

Electronic Contracts and Cloud Computing

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Abstract: Cloud computing has revolutionized computing technology and has opened new avenues for carrying out web based transactions. The *Electronic Transactions Amendment Act 2011* of Australia has become one of the significant pieces of legislation that deals with the latest electronic transactions. This article seeks to explore the effect of electronic contracts in the light of these recent legal developments. A comparative analysis of the laws of Australia and United States of America (USA) is also carried out to gain additional insights

1. Introduction

Computing technology as we know today is changing. Cloud technology allows hosting of applications and documents into a cloud consisting of thousands of computers and servers which are linked together and accessible through the internet. Everything done on the computer through cloud technology is web based, instead of being desktop based. Thus, desktop based documents and applications are moving into the cloud. People will no longer be tied up to a single computer located in the office as the data can be stored on the web and can be accessed from anywhere in the world. Although cloud computing sounds far-fetched it has been employed by common provides such as Gmail, hot mail and Apple me Mobile. Several big companies such as Google, Amazon, Microsoft and sun systems are offering cloud computing.¹

With traditional desktop based computers documents are stored on the computer on which they are created. Software programmes are also run on the personal computer. Desktop based documents can be accessed through other computer located within the same network but cannot be accessed by computers outside the network. In contrast, cloud computing removes this barrier. With cloud computing software programmes are not run by personal computer instead they are stored and run by the cloud servers. Unlike the traditional model cloud computing is not personal computer centric instead it is document centric. Cloud computing encompasses multiple computers, multiple servers and multiple networks. In a layman's language cloud is a collection of computers and servers which are accessible through the internet. A web based application or service offered via the internet is called cloud computing. It can include cloud based word processor, email, and power point presentation.²

Cloud computing can be seen as a collection of services. It can be described as a layered cloud computing architecture. Services offered through the internet usually consist of IT services and is called SaaS (Software as a service). It allows software to be run remotely via a cloud. Infrastructure as service (IaaS) guarantees processing power, storage and internet access.³ Platform as a service (PaaS) provides platform to the developers to host web applications.⁴

The aim of the article is to examine the effect of electronic contracts from the perspective of cloud computing. The research specifically examines the impact of electronic contracts in Australia and USA. The article examines the effectiveness of electronic contracts in the light of recent legal developments and identifies the main factors that may be creating uncertainty. The article does not attempt to find solutions

¹ M Mille, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online (2009).

² M Mille, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online (2009).

³ B Furht, Handbook of Cloud Computing (2010) p 5

⁴ N Antonopoulos and L Gillam, Cloud Computing: Principles Systems and Applications (2010) p5

to the issues. It merely seeks to identify the key factors of uncertainty. The article specifically focuses on the issues associated with writing, signature, time and place of contract formation. As the article deals specifically with electronic contracts, the issue of jurisdiction is analysed only within the realm of contract formation. The article first makes an assessment of new and novel issues associated with electronic contracts under the *Electronic Transactions (Victoria) Amendment Act 2011*. After examination of issues the approach adopted under *Uniform Electronic Transactions Act 1999* (UETA) is analysed. The article also evaluates whether the contract law reform is desirable for the effective formation of electronic contracts.⁵

2. Time and Place of Contract formation: Australia

The *Electronic Transactions (Victoria) Amendment Act 2011* has become one of the significant pieces of legislation that deals with the latest electronic transactions in Victoria. This Act commenced on 1 December 2011⁶ and made amendments to the *Electronic Transactions (Victoria) Act 2000*. The main purpose and intention of the Act is to amend the *Electronic Transactions (Victoria) Act 2000*, which was introduced a decade ago. The *Electronic Transactions (Victoria) Amendment Act 2011* is expected to bring the current legislation into line with the international standards and to allow for greater certainty in electronic transactions through compliance with international legal standards and in particular with the United Nations Convention on the Use of Electronic Communications in International Contracts 2005.⁷ The *Electronic Transactions (Victoria) Act 2000* and the *Electronic Transactions (Victoria) Amendment Act 2011* will be jointly referred as electronic Transaction legislation of Australia in this Article.

The electronic transactions legislation merely provides default rules for determining the time of receipt and dispatch of messages. It enables the application of common law principles. It does not provide precise criteria for ascertaining time of contract formation⁸

Under the electronic transactions legislation addressee is a person with whom originator intends to communicate. People who happen to just receive, copy or forward the message in the course of the communication are excluded from the definition of the addressee.⁹ Originator is the person who sends the communication. It differs from the definition of the addressee which focuses on the intent of the action. However, the definition of both addressee and originator cover natural persons, corporate bodies and legal entities.¹⁰

Section 13 of the electronic transactions legislation deals with the time of dispatch of an electronic message. Under section 13(1) (a) dispatch takes place when an electronic communication leaves the information system of the originator. The term 'information system' is defined as a system used for 'generating, sending, receiving, storing or otherwise processing electronic communication' The term electronic communication is defined as 'a communication of information in the form of data text or image by means of guided or unguided electromagnetic energy'.¹¹ The electronic transaction legislation does not explain what amounts to the 'information system of the originator'. It is broad enough to encompass the server, web browser and the full communication network itself.¹² The definition of the

⁵ Attorney General's Department, Summary: Australian Contract Law Reform <<http://www.ag.gov.au/Consultationsreformsandreviews/Pages/Contract-Law-Discussion-Paper.aspx>> at 17 July 2012, Attorney General's Department, Improving Australia's Law and Justice Framework: A Discussion Paper to Explore the Scope for Reforming Australian Contract Law', (Discussion Paper, March 2012) <<http://www.ag.gov.au/Consultationsreformsandreviews/Pages/Contract-Law-Discussion-Paper.aspx>> at 17 July 2012, A Wheeler, Federal Attorney-General Starts a Discussion on Reform of Contract Law (2012) <http://www.pwc.com.au/legal/assets/legaltalk/LegalTalk-Alert-28Mar12.pdf> at 17 July 2012

⁶The *Electronic Transactions (Victoria) Amendment Act 2011*. Act No.52/2011, Victoria Government Gazette S389.

⁷The *Electronic Transactions (Victoria) Amendment Act 2011*, *Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum*, 2, United Nations Convention on the Use of Electronic Communications in International Contracts (2005). <[http://www.georgiecrozier.com.au/articles/speeches/12/electronic-transactions-\(victoria\)-amendment-bill-2011](http://www.georgiecrozier.com.au/articles/speeches/12/electronic-transactions-(victoria)-amendment-bill-2011)> accessed on 11 June 2012.

⁸ *Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum*, 11, *Electronic Transactions (Victoria) Amendment Act 2011*.

⁹ *Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum*, 6.

¹⁰ *Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum*, 6, *Electronic Transactions Act 2000 (Vic)*.

¹¹ *Electronic Transactions Act 2000 (Vic)*.

¹² E Karoline, Updating the *Electronic Transactions Act*?-Australia's Accession to the UN Convention on the Use of Electronic Communications in International Contracts (2005) *Journal of Contract Law* <

information system is broad enough to encompass IaaS, PaaS and DaaS of cloud technology. There is lack of specific criteria describing what factors should be considered for determining dispatch. The criteria pose even bigger problems in relation to mobile devices such as PDA (Personal Digital Assistant), laptops and mobile phones. Data is transferred to and forth between the mobile devices and cloud infrastructure in the following manner:

1. First data from a mobile hand held device is sent to cloud infrastructure.
2. Then the data is sent to the transmission tower.¹³ Section 13(1) (a) is broad enough to cover the entire transaction network consisting of cloud infrastructure and wireless transmitters. There is lack of single specific criteria.¹⁴
3. Further, Cloud infrastructure does not adequately supports data transfer between portable devices as they require more memory space than devices such as PDAs. Further, they do not recognize many communication protocols.¹⁵

Therefore, due to these novel features communication can suffer significantly when transactions are conducted through mobile devices.¹⁶

Under Section 13 (1) (b) if the communication does not leave the information system of the originator then dispatch occurs when the communication is received by the addressee. According to the explanatory memorandum of the bill this criteria anticipates exchange of electronic communications within the same information system.¹⁷ It does not tell whether the addressee must actually view the message or whether receipt of message at the inbox or server will amount to receipt.¹⁸ In parallel, Section 13 (1) (b) appears to be problematic as there can be firewalls, antivirus software which can prevent the message from reaching the addressee.¹⁹ Moreover, cloud computing infrastructure suffers from the issue of interoperable standards due to which receipt many never occur. Further, receipt may not occur if the system has access control list filters. There are traffic control filters used on routers which identify specific type of data and prevent it from passing through the network.²⁰

The issue is also complicated in relation to mobile phones. Mobile phone internet browsers have infinitely variable degree of support with regards to web pages and graphics. Therefore, criteria for receipt can create problems in relation to these devices especially if actual reading or viewing of the message is required under Section 13 (1) (b).²¹

2.1 Time of Receipt: Australia

In relation to receipt the legislation provides different criteria for a designated information system (when a specific email address is provided for sending communication) and a non-designated information system (when a specific email address is not provided for sending communication). Hence, the time of receipt will vary depending upon whether there is a designated or non-designated information system.²²

<http://works.bepress.com/elizamik/16>> at 17 July 2012, Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum, 11

¹³ W.C Hu, et al, (2005) 'Internet Enabled Mobile Hand Held Devices for Mobile commerce '1(1) Contemporary Management Research 13, 13-34.

¹⁴ Electronic Transactions (Victoria) Amendment Act 2011

¹⁵ N Shi, Wireless Communication and Mobile Commerce (1st ed, 2004) 97-98.

¹⁶ Electronic Transactions (Victoria) Amendment Act 2011

¹⁷ Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum, 11-12.

¹⁸ Electronic Transactions (Victoria) Amendment Act 2011

¹⁹ E Mik, Updating the Electronic Transactions Act?-Australia's Accession to the UN Convention on the Use of Electronic Communications in International Contracts (2005) Journal of Contract Law <<http://works.bepress.com/elizamik/16>> at 17 July 2012

²⁰ S Malik, Network Security Principles and Practices (1st ed 2003) 567 <[http://www.orbit-computer-solutions.com/Access-Control-Lists-\(ACL\).php](http://www.orbit-computer-solutions.com/Access-Control-Lists-(ACL).php)>

²¹ Joe Dolson, Accessible Web Design ' What is Web Accessibility?' (2011)

<<http://www.joedolson.com/what-is-web-accessibility.php>, <http://www.w3.org/TR/2006/WD-mobile-bp-20060113/>> at 8 September 2012.

²² Electronic Transactions (Victoria) Amendment Act 2011

Under Section 13A (1) time of receipt is the time when the electronic communication becomes capable of being retrieved by the addressee at a designated electronic address. The legislation replaces the term ‘information system’ while defining the criteria of dispatch with the term ‘electronic addresses’. Electronic address indicates the specific part of the information system which can be the email address or the Internet Protocol (IP) Address of cloud infrastructure. It is uncertain whether terminology is pointing towards the email address or the IP address of cloud infrastructure.²³ In *William Close Pty Ltd v City of Salisbury & Anor (No 2)*²⁴ the term designated information system was liberally interpreted and the receipt of email in the dead folder of the email account due to a mistake in the email header was regarded as entry into the designated information system. However, given the broad definition of information system, with regards to cloud computing technology issue will arise as to which part of the infrastructure should be considered for determining receipt. While, in *Thorn Airfield Lighting Pty Ltd v W*²⁵ it was held that the electronic transactions Act applies only if the parties have agreed to receive electronic communication.

Like Section 13 (1) (b) receipt will not occur under Section 13A (1) if firewalls, antivirus software²⁶ and filters prevent the message from reaching the addressee. Difficulties may also arise if the message is received but in an unreadable form. Moreover, cloud computing infrastructure suffers from the issue of interoperable standards due to which receipt may never occur. In particular, Section 13A (1) will create problems in relation to online shopping transactions.²⁷

If the message is sent to some other electronic address then it will be regarded as received when it becomes both ‘capable of being retrieved and the addressee becomes aware’ that the message was sent to that particular electronic address. These criteria’s can create problems if a message is sent to a non-designated system which the user has ceased to use. In such circumstances receipt will never occur. Similarly, if the message is sent when the employee of a company is laid off or is away from the office for a long period of time then the receipt of message on the server will bind the company even without the knowledge of the message. In addition, under this approach receipt will not occur until the user actually becomes ‘aware’ that the message was sent. The requirement of awareness provides scope for manipulation. An addressee can claim that the message was not received to delay the time of formation of contract or to revoke the contract.²⁸

Websites function on a twenty four hour basis. Some websites prescribe specific time for cancelling order. Determination of time can arise when such time limits are provided.²⁹ Determination of time of contract formation will also, likely, create problems especially in situations where a contract is open for a specific period.³⁰

Under the cloud computing technology, data will be stored on several data centres of cloud service providers, thereby raising jurisdictional issues (where in the world is my data?). Under Section 13(6) an electronic communication will be deemed to be dispatched at the originator’s place of business. It will be deemed as received at the addressee’s place of business. The term ‘Place of business’ has been defined as a place where the party has a non-transitory establishment to carry out an economic activity. Cloud computing infrastructure and websites are transitory in nature therefore are not accommodated comfortably by the definition. Under section 2 (b) if the party is a natural person, then that person’s habitual residence must be regarded as place of business. A person can have multiple residences therefore this section does not provide a definitive answer. Further for the purpose of section 2 the place indicated by a party is presumed to be his place of business unless it is disproved by the other party. This places an unreasonable burden of disproving it on the other party and is therefore unworkable. Under section 3 (b) if the location is not indicated by the party then the place which has the closest connection to the

²³ Electronic Transactions (Victoria) Amendment Act 2011

²⁴ *William Close Pty Ltd v City of Salisbury & Anor (No 2)* [2012] SAERDC 26 (3 May 2012)

²⁵ *Thorn Airfield Lighting Pty Ltd v W* (2012) TASWRCT 11 (5 April 2012)

²⁶ Electronic Transactions (Victoria) Amendment Act 2011, E Karoline, Updating the Electronic Transactions Act?- Australia’s Accession to the UN Convention on the Use of Electronic Communications in International Contracts (2005) *Journal of Contract Law* < <http://works.bepress.com/elizamik/16>> at 17 July 2012

²⁷ Electronic Transactions (Victoria) Amendment Act 2011

²⁸ Electronic Transactions Bill 2011 (Vic) Explanatory Memorandum, 12

²⁹ Slatterymedia <http://www.slatterymedia.com/termsfuse/> at 17 July 2012 Harvey Norman < <http://www.harveynorman.com.au/terms-and-conditions/>> at 17 July 2012.

³⁰ *Bressan v Squires* [1974] 2 NSWLR 460 *Smilie Pty Ltd v Bruce* (‘Smilie’) [1998] 8 BPR (Bryson J); [1998] 9 BPR 16723 (Court of Appeal), *Imperial Brothers Pty Ltd v Ronim Pty Ltd* [1999] 2Qd R 172, *Carrapetta v Rado* [2012] NSWCA 202.

transaction must be regarded as the place of business. The infrastructure of cloud computing technology is such that there will always be more than one closest connection to the transaction. Therefore this section is equally flawed. Section 3 (c) (i) of the Act states *that a location is not a place of business merely because the equipment and technology supporting the transaction is located at that place*. This section disregards the fact that a distinction between location of equipment and place of business cannot be made with regards to the virtual online companies who carry out the entire transaction online. Section 3 (d) states domain names and email addresses must not be taken into account for determining place of business.

3. Time and Place of contract formation: USA

Drafters of both *Model Law on Electronic Commerce 1996* (Model Law) and UETA regarded it necessary to state when and where a message is sent and received.³¹ Section 15 of UETA is similar to Model Law however, it provides slightly different criteria for receipt and dispatch of electronic communication. Section 15 (a) of the Act deals with the dispatch of an electronic communication. Under s 15 (a)(1) of the Act, an electronic communication will be considered as sent if it is addressed properly and sent to an information processing system which the recipient has designated or makes use for the purpose of receiving messages of similar type. The term information system is defined as 'an electronic system used for creating, generating, sending, receiving, storing, displaying or processing information'. Section 15(a) (1) is broad enough to encompass IaaS, PaaS and DaaS of cloud technology.

Under s 15 (a)(2) an electronic communication will be considered as sent if it is capable of being processed or retrieved. Section 15(a) (2) will apply only if the message becomes capable of being processed or retrieved. SaaS allows delivery of web based content through a browser. The software resides within the cloud. While, PaaS, provides hardware, operation systems, data base systems and network support. Therefore section 15 (a) (2) appear to be pointing specifically towards both PaaS and SaaS infrastructures.³²

Under s 15(a)(3) of the Act, a message will be considered sent if it 'enters an information system that is under the control of the recipient'. This section disregards the fact that the cloud consumers will not have control over the underlying computer resources. This provision slightly improves the requirement provided under the Model Law on Electronic Commerce. Under the model law, a message will be regarded as sent when it enters an information system outside the control of the sender. UETA recognised that in certain situations both the sender and recipient of the message might be the part of the same information processing system. Such a situation arises when both the sender and the receiver are the part of the same intra net or same public network.³³ However, s 15(a) leaves scope for uncertainty by not specifically stating what factors must be considered to determine whether a message entered an information system under the control of the recipient. Clarification regarding this aspect can promote legal certainty.³⁴

Unlike Model Law on Electronic Commerce, the criteria provided under UETA also take account of some technical aspects of electronic communication. It requires the electronic communication to be addressed properly. Further, it requires the communication to be sent to a system from which it can be processed appropriately. In addition, it also requires it to be sent to a system from which it can be viewed appropriately.³⁵ However, this provision has limited scope, as it will only apply if the message is 'addressed properly or otherwise directed properly to an information processing system that the recipient has designated'.³⁶ Under the cloud infrastructure an organisation may outsource a number of functions to cloud services offered by different vendors. A company may use Gmail for email services and

³¹ Model Law on Electronic Commerce with Guide to Enactment, UNCITRAL, UN Doc A/51/62 15-18 (1996). Uniform Electronic Transactions Act 1999, § 15 Comment 2.

³² K Jamsa, Cloud Computing: SaaS, PaaS and IaaS, Virtualization, Business models, Mobile, security and More (2013) 6-7, Uniform Electronic Transactions Act 1999, § 15.

³³ J M Norwood, 'A Summary of Statutory and Case Law Associated with Contracting in the Electronic Universe' (2005-2006) 4 DePaul Business and Commercial Law Journal 415, 435-6.

³⁴ Uniform Electronic Transactions Act 1999, § 15(a).

³⁵ Uniform Electronic Transactions Act 1999

³⁶ Uniform Electronic Transactions Act 1999, § 15(a)(1).

salesForce.com for HR services. What amounts to designated information system can raise many issues and questions.³⁷

3.1 Time of receipt: USA

Under Section 15 (b) (1) electronic communication will be regarded as received when it enters an information system which the recipient has designated or uses for the purposes of receiving electronic records of the kind sent. The section emphasizes on entry of the message into the information system but does not specifically state which part of the information system must be considered. Section 15 (b) (2) the message must be capable of being processed by that systems. The criteria provided for receipt of electronic communication requires the message to be in a form capable of being processed. However, this criterion disregards the interoperability issues involved with a cloud computing technology.

Other aspects that differ from the model law are the analysis of designated and non-designated information system. The model law provides two different criteria to deal with situations when an information system is designated and non-designated by the addressee. Further, the Model Law on Electronic Commerce has a special rule when the message is sent to a non-designated information system. For example, under model law, if it is sent to a non-designated information system then the message will be deemed received only when the addressee retrieves the message.³⁸

UETA does not have any specific rule dealing with non-designated information system like model law. Instead, s 15(b)(1) differentiates it as 'information processing system that the recipient has designated or uses for the purpose of receiving electronic records or information of the type sent'.³⁹ Under UETA, if the message is sent to a system that was not designated, but is the one used by the receiver for the electronic messages of type, then general provision will apply and the message will be deemed received.⁴⁰ However, this provision has limited application as it will only apply if the message is sent to an information system that is either designated by the recipient or used by the recipient for receiving such message.⁴¹

The criteria for receipt fell short of this intended purpose as the provision is not broad enough to cover situations when the message is sent to some other email address that is neither designated by the receiver nor used by the recipient for receiving such message. In such circumstances, a recipient can still leave messages on a server or other services and avoid receipt.⁴² *Julie C. White, ET VIR v Lucas Strange*⁴³ involved a suit on contract with regards to buy and sell real estate property. The buyer made an attempt to terminate the contract to buy the property. However, the seller did not receive a timely notice to terminate the contract. Judgement was rendered in favour of the seller. In this case it was noted that the Uniform Electronic Transactions Act only applied if there was an agreement to conduct transactions by electronic means. Context and surrounding circumstances of the cases did not indicate that there was any such agreement between the parties therefore the Act was not applied.

Under UETA place of business is the place having closest relationship to the transaction.⁴⁴ If the recipient does not have place of business then recipient's residence. Cloud infrastructure is transient in nature therefore the criteria provided will give rise to unworkable results.

4. Writing and Signature: Australia

A contract is generally not required to be in writing and may be legally effective even in the absence of a signature. The absence of 'writing' and 'signature' does not affect the enforceability of a contract.

³⁷ T Dillon et al, Cloud Computing: Issues and Challenges (Paper Presented at the 4th IEEE conference on Advanced information Networking and Challenges, 2010)

³⁸ Uniform Electronic Transactions Act 1999, Model Law on Electronic Commerce with Guide to Enactment, UNCITRAL, UN Doc A/51/62 15-18 (1996).

³⁹ Uniform Electronic Transactions Act 1999, § 15(b)(1).

⁴⁰ Amelia H Boss, 'The Uniform Electronic Transactions Act in a Global Environment' (2001) Idaho Law Review 275, 330-2.

⁴¹ Uniform Electronic Transactions Act 1999, § 15(b)(1).

⁴² Uniform Electronic Transactions Act 1999, § 15(b)(1).

⁴³ Julie C. White, ET VIR v Lucas Strange ET UX 80 So. 3d 1189, 2011 La. App. LEXIS 1657

⁴⁴ Uniform Electronic Transactions Act 1999, § 15.

However, it provides additional assurance to the other party regarding the acceptance of the terms of the contract and is therefore important.⁴⁵

The electronic transaction legislation states that a transaction is not invalid for being conducted electronically.⁴⁶ Accordingly, in *eBay International AG v Creative Festival Entertainment Pty Limited*⁴⁷ contents of a web site were liberally interpreted and regarded as writing. The electronic transaction legislation attempts to achieve functional equivalence without transposing all the functions of paper based documents into the online environment. In effect, the information contained within a paper based document does not change or get altered after it is created. Traditional paper based documents are tangible, stable and confined to a specific paper.⁴⁸ A person will have control over how a document is created and stored. In contrast, when a document is created by means of cloud computing a person will not have any control over the manner in which it is created, stored and processed. Traditional paper based documents or even the documents saved on the desktop of a personal computer are confined to a specific place they are not scattered and stored over various servers as in the case of cloud computing technology. Cloud computing based documents are stored on the internet therefore the insecure nature of internet also raises security concerns.

Moreover, under a cloud computing infrastructure a user will not know who is accessing their document and the data cannot be monitored in any way. The user cannot be sure that a confidential file which they delete has in fact been deleted from the system. As the cloud computing technology can always store a backup file. Cloud computing fully depends upon the internet for access and is therefore prone to security risks twenty four hours a day.⁴⁹ Documents and data are processed outside the company therefore inherent risks are always involved. In cloud computing technology outsourced services bypass the physical, logical and personal controls.⁵⁰ In desktop based documents data can be recovered from the hard drive of the laptop or desktop computer. In contrast, in case of cloud computing data is stored online hard drive cannot be removed to recover data.⁵¹

Under traditional desktop based models administrative access to servers and is controlled though on premises. While in cloud computing administrative access is through internet exposing the organisation to risks. Many times user credentials are stored outside the organisation in cloud infrastructure. Therefore companies must ensure that the accounts of employees are removed from the cloud infrastructure once they leave the company. Virtualization is one of the key components of cloud computing. Virtualised machines can be paused, restarted and reverted to earlier instances. Due to this dynamic structure of cloud computing security cannot be maintained constantly.⁵²

Under Section 8 of the electronic transaction legislation the requirement to give information in writing is satisfied if the information provided is accessible and usable for subsequent reference. It merely focuses on 'accessibility' and 'usability'. It does not specifically deal with retaining contents in a stable manner.⁵³ Electronic documents differ from paper based documents they are not only created but also processed through the cloud infrastructure. Online writing becomes accessible via various levels of cloud infrastructure unlike paper based writing. The criteria are wide enough to cover any storage device capable of retaining the information. These broad requirements leave more scope for disagreement regarding what

⁴⁵ Statute of Frauds 1677 (UK); Property Law Act 1974 (Qld); Instruments Act 1958 (Vic); Conveyancing Act 1919 (NSW); Law of Property Act 1936 (SA); S Christensen, W Duncan and R Low, 'The Requirement for Writing for Electronic Land Contracts – The Queensland Experience Compared With Other Jurisdictions' (2003) 10(3) E Law: Murdoch University Electronic Journal <<http://www.austlii.edu.au/cgi-bin/sinodisp/au/journals/MurUEJL/>> at 22 July 2007.

⁴⁶ Electronic Transaction Act 2000 (Vic) s 7.

⁴⁷ *eBay International AG v Creative Festival Entertainment Pty Limited* [2006] FCA 1768 at 48, 49

⁴⁸ E K MiK, From Clay Tables to AJAX Replicating Writing and Documents in internet Transactions 15(8) Journal of Internet Law2, 2-4.

⁴⁹ Stanford School of Medicine 'Cloud computing: An Overview' <<http://med.stanford.edu/irt/security/cloud.html>> at 23 January 2013

⁵⁰ InfoWorld, Gartner- Seven Cloud computing security risks ' <http://www.infoworld.com/d/security-central/gartner-seven-cloud-computing-security-risks-853> at 23 January 2013

⁵¹ Dwachira 'Data Security Issues in Cloud Computing' <<http://dwachira.hubpages.com/hub/Data-Security-Risks-In-Cloud-Computing>> At 23 January 2013

⁵² R P Padhy et al, 'Cloud Computing: Security Issues and Research Challenges' (2011) 2 (1) International Journal of Computer Science and Information Technology and Security p 139

⁵³ E K MiK, From Clay Tables to AJAX Replicating Writing and Documents in internet Transactions 15(8) Journal of Internet Law2, 2-4.

terms and conditions were agreed between the parties. Arguably, in an online environment additional factors such as technological variations and easy alterable ability of electronic documents make traditional paper-based safeguards even more crucial. The guidance provided under the legislation will be of little help from the perspective of agreed terms of a contract.

4.1 Signature: Australia

The requirement focuses on the basic function of a signature such as to identify the person and to indicate the person's intention.⁵⁴ According to the explanatory memorandum to the Victoria bill, the signature method is not required to uniquely identify the persons, instead it must sufficiently identify the person for the electronic communication or the contract.⁵⁵ Based on functional equivalence principle signatures are considered same as traditional paper based signature without transposing all their functions in an electronic media. Based on technology neutral principle all the signatures are provided equal validity although different signatures require different legal analysis. Paper based signatures are stable and inscribed on a static and stable medium. Electronic signatures are transient.⁵⁶

Moreover, transactions carried out through cloud technology are highly insecure; therefore it is necessary to re-evaluate the effect of electronic signatures. In an online environment, identities take the form of numbers and digits and lack physical identification. In an electronic medium means of verifying and ascertaining the identity of a person are limited and unreliable. In an offline environment a person is recognised by his name and physical appearance but in the online world the co relation between, name and physical appearance of a person is lost. Different electronic signatures provide varying degree of identification. In an online environment a person can have multiple identities. In an online environment a person can impersonate someone else or can cheat by claiming to be a person who is non-existent.⁵⁷ Means available in an electronic environment are email address, clicks, Internet Protocol (IP) addresses which can be easily manipulated. The issue is enhanced due to the fact that cloud computing enables remote identification and false identity can easily be obtained. It therefore makes identification and verification of signatures more difficult unlike signatures which are stored on the desktop. If a signatory denies a signature he cannot be easily made accountable. Signature cannot be uniquely associated with a person under the cloud computing infrastructure and provide significant scope for identity theft. Anyone who has access to the document can adopt the identity of another person. In addition cloud infrastructure also lack interoperable standards. As a result a signature may also lose its effect due to lack of interoperable standards.

Electronic signature criteria provide legal validity to electronic signatures without providing means for linking the signature to a specific person. Providing validity in this manner will be of little help if it cannot be enforced against the person who created it.⁵⁸ In the *Corporation of the City of Adelaide v Corneloup and Ors*⁵⁹ electronic signatures were liberally recognised without much legal analysis. Unlike traditional transactions 'identity' cannot be used effectively to distinguish between people and therefore does not have same value as in the case of offline transactions. Justifications made in relation to online identity lose their importance further in relation to cloud computing. Reliable means of determining the identity of a person are further reduced in a cloud infrastructure. Further, indication of personas intention with respect to a particular transaction cannot be determined. Cloud infrastructures are difficult to investigate. Investigation of unauthorised activity may be almost impossible in cloud computing as it consists of co-located data of several customers and spread across an every changing set of bots and data centres.⁶⁰ Long term viability of data can also be an issue availability of data in a replacement application

⁵⁴ Electronic Transactions Bill 1999 (Cth) Explanatory Memorandum.

⁵⁵ Electronic Transactions Bill 2000 (Vic) Explanatory Memorandum, 11-2.

⁵⁶ Electronic Commerce Expert Group, Electronic Commerce: Building the Legal Framework, Report of the Electronic Expert Group to the Attorney General, Executive Summary.

⁵⁷ E Mik, 'Mistaken Identity, Identity Theft and Problems of Remote Authentication in E-Commerce' 28 (2012) Computer Law and Security Review 396-402.

⁵⁸ E K Mik, 'Some technological Implications for ascertaining the contents of contracts in Web-Based Transactions' (2011) 26 Computer Law and Security Review 368-376.

⁵⁹ Corporation of the City of Adelaide v Corneloup and Ors [2011] SASFC

⁶⁰ InfoWorld, Gartner- Seven Cloud computing security risks ' <http://www.infoworld.com/d/security-central/gartner-seven-cloud-computing-security-risks-853> at 23 January 2013

can be difficult to ascertain.⁶¹ In addition an user of a computing infrastructure cannot precisely determine where the data is located and how it is protected. It may be located at various servers involving geographically dispersed data centres.⁶²

5. Writing and Signature: USA

Like the model law, UETA focuses primarily on removing traditional barriers to enable formation of electronic contracts.⁶³ Section 3 of UETA states that the Act applies to electronic records as well as electronic signatures in their relation to a transaction.⁶⁴ The term 'transaction' is defined as action which occurs between two or more people relating to commercial matters or governmental affairs.⁶⁵ Section 7(b) of the of the Act deals with formation of contracts. Under Section 7 (b) a contract formed electronically must not be denied legal effect for being in an electronic form.⁶⁶ In *Campbell v General Dynamics Government Systems Corp*,⁶⁷ web based content was liberally interpreted as writing.

The legislation not only recognises contracts formed through electronic means but also acknowledges the differences between electronic and paper-based media by specifically referring to electronic records.⁶⁸ The term 'electronic record' is defined as 'record created, generated, sent, communicated, received, or stored by electronic means'.⁶⁹ The definition of the term 'record' requires information stored on an electronic medium to be 'retrievable in a perceivable form'.⁷⁰ Although the Act acknowledges the technical difference between a paper based medium and electronic media it is not technology sensitive to an adequate extent.

Electronic record and writing are interrelated concepts. Writing is inscribed on an electronic record. In relation to cloud computing what should be regarded as the electronic record is it the Iaas, Paas, Daas or the entire hard ware of cloud infrastructure. Electronic records stored in a cloud may be out sourced and scattered over various servers. Hence cloud computing technology makes it difficult to confine the scope of the electronic record. Can the web browser be regarded as the electronic record? However, the stored version or printable version of a web document may appear different from the document accessed online. Cloud infrastructure also allows establishment of mash up web application. It combines data from more than one source into a single integrated document. Therefore unlike traditional paper based documents scope of a web based document cannot be determined.⁷¹

Furthermore, cloud computing facilitates establishment of virtualization software. Analysis of electronic records from the perspective of virtualisation software provides additional insights regarding the issue. By means of virtualization software multiple software applications can be run on a single computer simultaneously. In virtualization infrastructure the main operating system is called the host and the secondary systems are called guest. When virtualization software is running each subsequent system installed on the computer will act like a new computer. Different applications such as windows, linux can be run simultaneously. Traditional paper based documents maintain the contents of a document in a stable manner. When a single document is viewed by means of different software it may appear differently and may not incorporate all the features of a particular website. As a result electronic d records cannot be regarded as stable like traditional paper based documents.⁷²

⁶¹ Ibid.

⁶² Global Technology Industry Discussion Series, Cloud computing impact and assessment (2011) 26- 27.

⁶³ D Witte, 'Avoiding the Unreal Estate Deal: Has the Uniform Electronic Transactions Act Gone Too Far?' (2001-2002) 35 John Marshall Law Review 311, 315-7.

⁶⁴ Uniform Electronic Transactions Act 1999, § 3.

⁶⁵ Uniform Electronic Transactions Act 1999, § 2(16).

⁶⁶ Uniform Electronic Transactions Act 1999, § 7.

⁶⁷ *Campbell v General Dynamics Government Systems Corp* 407 F. 3 d 546, 556 (1st Cir. 2005)

⁶⁸ Uniform Electronic Transactions Act 1999, § 7.

⁶⁹ Uniform Electronic Transactions Act 1999.

⁷⁰ Uniform Electronic Transactions Act 1999, § 2(13); Boss, above n 52, 309.

⁷¹ B Furht, Hand book of cloud computing (2010) 11-12.

⁷² Techsoup <<http://www.techsoup.org/support/articles-and-how-tos/virtualization-101>> at 1 January 2013

5.1 Signatures: USA

UETA broadly defines 'electronic signature' as a symbol with intent to sign the record. s 2(8) of UETA defines an 'electronic signature' as electronic sound, symbol or process associated with a record. It also requires the signature to be adopted by a person with the intent to sign the record.⁷³

A critical element in UETA is the presence of intention to execute or adopt the sound or symbol or process for the purpose of signing the related record. Hence, under UETA, any form of electronic sound, symbol or process attached to or logically associated with a contract or other record and executed or adopted by a person with an intention to sign the record will constitute an 'electronic signature' as long as some affirmative step is taken by the signer with an intent to sign the record and the electronic signature is linked or logically associated with a record. However, the UETA does not specify as to how this intention can be exhibited. The commentary on UETA only states that the critical element is the intent to sign.⁷⁴⁷⁵

Most cloud computing infrastructure make use of HTML (Hyper Text Mark Up Language). By means of HTML various pages can be linked together. Therefore, contents of electronic contracts cannot be confined and restricted unlike traditional contracts. In addition websites can also be linked to other websites which makes it difficult to determine the scope of the document. Hyperlinks also create ambiguity reading the source of the documents. Contents from different sites may appear as if they belong to a single web site.⁷⁶ Therefore, intent to sign the record can be easily denied. In addition, webpages can be easily updated and the contents of a web site can be easily changed. Due to this inherent quality of websites logical association of intention with the electronic record as required by the Act cannot be determined easily.

Electronic signatures were liberally interpreted and were provided validity in *Shattuck v Klotzbach*⁷⁷ Discussion on validity of electronic signature was also made in *Richard S Berger v Robert Newhouse*⁷⁸ it was held that the form consisting of electronic signature was filed in error because the board member had not adopted, executed or authorized the electronic signature. Court noted that the Delaware's *Uniform Electronic Transactions Act* enables a board member to challenge the form on those grounds. Similar view was expressed in *Hepfinger v white*.⁷⁹ Overall, electronic signatures are being provided validity liberally. They are not being enforced only if the signatory fails to authorise the use of electronic documents.

6. Conclusion

The Article examined the legal effect of electronic contracts from the prospective of cloud computing. A comparative analysis of the laws of Australia and USA was carried out to gain additional insights. This article submits that the influence of technology and international and national developments has led to the development of different approaches. The overall discussion of the article leads to the consideration of deficiencies in relation to writing, signature, time and place of contract formation. Comparative analysis of the laws of USA and Australia indicate that the laws of USA have fallen behind. The laws of USA lack precise criteria. Although they acknowledge technical features of electronic contracts, they contain ambiguous technical terms that provide limited relief and create confusion.

In relation to determination of time of contract formation Uniform Electronic Transactions Act 1999 (USA) appears to be pointing towards the entire cloud computing infrastructure. In comparison, the Australian legislation appears to have adopted a better approach. Although the approach adopted by the Australian legislation has its own uncertainties it provides more precise criteria and appears to be pointing towards IP address of the cloud infrastructure or the email address.

⁷³ Uniform Electronic Transactions Act 1999, § 2(8).

⁷⁴ Uniform Electronic Transactions Act 1999, § 9(a); M R Hariss and N Singhvi, 'Electronic Contracts More Than A 'Virtual' Reality' (2000) 19(13) Banking and Financial Services Policy Report 7, 7-8.

⁷⁵ Uniform Electronic Transactions Act 1999, § 2 Comment 7.

⁷⁶ E K Mik, 'Some technological Implications for ascertaining the contents of contracts in Web-Based Transactions' (2011) 26 Computer Law and Security Review 368-376.

⁷⁷ *Shattuck v Klotzbach*, 14 Mass L Rptr 360 (Massachusetts Superior Court, 2001).

⁷⁸ *Richard S Berger v Robert Newhouse* 83 Fed Appx. 19 ; 2003 U.S App.Lexis 24745

⁷⁹ *Hepfinger v white* 2005 Mich App. LEXIS 2192.

Likewise, in the light of the nature of internet and websites there can be multiple locations involved when acceptance takes place. Therefore, determination of place of contract formation is problematic. Precise place of formation of contract cannot be determined. There is lack of rule which can indicate specific place of formation of electronic contracts under both the *Uniform Electronic Transactions Act 1999* and the Electronic Transaction legislation of Australia. However, the Australian legislation provides more precise criteria and appears to be better.

Traditional paper based documents or even the documents saved on the desktop are confined to a specific place they are not scattered and stored over various servers as in the case of cloud computing technology. Therefore cloud infrastructure raises security concerns in relation to writing and signature requirement. Further, by means of new technologies such as mash up, documents can be linked together raising concerns regarding scope of the document. Both the UETA and electronic transaction legislation has side stepped these aspects while addressing the criteria dealing with writing and signature.

In order to address the issues raised in this article the changes brought about by the new technologies must be closely epitomized

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