

The Capitalization of Abbreviated Terms and Their Full Forms, with
Special Reference to *VoIP*, *WiMAX*, and *FLASH-OFDM*

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Tässä pro gradu –tutkielmassa tarkastellaan kolmen uudehkon teknisen termin (*VoIP*, *WiMAX* ja *FLASH-OFDM*) kirjoitusasuja. Kyseiset termit ovat lyhenteitä, ja tarkastelussa ovat mukana sekä mainittujen lyhyiden muotojen että samojen käsitteiden pitkien muotojen kirjoitusasut. Englanninkielisiä lyhenteitä on toistaiseksi tutkittu melko vähän, ja niiden ”oikeasta” kirjoitustavasta on vaikea löytää tietoa. Tutkimuksen yhtenä tavoitteena onkin kartoittaa, mistä kirjoitusasuja koskevia ohjeita löytyy ja millaisia ne ovat. Pääasiassa tutkielma keskittyy kuitenkin autenttisten kirjoitusasujen tutkimiseen, erityisesti isojen kirjainten käyttöön.

Tutkielman teoriaosa koostuu yhtäältä lyhenteiden ja toisaalta isojen kirjainten tarkastelusta. Lyhenteitä käsittelevissä luvuissa esitetään tässä tutkielmassa käytetty jaottelu lyhennesanoihin eli akronyymeihin (acronym) ja kirjainlyhenteisiin (alphabetism). Tutkielmassa kerrotaan myös aiemmasta lyhenteitä koskevasta tutkimuksesta sekä lyhenteiden käytön ja muodostuksen historiasta ja trendeistä. Isoja kirjaimia käsittelevä luku keskittyy niihin lähteisiin, jotka antavat lyhenteiden kirjoitusasuihin liittyviä ohjeita: kielioppeihin ja tyylioppaisiin. Tutkimuksen aikana selvisi, että näistä ei ole paljon apua ohjeita etsivälle, sillä kielioppiteosten lähestymistapa on hyvin kuvaileva, eikä niissä useinkaan anneta tarkkoja sääntöjä. Tyylioppaidenkaan säännöt eivät aina ole yksiselitteisiä.

Analyysiosiosassa tutkitaan sanojen kirjoitusasuja kahdessa erikoisalan julkaisussa, kolmessa sanomalehdessä sekä useassa painetussa ja Internetissä julkaistussa sanakirjassa ja sanastossa. Yksittäisiä varhaisempia esimerkkejä lukuun ottamatta aineisto on julkaistu pääasiassa vuosina 2003–2007. Näinkin suppealta ajanjaksolta saadusta aineistosta oli kuitenkin mahdollista tehdä joitain havaintoja kirjoitusasujen muuttumisesta. Ajallista variaatiota ilmeni erityisesti siinä, että osa varhaisista kirjoitusasuista putoaa yleensä käytöstä jossain vaiheessa. Kokonaan pienillä kirjaimilla kirjoitetut muodot, jotka ovat tyyppillisiä kieleen vakiintuneille lyhennesanoille, eivät ole vielä näiden sanojen kohdalla yleisiä.

Ajallista variaatiota selvempänä aineistossa näkyi tekstityypin vaikutus. Eri tekstityypit suosivat osittain eri kirjoitusasuja, joskin variaatiota ilmeni myös yksittäisten julkaisujen sisällä. Hieman yllättäen kirjoitusasut olivat yhdenmukaisempia Internet-sanakirjoissa kuin painetuissa sanakirjoissa. Siten sanakirjatkaan eivät käytännössä anna yksiselitteisen ”oikeita” kirjoitusasuja – jos sellaisista edes voidaan puhua.

Avainsanat: kirjoitusasut, lyhenteet, sananmuodostus

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1 Introduction

In this thesis I will study the spellings of some relatively new abbreviated terms, *VoIP*, *WiMAX*, and *FLASH-OFDM*, and their full forms.¹ Such terms do not seem to have fully established forms yet, and therefore the capitalization of both the full forms and the abbreviations is especially interesting. In addition, it seems that abbreviations have not been studied as much as one might expect, and many of the seminal articles on abbreviation are either rather old, or do not deal with issues of spelling.

This topic emerged when I worked as a trainee at the Finnish Terminology Centre TSK in 2007. I was asked to check the English terms in the *Internet Telephony Vocabulary* compiled there,² and the capitalization of some of the terms drew my attention. Despite their extensive knowledge of terminology, the terminologists working on this project admitted that the capitalization of English terms is not based on any particular rule for their part. The attempt is to be consistent as regards the capitalization, but it is sometimes difficult to choose between different spellings. However, they said that it would certainly be useful to have something more tangible to base the spellings on. Therefore this issue seemed to deserve further investigation.

Originally my aim was to concentrate on studying whether there is a “correct” way to capitalize words like *VoIP* and their full forms, and if it had turned out there is not, I would have attempted a suggestion of my own. However, it became evident that there are indeed rules, or at least guidelines, regarding the capitalization of abbreviated terms, but they are not always followed. Therefore my focus shifted to studying the different spellings of *VoIP*,

¹ The full forms are, respectively, *voice over internet protocol*; *worldwide interoperability for microwave access*; and *fast low-latency access with seamless handoff, orthogonal frequency divisional multiplexing*. See Sections 4.1, 4.2, and 4.3 for more information and definitions of the terms.

² The *Internet Telephony Vocabulary* (TSK 37) is aimed at consumers, journalists, and translators interested in Internet telephony. It attempts to alleviate communication by clarifying the meanings of concepts and foreign terms.

WiMAX, *FLASH-OFDM* and their full forms, and the different sources of information on the capitalization of such abbreviations and their full forms.

I chose these particular lexical items because there seems to be considerable variation in their spellings in newspapers, magazines, various websites, and even in dictionaries and vocabularies. However, that is not the only reason why they are orthographically interesting: *VoIP* and *WiMAX* are often spelled with a lowercase vowel in the middle of the word, which is not particularly common for acronyms,³ and *FLASH-OFDM* represents a combination of two kinds of abbreviations, acronymy and alphabetism. Each concept is related to modern technologies of data transmission, but *VoIP* is a more general word, whereas *WiMAX* and *FLASH-OFDM* refer to specific techniques. In addition, the last two are registered trademarks, which may affect their spellings and the reasons for choosing to use a particular spelling.

Since this study focuses on issues of spelling, I think it is necessary to explain why I use *VoIP*, *WiMAX*, and *FLASH-OFDM* as the “basic” spellings in this thesis. They function as the lexemes for the concepts they refer to, covering all spellings, but I want to emphasize that I do not necessarily view them as more correct than any other spellings. I simply had to choose some forms as the bases. I chose *VoIP* because it is a common spelling, and the most familiar one to me. I chose *WiMAX* and *FLASH-OFDM* because they are registered trademarks, and the trademark owners prefer these spellings, although that does not mean that the words could not or should not be written in any other way. And finally, I decided to use lowercase letters for the full forms. This may not be the most obvious choice, but I want the authentic examples to speak for themselves. The spellings of the full forms are, if possible, even more varied than those of the abbreviations, and I do not wish to appear biased to begin with.

³ However, unconventional spellings in general are not rare. For example, the use of so-called mid-capitals has become increasingly common in trade names. I will discuss this trend briefly in Section 3.1.

This thesis is a descriptive study, and I hope its results and the theoretical discussion of different kinds of abbreviations and capitalization are of interest to anyone curious about English words and their spelling. Despite its narrow scope, it also offers some insight into modern word formation patterns in the field of telecommunication. The lexicographic and terminological aspect may be of interest to people working in those areas.

1.1 The Hypotheses and the Empirical Approach

In addition to examining the spellings of the three terms mentioned above, I will also attempt to find out whether there are some generalizable patterns that the spellings follow. As I mentioned above, the idea for this topic arose from the great variety in the capitalization of these words and their full forms. My preliminary hypothesis was that there are several factors that may cause this variation. In this section I will briefly describe these initial hypotheses, and I will get back to them in Sections 4.1.3, 4.2.3, 4.3.3, and Chapter 5.

Capitalization is an easy way to draw attention, and it suggests that the word or phrase in question is somehow special. I think one of the reasons why the full forms in general are often capitalized is that it is a practical way to introduce the new acronym or alphabetism formed from the capitalized letters. However, sometimes the full forms are written without capitalization, even if they are given together with the abbreviation. Although the way in which new terms can be introduced is not the main topic of this thesis, I will examine whether there are systematic differences in the capitalization of the abbreviations that occur alone and the abbreviations whose full form is given in the same text.

It is also possible that there is regional variation in the use of capital letters. I will analyze both American and British texts and reference works to see whether there are systematic differences in the spellings of abbreviations and their full forms between these two varieties of language, and some of the magazines I will examine also contain articles written

by non-native English speakers. It seems reasonable to assume that native speakers are not the only important informants on spelling, because the terms *VoIP*, *WiMAX*, and *FLASH-OFDM* are used internationally. The general attempt in this thesis is to examine authentic usage, regardless of the writer's nationality.

Register may also play a role, and in order to study the possible effects of register on spelling, I will examine samples taken from printed⁴ and online dictionaries, specialist magazines, and newspapers. I believe the comparison of magazines and newspapers may yield some interesting results, although the publications I have selected are rather formal and do not cover the informal registers.

The words *VoIP*, *WiMAX* and *FLASH-OFDM* refer to technical concepts, but it is probable that at least the word *VoIP* will become a part of the general lexicon, because it is a practical, short word for a popular phenomenon. I think the variation in the spellings of the three abbreviations and their full forms will decline with time. In order to find out whether this is the case, I will compare the spellings in magazine and newspaper articles from different years. I will also examine when these words made their appearance in dictionaries and vocabularies and in what form. One of the problems with new words is that it always takes time before they are included in any general purpose dictionary, and the various dictionaries and glossaries found on the Internet may not be particularly reliable as regards the standardization of the spelling of the term. I do not expect to find these words in many printed dictionaries yet, and there may be variation in the ways they are spelled in online dictionaries.

⁴ By printed dictionaries I refer to dictionaries that are compiled by lexicographers and published by established publishers in print format. These dictionaries may also have online editions. Online dictionaries, on the other hand, are only available on the Internet, and the background of their compilers may vary. For more information on the dictionaries examined in this thesis, see Chapter 4.

1.2 The Structure of the Study

This thesis contains an overview of two linguistic issues, abbreviation and capitalization, and an analysis of some of the different spellings of the three abbreviations and their full forms.

Chapters 2 and 3 form the theoretical part of this thesis. Chapter 2 begins with definitions of some of the most central linguistic terms used in this study. In the subsequent sections I will briefly discuss the history of abbreviation and some modern tendencies related to this word formation process. I will also investigate previous research into acronyms and alphabetisms. Chapter 3 focuses on capitalization and the possible sources of information on spelling, and lists the guidelines on the capitalization of abbreviations and their full forms found in various grammars and stylebooks.

In Chapter 4, the analysis chapter, I will examine different kinds of authentic examples of the ways the words *VoIP*, *WiMAX*, *FLASH-OFDM* and their full forms are written in magazines and newspapers, and in what form they occur in dictionaries and vocabularies. I will also discuss the factors that may affect the spellings.

In the final chapter I will summarize my findings and suggest some topics for further research.

2 Abbreviation: Definitions, History, and Trends

This chapter includes definitions and discussion of some basic linguistic concepts used in this thesis, namely abbreviation, acronymy, and alphabetism. I will also discuss how they differ from blending and clipping, which are other word formation processes that involve the shortening of words. Since this study deals with abbreviated terms, I do not discuss concepts related to other word formation processes.⁵ The definitions for the lexical items studied in this thesis, *VoIP*, *WiMAX*, and *FLASH-OFDM*, are given in Sections 4.1, 4.2, and 4.3 respectively.

I will also discuss the history of abbreviations, some modern trends related to this word formation process and the use of acronyms and alphabetisms, and how abbreviations have been studied before. For the most part, this chapter deals with acronyms and alphabetisms in general, not only with issues related to their capitalization. That is the topic of Chapter 3.

2.1 The Linguistic Terms Used in This Study

This chapter is divided into two sections, and the division is based on the distinction between the concepts, not on the terms by which they are called. The same terms occur in both sections because there is some variation in the ways linguists and grammar books use these terms; the meanings of the terms overlap, and the distinctions between them are not absolute. See Table 1 below for a summary of the differences.

⁵ They include coinage, borrowing, compounding, backformation, conversion, and derivation (Yule 2006, 54, 56–57).

Table 1 A summary of the linguistic terms used in this study and their hierarchy

Term used in this study	Terms used in other studies	Definition applied in this study	Examples
abbreviation	shortening (Cannon 1989, López Rúa 2002)	A short form of a word or a set of words. Also the word formation process.	VoIP, WiMAX, FLASH-OFDM, BBC, Mr
acronym		An abbreviation pronounced as a single word. The name of the process whereby such words are created is acronymy.	VoIP /voɪp/, NATO, FLASH
alphabetism	abbreviation (Huddleston & Pullum 2002), initialism (Plag 2003), initial (Carter & McCarthy 2006), literation (Malkiel 1968), abbreviation (Cannon 1989)	An abbreviation pronounced letter by letter. Also the word formation process.	OFDM, BBC, CIA

2.1.1 Abbreviation

In this study, I view abbreviation as one of the word formation processes in the English language that involve shortening of existing words or phrases. By contrast, some linguists regard abbreviation and especially acronymy as word creation, rather than word formation. They emphasize that there is a difference between the two processes: word formation is based on morpho-syntactic rules, whereas word creation is based on phonological rules (e.g. McCully & Holmes 1988, 29). However, while this kind of distinction may be useful in studies focusing on the phonological features of words, it is not relevant in the present study.

Abbreviation has been defined in different ways, and depending on the definition it can involve either a single word or several words. According to Plag (2003, 126), abbreviations are “amalgamations of parts of different words”, whereas the definition given in the *Oxford*

Advanced Learner's Dictionary (hereafter *OALD*) also covers cases where only one word is shortened. The definitions given in the *OALD* are “a short form of a word, etc.”, and “the process of abbreviating sth” (Wehmeier et al. 2005, s.v. *abbreviation*). The definition for the verb *abbreviate*, on the other hand, is “to make a word, phrase or name shorter by leaving out letters or using only the first letter of each word” (ibid., s.v. *abbreviate*).

The definitions for the words *abbreviation* and *abbreviate* given in the *OALD* are precise enough for the present purposes, although they would also cover clippings. Clippings are words formed by shortening a longer word to a shorter form (Yule 2006, 55), for example *lab* from the word *laboratory*. Plag, for example, discusses abbreviations separately from clippings. He points out that the orthography of abbreviations is particularly interesting, while the characteristic feature of clippings is that they are used by people who are familiar with the concept in question (Plag 2003, 121, 126). In addition, clippings resemble ordinary short words: they are usually not capitalized or spelled letter by letter. It might be added, however, that acronyms and alphabetisms are also often used by insiders (Suonuuti 2003, 17), and they may eventually begin to resemble words (e.g. Yule 2006, 57; Stockwell & Minkova 2001, 7).

The process in which several words are abbreviated is close to another process, blending. Blending means that parts of two words, usually the beginning of one word and the end of another, are combined to form a new word whose meaning is also related to the meanings of the two words (Yule 2006, 55).

In this thesis I use *abbreviation* as the higher level concept which contains four different word formation processes: acronymy, alphabetism, clipping, and “general” abbreviation.⁶ Acronymy and alphabetism are of particular interest in this study. Some grammars, such as *The Cambridge Grammar of the English Language* (Huddleston & Pullum 2002, 1632), and

⁶ “General” abbreviations would include word forms such as *St* for *Saint* or *street*, but they are not discussed in this study.

some linguists⁷ use the term *initialism* as the superordinate term for words derived from the initial letters of a combination of words, covering both acronyms and alphabetisms. However, this word is often used as a synonym for alphabetisms in other texts, and I do not use it in my study.

I use the term *full form* to refer to the phrase from which the abbreviation is created. For example, *voice over internet protocol* and *voice over IP* are full forms of *VoIP*. The full form may thus contain abbreviations. Such longer forms are also called *expanded forms* (ISO 704 2000, 32; also the term *full form* is mentioned in the standard), *unreduced forms* (Huddleston & Pullum 2002, 1634; they also use the term *full form*) and *source phrases* (Harley 2004, 369) or *source forms* (López Rúa 2002, 36). I use the term *full form* because it is clear and short, although *expanded form* might fit some cases even better: an expanded form seems to suggest that the longer form comes etymologically after the abbreviation, whereas a full form or a source phrase seems to precede the abbreviation. An expanded form is thus less “natural” than the abbreviation, which is indeed the case for some abbreviations, such as *WiMAX*. Sometimes the full forms are also referred to as the definitions of the abbreviation (e.g. McCaskill 1998, 81), which seems to imply an even greater distinction between the abbreviation – the actual word, as it were – and its full form, which is sometimes needed to clarify the meaning of the abbreviation but not related to it as such.

⁷ See, for example, López Rúa (2002).

2.1.2 Acronymy and Alphabetism

Words formed from the initial letters or sounds of other words can be either acronyms or alphabetisms, based on their pronunciation (Yule 2006, 57). Acronyms⁸ are pronounced as single words, and *VoIP* (pronounced /voɪp/) falls under this category. Alphabetisms, on the other hand, are pronounced letter by letter. As Table 1 shows, some linguists use the term *initialism* for what is in this thesis called *alphabetism*, i.e. words like *CIA* (e.g. Plag 2003, 127). The term *initial* appears in the *Cambridge Grammar of English*: “[i]nitials are similar to acronyms but are pronounced as sets of letters, not as words” (Carter & McCarthy 2006, 483). In the previous quotation, *initial* is used as a name for a linguistic category, but elsewhere in the grammar the writers refer to this kind of words by describing them as “common sets of initials” (ibid., 841) instead of using the linguistic term *initial* they gave earlier.

Some linguists⁹ consider acronymy as a special type of blending because acronyms are based on a combination of words. However, it can be argued that blends like *brunch* (*breakfast* + *lunch*) are semantically different from acronyms and alphabetisms. In addition, blends are usually not capitalized, except for proper nouns and trade names, such as *Oxbridge* (*Oxford* + *Cambridge*) and *Aquarobics* (*aqua* + *aerobics*). Blends are normally truly new words and may not have any synonyms, whereas abbreviations by definition have a full form that has the same denotation, although the forms may not be interchangeable. However, Pyles (1971, 294) points out that an abbreviation must be regarded as a new word, “particularly when, as it frequently does, it supplants the longer form altogether”.

The definition of acronyms given in the ISO 704 (2000, 33) standard is that they are “abbreviations created by combining initial letters or syllables from each or some of the

⁸ Sometimes all abbreviations formed from initial letters are referred to as acronyms (e.g. Quirk et al. 1985; Adams 1973 and 2001), but most linguists prefer to keep acronyms and alphabetisms separate. Kastovsky (2006, 270) suggests that “[f]or want of a convenient designation [for alphabetisms and acronyms] we might perhaps call these ‘letter acronyms’ and ‘word acronyms’”. Bauer (1983, 237–238) does not discuss alphabetisms separately, but makes a clear distinction between acronyms and other abbreviations.

⁹ See, for example, Stockwell and Minkova (2001, 7) and Plag (2003, 13).

elements of the full form”, and they are pronounced as words.¹⁰ The standard uses the term *initialism* for what is called *alphabetism* in this thesis, but the definition is essentially the same as the one I have applied: “[i]nitialisms are abbreviations created by using the first letter (or sound) of each or some of the elements of a complex term or appellation. Initialisms are always pronounced letter by letter.” (Ibid.)

Acronyms are usually written in full capitals, but *VoIP* and *WiMAX* are in this respect exceptional. Without the *o* the word *VoIP* would of course resemble another abbreviation, *VIP*, and unlike many three-letter combinations, *VoIP* has remained unique. Cannon (1989, 110) gives examples of abbreviations containing the initial letter of an article or a preposition, such as *MIA* (*missing in action*), but none of them contains lowercase letters, and Cannon does not discuss the capitalization of articles, prepositions or particles in abbreviations. Neither does any other source I have read.

Many acronyms lose their capitalization when they become “everyday terms such as *laser*” (Yule 2006, 57) or “fully accepted as a word” (Stockwell & Minkova 2001, 7). It remains to be seen whether the same will happen to *VoIP*, *WiMAX*, or even *FLASH-OFDM* and when. Even though *WiMAX* a trademark, it is possible that it begins to be used as a general term referring to the technology, as has happened to other words like *hoover* and *zipper* that were originally trademarks (Äijälä 2008; see also Yule 2006, 53). In this case, the word *WiMAX* would no longer be capitalized, because it would be an everyday term and no longer a proper noun.

Plag (2003, 127–128) argues that the capital letters used in acronyms “can be interpreted as a formal device that clearly links the acronym to its base word”, and when the word loses

¹⁰ In the first edition of the standard (ISO 704 1987, 14) acronyms were defined as “terms which have been formed from other terms by the processes of clipping and blending”, and the examples included *franglais* (*français + anglais*) and *radwaste* (*radioactive + waste*). However, such words are usually viewed as blends. On the other hand, the definition of *initialism* given in the first edition would cover both acronyms and alphabetisms: “[i]nitialisms are created by using the first letter (or sound) of each term element to form a designation. In some cases they can be pronounced like a word, in other cases they are pronounced letter by letter”.

its capitalization it is not as clearly related to its base word anymore. Capitalization is thus essentially a way to show the reader that a particular word is an abbreviation formed from some other word or phrase. This may, in some cases, help the reader. However, it is to be noted that even though it is easy to see that there is a difference in meaning between the words *WASP* and *wasp*, for example, because of their different spellings, it may not provide a valid reason to capitalize abbreviations. At least it could be argued that such reasoning does not rest on a particularly sound basis. After all, there are several English words that have more than one meaning although the spelling is the same.

2.2 A Brief History of English Abbreviations

Abbreviation is not a modern trend in the English language, but acronyms and alphabetisms began to be created in a more systematic way in the twentieth century (Cannon 1989, 101). World War II and the decade of New Deal in the United States in the 1930s were particularly prolific eras as regards new acronyms and alphabetisms (Cannon 1989, 101; Stockwell & Minkova 2001, 8). In addition, the 1930s and 1940s are often referred to as the time when such abbreviations established their place in the English lexicon, especially in the United States (e.g. Cannon 1989, 101; Stockwell & Minkova 2001, 8).

Nowadays acronyms, alphabetisms, and other abbreviations are not exclusively American anymore (Stockwell & Minkova 2001, 8). In fact, in 1971 Pyles (1971, 300) pointed out that “[t]he British seem to have beaten us [Americans] to the discovery of the joys of making acronyms”. On the other hand, Tottie (2002, 112) argues that although this is difficult to prove, “Americans are more apt to use abbreviations in conversation”. As regards written texts, at least one study shows that American newspapers and magazines use abbreviated forms of words more often than British publications (Schenker 1997, quoted in Tottie 2002, 112).

According to Baum (1955, 105–106), the “impulse toward acronym formation” emerged around World War I. Before that alphabetisms were more common, and even abbreviations such as *D.A.R* were pronounced letter by letter, although it would have been possible to pronounce them as monosyllable words. As the *D.A.R* example illustrates, early alphabetisms were often spelled with periods between the letters. However, the periods were soon deemed unnecessary. They even posed some problems for newspaper language, because they made hyphenated expressions such as “A.F.L.–C.I.O. Dispute” look rather clumsy. Therefore they began to be dropped in many publications.¹¹ *The New Yorker* and *The New York Times* are interesting exceptions. Malkiel (1968, 380) points out that *The New Yorker* uses periods between the letters in alphabetisms, while acronyms are set in small caps, without periods. *The New York Times Manual of Style and Usage*, published thirty years later, still contains the same advice, except that instead of using small caps, acronyms are usually capitalized throughout (Siegal & Connolly 1999, 4).¹² The use of periods between the letters in alphabetisms may now seem old-fashioned (see e.g. Minty 2004).

Nowadays acronyms and alphabetisms continue to be common in the names of organizations (Quirk et al. 1985, 1581), but they have also been extremely common in technical language and jargon in different fields since the 1970s (Thilmany 2003, 45). For example, almost half of the English terms in the *Internet Telephony Vocabulary* (TSK 37) examined in this thesis have an abbreviated form.

Acronyms and alphabetisms have also made their way into modern everyday language: abbreviated forms such as *FYI* (*for your information*), *lol* (*laughing out loud*), *pls* (*please*) and *imho* (*in my humble opinion*) appear in text messages, emails, chat discussions, and even in

¹¹ The current edition of *The Associated Press Stylebook* (Goldstein 2007, 4) instructs that periods should not be used in abbreviations consisting of more than three letters when the individual letters are pronounced.

¹² Technically this model, then, should yield spellings such as *FLASH-O.F.D.M*, but unfortunately there were not any examples of this term in *The New Yorker* or *The New York Times* online databases. It seems that *The New York Times* uses periods mostly in the abbreviated names of organizations, whereas technical terms such as *ECG* (*electrocardiogram*) are spelled without the periods.

speech, often for humorous effects. As Stockwell and Minkova (2001, 9) point out, it is possible to create acronyms “from just about any string of words”. According to Tottie (2002, 119), most of the abbreviated forms of words and phrases that are often used in emails and on the Internet originated in the United States.

2.3 Some Trends Related to Abbreviation

Linguistic economy and catchiness are often mentioned as the main reasons for using abbreviations (e.g. Pyles 1971, 299; Cannon 1989, 102–103), but Pyles (1971, 299) adds that sometimes abbreviations are used as euphemisms for their full forms. His examples include *B.M.* (*bowel movement*) and *VD* (*venereal disease*), but he does not give the full forms in his book, and this kind of usage does not seem particularly common today. In addition, the use of abbreviations can show that the speaker belongs to a particular group, in which case obscurity may be intentional. For example, Brusaw et al. (1997, 16, 29) point out that “technical people” often use abbreviations as “an affectation”, which they define as “the use of language that is more formal or showy than is necessary to communicate information to the reader”.

Sometimes abbreviations are formed before they even have a full form, which is then created to fit the abbreviation. Stockwell and Minkova (2001, 9) refer to this process of so-called *reverse acronymy*¹³ as a “sort of political offshoot of normal acronymic coinage”. Such acronyms often refer to names of products or organizations. They seem to be created to evoke particular connotations: they are often catchy and characterize the product or organization in question. One of the examples Stockwell and Minkova give is *MADD*, *Mothers Against Drunk Drivers*.

¹³ Reverse acronyms are also called *backronyms* and *bacronyms*. There is also a word for acronyms that are particularly appropriate considering the meaning of the full form: *apronym*. (Wikipedia. Backronym 2008.)

The process of reverse acronymy was already recognized in 1955: Baum (1955, 108) refers to it in his article, although he does not use any specific term for it. It is mentioned in several other texts as well. Adams (1973, 136–137), for example, discusses it in *An Introduction to Modern English Word-Formation*, and one of her examples is *MAGIC*, *Machine for Automatic Graphics Interface to a Computer*. Covington (1981, 66) wrote in the early 1980s that “[c]omputer scientists have a tendency to invent amusing terms first and then devise phrases for them to abbreviate”, but reverse acronymy is not limited to any particular field anymore, and it has apparently become more popular in recent years.¹⁴ In fact, Suonuuti (2003, 17) argues that the tendency seems to be to create abbreviations that resemble already existing words. For example, the acronym *CAMEL* is formed from the words *customized applications for mobile network enhanced logic*, and the initial of the word *network* is left out because it would not fit the acronym. As Bauer (1983, 237) points out, the full forms are sometimes “treated with a certain amount of freedom” in order to create effective acronyms. This can also be seen in the acronym *WiMAX*: the last two letters come from the initial sound of the word *access*, probably because *WiMAX* was considered to be a more effective acronym than *WiMA*. On the other hand, the full form of *FLASH-OFDM* contains the word *access*, too, but is only represented by an *a* in the abbreviation: *FLAXSH-OFDM* would be unpronounceable.

Acronyms that resemble existing words have also been criticized. According to Orłowski and Christensen (2002, 2026), the names of clinical research studies sometimes promise more

¹⁴ The names of organizations, for example, can be intentionally humorous reverse acronyms: Stockwell and Minkova (2001, 9) mention an investment group called *UPIG* (*University Park Investment Group*). Research into the creation of humorous acronyms has even received funding from the European Community: the first EU project devoted to computational creation of humorous acronyms, Humorous Agent for Humorous Acronyms or HAHAcronym, was launched in 2001 (Human Media Interaction (N.d.); Stock and Strapparava (2005) is a detailed description of this project). There are several websites dedicated to humorous acronyms, but I have not found any scholarly publications discussing them yet.

than they can deliver, and they contend that “[a] patient who is offered a research trial with an acronym of ACCEPT, BESMART, DESIRE, or ASSENT is being pressured”.¹⁵

Mitchell (2004, 14–15) points out that acronyms can sometimes even delude people. She discusses several United States government acronyms and alphabetisms related to secrecy, and argues that government agencies define them in ways that serve their particular needs. The meaning of *SBU* (*Sensitive But Unclassified*), for example, is not defined in federal law, and there is “no uniformity among federal agencies as to how the term is used”, either.

Acronyms and alphabetisms can also function as the bases for linguistic riddles or jokes. Examples of the so-called folk derivations for alphabetisms include *New York Punishment Dealers* for *NYPD* (*New York Police Department*) and *Big Money Wasted* for *BMW* (*Bayerische Motoren Werke*, or *Bavarian Motor Works* in English) (Howe 1989, 176–177).

2.4 Some Previous Studies

Acronyms and alphabetisms have been studied for decades, but it seems there are not any studies focusing on their capitalization, or the capitalization of their full forms. In this section I will discuss what has been studied before. My aim is to provide an overview of previous studies, and I want to emphasize that this presentation is not a comprehensive account of all related studies. I will include a variety of books and articles in this overview, but most of them only provide some background information on abbreviation, and do not deal with issues that are central to this study in detail.

The most detailed discussions of acronyms and alphabetisms can probably be found in linguistic journals, and I have already referred to some of them in the previous sections. *American Speech* has published several articles on different kinds of abbreviations. Baum

¹⁵ Fred and Cheng (2003, 255) point out that acronyms are extremely common in medical literature. In their opinion, acronyms can be effective, but may also cause confusion: they quote 16 different clinical trials with the acronym HEART as their name.

(1955) is a short but informative article on the history and reception of some early acronyms. Baum (1962) discusses the term *acronym* and the use of acronyms in English. Heller and Macris (1968) expand on Baum's articles and discuss some of the phonological properties of different kinds of abbreviations. Cannon (1989) is a detailed account of abbreviations in word formation, often cited in later articles. In addition to the acronyms themselves, it discusses research into abbreviations. Other journals have also published articles on abbreviation. McCully and Holmes (1988) investigate acronyms in terms of their phonological properties. More recent examples of articles include Harley's (2004) study on the syntactic behavior of acronyms and alphabetisms and López Rúa's (2002) research into different kinds of abbreviations and their categorization. Sobkowiak (2008) discusses the pronunciation instructions of abbreviations in two dictionaries.

Most books on word formation¹⁶ contain at least some information on acronyms and alphabetisms, usually a short chapter or a section. Some early examples include Jespersen (1942), which has a short appendix on "alphabetic shortenings", and Marchand's (1960) discussion of what he calls word-manufacturing. Interestingly, he only uses full capitalization for the alphabetism *YMCA*, whereas examples of "[l]etter-words or chiefly letter-words" such as *Unrra* (*United Nations Repatriation and Rehabilitation Administration*) have only the initial letter capitalized (Marchand 1960, 368–369). Marchand does not use the word *acronym* in his book, although it was already in use in the 1960s: according to Baum (1962, 48), the word *acronym* was coined in 1943, but he points out in his 1955 article that the importance of this word formation process "has only recently come to be recognized" (Baum 1955, 104).

¹⁶ See, for example, Adams (1973), Adams (2001), Plag (2003), and Stockwell and Minkova (2001). Bauer (1983) is a classic, but like many other books on word formation, it only contains a short discussion of acronyms.

Some books on language and linguistics¹⁷ also mention different kinds of abbreviations. However, they often discuss the topic at a rather general level, and especially books aimed at the general public tend to concentrate on the entertaining examples. In addition, research into American English sometimes addresses the use and formation of abbreviations (e.g. Venezky 1999, Tottie 2002). Grammar books are discussed separately in Section 3.2.

Because abbreviations have become so common, it is not surprising that abbreviations dictionaries abound. Their forewords often discuss this method of word formation, and they may also explain why particular spellings are used in the dictionary. Cannon (1989, 99–100) points out that the first dictionaries of abbreviations appeared in the fifteenth century, although these early dictionaries contained mostly visual means of abbreviating words, such as symbols, rather than “real” abbreviated words. In the following centuries, more dictionaries were published. Cannon (*ibid.*, 100) argues that entries are not often given citations in abbreviations dictionaries. My findings support this claim: some entries only contain the abbreviation and its full form, and even the longer ones tend to focus on the definition, and examples of usage are rare. Dictionaries and the contents of dictionary entries are discussed further in Chapter 4.

Abbreviations have also been studied in some Master’s theses. Nieminen’s *Acronyms in Automatic Data Processing* (1992) does not concentrate on any particular feature of abbreviations; rather, it aims at giving an overview of all the different features related to abbreviations. Despite its title, Nieminen’s thesis covers both acronyms and alphabetisms. It focuses on computing abbreviations, but also contains examples from other fields. Kihlakaski and Mikkola’s (2000) thesis also contains a chapter on abbreviations used on the Internet. I did not have access to Schenker’s 1997 thesis *Abbreviations in American and British Newspaper Language*, but the results of her study are briefly summarized in Tottie (2002).

¹⁷ For example Crystal (2002), Crystal (2003), Malkiel (1968), Pyles (1971), Yule (2006). Although their own treatment of the topic is brief, especially Crystal (2003) and Yule (2006) contain comprehensive lists of references to other books that discuss word formation.

Interestingly, articles on abbreviations are not limited to linguistic journals. Howe (1989) has discussed acronyms from a cultural point of view, and his article was published in *The Journal of American Folklore*. Multi-page articles have even appeared in medical journals and journals aimed at journalists,¹⁸ for example, in addition to the articles in journals on engineering and other technical fields. Often these articles are not mere wordlists, but discuss the actual consequences of the use of acronyms. This clearly shows that abbreviations, especially acronyms, are now a significant linguistic phenomenon, and may even have social and political consequences.

The list of previous studies on capitalization is short. It is an important topic in style guides and grammars, but books on capitalization are almost exclusively aimed at children or language students, and articles often focus on how to teach capitalization. Naturally, the unconventional capitalization used by some poets has been studied, and it might be argued that one of the most memorable things about e.e. cummings and bell hooks is the unusual orthography of their names. However, research into literature is out of the scope of the present thesis.

In addition to literary language, unconventional ways to use capital and lowercase letters, especially *e* and *i*, seem to be typical of so-called Netspeak and product names, and at least initial steps have been taken in research into this area. Crystal (2002), Elia (2006), and Ross (2006) discuss, among other things, the use of capital and lowercase letters on the Internet. Nuopponen and Pilke (2007) is a fascinating article focusing on names in vocabularies, and they also discuss the use of capital letters. Books on spelling tend to focus on the spellings of particular sounds, but some of them also touch upon the issue of capitalization: Venezky (1999), for example, contains a chapter on creative spellings, such as the trade names *Cheez-*

¹⁸ For example Mitchell (2004); see Section 2.3 above.

It, *Bake-N-Serv*, and *ThinkPad*. Nevertheless, there do not seem to be many scholarly articles or other publications focusing entirely on capitalization or the use of lowercase letters yet.

3 Capitalization

Capitalization practices vary between different languages, and they often change through the course of time. This is the case with English as well. In the 17th and 18th centuries, for example, it was common to capitalize almost all nouns in English (Crystal 2003, 67), and the use of capital letters was encouraged in some of the spelling books of the time (Salmon 1999, 48). However, by the mid-eighteenth century grammars had reduced the number of contexts where capital letters should be used (*ibid.*). The use of capital letters began to stabilize and resemble the modern practices, but it seems that it is still not fully fixed. The same goes for spelling in general: Soanes and Stevenson (2006, 1699) argue in one of the appendices to the *Concise Oxford English Dictionary* that “English spelling is not (and has never been) fixed. In fact, there are alternative forms constantly arising”.¹⁹

According to *The Cambridge Guide to English Usage*, “British writers and editors are more inclined to use capital letters where Americans would dispense with them” (Peters 2004, 90). On the other hand, Walsh (2004, 31) argues that British English tends to treat acronyms as words, and the spelling *Nato*, for example, is more common than *NATO* with full capitals in British English. Cannon (1989, 113), too, describes the spelling *AIDS* as American and *Aids* as British.

In the following sections I will discuss some guidelines on capitalization in general, and also guidelines focusing on capitalization of abbreviated terms and their full forms. However, capitalization is not always straightforward, although the rules may seem to be. This chapter focuses on the sources of information, and in Chapter 4 I will discuss how these instructions match some of the most common spellings of *VoIP*, *WiMAX*, and *FLASH-OFDM*.

¹⁹ There are also differing opinions, perhaps depending on the point of view: according to Milroy and Milroy (1998, 56), “[t]wentieth-century English spelling is almost absolutely invariant”.

3.1 General Guidelines on Capitalization

Biber et al. (1999, 245) point out that the use of initial capitals in English “extends beyond proper nouns”. The following list, which I have slightly modified from the *Longman Grammar of Spoken and Written English* (Biber et al. 1999, 245–246), presents some cases where capitalization is conventional:

- personal names
- geographical names
- names of objects and commercial products (e.g. *Chevrolet*)
- holidays, months, and days of the week
- religions, followers of particular religions, and some religious concepts
- family member address terms (e.g. *Mother*)
- persons or bodies with a unique public function (e.g. *the Queen*)
- public buildings, institutions, laws, etc.
- political parties and members of political parties
- languages and nationalities
- adjectives and common nouns derived from proper nouns (e.g. *New Yorker*).

In addition, the first letter of a sentence and the pronoun *I* are capitalized, and many acronyms and alphabetisms are written in full capitals as I pointed out in Section 2.1.2. In the case of acronyms and alphabetisms, convention plays a role in the capitalization, but it also helps readers to realize that a particular word is an acronym or an alphabetism. However, there is some variation in the use of capital letters, and it seems that even grammar books are reluctant to give specific rules as to what should be capitalized. Rather, they refer to convention.

It is in place to point out here that capital and lowercase letters are quite frequently used in unconventional ways. In fact, Ross (2006, 42) argues that “[i]n the world of dotcom

companies, capital letters appear to have a whole new set of rules”. For example, it has become increasingly common to use capital letters in the middle of the name of a company or product. Some examples include *AltaVista* and *ZoneAlarm*. According to Venezky (1999, 41), this kind of spellings derive from the spelling conventions in some programming languages which did not allow the use of space between words. Instead, internal capitals were used to mark the first letter of a word. Later this convention spread to product and company names. Peters (2004, 93) refers to this kind of capital letters as *mid-capitals*, and adds that they are also called *bicaps*, *incaps*, and *intercaps*.²⁰ Further examples of unconventional spellings include *iPod* and *KaZaA*. Understandably, such spellings can cause difficulties for journalists and other writers, and many style guides include some suggestions as to how to deal with such names. They have also aroused fairly heated discussion.²¹

3.2 Information Given in Grammars

Grammar books have traditionally been regarded as sources of information on the “correct” use of language, even though their approaches are not always strictly prescriptive. However, as the length of this section reveals, grammars seem to be wary of providing information on the use of capital or lowercase letters in abbreviations. In this section I quote two grammars that have something to say about this topic.

According to *A Comprehensive Grammar of the English Language*, capital letters can be used in abbreviations “whether the items abbreviated are proper nouns ... or not” (Quirk et al. 1985, 1638).

The Cambridge Grammar of the English Language states that “[m]ost words formed by abbreviation are written with upper-case letters, but some have lower-case”, and some can be

²⁰ These are not the only names for this phenomenon: Elia (2006, 19) adds the names *BiCapitalization* and *CamelCase*. As is the case with different kinds of abbreviations, this phenomenon seems to have attracted scholarly interest, but the variety in the labels shows that shared terminology does not exist yet.

²¹ See, for example, Walsh (2004).

written either way (Huddleston & Pullum 2002, 1633–1634). The examples of each case include *AIDS* (*acquired immune deficiency syndrome*), *scuba* (*self-contained underwater breathing apparatus*), and *UNESCO* or *Unesco* (*the United Nations Educational, Scientific and Cultural Organisation*) (ibid.). The grammar also points out that the capitalization of acronyms reflects the level of incorporation into general vocabulary: acronyms without capitalization, like *scuba*, are “formally indistinguishable from ordinary words”, and their full forms are rarely used. In addition, speakers may not even know they are acronyms. The abbreviations with uppercase letters, on the other hand, are practically interchangeable with their full forms. (Ibid., 1634.)

Neither grammar gives any rules as to how acronyms or their full forms should be capitalized. Instead, these grammar books seem to take a descriptive approach on the capitalization of abbreviations.

3.3 Instructions Given in Style Guides

One of the purposes of style guides is to help writers to create and maintain a consistent style in the texts created in or for a particular company or a particular field. However, there are differences between different style guides, and they may nevertheless all be equally reliable.

I examined the following style guides or handbooks for this thesis:

- *Microsoft Manual of Style for Technical Publications* (Purcell et al. 2004)
- *NASA’s Grammar, Punctuation, and Capitalization: Handbook for Technical Writers and Editors*²² (McCaskill 1998)
- *The Chicago Manual of Style* (Grossman 1993)
- *The Chicago Manual of Style Online* (University of Chicago Press Staff 2003)

²² *NASA’s Handbook for Technical Writers and Editors* was originally created for the Technical Editing Branch of the NASA Langley Research Center (McCaskill 1998, iii), but it is available on the Internet free of charge, and its rules are not specific to any particular field.

- *The Associated Press Stylebook and Briefing on Media Law* (Goldstein 2007)
- *The New York Times Manual of Style and Usage* (Siegal & Connolly 1999)
- *Handbook of Technical Writing* (Brusaw et al. 1997)

I chose them because they all contain some suggestions regarding capitalization, and they are widely used in the publishing industry, universities, companies, and other organizations, for example. It will also be interesting to see how the guidelines given in *The New York Times Manual of Style and Usage* will be applied to the words studied in this thesis, because *The New York Times* is one of the newspapers I will examine.²³ As one can see, the style guides examined in this study reflect American English guidelines. British style guides exist as well, but the most widely used style guides seem to be American.

Most of the style guides tend to warn against overusing capitalization. The *Microsoft Manual of Style for Technical Publications* gives an explicit rule regarding the proper way to write the full forms of abbreviated terms:

[C]apitalize technical terms and feature names only if they are brand names or if they are based on a proper noun ... With those exceptions, do not capitalize the words that make up an abbreviation, even if the abbreviation is capitalized. (Purcell et al. 2004, 64.)

NASA's *Handbook for Technical Writers and Editors* contains basically the same rule: "[t]he letters of the acronym are not capitalized in the definition unless the acronym stands for a proper name" (McCaskill 1998, 81).

Handbook of Technical Writing gives a rule regarding the capitalization of abbreviations themselves: "[c]apitalize abbreviations if the words they stand for would be capitalized" (Brusaw et al. 1997, 67). Examples include *UCLA* (*University of California at Los Angeles*) and *Ph. D.* (*Doctor of Philosophy*). However, the section on acronyms instructs technical

²³ I will also examine the *Times Online* (containing articles from *The Times* and *The Sunday Times*), and the *Financial Times* but *The Times Style and Usage Guide* does not contain information on the capitalization of abbreviations, and *The Financial Times Style Guide* is out of print. Therefore they are not included in this discussion.

writers to “[w]rite acronyms in capital letters”, and the only exceptions are acronyms which have become part of the general lexicon, such as *laser*. They are written in lowercase letters. (Ibid., 16–17.)

The New York Times Manual of Style and Usage advises to use capital letters for acronyms that are up to four letters long: thus *NATO* would be spelled with full capitals, but *Unicef* not (Siegal & Connolly 1999, 4). These guidelines refer to proper nouns. The manual adds that “[l]owercased exceptions exist, and the dictionary is the guide: *modem*; *radar*; *sonar*” (ibid., italics in the original). The user is not, however, referred to any particular dictionary.

Although the rules on capitalization seem clear, the variety of real-life examples shows that it may not always be clear which words should be capitalized, or even what counts as a proper noun. This is addressed in *The Chicago Manual of Style*: “[q]uestions and differences of opinion arise over what constitutes a proper noun, other than the name of a person or a place” (Grossman et al. 1993, 236).

There is also a reference to the capitalization of full forms of abbreviated terms in the questions and answers section of *The Chicago Manual of Style Online*:

Q. ... I am unsure as to the rules for spelling out what abbreviations stand for. In the passage I am proofreading, we refer to the DSD and the BPD, which stand for the design strategy document and the business process document, respectively. Am I right in thinking these should be lowercase when written in full?

A. Yes, that’s right. There is no need to uppercase common noun phrases simply because they can be represented by an acronym or initialism. (Chicago Style Q & A 2007.)

The style guides state that if the abbreviation is a proper noun, the full form is capitalized. However, *VoIP* does not qualify as a proper noun except if it is considered to be the name of a protocol.²⁴ It is usually regarded as the name of a technology, but is

²⁴ See Section 4.1 for a more detailed discussion of VoIP as a protocol.

nevertheless often capitalized. *WiMAX*, on the other hand, is the name of a technology, too, but in this case the unconventional spelling is partly related to the word's special status as a trademark. *FLASH-OFDM* is a name as well, but especially the first part is sometimes written without capitalization.

Interestingly, *The Chicago Manual of Style Online* points out that “[u]sage rather than logic determines whether abbreviations other than those standing for proper names are given upper- or lowercase letters” (University of Chicago Press Staff 2003, Section 15.7). This can also be seen in the way abbreviations are treated in grammar books.

The style guides also give instructions on the use of abbreviations in general. Common guidelines are that excessive use of abbreviations should be avoided, except if the abbreviation is better known than the full form. Abbreviated words or phrases the reader may not be familiar with should be spelled out the first time the abbreviation is used. This is often done by giving the full form followed by the abbreviated form in parentheses once, after which the abbreviated form is used alone. (Sager et al. 1980, 277; Brusaw et al. 1997, 2.)

The style guides I examined give basic instructions on capitalization, but their most recent editions do not provide information on the “proper” spelling of the words *VoIP*, *WiMAX*, *FLASH-OFDM* or their full forms yet. Some style guides refer their readers to certain dictionaries for more information on the spelling of words not included in the guide, but even these references may not help to find clear, reliable examples of the spellings of new words, because the words may not be included in the suggested dictionaries, either. Moreover, some style guides are rather cautious as regards the use of dictionaries: *The Chicago Manual of Style Online*, for example, states that dictionaries “merely describe how speakers of English use the language; despite occasional usage notes, lexicographers generally disclaim any intent

to guide writers and editors on the thorny points of English usage”²⁵ (University of Chicago Press Staff 2003, Section 5.202).

²⁵ I would like to add that learners’ dictionaries are an exception: the approach in dictionaries aimed at writers and editors may naturally be quite different from that in dictionaries aimed at language students. In addition, the *Bloomsbury English Dictionary* also states that it attempts to “offer clear advice and guidance on how to use our language well”, because that is what the readers want (Rooney 2004, xi).

4 Analysis

In this chapter I will discuss authentic examples of the spellings of *VoIP*, *WiMAX*, and *FLASH-OFDM* and their full forms in dictionaries, vocabularies, magazines, and newspapers. I will examine whether the spellings follow the guidelines seen above, and whether there are some general patterns that can be perceived in their use. This chapter begins with a brief description of each source. I will only mention the printed dictionaries by name, and introduce the online dictionaries in more detail. This is because there is considerable variation in the backgrounds of online dictionaries.

One of the things I examine in this thesis is when do the new abbreviations enter in general dictionaries, and in what form. The words I examined are so new that the spellings in the printed general purpose dictionaries do not appear any more standardized than those in online dictionaries, which often reflect authentic usage. Therefore I decided to include both dictionary types in this chapter, rather than put them among the sources of information on capitalization in Chapter 3. I do not intend to discuss all possible dictionaries and reference works containing the words in question. Instead, I focus on dictionaries that are readily available to any student, terminologist, researcher, or anyone else looking for information on the spellings of these words. I examined twelve dictionaries published in or after 2000, and the following dictionaries are the ones that contain one or more of the three words *VoIP*, *WiMAX*, or *FLASH-OFDM*:

- *Bloomsbury English Dictionary* (Rooney 2004)
- *The Chambers Dictionary* (Brookes et al. 2006)
- *Concise Oxford English Dictionary* (Soanes & Stevenson 2006)
- *The Penguin English Dictionary* (Allen 2007)
- *Collins English Dictionary* (Anderson et al. 2007)
- *Macmillan English Dictionary for Advanced Learners* (Rundell 2007)

- *Shorter Oxford English Dictionary* (Stevenson 2007)

All of these dictionaries include the word *VoIP*, and *The Chambers Dictionary* also contains the word *WiMAX*. The entries are discussed in more detail in the following sections. As I expected, *FLASH-OFDM* is not included in any of the printed dictionaries mentioned above, and because it is a highly specialized term, I think it is possible it may never be included in general purpose dictionaries.

As regards online reference material, I examined four dictionaries, one glossary, and one vocabulary. The online dictionaries I used in the present study were *Acronym Finder*, *Webopedia Computer Dictionary*, *NetLingo*, and *Computer Hope Dictionary*. The glossary and vocabulary I used were *JiWire Glossary of Wireless and Wi-Fi Terms and Definitions* and TSK's *Internet Telephony Vocabulary* (TSK 37). They are available on the Internet as well.

Unlike most traditional dictionaries, many online dictionaries do not contain a comprehensive description of the material included in the dictionary, or information on its compiler. Therefore there are gaps in the following descriptions as well. It is also to be noted that all the following dictionaries were published by American companies, and therefore the American English spellings, if there are such, may be overrepresented. I chose these particular dictionaries because they include interesting entries for the words studied; however, some of them are not compiled by professional lexicographers, and the dictionary may be only a minor feature on a website offering different kinds of content or services, which may affect their reliability.

Acronym Finder was launched in 1996. Its publisher is Mountain Data Systems LLC, and it contains almost 600,000 entries, mostly from the fields of computing, technology, and the military. The entries in the *Acronym Finder* are often short: they usually consist of the abbreviation followed by the full form. The users are referred to *The Free Dictionary* for more information on the concepts. (About the Acronym Finder 2008.) Some of the dictionary

entry pages have a link to *The Free Dictionary*, and *The Free Dictionary* also has a section on acronyms, which seems to consist of material from the *Acronym Finder*.

Webopedia Computer Dictionary is another online dictionary that belongs to a network of websites owned by a particular company. It contains words and phrases related to computers and Internet technology, and the information is compiled by “[f]ull-time experienced editors”. The introductory page points out that an attempt has been made to define the terms in a clear way, and the avoidance of jargon makes the dictionary suitable for the general public. (Webopedia. About Us 2008.)

According to its introductory page, *NetLingo* contains “thousands of definitions that explain the online world of business, technology, and communication[,] including the largest collection of Internet acronyms” (NetLingo. The Dictionary 2008). It was launched in 1994 by two private people, Vincent James and Erin Jansen, and it is still owned and operated by Jansen (NetLingo Help & FAQs 2008).

Computer Hope is a company providing free computer support online, including a dictionary of computing terms (Introduction to Computer Hope 2008). The *Computer Hope Dictionary* contains over 6,000 entries (ibid.). The browse functions do not appear particularly usable, although the number of entries is significantly smaller than in some other dictionaries. For example, the word *WiMAX* can only be found by text search, not by browsing.

JiWire Glossary of Wireless and Wi-Fi Terms and Definitions contains 290 terms related to wireless communications. It is maintained by JiWire, “the leading mobile broadband advertising network” (About JiWire 2007), but the website does not offer any in-depth information about the glossary.

The *Internet Telephony Vocabulary* (TSK 37, 3) was compiled by the Finnish Terminology Centre TSK, in cooperation with the Finnish Communications Regulatory

Authority (Viestintävirasto), Ministry of Transport and Communications Finland (Liikenne- ja viestintäministeriö), and Finnish telecommunications companies such as Nokia and TeliaSonera Finland Oyj. The vocabulary was published in 2007, and it contains 77 terminological entries related to Internet telephony.²⁶ It is available on the Internet in PDF format.

I will give full entries from both printed and online dictionaries, except if the entry is particularly long, in which case I may shorten it slightly. The formatting follows the original dictionary, unless otherwise stated. There may be, for example, differences in the ways in which pronunciations are given, but I have retained the original italicization and the use of bold type for the headwords. Like most of the online dictionaries, I will use underlining to represent hyperlinks.

I also searched for examples of the spellings in the online archives of magazines and newspapers. As I mentioned in Section 1.1, the register is rather formal in all of them, although some of the newspapers also contain less formal texts, such as columns. A more detailed examination of the influence of register on spelling would have required a more extensive and varied collection of samples to be studied, but I decided to concentrate on a limited number of registers: professional jargon in specialist magazines, and newspaper language. It has been clear from the beginning that there is variation in the spellings, and including informal text types, such as online chat discussions, would probably have added to the amount of different spellings these words have. I believe, however, that by examining magazines and newspapers it is possible to gain insight into the competing forms of these words: the spellings that are used frequently and may eventually enter dictionaries, and not only curiosities or spellings that might be typical of Netspeak.

²⁶ Vocabularies that follow the principles of terminology are organized according to concepts. A terminological entry normally contains a term, its possible synonyms and equivalents in other languages, and the definition of the concept (modified from Suonuuti 2001, 36–37).

The magazine that has the most central role in this thesis is *Telephony*, an American publication aimed at specialists. According to its publisher, Penton Custom Media, *Telephony* is “the leading publication for all communications service providers” (Penton 2008). Its first issue was published in 1996, and it is still in print. It is thus possible to see whether the spellings tend to change in this magazine as the concepts become more common, and whether there is more variation in the very early occurrences as compared with more recent ones.

In order to be able to compare the spellings in *Telephony* with those in another publication close to the field of telecommunication, I used the highly specialized journal *Microwave and Optical Technology Letters*.²⁷ Its readers are engineers, scientists and technicians, and the journal promises to provide “quick publication ... of the most recent findings and achievements in high frequency technology” (Wiley InterScience 2008).

The general newspaper databases included in the study were *The New York Times* and the *Times Online*, which contains material from *The Times* and *The Sunday Times*. I also examined the British business newspaper *Financial Times*. Considering the scope of this thesis, the number of newspapers had to be limited. I chose *The New York Times* and the *Times Online* because I wanted to examine both American and British newspapers. I included the *Financial Times* because otherwise British publications would have been underrepresented, and since it is a business newspaper, it may also offer additional information on the effect of genre on the spellings. The oldest articles in *The New York Times* archive are from 1981; the oldest articles in the *Times Online* and the *Financial Times* are from 2003. It is therefore not possible to examine the earliest occurrences of the word *VoIP* in those newspapers. However, the archives still contain articles spanning a period of five years, and provide ample examples of the recent use of the words.

²⁷ I only used this magazine for *WiMAX*, and its issues published before 2008 do not contain articles discussing *VoIP* or *FLASH-OFDM*. I think the articles on *WiMAX* in this journal complement and support the findings from *Telephony*.

I carried out the analysis by examining the spellings of the words *VoIP*, *WiMAX*, *FLASH-OFDM* and their full forms in the source material. I collected the different spellings by making searches in the online dictionaries and the archives of magazines and newspapers. As regards magazines, I examined all full text articles that contained the search words. For newspapers I only examined the abstracts, and I had to exclude the full forms that occurred only at the beginning of a sentence, because the sentence-initial position always affects the capitalization of the phrase. Therefore the statistics for the spellings used in newspapers are tentative. In addition, it is necessary to point out that some of the articles, especially in *Telephony*, were written by the same author, which may have an effect on the results.

The search function in the online databases I used is not case sensitive, and thus the search word *voip*, for example, yielded all the relevant spellings. However, I needed to carry out a separate search for the different kinds of full forms, because it is possible for the full form to occur alone, without the abbreviation.²⁸ In addition, I searched the hyphenated form of *WiMAX* separately. I may nevertheless have missed some rare spellings or spelling errors, but it is unlikely that such occurrences would be statistically significant. I excluded additional versions of the same article if the same spellings were used in both articles. I also excluded some search results that were not articles containing body text, such as files consisting only of tables. I organized the search results according to their time of publication. In the case of magazines and newspapers, I made notes on the spellings that occurred in each article or abstract, and I marked the results in the tables included in this thesis. The numbers in the tables refer to the amount of articles where each form occurs, not the occurrences of the word forms. I then compared these frequencies according to the type of their source – magazine or newspaper – and the time of the publication. The most recent magazine and newspaper

²⁸ Some of the search results in the magazines included articles where the search phrase was not mentioned. Therefore the number of results was sometimes higher than the number of articles where the full form was actually mentioned, and it was necessary to check each article separately in order to find the real occurrences. It is possible that the full form or some words of it are attached to the article as keywords.

articles I examined were published in early 2008, but in order to make the numbers in the tables comparable, I have not included them in most of the tables. However, I may comment on the spellings used in 2008 if they differ from the general trend, or if there are some particularly interesting examples.

4.1 VoIP

The definition of *VoIP* in the *Concise Oxford English Dictionary* is “a technology for making telephone calls over the Internet in which speech sounds are converted into binary data” (Soanes & Stevenson 2006). The Skype application, for example, uses this technology. According to Keating (2005), VoIP telephony was introduced in 1996, but it has become more common in recent years. Similar techniques, or even the same technique, are often referred to as *Internet telephony*, but the technique as such, or even the different names given for it, are not relevant in this study. Instead, I concentrate on the specific term *VoIP*, and its most commonly used full forms *voice over internet protocol* and *voice over IP*.

As I mentioned in Section 3.3, VoIP is sometimes defined as a protocol (e.g. Computer Hope Dictionary - VoIP 2008), but it is more commonly viewed as a technology. According to *Collins COBUILD English Dictionary for Advanced Learners*, the word *technology* “refers to methods, systems, and devices which are ... used for particular purposes” (Sinclair et al. 2001, s.v. *technology*). A protocol, on the other hand, is “a set of rules for exchanging information between computers” (ibid., s.v. *protocol*). Whether VoIP is regarded as a technology or a protocol may have an effect on its capitalization: the *Microsoft Manual of Style for Technical Publications* suggests that title capitalization²⁹ be used for the names of protocols (Purcell et al. 2004, 137), and it seems that the names of protocols are still often

²⁹ The *Microsoft Manual of Style* does not give a specific definition for title capitalization. The definition I apply in this thesis is that the first letter of each word is capitalized, except for articles, conjunctions, and prepositions (that do not occur at the beginning or end of the phrase).

capitalized, although some dictionaries have begun to treat them as common nouns. The full form of *IP* in both the *Microsoft Manual of Style* (Purcell et al. 2004, 188) and *The Associated Press Stylebook* (Goldstein 2007, 125) is *Internet Protocol*.

4.1.1 *VoIP* in Dictionaries and Vocabularies

VoIP is apparently the only one of the three words that has already entered several general purpose dictionaries. More than half of the twelve recent dictionaries I examined contain this word: *Bloomsbury English Dictionary*, *Concise Oxford English Dictionary*, *Shorter Oxford English Dictionary*,³⁰ *The Chambers Dictionary*, *The Penguin English Dictionary*, *Collins English Dictionary*, and *Macmillan English Dictionary for Advanced Learners*. I will give the entries and discuss them in the following paragraphs.

Bloomsbury English Dictionary (Rooney 2004) contains entries for both the full form and the abbreviated form of the concept:

voice over Internet protocol *n* ONLINE full form of **VoIP**

VoIP /voyp/ *n* a technology that enables voice messages to be sent via the Internet, often simultaneously with data in text or other forms. Full form **voice over Internet protocol**

Bloomsbury English Dictionary seems to have been ahead of its time: the dictionary was published in 2004, and it already contains this rather new word. The dictionary makes an explicit reference to the full form at the end of the entry for *VoIP*, although the abbreviated form is not given a separate label *abbrev*, which is used for some abbreviations in that dictionary. It is also significant that the definition is given in the entry for *VoIP* and not the full form: according to the guide to the dictionary, the definition is given in the entry for the abbreviation if the abbreviation is used more frequently than the full form (Rooney 2004, xv).

³⁰ Margot Charlton of the Oxford Word and Language Service kindly informed me that the word *VoIP* is also included in the *Shorter Oxford English Dictionary*, and she sent me a photocopy of the entry. I have not had access to the whole dictionary.

The guide does not mention conventions related to spelling, but the punctuation of abbreviations is based on the most common form in their Corpus of World English, and “important alternative forms are also shown” (ibid.). The full form *voice over Internet protocol* confirms to the general guidelines on capitalization in that only the word *Internet* is capitalized, and not all the letters that are capitalized in the abbreviation. *Internet Protocol* is not treated as a proper noun in this dictionary.

The *Concise Oxford English Dictionary* (Soanes & Stevenson 2006) contains the following entry for the word *VoIP*:

VOIP abbrev. voice over Internet protocol, a technology for making telephone calls over the Internet in which speech sounds are converted into binary data.

The spelling of the full form is the same as in *Bloomsbury English Dictionary*, that is, only the word *Internet* is treated as a proper noun, but in this dictionary the abbreviated form is capitalized throughout.

The entry in the *Shorter Oxford English Dictionary* (Stevenson 2007) contains the same abbreviated form, but all the initial letters of the full form are capitalized:

VOIP abbreviation.
COMPUTING. Voice Over Internet Protocol.

Unfortunately I had only a limited access to this dictionary, and therefore I do not know whether all full forms of acronyms are capitalized in the same way.

The same spellings can be found in *The Chambers Dictionary* (Brookes et al. 2006):

VOIP /voip/ *abbrev:* Voice Over Internet Protocol, a telecommunications standard that enables spoken communication via the Internet.

The Penguin English Dictionary (Allen 2007) gives the abbreviated form with a lowercase *o*:

VoIP *abbr* Voice over Internet Protocol, Internet technology that allows telephone calls to be made by means of a broadband Internet connection instead of a conventional telephone line.

Collins English Dictionary (Anderson et al. 2007) contains the following entry:

voip (vɔɪp) *n* *informal* voice-over internet protocol: a system for converting analogue signals to digital so that telephone calls may be made over the internet

This entry is somewhat surprising. First of all, both the abbreviated form and the full form are spelled with lowercase letters. Even the word Internet is lowercased; a practice that has gained some popularity, but that is not fully adopted by all dictionaries yet.³¹ Alternative spellings are not given, nor is there an etymology note on this particular word. The word *laser*, for example, has an etymology note which gives its original full form. The full form of *VoIP* is, of course, given in this entry as well, but the entry seems to suggest that the abbreviated form is not an acronym that could be used in its own right, but an informal variant of *voice-over internet protocol*. In *Collins English Dictionary*, the label *informal* is given to “words or senses that may be widely used, especially in conversation, letter-writing, etc, but that are not common in formal writing” (Anderson et al. 2007, x). It is also interesting that the full form is spelled with a hyphen. Usually *voice-over* refers to an unseen narrator speaking in a television program, for example, whereas in the phrase *voice over internet protocol* the meaning is rather different: voice is sent over the Internet by using a method called the *Internet protocol*.

Macmillan English Dictionary for Advanced Learners (Rundell 2007) gives the following entry:

VoIP /vɔɪp/ noun [u] COMPUTING voice over Internet protocol: a technology that allows voice messages to be sent over the Internet.

Only the word Internet is capitalized in the full form, and the abbreviation is spelled with a lowercase *o*. The following table summarizes the spellings that occur in the printed dictionaries quoted above.

³¹ Some dictionaries (e.g. Rooney (2004), Brookes et al. (2006)) give both spellings, *Internet* and *internet*. Advanced learners’ dictionaries and Oxford dictionaries (e.g. Soanes & Stevenson (2006)) still seem to prefer the spelling with a capital initial, whereas in the *Collins English Dictionary* (Anderson et al. 2007) *internet* is given as the headword, followed by a comment “sometimes capital” (ibid., s.v. *internet*).

Table 2 *VoIP* and its full forms in printed dictionaries

Name of the dictionary	Abbreviated form	Full form
Bloomsbury English Dictionary (2004)	VoIP	voice over Internet protocol
Concise Oxford English Dictionary (2006)	VOIP	voice over Internet protocol
Shorter Oxford English Dictionary (2007)	VOIP	Voice Over Internet Protocol
The Chambers Dictionary (2006)	VOIP	Voice Over Internet Protocol
The Penguin English Dictionary (2007)	VoIP	Voice over Internet Protocol
Collins English Dictionary (2007)	voip	voice-over internet protocol
Macmillan English Dictionary for Advanced Learners (2007)	VoIP	voice over Internet protocol

VoIP is also included in all of the online dictionaries I examined. The entry for *VoIP* in *Acronym Finder* is very concise:

What does VoIP stand for?
Voice over Internet Protocol

The following entry is taken from the *Webopedia Computer Dictionary*:

VoIP

Short for *Voice over Internet Protocol*, a category of hardware and software that enables people to use the Internet as the transmission medium for telephone calls by sending voice data in packets using IP rather than by traditional circuit transmissions of the PSTN. ...

VoIP also is referred to as *Internet telephony*, *IP telephony*, or *Voice over the Internet (VOI)* ...

Webopedia Computer Dictionary uses links in the entries, but they are not entirely consistent.

For example, the *VoIP* entry quoted above does not have a link to *Internet telephony*, although it has its own entry. On the other hand, *VoIP* is mentioned in the entry for the IEEE standard *802.16*, which is related to *WiMAX* and discussed in more detail below, but the link from the word *VoIP* leads to the entry for *Internet telephony*. In addition, this dictionary is not consistent with the use of capital letters, or there may be spelling errors. In the entry quoted

below, *VoIP* is spelled with full capitals, although in its own entry only the form *VoIP*, with lowercase *o*, is given.

Webopedia Computer Dictionary:

Internet telephony

A category of hardware and software that enables people to use the Internet as the transmission medium for telephone calls. ...

Internet telephony products are sometimes called *IP telephony*, *Voice over the Internet (VOI)* or *Voice over IP (VOIP)* products.

NetLingo gives the full form below the headword:

VoIP

Voice Over Internet Protocol

a.k.a. IP telephony

A technology that uses Internet Protocol (IP) instead of voice recognition as the conduit for a voice conversation by telephone. The technology transmits ordinary telephone calls over the Internet using packet-linked routes. It was developed because in 1999, the volume of data traffic surged past the volume of voice traffic on worldwide networks. ...

see also: Internet telephony

The use of “a.k.a.” for synonyms seems slightly out of place in this otherwise rather formal entry, especially because it is not used in all entries.³² Although many online dictionaries tend to use title capitalization for the full forms, *NetLingo* is one of the few to capitalize even the word *over*.

The following is the entry for *VoIP* in the *Computer Hope Dictionary*:

VoIP

Also known as **IP telephone** (sic), **VoIP** is short for **Voice over Internet Protocol** and is an Internet protocol that enables users to make calls over the Internet. The first experiment VoIP call was made in 1973, however the first software known as Vocaltec that enabled end users to make calls did not appear until 1995. ...

Unlike most of the other sources, the *Computer Hope Dictionary* describes VoIP as a protocol. As I argue in Section 4.1, this may affect the capitalization of its full form –

³² For example, the synonyms for *P2P* are marked simply “Peer-to-Peer --or-- Person-to-Person”.

although the capitalization may also derive from the general tendency to use title capitalization for the full forms in online dictionaries.

*JiWire Glossary of Wireless and Wi-Fi Terms and Definitions*³³ contains two entries that are of interest here:

voice-over-IP

A way of making telephone calls over a packet-switched network like the Internet. Voice-over-IP requires special telephones and software. Voice-over-IP is commonly abbreviated to VoIP.

VoIP

Short for Voice over IP, which is simply voice data sent using Internet Protocol over the public Internet or an intranet. Its main advantage is that it avoids the usual phone service tolls. A few companies are offering cordless VoIP phones that work on Wi-Fi networks.

These entries are placed next to each other in the alphabetical list, and at first glance they seem to refer to the same concept. However, the different spellings, *voice-over-IP* in the first entry and *Voice over IP* in the second, seem to suggest that they are not, in fact, synonyms. Even the sentence “[v]oice-over-IP is commonly abbreviated to VoIP”, which might connect the two entries, is potentially ambiguous: the fact that a phrase is “commonly abbreviated” in a particular way does not necessarily mean that the meanings of *voice-over-IP* (*VoIP*) and *Voice over IP* (*VoIP*) are the same, even though the abbreviated forms are. To make sure whether the meanings are the same, I asked this directly from JiWire, and they confirmed that the meaning is the same (JiWire Customer Care 2008). I think either entry would have been understandable alone, but having two separate entries with different definitions for the same concept is confusing, especially since the spellings are different as well. I think this inconsistency is an example of the haphazard editorial practices of some online dictionaries and glossaries.

³³ The *JiWire Glossary* indicates links by means of blue font color, instead of underlining. I have added the underlining to make the linked words explicit.

The English equivalents of *VoIP-tekniikka* ('VoIP technique') given in the *Internet Telephony Vocabulary* (TSK 37, 11) are the following:

Voice over Internet Protocol; Voice over IP; VoIP; ~Internet telephony (1);
~IP telephony (1); ~IPT (1)

The three terms marked with a tilde (~) are near equivalents³⁴ of *VoIP-tekniikka*. The number in parentheses after the term indicates that the term refers to more than one concept, that is, it has homonyms in the same vocabulary. The relationships of these terms were discussed extensively in the terminology group while they were compiling the vocabulary, and the general opinion seemed to be that *Voice over Internet Protocol* is a more specific term than *Internet telephony* (Äijälä 2007). However, the main language of the vocabulary is Finnish, and therefore the Finnish concept system was used as the basis for analyzing the relationships between concepts. Finnish does not make a clear distinction between *Internet telephony* and *Voice over Internet Protocol*.

4.1.2 *VoIP* in Magazines and Newspapers

The word *VoIP* or its full form is mentioned or discussed in 208 articles published in *Telephony* between September 1997 and December 2007. In general, the spellings are extremely consistent: the abbreviation is always spelled *VoIP*, and the full form is almost exclusively *voice over IP* or *voice-over-IP*. The hyphenated form is usually used when the phrase modifies another noun, for example "voice-over-IP provider". The form *voice over Internet protocol* is given only in one article, published in 2001 (Barthold 2001). In all other articles *Internet Protocol* is abbreviated to *IP*. In the early articles, published before 1999, the abbreviated form *VoIP* does not occur at all; in some of the later articles, especially short ones, only the abbreviated form is used. As Table 3 below illustrates, the spellings have

³⁴ In terminology, near equivalents are terms that refer to concepts delimited in a different way than the concept defined in the terminological entry, or that refer to concepts in a different concept system (TSK 37, 7).

remained the same, but the abbreviated form has become more common, although most articles still mention the full form at least once.

Table 3 *VoIP* and its full forms in *Telephony*

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>voice over IP</i> or <i>voice-over-IP</i> and <i>VoIP</i> in the same article				2	6	7	8	31	31	11	15
<i>voice over IP (VoIP)</i>					3	2	1	2	6	3	4
only <i>VoIP</i>				1	2	3	2	13	13	2	2
<i>voice over Internet protocol (VoIP)</i>					1						
only <i>voice over IP</i>	2	8	11	9	1			2	2	1	1

The first mention of the full form is not always followed by *VoIP* in parentheses. Instead, *voice over IP* is often used at the beginning of the article, *VoIP* in titles and in the rest of the article. This seems to imply that the readers are familiar with the abbreviated form, and the full form and the abbreviated form can be used interchangeably. In 2001 and 2002 the forms *voice over IP* and *voice-over-IP* still occurred in the titles of some articles, but the abbreviated form is nevertheless much more common in titles.

The newspaper articles show more variation in the spellings of both the abbreviated and full forms, and naturally the tone of the articles where *VoIP* is discussed is also quite different in *Telephony* and the newspapers. For example, most of the articles in *The New York Times* contain both the abbreviation and the full form, and the point of view is often quite practical: “VoIP is the annoyingly user-hostile name that the industry has chosen for voice calls carried over the Internet’s wiring. (VoIP stands for voice-over-Internet protocol...)” (Pogue 2007). Sometimes even the way in which the abbreviation is used carries a particular tone. In the

articles aimed at specialists, abbreviated forms sometimes occur alone because readers are expected to be familiar with them. On the other hand, in newspapers this may not suggest familiarity, as the following example from a column (Slatalla 2006) illustrates:

...Then I called my husband to say we were rich. By my calculations we were about to start saving \$100 a month by making our voice calls using a broadband Internet connection instead of a traditional phone line. “That technology is called VoIP,” he said. “I don’t suppose they told you that during a power outage our phone service will go out too?”

The column discusses how Internet telephony may affect people’s everyday lives, but the full form of *VoIP* is not mentioned at all. In fact, it seems that the writer has left it a mystery on purpose.

The New York Times online archive contains 74 articles mentioning the word *VoIP*. It was occasionally mentioned around the turn of the millennium: the oldest article is from 1999, but the next article after that is from 2001, and there is only one of them. The most recent articles were published at the beginning of 2008. In most of the articles, the spelling of the abbreviated form is *VoIP*; there are only two occurrences of *VOIP* and one *V.O.I.P.* Table 4 contains the abbreviated forms and their frequencies.

Unfortunately the oldest articles in the *Times Online* and the *Financial Times* archives are from 2003, and it is therefore not possible to examine the earliest occurrences of this word in these newspapers. However, the archives still contain articles spanning a period of five years, and some of the examples are very interesting indeed. The following table summarizes the occurrences of the different spellings of *VoIP* in the three newspapers.

Table 4 *VoIP* in *The New York Times*, *Times Online*, and *Financial Times*

	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>The New York Times</i> (total number of articles containing the word <i>VoIP</i> : 74)									
VoIP	1		1		5	17	17	19	11
VOIP						2			
V.O.I.P								1	
<i>Times Online</i> (total number of articles containing the word <i>VoIP</i> : 178)									
VoIP					2	19	39	50	20
VOIP					4	1	4	2	4
Voip							5	11	16
VOiP						1			
<i>Financial Times</i> (total number of articles containing the word <i>VoIP</i> : 516)									
VoIP					30	133	137	114	53
VOIP					2	10	6	10	3
Voip					1	3	4	3	3
voip						1	1		
VOiP					1			1	

Although *VoIP* is the most common spelling for the abbreviated form in the *Times Online*, there are three other spellings as well: *VOIP*, *Voip*, and *VOiP*. The last one might look like a spelling error, especially since it only occurs in one article. However, it is used three times in that article, and the spelling is always the same. *Voip* is particularly interesting: although it is not used as often as *VoIP*, it seems to be becoming more common. It made its appearance in

The Times in 2005, and it has gained in popularity ever since. This form also occurred in the *Financial Times*, but not in the other newspapers or magazines I examined. *VOIP* appeared in *The New York Times*, too, but it is somewhat more common in the *Times Online*.

The *Financial Times* archive has as many as five different spellings of the abbreviated form: *VoIP*, *VOIP*, *Voip*, *voip*, and *VoiP*. The last two, *voip* and *VoiP*, are marginal cases, occurring in only two articles, but they are nevertheless interesting because they add to the already rich collection of spellings. Again, *VoIP* is by far the most common form.

There is variation in the spellings of the full forms as well. The following table includes the different full forms of *VoIP* in *The New York Times* and their frequencies. Some of the columns are divided in two: in these cases the numbers in the left column indicate the occurrences of the full form together with an abbreviation, and the numbers in the right column indicate that only the full form was used.

Table 5 The full forms of *VoIP* in *The New York Times*

	1999	2000	2001	2002	2003	2004	2005	2006	2007
voice over Internet protocol					5 2	13 14	14 2	12 2	6 4
Voice over Internet Protocol	1		1			2	1	2	1
Voice Over Internet Protocol					1	2	1 1	1	
Voice Over I.P.			1						
voice over IP				1		1	1		
Voice over IP			1						

The most common spelling is *voice over Internet protocol*, but there are several instances of *Voice over Internet Protocol* as well. *Voice over IP*, which is particularly common in

Telephony, does not show up often in *The New York Times*. Most of the articles contain both one of the full forms and the abbreviation. There are several different ways in which either the abbreviated form or its full form are introduced in the articles. In several articles, *VoIP* is placed in parentheses after the full form: “voice over Internet protocol (VoIP)” (6 occurrences), but even more common examples are “VoIP, or voice over Internet protocol” (9 occurrences) and “voice over Internet protocol, or VoIP” (35 occurrences).

The British newspapers show different tendencies as regards the capitalization of the full forms. The following tables illustrate the different spellings of the full forms and their frequencies in the *Times Online* and the *Financial Times*.

Table 6 The full forms of *VoIP* in the *Times Online*

	2003		2004		2005		2006		2007	
voice over internet protocol	1		5	2	30	5	38	10	17	4
Voice over Internet Protocol			6		5	2	12		4	2
Voice Over Internet Protocol					3		1		2	
Voiceover Internet Protocol							1			
voiceover internet protocol				1				2		
Voice over IP		1	1		1					
Voice Over IP			1							
voice over IP	3	4	2	3	2	3		1		1
voiceover IP			2							

Note: The numbers in the left column indicate the occurrences of the full form together with an abbreviation, and the numbers in the right column indicate that only the full form was used.

Table 7 The full forms of *VoIP* in the *Financial Times*

	2003		2004		2005		2006		2007	
voice over Internet Protocol	3	1	6	1	3		2			
voice over Internet protocol			4							
Voice over Internet protocol					2				1	
Voice over internet protocol			1							
voice over internet protocol	5	1	31	12	53	21	35	20	17	16
Voice over Internet Protocol	2		50	4	26	3	18	6	7	5
Voice Over Internet Protocol	1		2	1				1		
voice over IP, voice-over-IP	8	25	7	31	1	25	7	17	1	8
Voice over IP, Voice-over-IP	4	3	8	12	1	4	2	7		2

Note: The numbers in the left column indicate the occurrences of the full form together with an abbreviation, and the numbers in the right column indicate that only the full form was used.

The preferred full form in both the *Times Online* and the *Financial Times* seems to be *voice over internet protocol*, without capitalization, whether the abbreviation is given or not. *The New York Times*, on the other hand, capitalizes the word *Internet*, and the form *voice over internet protocol* did not occur in that newspaper at all. The form *Voice over Internet Protocol* occurs more often in the articles that also mention the abbreviated form in all three newspapers. In addition, hyphenated forms such as *voice-over internet protocol*, *voice-over-internet protocol*, and *voice-over-internet-protocol* occurred in all three newspapers, but I did not count them separately.

4.1.3 *VoIP*: Discussion

The most common full forms of *VoIP* are *voice over internet protocol*, *Voice over Internet Protocol*, and *voice over Internet protocol*. The form *voice over IP* is extremely common in

the specialist magazine, and it also occurs in the *Financial Times*, but it is much less frequent in the general newspapers. The trend seems to be towards using fewer capital letters in the full form, and capital letters used in the full form are not always transferred to the abbreviation as such: I did not come across the spelling *voIp*, although theoretically such spelling might be possible.

VoIP is the most common form for the abbreviated term in the specialist magazine and British and American newspapers, although several other forms exist as well. *Voip* seems to be a strong competitor in British publications. It might become even more common in the future, because it is easier to write than *VoIP*. Eventually even the capitalization might be dropped if the word begins to be used as a normal common noun.

VoIP is also the only form chosen as a headword in the online reference texts I examined, which makes it all the more fascinating that the spelling in the *Concise Oxford English Dictionary* (Soanes & Stevenson 2006) and the *Shorter Oxford English Dictionary* (Stevenson 2007) is *VOIP*. I asked the Oxford Word and Language Service why the lexicographers chose this particular spelling for the word, and they replied that the spelling is based on the evidence provided by their reading program and the two-billion-word Oxford English Corpus, which give a “good picture of the current state of the language” (Charlton 2008, letter to the author). In other words, the spelling *VOIP* in the two dictionaries is based on authentic usage, but my small-scale study, which is also based on authentic usage, suggests that this spelling is not particularly common in the material I examined. However, I am not in a position to question the reliability of the Oxford dictionaries, and I can hardly compare the material I examined with the enormous corpus available to the compilers of the Oxford dictionaries. It would nevertheless be interesting to examine this issue further. The background information on the Oxford English Corpus does not seem to reveal anything that might cause the different results in this study and the evidence given by the corpus on the

spelling of *VoIP*: the corpus contains both formal and informal texts, most of the material is collected from the Internet between the years 2000 and 2006, and the material is not limited to British English (Oxford English Corpus. Composition and Structure 2008). It is not possible to know whether the evidence for *VOIP* could come from a single source, or whether the lexicographers have taken into account the relative frequencies of different forms. Furthermore, the form in the *Macmillan English Dictionary for Advanced Learners* (Rundell 2007) and *The Penguin English Dictionary* (Allen 2007) is *VoIP*, and in the former at least the definitions are based on the 200-million-word World English Corpus. It is quite possible that a different corpus might support a different spelling.³⁵

The spellings of the word *VoIP* in dictionaries do not seem to support my hypothesis that printed general purpose dictionaries would reflect standardized spellings. Instead, the spellings of the abbreviated form in online dictionaries were surprisingly consistent, although the full forms varied. The word *VoIP* was found in seven general dictionaries, and two of the dictionaries with the spelling that seems to be the most common in the material I examined are from 2007. Some of the other recent dictionaries chose different spellings, *voip* and *VOIP*, and at least the Oxford dictionaries argue that the latter spelling is based on real usage, and not on their editorial practices as might have been suspected.

4.2 *WiMAX*

The abbreviation *WiMAX* (/waɪmæks/) comes from the words *worldwide interoperability for microwave access*. The x at the end of the word is based on the pronunciation of the last word of the full form, *access*. *WiMAX* is a technology which enables wireless broadband access to the Internet, for example (WiMAX Forum. Technology 2008). The name was created by the

³⁵ I assume that the spellings in the *Macmillan English Dictionary for Advanced Learners* are based on the World English Corpus as well, but I was not able to confirm this from Macmillan.

WiMAX Forum (Kotevski 2007), and it has been in use since 2001. However, it becomes apparent from the examples I give in this section that this technology has only become more common in the recent years. It is, in fact, rarely mentioned before 2003 in newspapers or even specialist magazines.

The WiMAX Forum (2007, 3–4) states that “WiMAX should always be used with a capital ‘W,’ lower case ‘i’ and uppercase ‘MAX’”, and there is no hyphen. According to the WiMAX Forum, the trademark WiMAX is an adjective (*ibid.*, 3), but as I will discuss in more detail in the section below, it is normally treated as a noun.

4.2.1 *WiMAX* in Dictionaries and Vocabularies

I found the word *WiMAX* in only one printed general purpose dictionary, *The Chambers Dictionary*, but it is included in many online dictionaries and vocabularies. In most of the dictionaries, and in the glossary and vocabulary included in the present study, the form is *WiMAX*, and alternative spellings are not mentioned.

The entry for *WiMAX* in *The Chambers Dictionary* (Brookes et al. 2006) does not mention that it is a trademark, but the spelling is the same the WiMAX Forum prefers:

WiMAX /wi'maks/ *abbrev*: Worldwide Interoperability for Microwave Access, a technology for providing long-distance broadband Internet connections.

The definition in the *Acronym Finder* emphasizes the group behind WiMAX, instead of the technology itself:

What does WiMAX stand for?
Worldwide Interoperability for Microwave Access, Inc. (group promoting IEEE 802.16 wireless broadband standard)

In the *Webopedia Computer Dictionary*, the definition is very short and the full form is not mentioned at all:

WiMAX

The name commonly given to the IEEE 802.16 standard.

The underlined text *IEEE 802.16 standard* is linked to the definition of this standard in the same dictionary:

802.16

Commonly referred to as *WiMAX* or less commonly as *Wireless MAN™* or the *Air Interface Standard*, IEEE 802.16 is a specification for fixed broadband wireless metropolitan access networks (MANs) that use a point-to-multipoint architecture. Published on April 8, 2002, the standard defines the use of bandwidth between the licensed 10GHz and 66GHz and between the 2GHZ and 11GHz (licensed and unlicensed) frequency ranges ...

This entry, in turn, contains links to *IEEE*, *metropolitan access network*, and other concepts not included in the excerpt above. The use of hyperlinks is a common feature in online dictionaries, and it can be both a strength and a weakness. The entry for *WiMAX*, for example, is not particularly informative on its own, but the links may help to understand how *WiMAX* is related to other technologies.

NetLingo is one of the few dictionaries to give the headword as *WiMax*:

WiMax

a.k.a. 802.16e

Unlike Wi-Fi, which covers an area of a few hundred feet, *WiMax* networks are capable of extending over several square miles. *WiMax* antennas will be able to beam high-speed Internet connections to homes and businesses miles away (sic), eliminating the need for every building to be wired to the Internet. And eventually, by beaming signals over entire metropolitan areas and beyond, *WiMax* will allow true wireless mobility ...

The full form is not mentioned, and the definition is rather long-winded. It almost resembles an advertisement.

The entry in the *Computer Hope Dictionary* includes the full form in addition to the definition:

WiMAX

Also known as IEEE 802.16, **WiMAX** is short for **Worldwide Interoperability for Microwave Access** (sic) and is a wireless microwave technology used in MAN that provides connections up to 75Mbs as far away as 30 miles.

Title capitalization is used for the full form, and there is a spelling error in the word *access*.

In *JiWire Glossary of Wireless and Wi-Fi Terms and Definitions*, the headword is again

WiMax:

WiMax

Another name for the 802.16 wireless networking specification used for long-haul and backhaul connections.

The full form is not given. The spelling is somewhat surprising, considering that most of the other online dictionaries prefer the form with *MAX* in capital letters, *WiMAX*. In addition, a company specializing on wireless technologies might be expected to be connected to or work in cooperation with the WiMAX Forum, in which case they would probably use the spelling the Forum prefers. Since the glossary is only a minor feature on the JiWire website, there is little information about its compilation. However, elsewhere on the website, *The New York Times* is listed as one of its partners (JiWire Partner Showcase 2008), and as we saw above, that newspaper prefers the same spelling used in the *JiWire Glossary*. It is difficult to say whether the partners might really affect the glossary entries in this way, but I think it is possible.

The English equivalents for the term *WiMAX* in the *Internet Telephony Vocabulary* (TSK 37, 24) are *WiMAX* and *Worldwide Interoperability for Microwave Access*.

4.2.2 *WiMAX* in Magazines and Newspapers

The following table shows the different spellings of the word *WiMAX* in the two special-purpose magazines, *Telephony* and *Microwave and Optical Technology Letters*.

Table 8 *WiMAX in Telephony and Microwave and Optical Technology Letters*

	2003	2004	2005	2006	2007
<i>Telephony</i> (total number of articles containing the word <i>WiMAX</i> : 100)					
WiMax	1		(1)		
WiMAX	1	10	39	25	25
WiMAx				(2)	
WIMAX				(1)	(1)
<i>Microwave and Optical Technology Letters</i> (total number of articles containing the word <i>WiMAX</i> : 17)					
WiMAX			1	7	7
Wimax				1 (+1)	
WiMax				(1)	

In *Telephony*, there are 100 articles containing the word *WiMAX* in some form from April 2003 to November 2007. Two authors wrote 65% of the articles,³⁶ but there was some variation in the spellings they used, and I think the number of articles was large enough to reveal some general patterns, too.

WiMAX is mentioned for the first time in the April 2003 issue, and the form *WiMax* is used throughout that article. The next mention is from December 2003, with the spelling *WiMAX*, which is by far the most common form in *Telephony*. The form *WIMAX*, with all letters capitalized, is used normally only in headings that are set in full capitals, and not even in all of them: in some articles the lowercase *i* is retained in headings and table captions, for example “WiMAX INFRASTRUCTURE EQUIPMENT REVENUE IN U.S.” (Fitchard 2007, 40). In one article the *i* is set in small caps in the heading, while the rest is capitalized throughout.

³⁶ 41 articles were written by O’Shea, and 24 by Fitchard.

There are, however, some deviant spellings in the body text as well, but except for the April 2003 examples, they seem to be spelling errors. They are therefore placed within parentheses in Table 8. *WIMAX* occurs in two texts, in one of them five times, although the more commonly used form in that article is still *WiMAX* (O'Shea 2006b). Two articles contain the spelling *WiMax*, but the same articles contain many more occurrences of *WiMAX* (O'Shea 2006a, O'Shea 2006c). One short article contains the form *WiMax Forum*, although *WiMAX Forum* is also used in the same article (The WiMAX Wave 2005, 14).

Interestingly, the full form is only mentioned in one article in *Telephony*. It is the first article in *Telephony* to mention *WiMAX*, from April 2003, and the full form is given as “World Interoperability for Microwave Access (WiMax)” (O'Shea 2003, 14). In other words, the first word, *World*, is different from that in the more commonly used full form, *Worldwide*. Even though the full form occurs only once, the WiMAX technology is introduced in different ways in some of the articles from 2004 and 2005:

WiMAX, a broadband wireless technology we believe to have a tremendous future in service provider circles (Meyers 2004, 8)

The broadband wireless technology format WiMAX, which took the industry by storm earlier this year... (O'Shea 2004, 45)

Service providers anxiously awaiting broadband wireless equipment officially branded “WiMAX” by the technology's chief backing group, the WiMAX Forum, may have to wait longer than they expected... (Fitchard & Meyers 2005, 12)

WiMAX, the often-embattled but wildly promising set of IEEE specifications being touted by the WiMAX Forum as both complement and successor to existing wireline and wireless broadband solutions, will be a commercial reality... (O'Shea 2005, 16)

By 2006, the readers were apparently familiar with the concept and it was not introduced anymore.

Many of the articles in *Telephony* discuss *mobile WiMAX* or *fixed WiMAX*, which suggests that the articles are highly specialized. The WiMAX Forum is mentioned in several

articles, which may also have had an effect on the most common spelling: as I mentioned in Section 4.2, the WiMAX Forum clearly states that the correct spelling – according to them – is *WiMAX* (WiMAX Forum 2007, 3).

The word *WiMAX* occurs in 17 articles in *Microwave and Optical Technology Letters*.³⁷ As Table 8 above shows, in this publication, too, *WiMAX* is by far the most common form. This trend does not seem to be changing: it is the only abbreviated form of this word to occur in the seven articles that mention WiMAX published in early 2008. The form *Wimax* is used consistently in one article from 2006 (Chen & Kao 2006). Another article from the same year contains only two occurrences of the word, both with a different spelling: *WiMax* and *Wimax* (Floc'h & Rmili 2006). The occurrences in this article are placed within parentheses in the table, because it is not possible to say which would have been the preferred form. The form with all capital letters occurs only in some article titles that are capitalized throughout. However, in most of the earlier article titles from 2005 and 2006, the *i* is in lowercase, even in the otherwise capitalized titles such as “WIDEBAND INTERNAL FOLDED PLANAR MONOPOLE ANTENNA FOR UMTS/WiMAX FOLDER-TYPE MOBILE PHONE” (Wong et al. 2006).

The full form is given in several articles, which is a significant difference compared with the articles in *Telephony*. However, both the spellings of the full forms and the way they are given (before or after the abbreviated form) vary between different articles. The full form, if it is given at all, is given in the abstract or the introduction, sometimes in both. Table 9 below shows the different combinations and their frequencies. Interestingly, the number of articles where the full form is given seems to be growing again, after a decline in 2007. The capitalization continues to be varied, and even new forms have emerged: one article from 2008 (Valcarce Rial et al. 2008, 483) gives the full form twice, and one of the forms is

³⁷ I did not count articles where *WiMAX* occurs only in the references, although some of the References sections contained rather interesting spellings that differed from the spellings in the article body. For example, the article using the spelling *Wimax* (Chen & Kao 2006) had *WiMAX* in the references.

Worldwide interoperability for microwave access, which did not occur elsewhere. The forms used in this article are placed within parentheses in the table. All in all, the full forms with title capitalization and those that are lowercased throughout seem to be equally common. The additional articles from 2008 seem to favour the form with capital initials, but the lowercased form is also used.

Although this thesis focuses on the technology called *WiMAX*, I also examined the occurrences where the *WiMAX* Forum and the technology they promote are treated as synonyms. For example, the full form *Worldwide Interoperability for Microwave Access Forum* given in parentheses after the abbreviation *WiMAX* implies that the abbreviation and the phrase containing the word *Forum* are used synonymously. The following table illustrates the different combinations of the full and abbreviated forms.

Table 9 The full forms of *WiMAX* as they are given in *Microwave and Optical Technology Letters*

The order and spelling of the abbreviated and full form	2005	2006	2007	2008
WiMAX (Worldwide Interoperability for Microwave Access Forum)	1	1		
WiMAX (Worldwide Interoperability for Microwave Access)		1		1
WiMAX (worldwide interoperability for microwave access)		1	1	
Wimax (Worldwide Interoperability for Microwave Access)		1		
worldwide interoperability for microwave access (WiMAX)		2	1	1
Worldwide Interoperability for Microwave Access Forum (WiMAX)		2		
Worldwide Interoperability for Microwave Access (WiMAX)				2 (+1)
Worldwide interoperability for microwave access (WiMAX)				(1)
full form not given	0	1	5	3

As can be seen from the table, the full form can be given in parentheses after the abbreviated form, or it can precede the abbreviated form. Both patterns seem to be still in use. Something that has changed, however, is that the word *Forum* is not included in the full forms after 2006. The table is slightly simplified: in some articles there was additional information in the parentheses, not included in the table:

WiMAX (Worldwide Interoperability for Microwave Access, 2500–2690/5150–5850 MHz) (Su & Wong 2006, 2249)

the 2.5-GHz licensed WiMAX band (2495–2690 MHz, worldwide interoperability for microwave access band) (Chou & Su 2007, 3044)

WiMAX (worldwide interoperability for microwave access, IEEE 802.16a/d/e/2004) (Chen & Yu 2007, 2503)

One of the articles introduces WiMAX in the following way: “IEEE 802.16 Working Group created a new standard, commonly known as WiMAX” (Chen et al. 2007, 1807).

Next I will discuss the different spellings of *WiMAX* in newspapers. The following table illustrates the different spellings and their occurrences in *The New York Times*, the *Times Online* (online archive including *The Times* and *The Sunday Times*), and the *Financial Times*.

Table 10 *WiMAX* in *The New York Times*, *Financial Times*, and *Times Online*

	2003	2004	2005	2006	2007
<i>The New York Times</i> (total number of articles containing the word <i>WiMAX</i> : 43)					
WiMax	1	6	6	12	11
Wi-Max		5		1	1
WiMAX					(1)
<i>Times Online</i> (<i>The Times</i> and <i>The Sunday Times</i>) (total number of articles containing the word <i>WiMAX</i> : 79)					
WiMAX	1	1	1	4	5 (+1)
WiMax		2	5	15	12
Wimax			2	3	4
wimax		1		3	
Wi-Max		1	1		7
wi-max			2	3	6
<i>Financial Times</i> (total number of articles containing the word <i>WiMAX</i> : 187)					
WiMAX	1	3	3	8	6
WiMax		13	23	24	49
Wimax		3	5	15	13
wimax				1	
Wi-Max		2	2	3	7
wi-max			1	5	

The New York Times database contains 43 articles where *WiMAX* is mentioned, in one form or another. The articles range from July 2003 to December 2007. The spelling is mostly *WiMax*. There is one occurrence of *WiMAX* in a caption for a photograph (Quain 2007), but

otherwise the form *WiMax* is used in the same article. Therefore I placed this occurrence of the spelling *WiMAX* in parentheses. *WIMAX* occurs only in titles or subheadings which are capitalized throughout. The full form is given in two articles, both from 2004: "... a technology known as WiMax, or worldwide interoperability for microwave access" (Belson 2004) and "...an emerging technology called Worldwide Interoperability for Microwave Access, or Wi-Max" (Flynn 2004). The hyphenated form *Wi-Max* is also used, but it is less common than the form without hyphenation. The most common spelling, *WiMax*, seems to follow the guidelines given in *The New York Times Manual of Style and Usage* only partially: as we saw in Section 3.3, the suggestion is that acronyms referring to proper nouns that consist of more than four letters would have only the initial letter capitalized (Siegal & Connolly 1999, 4). According to this rule, the form would be *Wimax*, and the form *WiMax* includes an additional capital letter.

WiMAX occurs in 79 articles in the *Times Online* between the years 2003 and 2007. The most common form is *WiMax*, but other forms occur frequently as well. The full form is given only in one article, in capitalized form *Worldwide Interoperability for Microwave Access* (Need to Know 2007).

WiMAX is mentioned in 187 articles in the *Financial Times* online archive, excluding the duplicates. The oldest article is from November 2003. The occurrences from 2003 and the first two occurrences from 2004 are *WiMAX*, but later *WiMax* has become more common. A glance at the articles published in 2008 shows that it is still the most common form. There is nevertheless considerable variation, and other forms occur several times. In addition, the hyphenated versions *Wi-Max* and *wi-max* are surprisingly common in the *Financial Times*. The full form is given in only six articles, four of them are capitalized and two are not. Two of the full forms are different from the usual: *worldwide interoperability for microwave* (Budden 2004), and *World Interoperability for Microwave Access* (Taylor 2007).

4.2.3 *WiMAX*: Discussion

For *WiMAX*, two spellings seem to be almost equally common, but they are used in different genres. *WiMAX* is the preferred form in dictionaries, various corporate websites, and specialist discussion, whereas both British and American newspapers seem to prefer *WiMax*. However, other spellings can easily be found, too. The form *Wimax* is perhaps only used in the UK, which tallies well with Walsh's (2004, 31) claim that initial capitalization of acronyms is more typical of British English than American English. This form did not occur in any American publications, although some of the *Financial Times* correspondents located in the USA used it. The form without capitalization, *wimax*, is rare in formal texts.

Hyphenated forms of the abbreviation came up in some newspapers and websites, but in the specialist magazines they were not used at all. In fact, despite the occasional spelling errors, the specialist publications seemed to be more consistent with the spelling of the word than the other sources. I believe this is partly explained by the writers' close connections to the field, leading to an awareness of the preferred spellings. It is also to be noted that many of the articles in *Telephony* were written by the same person. On the other hand, the large number of occurrences of the form *WiMax* might be explained by the preference to avoid excessive capitalization put forward in so many style guides, as seen in Section 3.3 above.

Title capitalization is often, but not always, used for the full form of *WiMAX*, and it seems that the word *for* is never capitalized. The full form can be given before or after the abbreviated form, and the position does not seem to affect the capitalization. Often the full form of *WiMAX* is not given at all, even in dictionaries, although the concept is probably not very familiar to the general public. However, sometimes the alternative definitions given in dictionaries and articles are even more informative than the full form would be. It seems that *WiMAX* is not always treated as an acronym; it often appears as a word in its own right, as can be seen in such examples as "wireless internet technology called *WiMax*" (Pell 2007) where

the full form is not given at all.³⁸ WiMAX is not an old concept, but the abbreviation does not resemble any existing word or another abbreviation so closely that there would be a risk of confusing it with another word. Therefore the full form is not necessarily needed to clarify where the letters in the abbreviation come from.

The initial capitalization in the forms such as *WiMax* might be explained by the word's status as a name, but the interesting question is where does the capital *M* come from, if the other letters are not capitalized? One of the reasons might be that it makes the word resemble the words *WiBro* (*wireless broadband*) and *Wi-Fi* (*wireless fidelity*³⁹). However, in the word *WiMAX* the *w* supposedly comes from the word *worldwide*, and not *wireless*, although *wireless* would fit the denotation of the word as well. Especially the form with a hyphen, *Wi-Max*, seems to suggest the abbreviation stands for *wireless max*, or *wireless microwave access*. In fact, I would argue that the definitions in the dictionaries seem to support the hypothesis that the letters *w* and *i* might both come from the word *wireless* as well: although the full forms in the dictionaries I examined contain the words *worldwide interoperability*, most dictionary entries also mention that WiMAX is a wireless technology. A different full form occurs at least in some glossaries: Qualcomm's *Wireless Terminology Glossary* (Qualcomm Wireless Terminology Glossary 2008) gives the full form as *Wireless Interoperability for Microwave Access*. The spelling *WiMax* also makes the ending *max* stand out without excessive use of capitalization, and may thus evoke positive connotations of power.

³⁸ However, sometimes the full form is given as the name, and the abbreviated form as its synonym: "...an emerging technology called Worldwide Interoperability for Microwave Access, or Wi-Max" (Flynn 2004).

³⁹ There has been some debate as to whether the full form of the term *Wi-Fi* would be *Wireless Fidelity* or not. According to Phil Belanger, one of the founding members of the Wi-Fi Alliance, the name *Wi-Fi* was invented for marketing reasons only, because they "needed something that was a little catchier than 'IEEE 802.11b Direct Sequence'" (quoted in Doctorow 2005). However, some of Belanger's colleagues felt that there had to be a longer form behind it, and so the expression *Wireless Fidelity* was taken into use, although it does not really mean anything (ibid.). According to the Wi-Fi Alliance's glossary (Wi-Fi Alliance 2007), *Wi-Fi* refers to wireless local area network (WLAN) products that are based on a particular set of standards.

I believe the WiMAX Forum has been aware of the possibility that different full forms may be used, and the fact that the spelling with a lowercase *i* leaves room for two different but equally positive interpretations might be one of the reasons why the WiMAX Forum prefers the spelling *WiMAX*. Other companies have also made use of the fact that the ending *MAX* stands out in the word *WiMAX*: several WiMAX-based products have been named in a similar fashion. Some examples include RedMAX (Redline Communications) and PacketMAX (Aperto Networks 2007). Although they are not acronyms, their naming practice resembles the one applied in the so-called acronym families: Adams (1973, 137) points out that sets of acronyms related to a particular field sometimes have a common ending, such as *-ac* in the names of the early computers *binac*, *maniac*, and *ordvac*.

The most common spelling of the abbreviation in the dictionaries and magazines follows the preferences of the WiMAX Forum, but otherwise the word is used in ways the Forum might not approve of: according to the *WiMAX Forum Member Company Communications Policy* (WiMAX Forum 2007, 3), “‘WiMAX’ is *not* synonymous with the IEEE 802.16 standard or its individual variants” (emphasis in the original text), and almost all dictionaries I examined mention IEEE 802.16 as its synonym. Apparently the WiMAX Forum attempts to give clear and detailed guidelines on the use of the word, but the difference between WiMAX and the IEEE 802.16 standard is probably not very significant from the point of view of the general public. In addition, the Forum itself juxtaposes the names of the standards and particular types of WiMAX: “...products based on IEEE 802.16-2004 (Fixed WiMAX) ... Mobile WiMAX (802.16e-2005) products” (WiMAX Forum Certified Product Registry 2008).

There does not seem to be significant variation according to time in the spelling of this word. Thus *WiMAX* does not fully comply with the hypothesis brought forward in Section 2.1.2 that capitalization is dropped as the acronym begins to be used more widely, although

some evidence for this pattern can be seen in the *Financial Times*, where the spelling *Wimax* is relatively common. However, it might still be too early to say anything definite. It is possible that such forms will become more common in the future.

4.3 FLASH-OFDM

The term *FLASH-OFDM* (/flæʃ əʊ ef di: em/) is formed from the words *fast low-latency access with seamless handoff, orthogonal frequency divisional multiplexing*. The abbreviated form in full capitals is a registered trademark of Qualcomm Flarion Technologies, and they describe it on their website as a “technology designed for the delivery of advanced Internet services in the mobile environment” (Qualcomm FLASH-OFDM 2008). It was introduced in the year 2000 (Planetnetworks 2000).

FLASH-OFDM is the most recent one of the terms studied in this thesis, and it is also the rarest of them. It denotes a rather narrow, technical concept, and for all these reasons we can expect that it does not occur in newspapers as often as *VoIP* or *WiMAX*, and probably not at all in printed general purpose dictionaries. However, I think it is reasonable to suppose it is included in some specialized online dictionaries or vocabularies, because it was introduced several years ago but it still belongs to special jargon. In addition, it is clear that at least the latter part of the word, *OFDM*, is an abbreviation, but it is not obvious where the letters come from, or even to what the word as a whole refers. Therefore the word may attract curiosity – and cause confusion.

4.3.1 *FLASH-OFDM* in Dictionaries and Vocabularies

As I suspected, based on my findings *FLASH-OFDM* is not included in any general purpose dictionary yet, and it is not included in many online dictionaries, either. However, *The Chambers Dictionary* (Brookes et al. 2006) includes the abbreviation *OFDM*:

OFDM abbrev: orthogonal frequency division multiplexing, a technique for transmitting large amounts of digital data over radio waves.

I do not examine the abbreviation *OFDM* in detail in this thesis, but the entry in *The Chambers Dictionary* is interesting enough to be quoted here. The full form is lowercased, although title capitalization is used for the full forms of both *VoIP* and *WiMAX* in the same dictionary. Published in 2006, *The Chambers Dictionary* is not among the most recent dictionaries I examined, but as we have seen, it already contains some new words. The spellings that are used in this dictionary are *VOIP*, *WiMAX*, and *OFDM*, and each of them is labeled as an abbreviation. Thus there seems to be a tendency to prefer capital letters for abbreviations, both acronyms and alphabetisms, although *WiMAX* is an exception.

Acronym Finder does not have an entry for *FLASH-OFDM*, but the parts are defined in two separate entries. The acronym *FLASH* has twelve different full forms in the *Acronym Finder*, and the following entry is relevant here:

What does FLASH stand for?
Fast Low-Latency Access with Seamless Handoff (Flarion Technologies)

OFDM has two full forms:

OFDM Orthogonal Frequency Division Multiplexing
OFDM Optical Frequency Division Multiplexing

The problem with homonymous abbreviations is that it may be difficult to know which definition or full form applies in each case. Presumably at least the first full form of *OFDM* refers to the concept involved in the word *FLASH-OFDM*, but it may be difficult to discern the difference between the meanings behind these two phrases because they are not defined. As I mentioned in Chapter 4, the *Acronym Finder* usually gives only the full form of the

abbreviation, but the article page normally has a link to *The Free Dictionary* which has more information on the concept. However, in the case of *OFDM*, further information is available only for the first full form, *Orthogonal Frequency Division Multiplexing*. Therefore a user searching for information on the abbreviation *FLASH-OFDM* may not find the *Acronym Finder* very helpful. If he or she does not know what the full form is, the several different forms may all seem equally cryptic, and if the user wants to find more information on the concept, it is not to be found in this dictionary. In the end it only provides some suggestions regarding the full forms and where to find more information, and the user cannot even be sure whether the spellings used in the dictionary reflect the most common spelling, or whether they are based on some other principle, such as a general editorial principle applied in the dictionary in question. Despite this criticism, however, it needs to be added that the aim of the *Acronym Finder* is to be a concise abbreviations dictionary (About the Acronym Finder 2008), and that kind of reference works are undoubtedly useful in some situations.

Webopedia Computer Dictionary does not have an entry for *FLASH-OFDM*, either, and its entry for *Flash* is related to a different sense of the word, *Adobe Flash*. *OFDM* is, however, defined:

OFDM

(pronounced as separate letters) Short for *Orthogonal Frequency Division Multiplexing*, an FDM modulation technique for transmitting large amounts of digital data over a radio wave. OFDM works by splitting the radio signal into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver. OFDM reduces the amount of crosstalk in signal transmissions. 802.11a WLAN, 802.16 and WiMAX technologies use OFDM. ...

NetLingo, *Computer Hope Dictionary*, and *JiWire Glossary of Wireless and Wi-Fi Terms and Definitions* do not contain any entries for *FLASH-OFDM* or its constituent parts. There is an entry for *Flash* in *NetLingo* and *Computer Hope*, but it refers, again, to *Adobe Flash*.

The English equivalent given in TSK's *Internet Telephony Vocabulary* (TSK 37, 24) is *Flash-OFDM*. Although the full form is not given as an equivalent, probably because it is

rather long and not used very often, it is included in the Finnish definition of the term in the following form: *Fast Low-latency Access with Seamless Handoff Orthogonal Frequency Division Multiplexing*.

4.3.2 FLASH-OFDM in Magazines and Newspapers

Telephony contains only one article which mentions *FLASH-OFDM*. The spelling is *Flash-OFDM*, and the article is from 2000. The full form of *OFDM* is given in the article abstract and in the article itself: “orthogonal frequency division multiplexing (OFDM) technology” (Weber 2000, 23). The full form of *FLASH* is not given, even though the technology is discussed in some detail in the article, and the abbreviation is mentioned several times.

A search for *FLASH-OFDM* in the archives of *The New York Times* and the *Times Online* did not yield any results. It is, however, mentioned in seven articles in the *Financial Times*, from May 2003 to August 2006. Flarion, the company which developed this technology and which owns the trademark, is mentioned in all but one of the articles, and the only article that does not mention it is a very brief synopsis. The first article, from 2003, is particularly interesting: the spelling is *flash-OFDM*, and the first occurrence is “[t]he IP technology that Flarion has developed is called flash-OFDM (orthogonal frequency division multiplexing)...” (Handford 2003). It seems that only the latter part of the term, *OFDM*, is treated as an abbreviation, and the special meaning of *flash* is not made explicit. In the other articles the spelling is *Flash OFDM* or *Flash-OFDM*. The full form is given in one article, but it is divided in two:

OFDM, or Orthogonal Frequency Division Multiplexing, is the basis for the 802.20 FDD-based standard backed by Motorola, Cisco, HP, Flarion and about 50 other companies. ... Flarion’s Flash-OFDM technology, originally pioneered at Bell labs in 1998 by a team led by Rajiv Laroia, claims to be 100 per cent IP-based and is delivering download speeds of between 700Kbps and 1.3Mbps in trials. Flash stands for Fast Low-Latency Access and Seamless Handovers. (Taylor 2004.)

4.3.3 *FLASH-OFDM*: Discussion

Even though the trademark is capitalized throughout (*FLASH-OFDM*), and the trademark owner Flarion Technologies uses this spelling, it is rarely used in dictionaries, vocabularies, magazines, and newspapers. In this case even specialist magazines do not seem to follow the spelling preferred by the trademark owner. On the other hand, Flarion does not appear to have as strong opinions regarding the “proper” spelling of *FLASH-OFDM* as the WiMAX Forum has on the spelling of *WiMAX*.

Because the word *FLASH-OFDM* is so rare, it is not possible to make any definitive conclusions about its spellings or how they may evolve, but it seems that the first part, *FLASH*, is often treated as a normal proper noun with initial capitalization, and not as an acronym. The abbreviation *OFDM* is used alone as well, which may explain why it is given more prominence in articles and dictionaries. It may also be a more familiar concept than *FLASH-OFDM*.

Although the full form of this word looks clumsy, it might help readers understand the meaning of this concept, especially if only the initial letter of *FLASH* is capitalized, in which case it may be easy to confuse it with Adobe Flash. On the other hand, it might also be argued that giving the full form *fast low-latency access with seamless handoff, orthogonal frequency divisional multiplexing* would confuse the general public even more, because it does not help to understand the meaning of the word if it is not accompanied by a definition.

5 Conclusion

I examined two fascinating phenomena in this thesis: abbreviation and the use of capital letters. I focused on the spellings of three specific abbreviated terms and their full forms, but I also made some remarks regarding the use of abbreviations in general. While working on this thesis, I became increasingly convinced that abbreviations are not just shortened forms of words or phrases. As I have shown, they may be used for different purposes: to persuade, to amuse, to show membership in a particular group – and, of course, to present information in a condensed way. What is more, even the seemingly irregular spellings may be significant. Especially trademark owners seem to be fond of combining capital and lowercase letters, perhaps as a means of drawing attention. On the other hand, newspapers, for example, seem to follow different conventions.

Before I carried out the analysis, I had several hypotheses on the factors that might affect the spellings of the words *VoIP*, *WiMAX*, and *FLASH-OFDM* and their full forms. The text genre was one of them: one of my hypotheses was that there would be variation in the spellings in online dictionaries, because the words do not have standardized spellings yet, and the editorial practices in some online dictionaries may not follow any strict guidelines. I assumed that printed general purpose dictionaries might reflect the standardized spellings more accurately, but I did not expect to find the words in many printed dictionaries yet. Newspapers aimed at the general public and magazines aimed at specialists might also show different tendencies or levels of regularization, and they might reveal whether the spellings of these words tend to change with time. In addition, I thought there might be differences between British and American English.

The most common forms for the abbreviated terms in the online dictionaries, glossary, and vocabulary were *VoIP* and *WiMAX*. *FLASH-OFDM* only occurred in the *Internet Telephony Vocabulary* as such, in the form *Flash-OFDM*. There was some variation in the

full forms, but the forms with title capitalization, *Voice over Internet Protocol* and *Worldwide Interoperability for Microwave Access*, were the most common ones in the online reference material. A word of caution regarding the spellings in different online dictionaries might be in place: the spellings may appear consistent, but some dictionaries share material, which means that the same entries may be used in multiple dictionaries. The connections may not be obvious, and the fact that the same spelling is found in several online dictionaries does not necessarily mean that it is the most common spelling. The online dictionaries examined in this thesis, however, did not use the same entries.

VoIP is already included in several printed dictionaries, but even the most recent dictionaries give various different spellings for both the abbreviation and the full form. In other words, it does not have an established form yet, and the fact that a particular spelling appears in a dictionary does not mean that it is the only “proper” spelling, or even the most common spelling of the word. I had not expected to find *WiMAX* in any printed dictionaries yet, but I did. Interestingly, the printed dictionary and the online dictionaries are relatively unanimous as regards the spelling of this word, but different spellings, especially *WiMax*, occur frequently in newspapers. *FLASH-OFDM* was not included in any printed dictionary, which shows how difficult it is to find information on the spellings of new words.

Dictionary entries for new abbreviations in printed dictionaries tend to be rather concise. Some only contain the abbreviation and its full form, but even the ones that include a definition for the concept in question do not necessarily provide any further information on the word. For example, I did not come across any etymology or usage notes for the three abbreviations, although labels such as *abbreviation* were sometimes used. In my opinion, it shows that these abbreviations are not treated as words in their own right yet. The full forms rarely have separate entries, and even if they do, they do not seem to contain etymology notes, either. Thus the etymologies remain hazy, although these words might have just as interesting

stories as any other words, and etymology notes would be a natural place to provide information on the ways in which the spellings of these abbreviations have changed. Perhaps etymology notes will be included in later editions of the dictionaries. Mentions of alternative spellings were also missing from the dictionaries, although such information might be very useful for a dictionary user trying to decide which spelling to use.

The hypothesis concerning variation according to time was that there would eventually be less variation in the spellings as the terms begin to be used more widely, and they might also lose their capitalization. However, it was clear from the beginning that the words I examined are still so new that it might be too early to say anything definitive about the way they change and which spellings will become dominant. My analysis showed that there is still considerable variation in the spellings, but particular spellings seem to be gaining ground within certain text types. It remains to be seen which will survive, or whether the different spellings will continue to coexist.

As I mentioned in Section 2.1.2, abbreviations are not always fully interchangeable with their full forms. Although the denotation is the same, in some contexts the use of the full form would be awkward. The abbreviated and full forms *VoIP* and *voice over internet protocol* can be used rather freely, and especially newspaper articles use them in turn for variation, but the full forms of *WiMAX* and *FLASH-OFDM* are so long that the abbreviations are often much clearer alone.

Although all three words I examined are abbreviations, the full forms of *WiMAX* and *FLASH-OFDM* hardly ever occur alone. The abbreviations, on the other hand, can occur without the full form. *VoIP* is also quite often used without a mention of its full form. In other words, *VoIP* is not necessarily limited to informal discussion, although the *Collins English Dictionary* labels it as an informal word.

The full forms can be introduced in different ways, before or after the abbreviation. I assumed that the full forms that are given in parentheses after the abbreviated word would often be capitalized to show where the letters in the abbreviation come from, but the order does not seem to have a significant effect on the use of capital letters in the examples taken from magazines and newspapers.

As I pointed out in Chapter 3, there are differing opinions among linguists as to whether the use of capital letters is more prominent in American English or British English. In this study I found some evidence for Walsh's (2004, 31) argument regarding initial capitalization: spellings such as *Voip* seem to be more common in British English. The most significant difference in the full forms is that the spelling *voice over internet protocol* seems to be more common in British publications, whereas the American ones still capitalize the word *Internet*. As regards the different kinds of sources of information on capitalization, it would be tempting to argue that American publications tend to be more prescriptive. However, it needs to be added that I only used American style guides, and British grammars. Therefore the differences may be due to different genres, rather than varieties of English. Further evidence and a detailed comparison of grammars and style guides would be needed.

While I was investigating the sources of information on capitalization, it became evident that even grammars are reluctant to give exact rules regarding capitalization. Style guides still take a prescriptive approach to language, but it may be difficult to decide which style guide to use, and how to apply the rules they give. If we add to the lack of clear guidelines the different spellings used in printed and online dictionaries, it begins to look like there are no universally "correct" spellings, there are only some spellings that are more common than others, or spellings that are preferred in a particular publication or company. In the end, usage seems to determine what is "right".

This thesis also illustrates some of the difficulties involved in studying new words. I would have wanted to examine annotated corpus material in the study, but I did not have access to the kind of corpora I would have needed. Some popular and widely used corpora, such as the British National Corpus (BNC), did not contain any occurrences of the words studied in this thesis when I made the analysis, and some corpora that contain new material, such as the Corpus Eye or the English Internet Corpus, were either based on too narrow a range of material, or the corpus did not offer sufficient information on the context of the occurrence, deeming it difficult to systematically analyze the spellings from different periods of time, for example. This is not to say that it is not possible to study new words with the help of corpora: annotated corpus material simply is not available for all researchers. Lexicographers, on the other hand, have ample corpus evidence to support their decisions, as became clear with the word *VoIP* and its treatment in the Oxford dictionaries.

The current trends in spelling offer several possibilities for further study. It would be interesting to examine how acronyms and alphabetisms are combined with other words, and how this affects their spelling. For example, the word *VoIP* is already incorporated in the name of at least one organization: VOIPSA (Voice over IP Security Alliance). The alliance spells its name in full capitals, although it uses the form *VoIP* for the VoIP technique. Other intriguing aspects of spelling that arose during the course of this study were hyphenation and the use of internal capitals. Especially *voice over internet protocol* is often hyphenated in different ways, and the hyphenation may even affect the meaning of the phrase.

Even though this study only deals with three words, I believe it offers a welcome snapshot of English abbreviations. It will be interesting to see how the spellings of these words and their full forms change in the years to come, and which forms will eventually be chosen as the headwords in the *Oxford English Dictionary*.

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