1. Mobile commerce

(1) Before elaborating on the issues specific to this field of commerce, it is important to understand what the term “mobile commerce” or in short, as hereinafter referred to, “m-commerce” actually means. Since no single, binding definition exists, the following description shall outline the understanding of m-commerce for the purpose of this document.

a) Understanding of e-commerce:

(2) In general it is accepted that m-commerce is part of electronic commerce or in short “e-commerce”. It is therefore useful to first examine the understanding of the term “e-commerce”.

(3) E-commerce itself is, just like m-commerce, not defined in a standardized and binding way. Not even laws on e-commerce provide a definition but rather define for instance the form and context of information or the type of services which are then considered to be provided within the context of e-commerce. As such, according to the Model Law on Electronic Commerce, e-commerce is defined by the sending of “any kind of

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1 Whether m-commerce can be seen as part of e-commerce depends not only on the definition of e-commerce or m-commerce but also on the technology involved. Especially due to the latter, it is risky to purport that m-commerce was always part of e-commerce. Wariness of this issue may for instance be seen in the UNCITRAL document “Present and possible future work on electronic commerce”, A/CN.9/692, para. 68: “In most, if not all cases, the [mobile] communication may be qualified as of electronic nature under the legislative standards adopted in UNCITRAL texts.”


4 Ibid., 2.
information in the form of a data message used in the context of commercial activities[^5] where “data message” is any “means of information generated, sent, received or stored by electronic, optical or similar means.”[^6] In the Directive of the European Union on electronic commerce[^7], the exchange of information in a commercial context, defined as “commercial communication”,[^8] is also an important factor, however is not used to define e-commerce. Rather the main emphasis lies on “information society services”[^9], which are services “normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services.”[^10] Though, as the full title of the Directive “legal aspects of information society services, in particular electronic commerce” (emphasis added) suggests, not all information society services are services which define e-commerce. While the definitions used to explain the term “e-commerce” may differ from one another, they serve to draw the outer limits of m-commerce, if it is regarded as part of e-commerce.

b) Understanding of m-commerce:

(4) In contrast to e-commerce, m-commerce is not defined in any laws or international standards, neither directly nor indirectly. While laws exist, wherein the subject of m-commerce is touched[^11], they either contain no definition or define only a very narrow aspect of m-commerce, as is suitable for the scope of the law in question[^12].

(5) A very elaborate, supranational definition of the term “m-commerce” can however be
found in a study by the Organisation for Economic Co-operation and Development ("OECD"). Thein, m-commerce is defined as “commercial transactions and communication activities conducted through wireless communication services and networks by means of short message services (“SMS”), multimedia messaging service (“MMS”), or the Internet, using small, handheld mobile devices that typically have been used for telephonic communications.” (emphasis added)

(6) This definition highlights the two key aspects of m-commerce: wireless communication and mobile devices. However while it acknowledges that today mobile devices are no longer restricted to SMS or MMS and may also access the internet for purposes of m-commerce and while this possibility is included Accordingly, the restriction to mobile devices “that typically have been used for telephonic communications” does not reflect the current state of technology. For a long time already, various enterprises have developed mobile devices, which do not offer the possibility for telephony but whose primary use is rather to wirelessly access the internet from wherever the user wishes, e.g. either by means of a smart card inserted into the device, thus through mobile communications networks, or over a wireless local area network (“WLAN”) access point. This class of devices currently has no common name, apart from the generic term “mobile device”, which will be used for the purposes of this article though it does not distinguish between devices which are designed to access wireless networks and those which cannot. Depending on size and input method among other criteria, possible names for subclasses of this type of devices include “Mobile Internet Device” (“MID”), “Tablet” or “Smartphone”. While it cannot be ruled out that a new standard

14 Ibid., p 2.
15 This is not surprising, considering that the paper was published two years ago, even though it does show foresight in other aspects.
16 This is the main difference between such devices and laptops or netbooks, which offer the possibility of wireless access to the internet but are not intended to primarily connect through mobile communications networks. Many, if not most, laptops and netbooks do not even possess a built-in smart card slot.
17 Depending on the respective mobile communications network standard and the software on the card, smart cards for use in mobile phones may be referred to as e.g. “SIM-cards” (subscriber identity module cards), “R-UIM-cards” (removable user identity module cards) or “UICC” (universal integrated circuit cards). In the end however these names do not imply, that the so denominated cards were not smart cards, rather they serve to clarify that those smart cards are ones which are used for a specific purpose.
18 The term “Mobile Internet Device” originally applied to devices with certain processors only, but the meaning has since been expanded to cover a wider range of devices.

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term for this class of mobile devices will eventually emerge, fragmentation into additional subclasses cannot be ruled out.\(^{19}\) However where the primary route for mobile devices to access the internet is by means of a smart card,\(^{20}\) they share the same limitations inherent to the use of mobile communications networks\(^{21}\) as mobile devices primarily designed for telephony.

(7) Accordingly for the purposes of this document the definition by the OECD shall be adapted as follows: "**m-commerce are any commercial transactions and communication activities conducted through wireless communication services and networks using handheld mobile devices that have been designed to be used within mobile or other wireless communications networks.**"

(8) For the purpose of standardization or regulation, the above definition can, should the need arise, be narrowed, for instance to cover the situation commonly found in developing countries, where due to lower pricing types of devices featuring old technology are prevalent.\(^{22}\) However a broad and technology neutral understanding of m-commerce and especially the devices used for purposes of m-commerce is essential to make any definition future-proof.\(^{23}\)

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\(^{19}\) In recent times this has happened with the device class of netbooks, which are distinguished from laptops or sub-notebooks. While the differentiation can be unclear in some cases, the different denominations are still used.\(^{20}\) While mobile devices exist which are not designed to access mobile communications networks and while constant WLAN-access would in theory be possible, mobile devices are not intended for stationary use and it is highly unrealistic, even in urban areas, that one may always or at least most of the time find a WLAN access point, much less a free one.\(^{21}\) For details see below, paras. (22)-(31).\(^{22}\) ITU, *Information Society Statistical Profiles 2009 – Africa*, p. 17, UNCTAD, *Information Economy Report 2009*, United Nations publication, SalesNo. E.09.II.D.18, p. 4.\(^{23}\) As can be seen by the example of the definition contained in the OECD *Policy Guidance for Addressing Emerging Consumer Protection and Empowerment Issues in Mobile Commerce*, a definition that adheres too strictly to the technological status quo may become inappropriate for purposes of legislation and standardization in as little as two years’ time.
2. Conclusion of contracts

a) Legally binding information:

(9) The main legal requirement for m-commerce to be even possible is the ability to submit legally binding information, such as the declaration to accept a contract, from and to a mobile device. This issue is not exclusive to m-commerce, rather it also applies to e-commerce and has thus been addressed for instance in Article 12 para. 1 of the Model Law on Electronic Commerce:24 “In the context of contract formation, unless otherwise agreed by the parties, an offer and the acceptance of an offer may be expressed by means of data messages. Where a data message is used in the formation of a contract, that contract shall not be denied validity or enforceability on the sole ground that a data message was used for that purpose.” Article 5 furthermore stipulates: “Information shall not be denied legal effect, validity or enforceability solely on the grounds that it is in the form of a data message.” The definition of “data message”25 is broad enough to cover information sent to and from mobile devices. Insofar any nation that has enacted or adopted the Model Law on Electronic Commerce should also have provided the basic requirement for m-commerce as defined in this document.26

b) Signing:

(10) Signing of electronic data27 is possible by means of electronic signatures, which are themselves electronic data attached to or logically associated with the signed data.28

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25 Ibid., Article 2 (a).
26 This would not be the case if mobile communication or messages sent from and / or retrieved by mobile devices are except from the scope of national law.
27 Laws such as the Model Law on Electronic Signatures of the United Nations Commission on International Trade Law, A/RES/56/80, or the Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures do not restrict the type of electronic data that can be signed. Under such laws therefore it would not only be possible to sign written communication but also audio or audiovisual messages. However Article 9 para. 4 (b) of the United Nations Convention on the Use of Electronic Communications in International Contracts, A/RES/60/21, stipulates that where communication is required to be retained in the original form, it needs to be capable of being displayed, thus suggesting that only visual data can be retained in the original form.
28 See, for instance, Model Law on Electronic Signatures of the United Nations Commission on International
Various laws\textsuperscript{29} provide for different types of signatures,\textsuperscript{30} though all types of signatures have in common that they should ensure on the one hand the identity of the sender and on the other hand provide an indication for his intention\textsuperscript{31} in respect of the information contained in the electronic data. Additionally signatures may also ensure the integrity of the electronic data transmitted by the sender. However not any electronic signature may replace a handwritten signature, if the latter is demanded by law for the validity of a contract. Rather this can only be achieved by using certain electronic signatures, which meet specific criteria defined by law.\textsuperscript{32} Apart from legal requirements, contracting parties also have a legitimate interest in documenting and preserving agreements in a form that allows them to reproduce the content of the agreement and verify the identity of the other contracting party or parties later on. For this reason even if the applicable law does not require that a contract is concluded in written form or with a handwritten signature, contracting parties may still insist that certain formal requirements are met for internal purposes alone.

(11) The most prevalent method for digital signing is by use of a smart card / card reader combination. The smart card contains the private key and access to this data is secured by a personal identification number (“PIN”). The card reader accesses the data

\textsuperscript{29} See 28.
\textsuperscript{30} For instance Article 2 of the Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures distinguishes between electronic signatures, advanced electronic signatures and advanced electronic signatures based on a qualified certificate. The Model Law on Electronic Signatures of the United Nations Commission on International Trade Law, A/RES/56/80, does not define different types of signatures, however Article 6 para. 3 (d) stipulates that any alteration made to the signed information needs to be detectable if the purpose of the legal requirement for a signature is to provide assurance of the integrity of the signed information. For an overview see also Getting The Deal Through – e-Commerce 2011, question 7.
\textsuperscript{31} In contrast to Article 2 (a) of the Model Law on Electronic Signatures of the United Nations Commission on International Trade Law, A/RES/56/80, or Article 7 para. 1 (a) of the Model Law on Electronic Commerce of the United Nations Commission on International Trade Law, A/RES/51/162, Article 9 para. 3 (a) of the United Nations Convention on the Use of Electronic Communications in International Contracts, A/RES/60/21, no longer restricts signatures to the purpose of indicating the signatory’s approval of the signed information but rather more broadly requires the indication of the signatory’s intention in respect to the signed information. It should be noted that Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures does not explicitly stipulate that an electronic signature should indicate the approval or the intention of the signatory regarding the signed information though this requirement is implied.
on the card upon entry of the PIN and then generates the signature by combining the
user's private and public keys. While today mobile devices exist which can read smart
cards used to generate electronic signatures, there are only a handful of models.
External card readers for mobile phones are at the time nonexistent. While the
introduction of Micro-USB as standard port for connection and charging of mobile
devices,\(^\text{33}\) which is realized slowly but steadily, may facilitate the connection of external
card readers to mobile phones, the commercial viability of such devices is doubtful,
especially considering that today's card readers are about the size of a mobile phone.

(12) Since mobile devices designed to access mobile communications networks allow for
the insertion of smart cards, such devices already are card readers. Therefore it would
be possible to use such specific smart card / card reader combinations to generate
electronic signatures for electronic data transmitted by means of the mobile device
itself. The technology for generating a mobile signature,\(^\text{34}\) thus an electronic signature
using only a smart card and a mobile device as card reader, exists and is commercially
available. However it is not yet widespread, therefore the possibility of being able to
electronically sign mobile information is not ensured. The main reason for this is not of
a technical but rather legislative nature, though naturally the legal provisions on
electronic signatures have technological implications. Laws on electronic signatures
such as the \textit{Model Law on Electronic Signatures}\(^\text{35}\) or the \textit{Directive for electronic
signatures}\(^\text{36}\) contain very detailed provisions regarding the electronic signatures
themselves, data and devices used for generating and verifying them, certificates for
confirming the link between the signatory and the signature creation data, the providers
of such certificates as well as the complex interaction between all these components
and entities. The requirements and thus the complexity increase the more secure or
advanced an electronic signature needs to be.\(^\text{37}\)

\(^{33}\) Announcement of the Open Mobile Terminal Platform, now part of the Wholesale Applications Community, from
19.08.2010.

\(^{34}\) This is not to be confused with e-Government mobile signature offerings, where a code is sent to a registered
mobile device via SMS which code then needs to be input on a website. See for instance the explanation of this

\(^{35}\) \textit{Model Law on Electronic Signatures} of the United Nations Commission on International Trade Law,
A/RES/56/80.

framework for electronic signatures.

\(^{37}\) Ibid., 30.
(13) Certain legal requirements pertaining to electronic signatures can be regarded as fulfilled by the data already attached to or associated with mobile communication such as SMS or calls from a mobile device. For example electronic data sent from a mobile device usually contains information on the identity of the sender of such data, unless purposefully withheld by the sender. However information on alterations to the electronic signature made after the time of signing\(^\text{38}\) or on the integrity of the signed information\(^\text{39}\) is not provided by default. Where the mobile device does not provide the means to create such data and cannot be updated with reasonable effort to do so, which is usually the case with older or current non-smartphone mobile phones, methods for the external generation of such information would need to be provided, which can preferably be used by SMS.\(^\text{40}\)\(^\text{41}\) However it needs to be taken into consideration that the more data needs to be transferred, higher the costs of mobile signatures and the requirements pertaining to the mobile communications networks may rise, thus deterring possible users\(^\text{42}\) or excluding certain geographic areas.\(^\text{43}\) Another issue is that while a smart card and the card reader used only for generating electronic signatures can be and usually are kept separately, in case of mobile devices, the smart card is usually left in the mobile device at all time.

(14) Therefore any legislation which aims to enable the use of mobile signatures in general or as an electronic replacement for handwritten signatures\(^\text{44}\) will need to take the above


\(^{39}\) Ibid., Article 6 para. 3 (d).

\(^{40}\) For details see below, paras. (29) – (31).

\(^{41}\) The use of mobile transaction authentication numbers (“mTANs”), which are provided by SMS and are used for verification purposes in banking transactions, would not be feasible in such a context. The mTAN system relies on the separation of access credentials required to access an account and prepare a transaction and the mTAN itself needed to execute said transaction. In the context of electronic signatures generated with the help of a smart card and a mobile device into which it is inserted, all information required for the generation of an electronic signature can be provided upon access to the service. The requirement to enter a confirmation code sent to the very device from which the service has been accessed would therefore have no impact on the security of the electronic signature.

\(^{42}\) For details see below, para. (25).

\(^{43}\) For details see below, paras. (29) and (30).

\(^{44}\) This does not impede the legislator to exclude the use of certain or all types of electronic signatures for certain types of contracts or declarations. For instance Article 4 para. 2 of the Austrian *Bundesgesetz über elektronische Signaturen (Signaturgesetz - SigG)* stipulates that handwritten signatures cannot be replaced by qualified electronic signatures for e.g. legal acts regarding family or inheritance law or legal acts requiring notarization.
peculiarities into account to facilitate mobile signing. However for the furtherance of m-commerce in general it additionally needs to be ensured that a significant number of contract types, especially those that users might conclude regularly, are exempt from the requirement of a handwritten signature in the first place.

c) Retention:

(15) Usually for taxation purposes laws may require the retention and preservation of communication or agreements for several years.\(^{45}\) One problem in this context is that usually retention of the original is required which is not possible for electronic data, where no original exists. Though where law provides for electronic retention of data, this issue is usually solved by determining the criteria under which electronically stored data can be regarded as equivalent to original form.\(^{46}\)

(16) Another problem which cannot be solved as easily is that mobile devices, especially older mobile phones, are not designed for storage of significant amounts of data or for an extended period of time. These design restrictions manifest themselves in various forms, such as limited storage space, probable lifetime of the hardware but also in the marketing efforts not only by hardware suppliers but also by mobile communications network providers to convince people to acquire new mobile devices at regular intervals. While modern mobile devices may have removable storage media or at least the ability to synchronize with a computer, thus providing the possibility to copy and backup relevant electronic data, older devices usually lack such features. However even the latter possess the ability to access mobile or other wireless communications networks,\(^{47}\) thus retention of electronic communication stored on such devices could be achieved by forwarding the communication to devices which allow for easier storage and backup. Another possibility would be the forwarding of such communication to paid-for storage service providers.

\(^{45}\) For example Article 132 para. 1 of the Austrian Bundesabgabenordnung (BAO) demands retention of commercial documents for at least 7 years. Article 18 para. 10 of the Austrian Umsatzsteuergesetz (UStG) requires that documents relating to certain real estate need to be retained for 22 years.

\(^{46}\) See for example Article 132 para. 2 of the Austrian Bundesabgabenordnung (BAO) or Article 9 para. 4 of the United Nations Convention on the Use of Electronic Communications in International Contracts, A/RES/60/21.

\(^{47}\) Otherwise they would not fall under the definition in para. (7).
3. Display of information

a) Restrictions resulting from the mobile device.\textsuperscript{48}

(17) Mobile devices are as a rule designed to be portable and usually handheld. From this design decision, restrictions result as to the possible dimensions and weight of the mobile device. While the weight limits the materials that may be used as well as features which require specific hardware to be built in, the dimensions, while once again limiting features requiring specific built-in hardware, also limit the size of the screen, viable screen resolution as well as possible input methods.

(18) Tablets, which are among the largest mobile devices, are affected the least by the above mentioned restrictions. Modern mobiles devices intended for telephonic communication currently feature display sizes of around 4” and resolutions of around 480x800 pixels, which is but a fraction of the average size and resolution of current monitors. The gap grows far wider if older mobile devices are taken into consideration, featuring display sizes of around 1” and resolutions of around 100x60 pixels. Such low-end mobile devices however are still widely used especially in developing countries, not only in the form of second-hand devices but also new devices specifically developed to be cheap in production and thus be sold for a very low price.\textsuperscript{49}

(19) Display size and resolution determine how and which information can be displayed to the user. Long text is very hard to read on low-end mobile devices; even scrolling through such texts can prove tedious, if the text can even be sent to the mobile device.\textsuperscript{50} Images with high resolutions cannot be displayed in their entirety on such devices. Scaling is usually not an option, leading to loss of detail up to the point of rendering the image unidentifiable. It is therefore important to ask, whether required information can be transmitted at a later time using a more appropriate medium. The answer to this question is crucial where certain information is not only required factually

\textsuperscript{48} This section only covers restrictions resulting from the hardware used. Restrictions resulting from software or lack thereof are not treated here.


\textsuperscript{50} For details see below, paras. (22)-(31).
but by law. One way to alleviate these problems with mobile services is to have users register by computer or paper form and then supply them with the data necessary for accessing the service proper from the mobile device. On the one hand this allows for the provision of all information required by law, on the other hand the amount of information that needs to be sent to the mobile device as well as the amount of data the user needs to input over the mobile device can be reduced. While this method is a viable option for services which are used periodically or regularly, it is far less attractive for services which the user expects to use rarely or only a few times or for the purchase of electronic or non-electronic goods. Furthermore by forcing the user to employ other devices or media for registration, artificial bottlenecks may be created for areas, where the required devices are scarce or the delivery of analogue media is problematic.

(20) One basic principle of most, if not all legal systems is that a contracting party needs to be informed of or at least be able to access the contract details to validly conclude the contract in question. This is especially true for consumer contracts. Therefore e-commerce and consumer protection laws generally oblige the vendor or provider of goods or services to transmit the contract details to the customer before conclusion of the contract or to explicitly point out, where those can be found while also ensuring that the customer can access them before conclusion of the contract. The problem in the case of m-commerce is that on the one hand it may not be feasible or possible to send the contract details in their entirety to the mobile device while on the other hand the customer may not be able to access the contract details from his mobile device, though they may be easily accessible through other mobile devices, supporting the appropriate protocols for internet access over mobile communications networks. Where the law requires that the information needs to be provided in such a way that it can be saved by the customer for further reference, limited storage space on mobile devices can become an additional problem.

52 For details see below, paras. (22)-(31).
53 Ibid.
54 For details see above paras. (15) and (16).
(21) For purposes of legislation the consequence is that informational requirements which need to be met before the conclusion of a contract have be reduced to the necessary minimum while allowing the full contract details to be provided later by means of an appropriate medium.

b) Restrictions resulting from the mobile communications network:

(22) Mobile communications networks were originally designed for telephonic communication only and the effects of this design can still be felt in regard to data services, among them internet access.

i) Transmission of electronic data:

(23) The original Global System for Mobile Communications ("GSM") network, launched in 1991, was primarily focused on analogue speech transmission, though it did allow transmission of digital data with a rate of up to 9.6 kpbs. Packet data capabilities were added with the introduction of General Packet Radio Service ("GPRS") in 1997, raising data rates to around 48 kbps. The next big leap forward resulted from the introduction of Enhanced Data Rates for GSM Evolution ("EDGE") in 2003 with data rates of around 57 kbps. At the same time IEEE 802.11g-2003 for WLAN allowed for data rates of 54 Mbps, that is 54.000 kbps. Currently, Evolved High-Speed Packet Access ("HSPA+"), which was introduced in 2009, provides data rates of up 56 Mbps over mobile communications networks while IEEE 802.11n-2009 for WLAN features a maximum data rate of 600 Mbps. Both are however dwarfed by Ethernet LAN connections, achieving data rates of many Gigabits per seconds.

(24) While maximum possible data rates are rarely, if ever, seen in practice, the gap

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55 Even SMS were not part of the original design.
56 Originally Groupe Spécial Mobile.
57 Kilobits per Second, equals 125 Bytes per Second.
58 While GPRS is technically capable of data rates from 21.4 to 171.2 kpbs, rates above 48 kpbs are rarely achieved in practice. The main reasons are throttling by mobile network operators and the lower priority of data packets compared to voice packets but the signal strength or the phone used also have an effect on data rates.
59 Technical specifications allow for rates between 43.2 and 345.6 kbps.
60 1 Gigabit equals 1.000.000,00 Kilobits.
between mobile and other wireless or wired connection speeds is evident and widening. Currently achievable data rates over mobile communications networks already qualify as broadband connections. As such, mobile access to the internet, even to sites demanding high data rates, is possible, though it cannot be assured to which extent this will hold true for the future.

(25) Another factor that needs to be considered is pricing. While for other types of internet connections true flat-rate offerings are widespread, where no specific data volume is set and no charges can arise from exceeding such volume, such offerings for mobile communications networks are very limited, especially coupled with telephony, and not available everywhere. Additionally, mobile networks operators generally distinguish between data tariffs for mobile modems, where the smart card is only to be used for internet access as well as sending and receiving SMS, and data tariffs for mobile phones. The latter are generally more expensive and offer a lower volume than data tariffs for mobile modems. Users therefore constantly need to monitor their data usage to avoid additional charges, especially when using a mobile phone. This can prove a significant barrier to the adoption and use of mobile internet connections, especially in highly price-sensitive areas.⁶¹⁶²

(26) A technical measure to alleviate the negative effects of the above described restrictions is to reduce the amount of data flowing when information is sent or received by mobile devices. Apart from the choice of the format, in which information is transmitted, and compression of information, as far as internet sites are concerned, the optimization of the site for mobile use or the creation of a separate site, intended for mobile use only,⁶³ are common methods to limit data flow in mobile communications networks.⁶⁴

(27) Mobile internet sites however not only send less data, they also conceal information, which is present on the main version of the site but either not deemed necessary for

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⁶² It should be noted that the existence or non-existence of net neutrality may also affect pricing, however due to the complexity of the topic it shall not be elaborated further in this document.
⁶³ As yet no standard denomination exists for mobile internet sites. Possibilities include “m.”, “wap.” or “wireless.” as prefix or “.mobi” as suffix.
⁶⁴ The use of such site a does however not imply, that the information can be easily accessed with slow data rates as, for instance, mobile versions of streaming sites prove.
mobile use or left out due to other reasons. The other side of the coin is that the mobile version of a site may display additional information regarding mobile use, which is not present on the site’s main version.\textsuperscript{65} All this can turn into a problem where, as is often the case, the internet instead of the user determines, which version of a site should be displayed.\textsuperscript{66} While originally intended as a method to conveniently direct a user to the version of the site most appropriate for his device and network, the result can be inaccessibility of certain information or even display of the inappropriate information.

ii) Mobile communications infrastructure:

(28) The main restriction however is the mobile communications infrastructure itself. Wireless infrastructure is cheaper to set up than wired infrastructure, since one cell tower may provide access to the mobile communications network for the surrounding area while wired infrastructure would require laying cables to each user of the wired network or multiple points of access, which the users would need to visit for network usage. As a result, fixed line telephony is stagnating and in some areas even declining,\textsuperscript{67} while mobile infrastructure is steadily growing.\textsuperscript{68}

(29) However for mobile communications networks coverage does not equal quality of service. One issue is the strength of the signal, which declines as the distance to the cell mast increases. The decrease may be accelerated by environmental conditions which may damp or block the signal, such as rain, smog, hills or high buildings. Signal strength determines not only the quality of speech but also the data rate. Therefore at the outskirt of the effective area of a cell mast capable of providing HSPD+-connection, available services may be reduced to telephony and SMS, sometimes telephony alone. The same decline of service quality may result from an increase of users of a given cell. The more users a single cell needs to cover, the lower the service quality for each user. Additionally, the effective radius of a cell mast shrinks, due to the signal strength

\textsuperscript{65} Some mobile internet sites even link to alternate versions of their terms and conditions specifically covering mobile use.

\textsuperscript{66} This can lead to confusing results, when an internet site is accessed through the same mobile device over the mobile communications network and WLAN, resulting in being directed to the site’s mobile or main version respectively.


\textsuperscript{68} Ibid. p. 4-8.
being too poor at the outskirts to even allow for telephony.

(30) These phenomena are usually counteracted by having multiple cell towers overlapping each other’s effective area. However if the aim is coverage instead of quality, mobile networks operators will opt to place cell masts farther apart, reducing signal strength in general but providing network access to a larger area and thus more users. This situation can be witness especially in developing countries, where, also due to the mobile devices available, the demand is high for telephony and SMS and low for expensive data services. This in turn, coupled with competition on the mobile market, makes the expansion of the area, which has access to the mobile communications network, crucial even at the cost of signal quality.⁶⁹

(31) Thus, as far as m-commerce is concerned, SMS is not only the lowest common denominator but also the most widely available and used, especially in developing countries.⁷⁰⁷¹ From a legislative perspective this means that any legal requirements relating to m-commerce which cannot be fulfilled by means of an SMS will deprive a (significant) number of the population from access to m-commerce.⁷² As in the case of electronic signatures,⁷³ this does not impede the legislator to consciously exclude certain types of contracts or declaration from the possibility of being concluded or made by SMS or other simple electronic means. It also needs to be taken into consideration, that due to the impossibility of electronically signing an SMS, contracts or declarations requiring a handwritten signature are automatically excluded from being concluded or made electronically by anyone, who has no access to at least e-mail and an appropriate electronic signature.⁷⁴

⁷⁰ Ibid., p. 17-18.
⁷² Even though technological neutrality needs to be observed, any law needs to take into account the current state of technology, also in the light of advanced technology being able to meet legal requirements designed for legacy technology.
⁷³ See 44.
⁷⁴ This only applies if the law allows for the replacement of a handwritten signature by an electronic one.
4. Summary

(32) M-commerce can well be regarded as part or aspect of e-commerce. Accordingly, the two share many similarities regarding the legal challenges associated with them. Technological advances seem to suggest that m-commerce will before long simply become mobile e-commerce with no distinguishing features; however this has proven not to be the case.

(33) M-commerce is and will for the foreseeable future be distinguished from e-commerce by in some regards small but significant peculiarities, caused by the very foundations and principles of mobile communication themselves. While existing e-commerce laws may mostly be compatible with the needs of m-commerce, provisions found in other laws, such as informational requirements, may pose great problems for m-commerce. Thus it is of great importance that the unique issues of m-commerce are taken into consideration by legislators and appropriate provisions are enacted, be it as new legal rules or exceptions to existing ones.