NUANCE COMMUNICATIONS, INC. Version 4.0 June 2007

RealSpeak Telecom Software Development Kit

User Guide Norwegian V 4.0

EVALUATION AGREEMENT

READ THE FOLLOWING CAREFULLY BEFORE USING THE SOFTWARE. PRIOR TO RECEIVING THE SOFTWARE, YOU HAVE SIGNED EITHER A LICENSE AGREEMENT OR A NON-DISCLOSURE AGREEMENT WITH SCANSOFT, CONCERNING THE REALSPEAK TELECOM DEVELOPMENT SYSTEM OR SOME OF ITS COMPONENTS. THEREFORE, REFERENCE IS MADE TO THESE AND AS SUCH THE CONTRACTUAL TERMS AND CONDITIONS SHALL APPLY TO THE SOFTWARE.
IF YOU HAVE NOT SIGNED SUCH AN AGREEMENT AND IF YOU USE THE SOFTWARE, SCANSOFT WILL ASSUME THAT YOU AGREED TO BE BOUND BY THE EVALUATION AGREEMENT SPECIFIED HEREUNDER. IF YOU DO NOT ACCEPT THE TERMS OF THIS EVALUATION AGREEMENT, YOU MUST RETURN THE PACKAGE UNUSED TO SCANSOFT WITHIN SEVEN (7) DAYS AFTER RECEIPT.

1. Grant of Rights

In consideration of a possible commercial relationship, ScanSoft hereby grants to you, the LICENSEE, who accepts, a non-exclusive right to internally evaluate and test the software program ("the Software").

2. Ownership of Software

ScanSoft retains title, interests and ownership of the Software recorded on the original disk(s) and all subsequent copies of the Software and Documentation, regardless of the form or media in or on which the original and other copies may exist. ScanSoft reserves all rights not expressly granted to LICENSEE.

3. Copy Restrictions

This Software and the accompanying documentation are copyrighted. Unauthorized copying of the Software, including Software that has been merged or included with other software, or of the documentation is expressly forbidden. LICENSEE may be held legally responsible for any intellectual property infringement that is caused or encouraged by his failure to abide by the terms of this agreement. LICENSEE is allowed to make two (2) copies of the Software solely for backup purposes, provided that the copyright notice is included on the backup copy.

4. Use Restrictions

LICENSEE agrees not to use the Software for any other purpose than internally evaluating the Software. LICENSEE may physically transfer the Software from one computer to another, provided that the Software is used on only one computer at a time. LICENSEE may not modify, adapt, translate, reverse engineer, decompile, disassemble or create derivative works based on the Software.LICENSEE may not modify, adapt, translate or create derivative works based on the documentation provided by ScanSoft. The Software may not be transferred to anyone without the prior written consent of ScanSoft. In no event may LICENSEE transfer, assign, lease, sell or otherwise dispose of the Software and Documentation on a temporary or permanent basis except as expressly provided herein.

5. Warranty

THE SOFTWARE IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ScanSoft shall have no liability to LICENSEE or any third party for any claim, loss or damage of any kind, including but not limited to lost profits, punitive, incidental, consequential or special damages, arising out of or in connection with the use or performance of the Software and accompanying documentation.

6. Termination

This agreement is effective until terminated. ScanSoft reserves the right to terminate this agreement automatically if any provision of this agreement is violated. LICENSEE may terminate this agreement by returning the Software and the accompanying documentation to ScanSoft, along with a written warranty stating that all copies have been returned.

Copyright

RealSpeak Telecom Software Development Kit
User's Guide for Norwegian

Trademarks

Document History

Date	Type of change	SoftwareVersion
December 2004	Document creation	V4.0
January 2006	Update "SSML Preprocessor" chapter and "Using Control Sequences" section of Chapter I	V4.0

Table of Contents

RealSpeak Telecom SDK

Chapter 1

Norwegian Text-To-Speech System

User's Guide for Norwegian
V4.0

Chapter 1

Norwegian Text-To-Speech System

Introduction

This section provides operational instructions for the RealSpeak Telecom Text-To-Speech system for Norwegian. It reviews the functionality of the system, and describes how the user can customize the pronunciation of input texts. This part also describes issues that are particular to the Norwegian Text-To-Speech system. It introduces the Norwegian phonetic alphabet and discusses some language-specific features of the Norwegian Text-To-Speech system.

Preparing a text for Text-To-Speech

In general, there are four ways to intervene in the pronunciation of text:

- By using control sequences
- By entering phonetic input
- By using a user dictionary or a user ruleset
- By using one of the supported API's

These mechanisms are described in the Programmer's Guide.
In this part, however, the specifications for Norwegian are fully described.

Native Character Set

The native character set of the Norwegian TTS system is Windows-1252; it has the printable characters in the ASCII range 1-127 as a subset. Note that TTS input encoded in another supported character set is converted to the native character set before it is processed internally. Consequently, input must be representable in the native character set even if it is encoded in another character set supported by the API.

Using Control Sequences

For a description of the various supported markup languages (independent from the language), refer to the **Programmer's Guide.**

Remark: <ESC> represents the escape character "\x1B" (decimal 27) that generates the ASCII character 27 (Hex 1B).

Chapter 1

Below, you find a quick reference table for the RealSpeak native control sequences for Norwegian. The language-specific support for the SSML markup language is described in the "SSML Preprocessor" chapter.

Chapter 1

Quick Reference of the RealSpeak native Control Sequences for Norwegian

Sequence	Description	Range	De-fault	Break
<ESC> \vol=x\	Volume	x : 0 .. 100 0 = silence 10 = low 100 = high	80	No
	For example: <ESC>\vol=10\ Jeg kan snakke ganske lavt, <ESC>\vol=90\ men også veldig høyt.			
<ESC> \rate=x\	Speech Rate	x : 1 .. 100 1 = slow 100 = fast	50	No
	For example: Jeg kan <ESC>\rate=70\ snakke hurtigere <ESC>\rate=20\ eller langsommere.			
<ESC> \rate_wpm=xxx\	Word per minute (xxx: 1..1000)	Voice-specific (see subsequent table)	Voice-specific	No
	For example: Jeg kan <ESC>\rate_wpm=350\ snakke hurtigere <ESC>\rate_wpm=110\ eller langsommere.			
<ESC>Mx	Read mode; some read modes are not supported in e-mail mode	x = 0..3: 0 = character-by-character 1 = word-by-word (not supported in e-mail mode) 2 = sentence-by-sentence 3 = line-by-line (not supported in e-mail mode)	2	Yes

Chapter 1

Sequence	Description	Range	De-fault	Break
	For example: <ESC>M0 Tekst-til-tale-system. (The word "Tekst-til-tale-system" will be spelled.) <ESC>M1 Dette er det norske tekst-til-tale-systemet. (This sentence will be read word by word.) <ESC>M2 Dette er det norske tekst-til-tale-systemet. (This sentence will be read as one sentence.)			
<ESC>Wx	Wait Period	0 = no wait period 1 = 200 millisecond wait period 9 = 1800 millisecond wait period	2	Yes
	For example: <ESC>M2 <ESC>W2 Etter denne setningen følger en kort pause. <ESC>W9 Etter denne setningen følger en lang pause. La du merke til forskjellen?			
<ESC> \Pause=xxx\	Long Pause	xxx is the duration of the pause in milliseconds; the supported range is 1 ..65535 msec		No
	For example: Du kan legge inn pauser i beskjeden ved å angi pausens <ESC>\pause=1500\ varighet.			
<ESC>"	Sentence Accent			No
	For example: Anne kommer i <ESC>"morgen (ikke i dag). <ESC>"Anne kommer i dag (ikke Kristine). Note: Manually inserted sentence accents may have no effect in RealSpeak. The RealSpeak synthesis module may indeed have reasons to override the requested sentence accent, and thus not realize it.			
<ESC>C	Continuation			No

Chapter 1

Sequence	Description	Range	De-fault	Break
	For example: Hun har jobbet på avd. A siden nyttår Hun har jobbet på avd.<ESC>C A siden nyttår In the first of the above examples, the text-to-speech system will detect an end-of-sentence after *avd.* and hence pause before pronouncing the second part of the input. In order to make the system pronounce the entire input as one sentence, a continuation sequence should be inserted.			
<ESC>E	End-of-Message			Yes
	For example: Hun heter Anne Pedersen. Initialene hennes er A.P. <ESC>E Etternavnet er Pedersen. In the first of the above examples, the text-to-speech system will appropriately read the input as one sentence. In the second example, the system would likewise read the two sentences of the input as one sentence. The sequence <ESC>E forces the system to read the entire input as two separate sentences.			
<ESC>/+	Phonetic Input (L&H+ phonetic alphabet)			No
	For example: <ESC>/+ 'bu:.kEn <ESC>/+			
<ESC>%x	Preprocessing Mode	text = standard text mode email = e-mail mode		Yes
	For example: <ESC>%text Author: Knut Hamsun. <ESC>%email Author: Knut Hamsun.			

Chapter 1

Sequence	Description	Range	De-fault	Break
<ESC>\tn=x\	Guide text normalization; limited support in e-mail mode	address=address mode (not supported in e-mail mode) normal=standard mode spell=spell mode	Normal	No
	For example: <ESC>\tn=address\ T. Hansen Nedre bakkegt. 5A 2600 Lillehammer<ESC> <ESC>\tn=normal\ <ESC>\tn=address\ 7005 Trondheim <ESC>\tn=normal\ <ESC>\tn=address\ Trude Falseth, Møllevn. 14<ESC>\tn=normal\ For example: <ESC>\tn=spell\ stav ord. <ESC>\tn=normal\ ikke stav ord.			
<ESC>F	Reset to Default			Yes
	For example: <ESC>\vol=90\ Dette er maksimalt volum. <ESC>F Nå er volumet stilt tilbake til normal styrke. <ESC>\rate=10\ Dette er den laveste talehastigheten. <ESC>F Nå er talehastigheten stilt tilbake til normalt nivå.			
<ESC>@c	Specify part-of-speech	With c a character with possible values: N = noun J = adjective A = adverb V = verb R = past participle v = infinitive		No

Chapter 1

Sequence	Description	Range	De-fault	Break
	For example: <ESC>@N snakket (noun 'snakket') vs. <ESC>@V snakket (verb 'snakket') De hadde bodd i dette <ESC>@N landet i tre år. vs. Flyet <ESC>@V landet fem minutter etter tidsskjemaet.			
	Comment: You can also use the control sequence <ESC>@@, which allows you to get the alternative pronunciation of a homograph without specifying the part-of-speech. This is especially useful for words that have different pronunciations based on meaning rather than on part-of-speech. For example: svart adjective "svart" vs. <ESC>@@ svart past participle of the verb "svare"			
<ESC>\domain=s\	Enable the extension (only if a custom g2p has been loaded)	s = string: the name of the extension		Yes
<ESC>\domain\	Disable the last extension			Yes
<ESC>\voice=s\	Set the voice (if more than one voice is available)	s = string: the name of the voice		Yes
<ESC>\mrk=n\	Insert a bookmark	n = 0.. 2147483647		No
<ESC>\p\	Insert a paragraph boundary			Yes
<ESC>\audio="s"\	Insert an audio document; not supported in e-mail mode	s = string: the URI of a document with an appropriate MIME type		Yes

Chapter 1

Speech Rates in Words per Minute for Norwegian Voices

Words per minute		
Voice	**Range**	**Default**
Nora	Min = 77 Max = 362	145

Entering phonetic input

How to proceed

To switch from orthographic to phonetic mode, insert <ESC>/+ to use the L&H+ phonetic alphabet. The phonetic input mode remains active until the command is explicitly reset by entering <ESC>/+ again.

The phonetic input string is composed of symbols of the L&H+ phonetic alphabet (see phonetic table below). Examples are given in the phonetic table below.

In addition to the phonetic symbols, it is advised to use the following characters in the phonetic input string:

Chapter 1

Special characters		
L&H + Symbol	**Meaning**	**As in:**
' (ASCII 39, Hex 27)	primary word stress	<ESC>/+ 'bu:.kEn <ESC>/+ (boken) <ESC>/+ 'no: <ESC>/+ (nå)
2	toneme 2	<ESC>/+ 'le:2.sE <ESC>/+ (lese)
'2	Secondary word stress	<ESC>/+ 'me:d.'2fe+:.r6E <ESC>/+ (medføre)
" (ASCII 34, Hex 22)	sentence accent	<ESC>/+ 'dE2.nE_'sE2t.nInK.En_'I2.nE.hOl.Er_"tu:_"sE2t.nInks.'2trYk <ESC>/+ (Denne setningen inneholder to setningstrykk)
.	syllable boundary	<ESC>/+ 'le:2.sE <ESC>/+ (lese)
#	silence (pause)	<ESC>/+jE&I_'sA #'I2.kE_'je+:_d+E <ESC>/+ (Jeg sa: ikke gjør det!)

NOTE

- The toneme symbol 2 should be marked after the primary stressed vowel.
- The use of punctuation marks remains useful within phonetic input to assure a correct intonation. Each punctuation mark needs to be preceded by an asterisk.

  For example:

  <ESC>/+ hAn_'Ce+:2.t+E_'sA2k.tE*, 'VE2l.dI_'sA2k.tE*.'<ESC>/+
  (Han kjørte sakte, veldig sakte.)

Chapter 1

Punctuation Marks	
L&H+ Symbol	**Meaning**
_	Word delimiter
*.	End of declarative
*,	Comma
*!	End of exclamation
*?	End of question
*;	Semicolon
*:	Colon

Lexical stress and sentence accents in phonetic input

In phonetic input strings, *lexical stress* and *sentence accents* can be manually indicated by the user, by using a single quote (') or double quote (") respectively.

Note that manually inserted lexical stress or sentence accents may have no effect in RealSpeak. The RealSpeak synthesis module may indeed have reasons to override the requested sentence accent, and thus not realize it.

- The Text-To-Speech system will automatically convert all lexical stress marks into sentence accents in case no manually added sentence accents are found in the phonetic input string.

  For example:

  <ESC>/+ dE.SOm_'V@:.r6E_bli:r6_'br6A:_i:_ 'hEl.gEn*, dr6A:r6_Vi:_tr6u:2.lI_tIl_'CY.stEn*. <ESC>/+

  is the same as:

  <ESC>/+ dE.SOm_"V@:.r6E_bli:r6_"br6A:_i:_ "hEl.gEn*, dr6A:r6_Vi:_tr6u:2.lI_tIl_"CY.stEn*. <ESC>/+

  (Dersom været blir bra i helgen, drar vi trolig til kysten.)

Chapter 1

- If phonetic input contains at least one manually added *sentence accent*, no additional sentence accents are assigned by the text-to-speech system. Therefore, only those words marked with " will get a sentence accent. As a consequence, a message containing only one manual sentence accent will have an almost flat intonation on all the other words.

  For example:

  <ESC>/+ 'd@.SOm_'V@:.r6E_'bli:r6_'br6A:_ 'i:_ "hEl.gEn, 'dr6A:r6_'Vi:_ 'tr6u:2.lI_'tIl_'CY.stEn*. <ESC>/+*

  (Only one sentence accent will be realized.)

- Phonetic input can also be combined with orthographic input.
  If no sentence accents are found in the input text (indicated by <ESC>" in orthographic input, or by " in phonetic input), the Text-To-Speech system will automatically assign sentence accents. In the orthographic part of the input, the Text-To-Speech system will realize these sentence accents on the basis of part-of-speech and syntactic information. In the phonetic part of the input, all lexical stress marks (if any) will be converted into sentence accents. If there are no lexical stress marks, no sentence accent will be realized for the phonetic part of the input (see point 1 above).
  If the user has manually specified one or more sentence accents, no additional sentence accents will be realized (see point 2 above).

  For example:

  Dersom været blir bra i helgen, drar vi trolig til <ESC>/+'CY.stEn <ESC>/+.

  (No sentence accents are found; the Text-To-Speech system will automatically assign sentence accents.)

  Dersom været blir bra i helgen, drar vi trolig til <ESC>/+"CY.stEn <ESC>/+.

  (A sentence accent is specified in the phonetic part of the input text. No additional sentence accents will be realized.)

Chapter 1

Dersom været blir <ESC>"bra i helgen, drar vi trolig til <ESC>/+CY.stEn <ESC>/+.

(A sentence accent is specified in the orthographic part of the input text. No additional sentence accents will be realized.)

Dersom været blir <ESC>"bra i helgen, drar vi trolig til <ESC>/+"CY.stEn <ESC>/+.

(Two sentence accents were specified; no additional sentence accents will be realized.)

Chapter 1

The Norwegian L&H+ and UNIPA Phonetic Alphabets

Vowels & Diphthongs				
L&H+ Symbol	**L&H+ Transcription**	**UNIPA Symbol**	**UNIPA Transcription**	**As in:**
i:	'fi:n	i:	'fi:n	fin
I	'fIn	I	'fIn	Finn
y:	'by:	y:	'by:	by
Y	'hY2.tE	Y	'hY2.tE	hytte
e+:	'se+:t	e=:	'se=:t	søt
E+	'sE+t	E=	'sE=t	søtt
e:	'se:r6	e:	'se:r6	ser
E	'pEn	E	'pEn	penn
A:	'dA:g	A:	'dA:g	dag
u0:	'bu0:d	u0:	'bu0:d	bud
u:	'bu:k	u:	'bu:k	bok
U	'fUt+	U	'fUt=	fort
o:	'to:g	o:	'to:g	tog
U0	'gU0l	U0	'gU0l	gull
@:	'b@:r6	@:	'b@:r6	bær
A	'hAt	A	'hAt	hatt
O	'gOt	O	'gOt	gått
E&U0	'tE&U0	E+U0	'tE+U0	tau
E&I	'VE&I	E+I	'VE+I	vei
E+&Y	'hE+&Y	E=+Y	'hE=+Y	høy
A&I	'kA&I	A+I	'kA+I	kai
O&I	kUn.'VO&I	O+I	kUn.'VO+I	konvoi

Chapter 1

Consonants				
L&H+ Symbol	**L&H+ Transcription**	**UNIPA Symbol**	**UNIPA Transcription**	**As in:**
p	∪**p**i:l	p	∪**p**i:l	pil
b	∪**b**i:l	b	∪**b**i:l	bil
t	∪**t**A:k	t	∪**t**A:k	tak
d	∪**d**A:g	d	∪**d**A:g	dag
t+	∪fU**t+**	t=	∪fU**t=**	fort
d+	∪fO2.**d+**El	d=	∪fO2.**d=**El	fordel
k	∪**k**A:r6	k	∪**k**A:r6	kar
g	∪**g**o:r6	g	∪**g**o:r6	går
m	∪**m**An	m	∪**m**An	mann
n	∪**n**At	n	∪**n**At	natt
n+	∪A:2.**n+**E	n=	∪A:2.**n=**E	arne
nK	∪U**nK**	nK	∪U**nK**	ung
f	’**f**i:n	f	’**f**i:n	fin
V	∪**V**A:r6	V	∪**V**A:r6	var
r6	∪b**r6**A:	r6	∪b**r6**A:	bra
s	∪**s**e:r6	s	∪**s**e:r6	ser
S	∪**S**e+:	S	∪**S**e=:	sjø
C	∪**C**e+:2.pE	C	∪**C**e=:2.pE	kjøpe
h	∪**h**A:r6	h	∪**h**A:r6	har
j	∪**j**A:2.gE	j	∪**j**A:2.gE	jage
l	∪**l**i:V	l	∪**l**i:V	liv
l+	∪@:2.**l+**I	l=	∪@:2.**l=**I	ærlig

NOTE

Note that the L&H+ alphabet is not SSML compliant. For SSML, use the UNIPA alphabet.

Chapter 1

Using a User Dictionary

For information on how to create and use user dictionaries, please refer to User Configuration chapter of the RealSpeak Telecom Programmer's Guide.

Using the Microsoft SAPI5 Lexicon

Microsoft SAPI5 provides lexicons so that users and applications can specify pronunciation and part-of-speech information for particular words. As such, all SAPI compliant Text-To-Speech engines should use these lexicons to guarantee uniformity of pronunciation and part of speech information.

There are two types of lexicons in SAPI: user lexicons and application lexicons.

User Lexicons

Each user who logs in to a computer will have a User Lexicon. Initially, this lexicon is empty; words can be added either programmatically, or by using an engine's add/remove words UI component (for example, the sample application Dictation Pad provides an Add/Remove Words dialog).

Application Lexicons

Applications can create and ship their own lexicons of specialized words. These lexicons are fixed and cannot be edited.

Detailed information on how to use the MS SAPI5 lexicons can be found in the manual "Microsoft Speech SDK V5.1", chapter "ISpLexicon Interface".

Chapter 1

The Norwegian SAPI5 Phoneme List

To add entries to the lexicon, the user should use a set of language specific phonemes. The language specific phoneme list for Norwegian is given below.

SAPI5 Symbols			
SAPI5 Symbol	**As in:**	**SAPI5 Transcription**	**SAPI Phone ID**
I lng	fin	S1 F I lng N	0060 02D0
Y lng	by	S1 B Y lng	0079 02D0
YX lng	bud	S1 B YX lng D	0289 02D0
U lng	bok	S1 B U lng K	0075 02D0
IH	Finn	S1 F IH N	026A
YH	hytte	S1 YH T2 . T EH	028F
UH cen	gull	S1 G UH cen 0 L	028A 0308
UH	fort	S1 F UH TR	028A
E lng	ser	S1 S E lng DX	0065 02D0
EU lng	søt	S1 S EU lng T	00F8 02D0
O lng	tog	S1 T O lng G	006F 02D0
EH	penn	S1 P EH N	025B
OE	søtt	S1 S OE T	0153
AO	gått	S1 G AO T	0254
AE lng	bær	S1 B AE lng DX	00E6 02D0
AA lng	dag	S1 D AA lng G	0251 02D0
AA	hatt	S1 H AA T	0251
EH + UH cen	tau	S1 T EH + UH cen 0	025B 028A 0308

Chapter 1

SAPI5 Symbols			
SAPI5 Symbol	**As in:**	**SAPI5 Transcription**	**SAPI Phone ID**
EH + IH	vei	S1 VA EH + IH	025B 026A
OE + YH	høy	S1 H OE + YH	0153 028F
AA + IH	kai	S1 K AA + IH	0251 026A
AO + IH	konvoi	K UH N .'VA AO + IH	0254 026A
P	pil	S1 P I lng L	0070
B	bil	S1 B I lng L	0062
T	tak	S1 T AA lng K	0074
D	dag	S1 D AA lng G	0064
TR	fort	S1 F UH TR	0288
DR	fordel	S1 F AO T2 . DR EH L	0256
K	kar	S1 K AA lng DX	006B
G	går	S1 G O lng DX	0067
M	mann	S1 M AA N	006D
N	natt	S1 N AA T	006E
NR	Arne	S1 AA lng T2 . NR EH	0273
NG	ung	S1 UH NG	014B
F	fin	S1 F I lng N	0066
VA	var	S1 VA AA lng DX	028B
DX	bra	S1 B DX AA lng	027E
S	ser	S1 S E lng DX	0073
SH	sjø	S1 SH EU lng	0283
C	kjøpe	S1 C EU lng T2 . P EH	00E7
H	har	S1 H AA lng DX	0068
L	liv	S1 L I lng VA	006C
LR	ærlig	S1 AE lng T2 . LR IH	026D
J	jage	S1 J AA lng T2 . G EH	006A

Chapter 1

SAPI5 Symbols			
SAPI5 Symbol	**Meaning**	**SAPI5 Transcription**	**SAPI Phone ID**
S1	primary stress	S1 L I lng VA	02C8
S2	secondary stress	S1 L AA N . S2 B RR YX lng K	02CC
.	syllable break	S1 J AA lng T2 . G EH	002E
T2	toneme 2	S1 J AA lng T2 . G EH	0300

Chapter 1

SAPI5 Symbols		
SAPI5 Symbol	**Meaning**	**SAPI Phone ID**
.	syllable break	002E
S1	primary stress	02C8
_s	silence	0004
_&	word boundary	0002
_.	sentence terminator (period)	2198
_,	sentence terminator (commar)	0003
_!	sentence terminator (exclamation mark)	0001
_?	sentence terminator (question mark)	2197

Chapter 1

Notes on the Norwegian Text-To-Speech System

The Norwegian Text-To-Speech system is designed in order to pronounce correctly any input written according to the rules of Norwegian orthography. The following cases, however, require special attention.

Cardinal Numbers

Cardinal numbers up to 15 digits are pronounced as full numbers. Periods may be used to separate groups of digits. Digit strings consisting of more than 15 digits are pronounced digit by digit. Leading zeros are pronounced.

For example:
1234567
1.666
007

Decimal Numbers

Decimal numbers may consist of up to 15 digits before the decimal comma. Periods may be used to separate groups of digits in the digit string before the decimal comma. The decimal part is read as a full number.

For example:

1,12	en komma tolv
12,514	tolv komma femhundre og fjorten

Fractions

Digit strings consisting of maximally 3 digits, followed by a slash, followed by a maximum of 5 digits, are pronounced as fractions.

For example:

3/5	tre femtedeler
6/2	seks todeler
11/14	elleve fjortendeler

Chapter 1

Telephone Numbers

Telephone numbers must be preceded by "telefon" or an abbreviation thereof.
Digit strings of maximum 3 digits are read as cardinal numbers. Longer digit strings are read in pairs. Initial zeros are pronounced. A pause is inserted between the digit groups.
You can use a space to separate groups of digits.

For example:

Tel: 22 74 80 06
Tlf: 61 23 75 57
Tel.nr: 73 88 60 43
Fax: 22 30 43 32

Even international formats are read correctly: the telephone number will be read in groups as explained above. International phone numbers may be preceded by a plus or double zero.

For example:

Tel: +47 22 39 56 44
tel: +32 57 22 88 88
Tlf: 00 47 56 78 35 66

Chapter 1

Dates

The Norwegian Text-To-Speech system reads dates in the following formats:

- with optional dayname (or abbrevation):

  Dayname or abbreviation (optional) *space* Day (1 or 2 digits) *period, slash or hyphen* Month (1 or 2 digits) *period, slash or hyphen* Year (2 digits)

  Dayname or abbreviation (optional) *space* Day (1 or 2 digits) *period, slash or hyphen* Month (1 or 2 digits) *period, slash or hyphen* Year (2 to 4 digits)

  For example:

tirs. 30.06.49	tirsdag trettiende juni førtini
03/12/2000	tredje desember totusen
Man. 26-04-1975	mandag tjuesjette april nittensyttifem

- separated by periods, slashes or hyphens

  Day (1 or 2 digits) . Month (1 or 2 digits) . Year (2 or 4 digits)

  Day (1 or 2 digits) / Month (1 or 2 digits) / Year (2 or 4 digits)

  Day (1 or 2 digits) - Month (1 or 2 digits) - Year (2 or 4 digits)

  For example

30.06.49	trettiende juni førtini
03/12/2000	tredje desember totusen
26-04-1975	tjuesjette april nittensyttifem

- Dates can also be specified in written format, with abbreviated or fully written month names:

  For example:

30 jan. 2000	trettiende januar totusen
6 febr. 1949	sjette februar nittenførtini
20 APRIL 33	tjuende april trettitre

Chapter 1

Time Indications

Time indications will be correctly pronounced when written in one of the following formats:

- Hours.minutes or hours:minutes
  Abbreviations of "klokken" are expanded.

  For example:

kl.11.15	klokken elleve femten
kl. 9.00	klokken ni
Kl. 13:30	klokken tretten tretti
8.30 pm	åtte tretti pm
5:20 am	fem tjue am
kl. 11.15	klokken elleve femten

- Hours only

  For example

Kl. 13	klokken tretten
kl. 7	klokken sju
kl. 23	klokken tjuetre

Currencies

The Norwegian Text-To-Speech system correctly handles the currency symbols $, £, €, and ¥. The currency signs may precede or follow the numeral.

For example

$40	førti dollar
£200	to hundre pund
5¥	fem yen

Chapter 1

Also the most common currency abbreviations from around the world are supported. These abbreviations can precede or follow the amount and are expanded.

For example

NOK 500	fem hundre norske kroner
25 NOK	tjuefem norske kroner
DM 50	femti tyske mark
10 GBP	ti pund
46 US$	førtiseks dollar

Other currencies are written in full words and have to follow the numeral.

For example

100 drakmer
350 rubler

Abbreviations

The Norwegian Text-To-Speech system contains a dictionary with the most common abbreviations, such as: *o.s.v., t.o.m., nr., m.fl.*
Some abbreviations are ambiguous, however, and are pronounced depending on the context in which they appear. For example, the abbreviation *Tor* is pronounced "*torsdag*" when followed by a date, but "*tor*" in other cases.

For example

Tor. 30.03.1975 torsdag trettiende mars nittensyttifem
Han presenterte seg som Tor Pettersen

Chapter 1

Acronyms and Initialisms

The Norwegian Text-To-Speech system contains a standard dictionary with acronyms and initialisms such as: *UD, EU, EEC*, etc.

Acronyms are abbreviations formed by combining the first letter(s) of a group of words. They are pronounced as words.
E.g. *NATO, UNESCO.*

Initialisms are abbreviations formed by combining the first letter of each part of a group of words. Initialisms are spelled.
E.g. *USA, PLO.*

RealSpeak Telecom SDK

Chapter II

E-Mail Preprocessor

User's Guide for Norwegian
V4.0

Chapter II

E-Mail Preprocessor

Introduction

The ScanSoft e-mail preprocessor (EMPP) has been developed to analyze a specific type of text: e-mail messages. E-mail messages differ from any average type of text in both structure and contents.

An e-mail message consists of two clearly distinguished parts: the header and the body. A substantial part of the header contains routing and administrative information, which is irrelevant to the user. Both the header and the body contain all kinds of e-mail specific text features, e.g. e-mail addresses, emoticons such as smileys, etc. Furthermore, informal writing is often combined with a lack of grammatical conventions. Spelling rules are frequently violated, punctuation is often omitted, etc.

Although the standard ScanSoft Text-To-Speech system can handle special text items (abbreviations, numbers, dates, etc.), it is not capable of correctly handling all e-mail specific text features. These text features are therefore dealt with by the e-mail preprocessor. The EMPP transforms e-mail specific information into a format that complies with the rules of the standard ScanSoft Text-To-Speech system. The EMPP is a plug-in preprocessing module of the ScanSoft Text-To-Speech system. It replaces the preprocessor of the standard Text-To-Speech system.

In the following sections you will find a description of the functioning of the ScanSoft e-mail preprocessor as well as an overview of its features.

The e-mail preprocessor has two main tasks: processing of the e-mail header and processing of the body of the e-mail message.

The input to the EMPP consists of one or more e-mail messages. In order to process the e-mail header, the EMPP extracts relevant header fields and then provides an intelligent header field reading.

Chapter II

During the processing of the e-mail body, the text is divided into smaller text units, called text-to-speech messages, which are synthesized by the Text-To-Speech system. Text normalization is applied to e-mail specific text features such as e-mail addresses, proper names, emoticons, URLs (Universal Resource Locators), etc. For the text normalization of an e-mail message, the ScanSoft EMPP applies linguistic rules and performs dictionary look-up, in order to yield an adequate phonetic transcription. The EMPP also supports the ScanSoft user dictionary mechanism, which allows the user to customize the output of the e-mail processing.

E-Mail Header Processing

Header Field Extraction

An e-mail message consists of two clearly distinguished parts: the header and the body. The EMPP detects the header and extracts the relevant header fields. Information that is of no interest to the user (such as routing information) is not retained.
The EMPP extracts the following header fields:

From Field	Contains the sender's name and/or address
Date Field	Contains the date and time of sending
Subject Field	Optionally contains the subject of the e-mail

The extraction of the header fields is based on the detection of specific keywords in the e-mail header. The supported keywords for the extraction of the header fields are listed below:

From Field	From: Author: Sender: De: Von:
Date Field	Date: Enviado: Gesendet:
Subject Field:	Subject: Subj: Asunto: Betreff:

Chapter II

The following is an example of header field extraction. The original header holds information that is irrelevant to the user. After extraction of date, sender and subject, the processed header merely mentions the Date field, the From field and the Subject field:

Original header:

Date: Tue, 7 Sep 1999 11:11:02 -0300 (EST)
Message-Id: <199909071411.LAA06415@program.com.br>
To: anne.pettersen@ling.no
Subject: Info om programmeringskurset
Reply-To: info@program.com.no
SMTPOriginator: owner@program.com.no
From: info@program.com.no
PostedDate: 09/07/99 04:11:02 PM
ReplyTo: info@program.com.no
$MessageStorage: 0
$UpdatedBy: CN=LNMAILMTA01/OU=SERVER/OU=BE/O=LHS
RouteServers:
CN=LNMAILMTA01/OU=SERVER/OU=BE/O=LHS,CN=LNMAILIEP0
1/OU=SERVER/OU=BE/O=LHS
RouteTimes: 09/07/99 04:29:50 PM-09/07/99 04:29:51 PM,09/07/99
04:11:11 PM-09/07/99 04:11:12 PM
$Orig:
DeliveredDate: 09/07/99 04:11:12 PM
Categories:
$Revisions:

Extracted header fields:

Date: Tue, 7 Sep 1999 11:11:02 -0300 (EST)
Subject: Info om programmeringskurset
From: info@program.com.no

Chapter II

Header Field Reading

After the header fields have been extracted, they are processed by the EMPP. The header field keywords (see above) are replaced by an introductory message. The remainder of the header fields is processed by the EMPP in order to allow the Text-To-Speech system to intelligently read the fields.

From Field

The **From** field keyword is replaced by the introductory message *"Melding fra:"*

For example:

Author: Anne Larsen
is pronounced:
Melding fra: Anne Larsen

The remainder of the **From** field is further processed by the EMPP. The EMPP supports **From** fields that either consist of

a) a proper name
b) a proper name and an address
c) an address

a) - b) In case the **From** field contains a proper name, this name and only this name is sent to the Text-To-Speech system. This means that if both a name and an address are found in the **From** field, the address will not be read by the Text-To-Speech system.

Chapter II

For example:

From: Mette Henriksen
From: (Anders Madshus) andersma@nvh.no
From: trudejak@almnet.no (Trude Jakobsen)

are pronounced:

Melding fra: Mette Henriksen
Melding fra: Anders Madshus
Melding fra: Trude Jakobsen

c) In case the **From** field contains only an address, the EMPP reads the address literally.

For example:

From: eva@ktp.no
From: tomas@bsp.no

are pronounced:

Melding fra: eva alfakrøll k t p punktum n o
Melding fra: tomas alfakrøll b s p punktum n o

Date Field

The **Date** field keyword is replaced by the introductory message *"Dato:"*.

The **Date** field contains the date and time of sending. The EMPP supports multiple date and time formats, which are transformed into a uniform format that complies with the rules for date and time indications of the ScanSoft Text-To-Speech system. The EMPP only pronounces the date.

The EMPP supports dates in the following formats:

For example:

Date: 16 Oct 1996 22:37:02 +0100
Date: Sat, 21 Sep 2000 23:45:00 GMT

are pronounced:

Dato: 16 oktober 1996
Dato: lordag 21 september 2000

Chapter II

Subject Field

The **Subject** field keyword is replaced by the introductory message "*Emne:*"

The **Subject** field can contain all kinds of data, but may also be empty. The EMPP searches for keywords that are typical for the subject field (e.g. RE, FYI, FW).

For example:

Subject: RE: din bestilling
Subject: FYI: informasjon om bedriften
Subject: FW: fest hos Tone
Subject: K: Audi 80
Subject: S: Pent brukt TV

are pronounced:

Emne: svar på: din bestilling
Emne: til orientering: informasjon om bedriften
Emne: videresendt melding: fest hos Tone
Emne: kjøpes, Audi 80
Emne: selges, pent brukt TV

Chapter II

E-Mail body processing

Message Extraction

The e-mail preprocessor splits the body of the e-mail message into text-to-speech messages. This is done on the basis of a number of criteria, such as punctuation, capitalization, layout, intelligent abbreviation handling, etc.

The following examples illustrate some criteria for splitting the e-mail text into text-to-speech messages:

- Using sentence final punctuation and capital letters

  Kontakt oss dersom dere ønsker ytterligere informasjon. Skriv til denne adressen: info@lht.no

- Using layout

  Ukens program:

  Møte med nye kunder

  Gjennomgang av månedens prosjekt

  Telefonkonferanse

- Using intelligent abbreviation handling

  Under møtet på tirs. satte vi opp en plan t.o.m. aug. 2001.

Chapter II

Text Normalization

An e-mail message typically contains e-mail specific text features, such as e-mail addresses, URLs, file names, emoticons, etc. The EMPP transforms these e-mail specific features into a format that complies with the rules of the standard text normalization of the ScanSoft Text-To-Speech system.

The following are examples of e-mail specific text normalization:

- Support for multiple e-mail address formats
  julie@penta.kesup.com
  Valp@p4.f3.fido.no
  help@anon.penet.no

- Support for URLs (Universal Resource Locators)
  gopher://www.fflch.gov
  http://www.norge.no
  telnet://www.fling.no

- Support for file names
  ldb001.tse
  sysinfo.exe
  lipedu.xls

- Processing of emoticons
  :-) *is pronounced "haha"*
  ;-) *is pronounced "blunk"*

- Processing of overuse of punctuation
  Advarsel!!!!!!!Virus!!!!!!!!! Hjelp, jeg har problemer med et #§#>>§ program!

  becomes:

  Advarsel! Virus! Hjelp, jeg har problemer med et program!

Chapter II

- Normalization of lay-out lines (e.g. part of an e-mail signature); not active when in spell mode.
  These sequences of identical characters are not pronounced:
  - 10 or more identical digits
  - a word consisting of 5 or more identical US-ASCII encoded letters of the modern Latin alphabet
  - a sequence of 3 or more identical US-ASCII characters that are no letters, no digits, no sentence-final punctuation marks (.?!) and no white spaces; e.g. '&', '#', '%', '*', '-'

  For example:
  oooooooooooooooooooooooooooo
  ---
  will be removed.

- Processing of inserted mail
  Henrik> Pia, hva mener du? Er du ikke enig
  Henrik> i at dette er den beste løsningen?
  Henrik> Ingen av oss har uansett tid i dag.
  Pia> Jo, jeg er enig med deg. Jonas gjør det nok
  Pia> gjerne for oss.

Chapter II

becomes:

Henrik>
Pia, hva mener du? Er du ikke enig i at dette er den beste løsningen?
Ingen av oss har uansett tid i dag.
Pia>
Jo, jeg er enig med deg. Jonas gjør det nok gjerne for oss.

Chapter II

Customizing the E-Mail Preprocessor

The e-mail preprocessor supports the standard ScanSoft Text-To-Speech SDK user dictionary mechanism, which allows the user to customize the output of the e-mail preprocessor. The user dictionary is consulted both during the header processing and the body processing.

For more information on how to build and use user dictionaries, see **Appendix C: User Dictionaries** of the *Programmer's Guide*.

Customizing the E-Mail Header

The user dictionary is consulted during the header processing while reading the **From** field and the **Subject** field.

From Field

The **From** field either consists of

a) a proper name
b) a proper name and an address
c) an address

a) In case the **From** field contains a proper name only, the name is passed on to the user dictionary. If the lookup is successful, the proper name is substituted by the replacement string. If not, the name is further processed by the header reading module.

For example:

If the user dictionary contains the following line:

Fredrik /+'fr6E.dr6Ik

the following From field:

From: Fredrik Indrevik

becomes:

Melding fra: <esc>/+ 'fr6E.dr6Ik<esc>/+ Indrevik

Chapter II

b) In case the **From** field contains a proper name and an address, the EMPP first passes the address to the user dictionary. If the lookup is successful, both the proper name and the address are substituted by the replacement string. If not, the EMPP passes the proper name to the user dictionary. If this lookup is successful, the name and the address are substituted by the replacement string. If not, the name is further processed by the header reading module. The address will not be read by the Text-To-Speech system.

For example:

If the user dictionary contains the following lines:

kjell@skp.no	Kjell, min håndballtrener
Anne	min beste venninne

the following **From** fields:

From: "Kjell Svendsen" kjell@skp.no
Author: anne@elis.rug.no (Anne)

become:

Melding fra: Kjell, min håndballtrener
Melding fra: min beste venninne

c) In case the **From** field contains only an address, the complete address is looked up in the e-mail user dictionary. If the lookup is successful, the address is substituted by the replacement string. If not, the address is further processed by the header reading module.

For example:

If the e-mail user dictionary contains the following lines:

magne.lunde@bstg.no	min sønn

the following From field:

Sender: magne.lunde@bstg.no

becomes:

Melding fra: min sønn

Chapter II

NOTE

To allow a correct processing of the **From** field, the replacement string in the user dictionary should not contain an address or a domain.

Subject Field

Each word in the **Subject** field is sent to the user dictionary. If the lookup is successful, the replacement string is sent directly to the Text-To-Speech system. If not, the **Subject** field is further processed by the header reading module.

For example:

If the user dictionary contains the following lines:

UD /+ 'u0:2.'2de:
PDT *P D T*

The following **Subject** fields:

Subject: UD Tredje verden
Subject: Koder for PDT

are pronounced:

Emne: <esc>/+ 'uO:2.'2de: <esc>/+ Tredje verden
Emne: Koder for P D T

Chapter II

Customizing the E-Mail Body

When a user dictionary has been loaded, the EMPP will call the dictionary for every word of the e-mail body. If the word is found in the user dictionary, it is substituted by the replacement string. If not, the body is further processed by the e-mail body processing module.

For example:

If the e-mail user dictionary contains the following line:

ling5 datalingvistikk

the word "ling5" in the following sentence:

En som er oppmeldt på ling5 bør klare denne oppgaven.

is replaced by the corresponding string found in the e-mail user dictionary:

En som er oppmeldt på datalingvistikk bør klare denne oppgaven.

RealSpeak Telecom SDK

Chapter III

SSML Preprocessor

User's Guide for Norwegian
V4.0

Chapter III

SSML Preprocessor

Introduction

SSML (Speech Synthesizer Markup Language) is part of a set of markup specifications by the W3C for voice browsers.
General information regarding the RealSpeak SSML processor can be found in the **SSML Support** chapter of the *Programmer's Guide*.
The RealSpeak Telecom SDK provides a built-in preprocessor that supports a large portion of the SSML 1.0 September 2004 Recommendation (REC). Moreover RealSpeak extends SSML with a number of Scansoft specific elements/attributes.
The set supported by Scansoft is called "ScanSoft SSML" (4SML).

The section below describes language-specific SSML support included in the RealSpeak Telecom V4.0 –Norwegian language version.

Norwegian specific SSML markup

XML encoding types for Norwegian

The encoding is specified in the XML text declaration ("<?xml … ?>") by the encoding declaration which is of the form encoding="<EncodingName>".
E.g. <?xml version="1.0" encoding="UTF-8"?>

RealSpeak Telecom V4.0 – Norwegian supports:

- "Windows-1252" and "ISO-8859-1" (ISO Latin1)
- The Unicode encoding "UTF-8", "UTF-16" and "UCS-4" (Note that the alias "ISO-10646-UCS-4" is not supported)
- Any coding character set supported by the ICU component as long as the input text only contains characters that can be transcoded to the native coded character set, being "Windows-1252". For more information about the character sets supported by ICU, take a look at the ICU website http://www-306.ibm.com/software/globalization/icu and http://www.iana.org/assignments/character-sets .

Chapter III

NOTE

Encoding names are parsed case-insensitive; hyphens and underscores are ignored

4SML Specifics for Norwegian

For reasons of compatibility with the 'standard' Norwegian system, the parallel RealSpeak native control sequence (<esc> sequence) is listed where applicable. As such, a similar TTS behavior can be created – or
combined – with non-SSML driven text input.

Chapter III

4SML Tags	Comment	Corresponding control sequence
High-level and document structure tags		
xml:lang	Supported 'no-NO' for Norwegian. Attribute of speak, paragraph, sentence and voice.	N.A.
Text normalization tags		
<say-as interpret-as="xxx">	Not supported, except for the types listed below.	
<say-as interpret-as="address">	Supported (not supported in e-mail mode)	<esc>\ tn=address\
<say-as interpret-as="spell">	Supported	<esc>\ tn=spell\
Pronunciation tags		
<phoneme alphabet="unipa">	Supported See section 'the Norwegian L&H+ and UNIPA phonetic alphabets' for an overview of the alphabet.	<esc>/+ …/ supports transcriptions using the related L&H+ phonetic alphabet

RealSpeak Telecom SDK

Chapter IV

Custom G2P Dictionaries

User's Guide for Norwegian
V4.0

Chapter IV

Custom G2P Dictionaries

Introduction

ScanSoft's RealSpeak system now offers support for custom G2P dictionaries. A custom G2P dictionary module is an add-on module specifically designed to improve the quality of pronunciation for specific kinds of words.

The Norwegian system is currently not designed to support the use of a custom G2P dictionary module.

RealSpeak Telecom SDK

Chapter V

Appendix

User's Guide for Norwegian
V4.0

Chapter V

Appendix

Appendix: Norwegian voice name

The RealSpeak Telecom Text-To-Speech system now supports selecting the voice and language via a string as well as a define (please see the definition for the function **TtsInitialize()** in the *Programmers Guide* and also the *Backwards Compatibility Guide* for details). The name strings for the currently supported Norwegian voices are listed in the table below.

Norwegian Voice Name Strings	
Voice	**Name String**
Nora	"Nora"

The string to use to set the language to Norwegian is "Norwegian."