in services between countries. Cloud technology enables increased global specialization and competition in regards to advanced and high-technology services, through cloud suppliers and customers being able to make use of resources from different parts of the world. The large investments being made in this area today around the world could have a large effect on the future global economy and international trade patterns.

The technology for actualizing a more global market for cloud services already exists to a large extent, but legislation in different areas can function as an impediment to trade in this type of

development. As laws exist for legitimate reasons, such as to protect personal integrity, it is problematic to overcome these “impediments”. Differences in countries’ legal systems can also create problems for global trade in cloud services, as well as uncertainty regarding which country’s legal system should be applied.

In the same way that the internet has entailed monitoring of laws relating to confidentiality, security and copyright requiring examination, the emergence of cloud computing means that these issues have become even more imperative. The management of cross-border information is crucial for the international trade in cloud services. Data protection legislation in particular is a vital issue. The great challenge for decision makers is to



update and design laws so that they achieve central goals, such as protection of the individual and the business secrets of companies, without overregulating and impeding technological development. Global trade in cloud services would also benefit from more harmonized international rules for the management of the cross-border information flow and agreements concerning what applies when different countries' legal systems are in opposition to one another.

As cloud computing is a relatively new concept, there is no internationally accepted terminology or categorization. In order to prevent the rise of national and regional standards and definitions, which would restrain international trade, global agreements in the area may be desirable. Standardized methods of exchanging information between different systems would assist consumers of cloud services and lead to increased competition, both nationally and internationally. States can facilitate the ratification of agreements between companies, but as in other areas, the sector itself is best suited to developing definitions and standards.

A global liberal trade policy in all sectors – and in certain service sectors in particular – is crucial for the continued development of cloud services.

For example, software that is supplied via cloud computing should also receive full market access and non-discriminative treatment in the same way as before (when it was delivered in physical units). The international cooperation and agreements which ensure a liberal trade policy for cloud services and closely related areas are central for continued favourable development in the area.

As the cloud industry grows and the potential profits of a more global market for cloud services become even more apparent, interest increases in the problems which arise during cross-border trade. Discussions concerning the issue of how the cross-border data flow should be managed are now being conducted in different contexts and international forums, both multilateral (e.g., WTO) and bilateral (TPP) trade contexts.

Cloud computing as a concept is becoming increasingly difficult to define as its area of usage expands, and it is problematic to reach an international consensus regarding the concept. Something that the majority of people seem to agree upon, however, is that cloud computing as a concept will not exist in the future. Instead, the method of providing computer power over the internet, which we currently call cloud computing, will be a matter of course.

Notes

- 1 For more in-depth information on the development of global value chains, see the National Board of Trade's studies: "Made in Sweden - A New Perspective on the Relationship between Sweden's Exports and Imports" and "Business Reality and Trade Policy – Closing the Gap"
- 2 BSA is a group consisting of approximately 80 international IT companies including Microsoft, Adobe, Apple, Intel and Symantec.
- 3 The Commission's proposal will be negotiated by the EU countries and in the EU Parliament in 2012, to become law (if an agreement can be reached) in 2014.
- 4 For a more comprehensive account of the current intellectual property rights issues which can arise with international trade in digital environments, see the Swedish National Board of Trade's study: "Piratkopiering i världshandeln – och andra immaterialrättsliga problem i BRIC, Indonesien och Japan ur handelspolitiskt perspektiv" (2012:5). ["Counterfeiting and Piracy in World Trade – and Other Intellectual Property Rights Issues in BRIC, Indonesia and Japan" (2012:5)]
- 5 The GATS agreement divides trade in services into four different modes of supply: 1) cross-border supply 2) consumption abroad 3) commercial presence and 4) temporary movement of natural persons.
- 6 At present, only countries in the Council of Europe and the USA have signed and implemented the agreement. Japan, South Korea and Canada have signed the agreement but have yet to implement it.

References

Literature

APAC Insight. (2012) "China Cloud Computing Industry and Market Report".

BSA (2012) "BSA Global Cloud Computing Scorecard – A Blueprint for Economic Opportunity". Business Software Alliance & Galexia Consulting.

Berry, Rennee and Matthew Reisman, (2012), "Policy Challenges of Cross-Border Cloud Computing" in *Journal of International Commerce and Economics*, Web version May 2012. United States International Trade Commission.

CEBR (2011) "Cloud Dividend" commissioned by EMC corporations.

Cloud Sweden (2011) Juridikgruppen "Rättsliga frågor vid flytten till molnet – en checklista" (Legal issues with the move to the cloud – a checklist) version 1.0 11-05-2011.

EMC (2011) "Private cloud landscape in India". Study by and Zinnov Management Consulting, commissioned by EMC Corporation.

European Commission (2010) "A digital agenda for Europe."

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions.

Forrester Research (2011) "Benchmarking Asia Pacific CIOs' Attitudes Toward Cloud Computing" av Tim Sheedy, med Sharyn Leaver och Mackenzie Cahill

Gartner (2010) “Forecast: Public Cloud Services, Worldwide and Regions, Industry Sectors, 2009–2014.”

Hindley, Brian and Hosuk Lee-Makiyama (2009). “Protectionism online: internet censorship and international trade law.” ECIPE working paper. No. 12/2009.

Jaeger, P., Lin J. and Grimes, J (2008) “Cloud Computing and Information Policy: Computing in a Policy Cloud?” *Journal of Information Technology Politics* (2008) Volume: 5, Issue: 3, Publisher: Routledge, Pages: 269–283.

Swedish National Board of Trade (2010) “E-invoicing in cross-border trade”. 2010:4.

Swedish National Board of Trade (2011) “Survey of e-commerce barriers within the EU” 2011:2.

Swedish National Board of Trade (2012:4) “E-handel – nya möjligheter, nya hinder” [“E-commerce – New Opportunities, New Barriers”].

Swedish National Board of Trade (2012:5) “Piratkopiering i världshandeln – och andra immaterialrättsliga problem i BRIC, Indonesien och Japan ur handelspolitiskt perspektiv”. [“Counterfeiting and Piracy in World Trade – and Other Intellectual Property Rights Issues in BRIC, Indonesia and Japan”]

Kundra, Vivek (2011) “Federal Cloud Computing Strategy.” U.S. Chief Information Officer. The White House, Washington. February 8 2011.

Mell, Peter and Timothy Grance (2011) “The NIST Definition of Cloud Computing. Recommendations of the National Institute of Standards and Technology.” NIST, National Institute of Standards and Technology. September 2011. Special Publication 800–145.

Noerr LLP, and SNR Denton US LLP (2011) “The USA Patriot Act – Implications for cloud computing”.

OECD (2009) “Briefing paper for the ICCP Technology foresight forum – Cloud Computing and Public Policy” DSTI/ICCP(2009)17.

OECD (2011) “The evolving privacy landscape: 30 years after the OECD privacy guidelines”. DSTI/ICCP/REG(2010)6/FINAL. Working Party on Information Security and Privacy.

Government Offices of Sweden (2011) “ICT for Everyone – A Digital Agenda for Sweden”. Ministry of Enterprise, Energy and Communications.

Rittinghouse, J. (2010). “Cloud Computing: Implementation, Management and Security”. Boca Raton, FL: CRC Press.

World Economic Forum (2011), “Advancing Cloud Computing: What to do now?” World Economic Forum In partnership with Accenture.

Electronic sources

www.iso.se

www.cloudsecurityalliance.org



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