

University of Balamand

NEMLAR – TTS Validation Report

June 2006

Executive summary

This document considers the specifications of the validation criteria for the Arabic TTS database within the Nemlar project and gives an overview of the aspects of the database which are validated. According to the validation report provided, the following aspects of the validation criteria are addressed:

1. Documentation.
2. Database structure, file names and contents.
3. Database items and completeness.
4. Acoustic quality of the speech files.
5. Annotation files.
6. Lexicon.
7. Database design and collection.
8. Recording conditions.
9. Transcription quality.

The following sections describe the data validated for male speakers and the procedure undertaken at Balamand for this purpose.

1 Documentation

The database is accompanied by an English document “DESIGN.DOC” which clearly describes the database. However, the following comments exist:

- The data directory is not NMTTS7AR\DATA, it is NMTTS7AR\BLR\
- There is no reference to the validation report VALREP.DOC (to be done later perhaps?)

2 Database Structure, File Names and Contents

2.1 File names for label files and speech files and directory names

The following directories were not found in the database received.

/<database>/HTML	HTML access to (selected) recordings
/<database>/INDEX	Index files
/<database>/SOURCE	Source code

2.2 The DOC directory

The following files were found to be missing in \NM7TTSAR\DOC:

- SAMPSTAT.TXT
- VALREP.DOC
- TRANS-13.DTD

2.3 The TABLE directory

The table files SPEAKER.TBL and REC_COND.TBL were not found in \NM7TTSAR\TABLE.

2.4 The INDEX directory

Not available

2.5 Other directories

The root directory contains the three files README.TXT, COPYRIGHT.TXT, and DISK.ID.

2.6 Other requirements

- ✓ No empty files
- ✓ For each label file there must be one corresponding speech file and vice versa.
- ✓ Obviously the database should not be infected by any viruses - OK

3 Database Items and Completeness

3.1 Mandatory items specifications

Parts of the two corpuses checked were C1.1_T and C2_T.

4 Acoustic Quality of the Speech Files

Acoustic quality of speech file is ok but not two channels – the files were divided into AR1 and AR2 corresponding to channel 1 and channel 2 of the original signal file.

5 Label Files

All label files are ok.

6 Lexicon

There are supposed to be three lexica files:

- common word lexicon
- extended common word lexicon which are not included in the common word lexicon
- a small proper name lexicon.

The lexicon table in LEXICON.TBL was checked for the format and the content – all the words in the transcriptions are found in the table.

7 Recording Conditions

All wave files were synchronized signals recorded from a large microphone and corresponding laryngograph was provided.

8 Transcription

8.1 Annotation levels

The speech, the orthographic transcription, prosodic transcription, segmentation and pitch mark files have identical names. The names of the validated files are shown in the Appendix.

8.2 Speaker information

Cannot be done because documents with speaker information are not available.

8.3 Orthographic transcription

Total number of files processed: Subcorpus 11 (50) Subcorpus 20 (60 files).

- The WER (Word Error Rate) was 0.55% with two spelling mistakes.
- Approximately 3.5K words were validated.

The tables in the appendix depict the validated files for both subcorpora as well as the errors found.

8.4 Segmentation

Three files have been selected for checking the manual segmentation. These files are:

- T7B11010031
- T7B11010037
- T7B20010105

The result of the checking is presented in the following table.

File	Nb of Phones	Nb of errors (dev. > 20ms)	Nb of small deviations	Nb of errors in transcription
T7B11010031	206	2 (0.97%)	3 (1.45%)	0
T7B11010037	163	0	0	0
T7B20010105	95	0	1 (1.05%)	0
Total	464	2 (0.43%)	4 (0.86%)	0

- The results show that the wrong segmentation is much less than 5%.

Two files have been selected for checking the automatic segmentation. These files are:

- T7B11010119
- T7B11010171

File	Nb of Phones	Nb of errors (dev. > 20ms)	Nb of small deviations	Nb of errors in transcription
T7B11010199	168	5 (2.97%)	3 (1.78%)	0
T7B20010132	179	6 (3.35%)	1 (0.55%)	1 (0.55%)
T7B20010137	264	3 (1.13%)	4 (1.51%)	0
Total	611	14 (2.29%)	8 (1.30%)	1 (0.16%)

- The results show that the wrong segmentation is much less than 10%.

Note: There were some very very small (1 to 2 ms) deviations in the automatic segmentation that were not included.

8.5 Pitch marks

As noted in the validation report, this was done for the files chosen in the orthographic transcription part.

Procedure:

Using the software *wavesurfer 1.4.1*, the pitch marks were calculated and saved in a file using the ESPS pitch method. The results were plotted versus time along with the corresponding Pitch Marks file of the database for comparison purposes. The maximum deviation from the reference pitch mark should be 5%. Therefore the reference marks (produced by *wavesurfer 1.4.1*) were plotted twice with an increment and decrement of 5% in value in addition to a restriction of 0.5ms to facilitate the procedure. It was concluded that these files do not match but are symmetric with respect to $y \approx 125$.

Therefore we first tried to validate the reference pitch marks calculated from the laryngograph signals. Random points were taken from random files and calculated manually using the formula:

$$f = \frac{1}{T} \quad \text{where } f \text{ is the frequency (Hz) and } T \text{ is the period (s)}$$

The values were found to match those produced by *wavesurfer 1.4.1* therefore it was deduced that the software is functioning properly and the reference values are correct.

As for the voiced/unvoiced errors which should not exceed 3%, these were also checked to the best extent possible and seem to be correct. Please refer to the figures below.

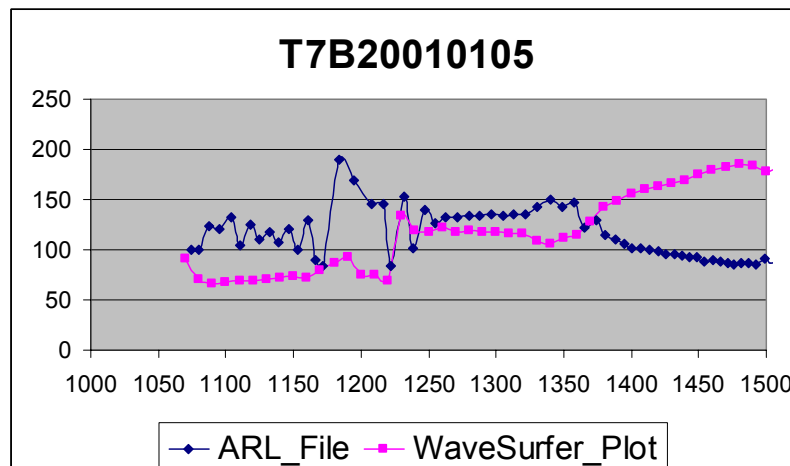


Figure 1 – Example of pitch mark detection problem for T7B20010105 without $\pm 5\%$ variations

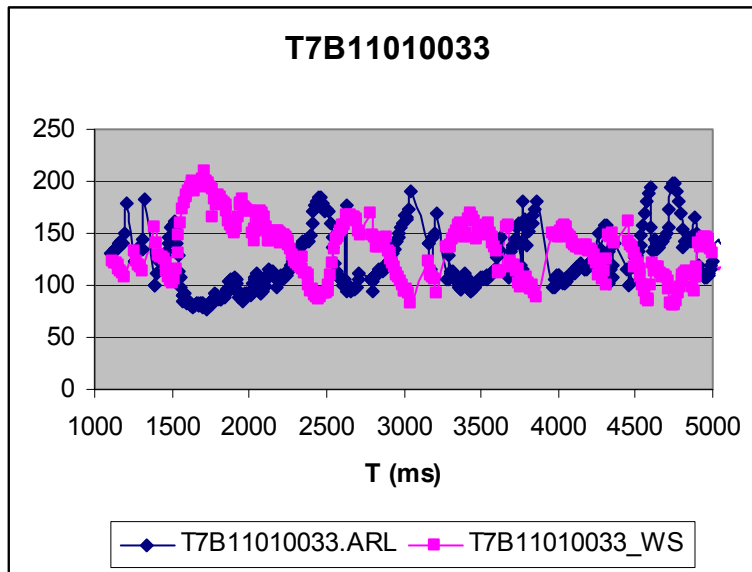


Figure 2 – Example of pitch mark detection problem for T7B11010033 without $\pm 5\%$ variations

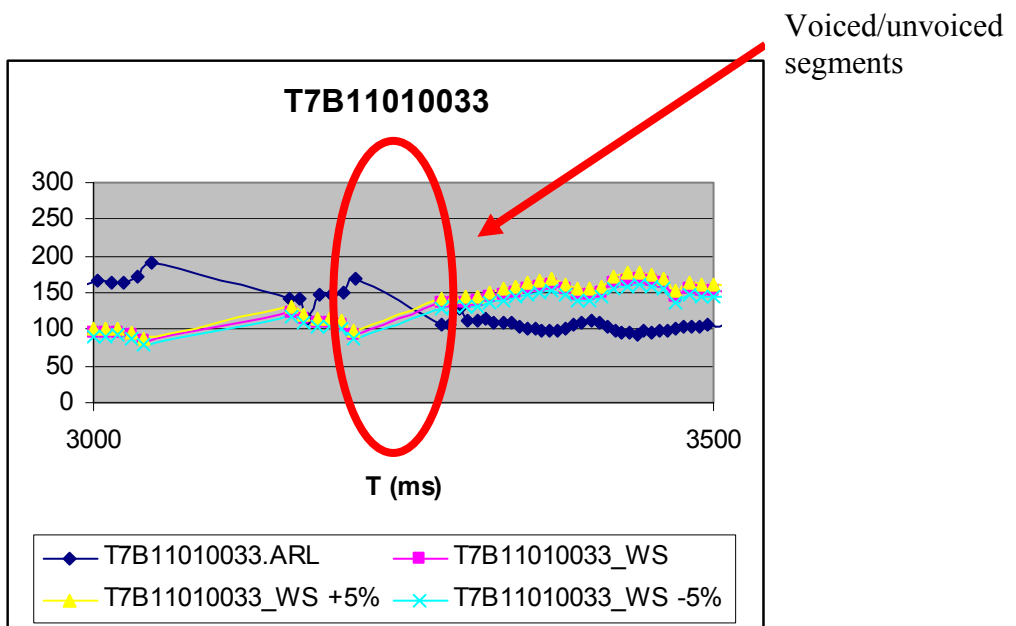


Figure 3 – Example of pitch mark detection problem for T7B11010033 with $\pm 5\%$ variations

8.6 Spelling check

→ Two spelling mistakes were found and are shown in the transcription tables in the Appendix.

Appendix

A. Orthographic transcription

The following tables give the results of the orthographic transcription task in the NEMLAR TTS validation project. The transcription files used were extracted from the files SUMMARY.TXT

SubCorpus ID: 11

T7B11010030.AR1	OK
T7B11010031.AR1	OK
T7B11010032.AR1	لِلانْتِشَارِ -> missing hamza الْمُتَّابِعِينَ -> repeated t
T7B11010033.AR1	OK
T7B11010034.AR1	OK
T7B11010035.AR1	الْبَاعِثَاءُ -> missing hamza
T7B11010036.AR1	OK
T7B11010037.AR1	OK
T7B11010038.AR1	OK
T7B11010039.AR1	OK
T7B11010109.AR1	الْبَاقِضَاتِي -> missing hamza الْبَاسِطَاتِي -> missing hamza
T7B11010119.AR1	الْجَدَارِ -> ji not ja (kasra not fat7a)
T7B11010129.AR1	OK
T7B11010130.AR1	OK
T7B11010131.AR1	OK
T7B11010132.AR1	OK
T7B11010133.AR1	الْمُضْدَرُ -> ma not moo (fat7a not dama)
T7B11010134.AR1	OK
T7B11010135.AR1	OK
T7B11010136.AR1	OK
T7B11010137.AR1	OK
T7B11010138.AR1	OK
T7B11010139.AR1	وَأَشَارَاتِ -> no Alef after sheen
T7B11010149.AR1	OK
T7B11010159.AR1	OK
T7B11010169.AR1	OK
T7B11010179.AR1	الْبَاسِطَاتِي -> missing hamza
T7B11010189.AR1	OK
T7B11010190.AR1	OK
T7B11010191.AR1	OK
T7B11010192.AR1	OK
T7B11010193.AR1	OK
T7B11010194.AR1	OK
T7B11010195.AR1	OK
T7B11010196.AR1	OK
T7B11010197.AR1	OK
T7B11010198.AR1	OK

T7B11010199.AR1	OK
T7B11010227.AR1	الْبَاجِمَاغُ -> missing hamza
T7B11010230.AR1	OK
T7B11010231.AR1	OK
T7B11010232.AR1	الْمُؤَاجِهَةُ -> ja not jee (fat7a not kasra)
T7B11010233.AR1	OK
T7B11010234.AR1	OK
T7B11010235.AR1	OK
T7B11010236.AR1	OK
T7B11010237.AR1	OK
T7B11010238.AR1	قَبْلِيَّةٌ -> fat7a on b الْدُمَاءُ -> no kasra on hamza
T7B11010239.AR1	الْيَاسْتِقْبَالَ -> missing hamza
T7B11010242.AR1	OK

SubCorpus ID: 20

T7B20010009.AR1	الْبَاحْتِلَافُ -> missing hamza
T7B20010019.AR1	OK
T7B20010029.AR1	OK
T7B20010039.AR1	OK
T7B20010049.AR1	OK
T7B20010059.AR1	OK
T7B20010069.AR1	رَفِيقٌ -> missing damma on kaaf
T7B20010079.AR1	OK
T7B20010089.AR1	الْبِاعْلَامِيَّةُ -> should be الْبِاعْلَانِيَّةُ
T7B20010099.AR1	OK
T7B20010100.AR1	OK
T7B20010101.AR1	OK
T7B20010102.AR1	OK
T7B20010103.AR1	OK
T7B20010104.AR1	OK
T7B20010105.AR1	OK
T7B20010106.AR1	OK
T7B20010107.AR1	OK
T7B20010108.AR1	OK
T7B20010109.AR1	OK
T7B20010130.AR1	OK
T7B20010131.AR1	OK
T7B20010132.AR1	وَأَشْنَطُنٌ -> shin not shon (kasra not damma)
T7B20010133.AR1	OK
T7B20010134.AR1	OK
T7B20010135.AR1	OK
T7B20010136.AR1	OK
T7B20010137.AR1	OK
T7B20010138.AR1	OK
T7B20010139.AR1	OK
T7B20010160.AR1	OK
T7B20010161.AR1	OK

T7B20010162.AR1	OK
T7B20010163.AR1	OK
T7B20010164.AR1	OK
T7B20010165.AR1	OK
T7B20010166.AR1	OK
T7B20010167.AR1	OK
T7B20010168.AR1	التَّكْنُولُوجِيَّة -> too not tee (damma not kasra on t)
T7B20010169.AR1	OK
T7B20010209.AR1	OK
T7B20010219.AR1	OK
T7B20010229.AR1	OK
T7B20010239.AR1	OK
T7B20010249.AR1	OK
T7B20010259.AR1	OK
T7B20010269.AR1	OK
T7B20010279.AR1	OK
T7B20010289.AR1	OK
T7B20010299.AR1	OK
T7B20010309.AR1	OK
T7B20010319.AR1	OK
T7B20010329.AR1	OK
T7B20010339.AR1	OK
T7B20010349.AR1	OK
T7B20010359.AR1	ضَحْكَةٌ -> di not da (kasra not fat7a)
T7B20010369.AR1	OK
T7B20010379.AR1	OK
T7B20010389.AR1	OK
T7B20010399.AR1	OK

B. Manual Segmentation

The following manual segmentation files were checked:

T7B11010031.ARM (206 phones)

#
0.572000 121 sil
0.600500 121 ?
0.660375 121 a
0.718000 121 l
0.770813 121 m
0.835562 121 u
0.905781 121 s
0.971406 121 a
1.053188 121 l
1.114375 121 a
1.183406 121 X
1.280000 121 u:
1.328000 121 n
1.392000 121 a

1.416000 121 l
1.464000 121 l
1.534000 121 a
1.572000 121 D
1.652000 121 i:
1.686000 121 n
1.750000 121 a
1.775311 121 ?
1.864000 121 a
1.957031 121 q
2.080000 121 a:
2.130812 121 m
2.217406 121 u
2.348000 121 X
2.476000 121 a:
2.527031 121 Z
2.591625 121 i
2.655188 121 z
2.742218 121 a
2.818000 121 n
2.914000 (2.930000) 121 m
3.010000 121 u
3.060969 121 z
3.136000 121 a
3.178000 121 j
3.272000 121 j
3.353188 121 a
3.426594 121 f
3.514000 121 a
3.628000 121 n
4.136000 121 sil
4.166000 121 ?
4.224000 121 a
4.328813 121 t`
4.386375 121 l
4.444000 121 a
4.535781 121 q
4.606219 121 u
4.656000 121 r
4.724218 121 r
4.811406 121 a
4.908594 121 s`
5.024375 121 a:
5.112000 121 s`
5.198000 121 a
5.250000 121 ?`
5.316000 121 a
5.354000 121 l
5.450000 121 a:
5.486000 121 ?

5.532000 121 a
5.594000 121 r
5.657344 121 b
5.698000 121 a
5.745687 121 ?
5.818812 121 i
5.896594 121 s
5.956000 121 a
5.998000 121 j
6.080000 121 j
6.197187 121 a:
6.238000 121 r
6.334000 121 a:
6.403781 121 t
6.458000 121 i
6.505406 121 n
6.584594 121 w
6.645126 121 a
6.732594 121 S
6.846157 121 a:
6.935188 121 X
7.016000 121 i
7.055188 121 n
7.135406 121 a
7.222000 121 h
7.782000 121 sil
7.843188 121 q
7.911188 121 a
7.990000 121 b
8.031187 121 l
8.100000 121 a
8.130000 121 ?
8.216813 121 a
8.258000 121 n
8.344000 121 j
8.419187 **(8.508)** 121 u
8.517560 **(8.570)** 121 d`
8.606747 121 r
8.680000 **(8.665)** 121 i
8.736000 121 m
8.815187 121 u
8.866440 121 n
8.962000 121 n
9.096220 121 i:
9.138440 121 r
9.256000 121 a:
9.300000 121 n
9.368000 121 a
9.396000 121 l
9.466000 121 l

9.526000 121 a
9.615187 121 t
9.724000 121 i:
9.760000 121 ?
9.840000 121 a
9.888000 121 d
9.972660 121 d
10.040000 121 a
10.120067 121 t
10.147627 121 ?
10.204967 121 i
10.242000 121 l
10.350594 121 a:
10.405407 121 t
10.466000 121 a
10.530000 121 f
10.593186 121 a
10.638000 121 X
10.719780 121 X
10.798000 121 u
10.836000 121 m
10.922000 121 i
10.978000 121 ?`
11.060746 121 a
11.146220 121 S
11.197968 121 a
11.232000 121 r
11.292000 121 a
11.369186 121 t
11.435780 121 i
11.460000 121 ?
11.530000 121 a
11.642000 121 S
11.740000 121 x
11.910374 121 a:
12.094000 121 s`
12.794000 121 sil
12.818813 121 ?
12.874000 121 a
12.932000 121 l
12.990000 121 m
13.046594 121 a
13.109406 121 Z
13.154000 121 z
13.229627 121 a
13.258220 121 r
13.320000 121 a
13.398000 121 t
13.440000 121 u
13.465406 121 l

13.521187 121 l
13.596000 121 a
13.668220 121 t
13.776000 (13.765) 121 i:
13.862287 121 q
13.930747 121 a
14.002220 121 t`
14.074000 121 a
14.125340 121 ?`
14.182593 121 a
14.251407 121 t
14.298000 121 i
14.338000 121 l
14.402594 121 h
14.468373 121 u
14.521847 121 d
14.616000 121 u:
14.652000 121 ?
14.714220 121 a
14.750813 121 l
14.805780 121 l
14.873187 121 a
14.912000 121 D
15.030000 121 i:
15.125934 121 t
15.186000 121 a
15.238000 121 ?`
15.338593 121 i:
15.426000 121 S
15.492000 121 u
15.537560 121 h
15.598000 121 u
15.678000 121 l
15.750000 121 m
15.808000 121 i
15.912000 121 n
16.005566 121 t`
16.073942 121 a
16.166811 121 q
16.236000 121 a
16.354000 121 h
17.184000 121 sil

T7B11010037.ARM was also checked (163 phones) but no errors were found
T7B20010105.ARM (95 phones)

1.057446 121 sil
1.099138 121 w
1.180000 121 a

1.216708 121 ?
1.332000 121 a
1.375292 121 d`
1.537539 121 a:
1.758000 121 f
2.186862 121 sil
2.219569 121 ?
2.282000 121 a
2.361292 121 l
2.483569 121 X
2.612861 121 a:
2.658584 121 d
2.741723 121 i
2.802000 121 T
2.868861 121 u
2.900862 121 l
2.937569 121 ?
3.009723 121 i
3.045108 121 r
3.114000 121 h
3.254000 121 a:
3.306277 121 b
3.362000 121 i
3.398000 121 j
3.474431 121 j
3.538000 121 u
3.599416 121 b
3.676708 121 i
3.724000 121 m
3.802000 121 a
3.882000 121 T
3.988000 121 a:
4.033139 121 b
4.104861 121 a
4.194277 121 t
4.256000 121 i
4.320277 121 m
4.396862 121 u
4.426708 121 ?
4.581139 121 a:
4.628000 (4.645) 121 m
4.722000 121 a
4.758708 121 r
4.854000 121 a
4.930277 121 t
5.014000 121 i
5.172000 121 n
5.549015 121 sil
5.577415 121 ?
5.616000 121 i

5.678000 121 s
5.743846 121 t
5.784000 121 a
5.858000 121 h
5.918154 121 d
5.984000 121 a
6.039723 121 f
6.097292 121 a
6.155292 121 t
6.205693 121 i
6.270000 121 s
6.339569 121 t
6.389416 121 i
6.491723 121 q
6.553416 121 r
6.647569 121 a:
6.675569 121 r
6.738000 121 a
6.813292 121 l
6.880861 121 u
6.972431 121 b
7.028000 121 n
7.148431 121 a:
7.192862 121 n
7.254861 121 a
7.326000 121 w
7.382000 121 a
7.448000 121 w
7.506431 121 a
7.634955 121 X
7.737846 121 d
7.828000 121 a
7.893292 121 t
7.973138 121 a
8.054862 121 S
8.124432 121 a
8.209138 121 ?`
8.283844 121 b
8.328000 121 i
8.416000 121 h
9.384000 121 sil

C. Automatic Segmentation

The following automatic segmentation files were checked:

T7B20010132 (179 phones)

1.506000 121 sil
1.572000 121 w

1.626000 121 a
1.674000 121 ?
1.728000 121 a
1.824000 121 w
1.908000 121 d`
1.968000 121 a
2.064000 121 X
2.124000 121 a
2.196000 121 l
2.250000 **(2.175)** 121 m
2.310000 **(2.330)** 121 a
2.400000 121 s
2.430000 121 ?
2.520000 121 u:
2.550000 121 l
2.628000 121 u
2.664000 121 l
2.712000 121 ?
2.748000 121 a
2.820000 121 m
2.868000 121 r
2.946000 121 i:
3.024000 121 k
3.060000 **(3.112)** 121 i
3.096000 **(xxxxx)** 121 j
3.144000 **(xxxxx)** 121 j
3.204000 121 u
3.240000 121 l
3.276000 121 l
3.336000 121 a
3.396000 121 D
3.516000 121 i:
3.636000 121 t`
3.720000 121 a
3.756000 121 l
3.834000 121 a
3.882000 121 b
3.918000 121 a
4.152000 121 ?`
4.200000 121 a
4.254000 121 d
4.332000 121 a
4.374000 121 m
4.428000 121 a
4.512000 121 l
4.566000 121 k
4.620000 121 a
4.722000 121 S
4.770000 121 f
4.818000 121 i

4.896000 121 ?`
4.938000 121 a
4.974000 121 n
5.034000 121 h
5.094000 121 u
5.148000 121 w
5.172000 121 i
5.214000 121 j
5.268000 121 j
5.334000 121 a
5.406000 121 t
5.466000 121 i
5.538000 121 h
5.586000 121 i:
5.628000 121 l
5.682000 121 i
5.742000 121 s`
5.832000 121 s`
5.874000 **(5.895)** 121 a
5.964000 121 X
6.072000 121 i:
6.156000 121 f
6.228000 121 a
6.312000 121 h
6.906000 121 sil
7.038000 121 ?
7.068000 121 a
7.098000 121 n
7.140000 121 n
7.206000 121 a
7.260000 **(7.268)** 121 b
7.338000 121 i
7.380000 121 l
7.494000 121 a:
7.536000 121 d
7.614000 121 a
7.662000 121 h
7.806000 121 u:
7.896000 121 t
7.962000 121 u
8.046000 121 t
8.148000 121 a:
8.184000 121 b
8.220000 121 i
8.310000 121 ?`
8.388000 121 u
8.448000 121 ?`
8.496000 121 a
8.568000 121 n
8.664000 121 k

8.718000 121 a
8.796000 121 T
8.886000 121 a
8.940000 121 b
9.000000 121 i
9.048000 121 n
9.114000 121 i
9.186000 121 t
9.234000 121 t
9.294000 121 a
9.378000 121 t`
9.408000 121 a
9.486000 121 w
9.564000 121 w
9.594000 121 u
9.642000 121 r
9.762000 121 a:
9.990000 121 t
10.494000 121 sil
10.542000 121 m
10.602000 121 u
10.668000 121 ?
10.734000 121 a
10.764000 121 k
10.854000 121 k
10.908000 121 i
10.956000 121 d
11.040000 121 a
11.166000 121 n
11.280000 121 q
11.340000 121 a
11.376000 121 l
11.460000 121 a
11.562000 121 q
11.634000 121 a
11.742000 121 w
11.808000 121 a:
11.958000 121 S
11.976000 121 u
12.060000 121 n
12.114000 121 t`
12.198000 121 u
12.348000 121 n
12.642000 121 sil
12.804000 121 X
12.858000 121 i
12.900000 121 j
12.978000 121 a:
13.014000 121 l
13.056000 121 a

13.092000 121 t
13.146000 121 t
13.176000 121 a
13.224000 121 d
13.266000 121 a
13.320000 121 x
13.380000 121 x
13.422000 121 u
13.464000 121 l
13.494000 121 i
13.572000 121 s
13.632000 121 s
13.680000 121 u:
13.728000 121 r
13.746000 121 i
13.782000 121 j
13.842000 121 j
13.890000 121 i
13.962000 121 f
14.052000 121 i:
14.094000 121 l
14.154000 121 u
14.232000 121 b
14.274000 121 n
14.406000 121 a:
14.574000 121 n
15.594000 121 sil

T7B20010137 (264 phones)

0.546000 121 sil
0.630000 121 w
0.696000 121 a
0.792000 121 q
0.894000 121 a:
0.930000 121 l
0.996000 121 a
1.104000 121 S
1.224000 121 a:
1.260000 121 r
1.338000 121 u:
1.392000 121 n
1.500000 121 u
1.554000 121 l
1.608000 121 i
1.650000 121 ?
1.752000 121 i
1.818000 121 D
1.884000 121 a:
2.004000 121 ?`

2.070000 121 a
2.136000 121 t
2.208000 121 i
2.232000 121 ?
2.268000 121 i
2.388000 121 s
2.466000 121 r
2.532000 121 a:
2.592000 121 ?
2.766000 121 i:
2.946000 121 l
3.252000 121 sil
3.348000 121 s
3.408000 121 a
3.444000 121 w
3.510000 121 f
3.540000 121 a
3.594000 121 j
3.630000 (3.652) 121 u
3.744000 121 s
3.792000 121 ?`
3.852000 121 i
3.900000 121 d
3.984000 121 u
4.020000 121 n
4.152000 121 i:
4.224000 121 k
4.284000 121 a
4.380000 121 T
4.488000 (4.527) 121 i:
4.578000 121 r
4.632000 121 a
4.704000 121 n
4.740000 121 ?
4.806000 121 a
4.878000 121 n
4.896000 121 ?
5.004000 121 u
5.106000 121 Z
5.160000 121 r
5.190000 121 i
5.226000 (5.258) 121 j
5.304000 121 a
5.358000 121 m
5.430000 121 u
5.544000 121 X
5.622000 121 a:
5.682000 121 d
5.754000 121 a
5.844000 121 T

5.940000 121 a:
6.006000 121 t
6.048000 121 i
6.126000 121 n
6.156000 121 m
6.186000 121 a
6.282000 121 ?`
6.300000 121 a
6.318000 121 ?
6.336000 121 a
6.384000 121 j
6.444000 121 j
6.474000 121 i
6.522000 121 d
6.582000 121 a
6.606000 121 w
6.666000 121 l
6.726000 121 a
6.786000 121 t
6.834000 121 i
6.870000 121 n
6.942000 121 ?`
6.996000 121 a
7.032000 121 r
7.062000 121 a
7.122000 121 b
7.146000 121 i
7.200000 121 j
7.272000 121 j
7.332000 121 a
7.416000 121 h
8.034000 121 sil
8.136000 121 l
8.232000 121 a:
8.304000 121 k
8.340000 121 i
8.376000 121 n
8.460000 121 j
8.532000 121 a
8.604000 121 Z
8.658000 121 i
8.712000 121 b
8.808000 121 u
8.856000 121 ?
8.928000 121 a
8.964000 121 n
9.054000 121 n
9.156000 121 a
9.216000 121 r
9.300000 121 a:

9.360000 121 m
9.426000 121 u
9.480000 121 ?
9.540000 121 a
9.660000 121 S
9.714000 121 S
9.738000 121 i
9.810000 121 r
9.864000 121 a
9.984000 121 n
10.026000 121 m
10.206000 121 a:
10.590000 121 sil
10.662000 121 X
10.728000 121 a
10.776000 121 t
10.824000 121 t
10.878000 121 a:
10.944000 121 w
10.974000 121 a
10.998000 121 l
11.046000 121 a
11.094000 121 w
11.172000 121 k
11.250000 121 a:
11.274000 121 n
11.340000 121 a
11.436000 121 s`
11.502000 121 a
11.574000 121 G
11.664000 121 i:
11.748000 121 r
11.784000 121 a
11.904000 121 n
12.198000 121 sil
12.378000 121 ?`
12.414000 121 a
12.444000 121 l
12.540000 121 a:
12.576000 121 ?
12.636000 121 a
12.678000 121 n
12.732000 121 n
12.804000 121 a
12.852000 121 n
12.930000 121 a
12.996000 121 w
13.116000 121 a:
13.194000 121 j
13.290000 121 a:

13.416000 121 s
13.500000 121 u:
13.548000 121 r
13.590000 121 i
13.662000 121 j
13.734000 121 j
13.854000 121 a:
14.352000 121 sil
14.478000 121 Z
14.598000 121 a:
14.706000 121 d
14.748000 121 d
14.814000 121 a
14.934000 121 h
15.534000 121 sil
15.696000 121 w
15.756000 121 a
15.786000 121 l
15.840000 121 a
15.876000 121 j
15.960000 121 s
16.025999 121 a
16.068001 121 t
16.158001 121 m
16.212000 121 u
16.313999 121 X
16.379999 121 a:
16.469999 121 w
16.511999 121 a
16.548000 121 l
16.614000 121 a
16.674000 121 t
16.733999 121 a
16.775999 121 n
16.799999 121 l
16.860001 121 i
16.914000 121 t
16.955999 121 a
17.063999 121 X
17.124001 121 w
17.153999 121 i:
17.195999 121 l
17.256001 121 i
17.292000 121 d`
17.375999 121 d`
17.472000 121 a
17.490000 121 G
17.573999 121 t`
17.622000 121 i
17.694000 121 l

17.742001 121 ?
17.796000 121 a
17.868000 121 m
17.916000 121 r
18.011999 121 i:
18.090000 121 k
18.126000 121 i
18.186001 121 j
18.294001 121 j
18.672001 121 sil
18.732000 121 b
18.785999 121 i
18.888001 121 X
18.941999 121 a
19.032000 121 s
19.098000 121 a
19.139999 121 b
19.212000 121 i
19.278000 121 w
19.313999 121 i
19.410000 121 k
19.469999 121 a:
19.506001 121 l
19.572001 121 a
19.656000 121 t
19.704000 121 i
19.757999 121 r
19.854000 121 u:
19.902000 121 j
19.986000 121 t
20.034000 121 a
20.094000 121 r
20.226000 121 z
20.244000 121 i
20.274000 121 l
20.340000 121 i
20.412001 121 l
20.448000 121 ?
20.502001 121 a
20.591999 121 n
20.634001 121 b
20.754000 121 a:
20.958000 121 ?
22.086000 121 sil

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0.504000 121 sil
0.564000 121 ?
0.642000 121 a
0.684000 121 S
0.828000 121 S
0.966000 121 a
0.990000 121 ?
1.068000 121 n
1.140000 121 u
1.200000 121 l
1.284000 121 ?
1.326000 121 i
1.386000 121 r
1.476000 121 a:
1.578000 121 q
1.632000 121 i
1.710000 121 j
1.818000 121 j
2.310000 121 sil
2.388000 121 s
2.460000 121 a
2.550000 121 q
2.616000 (2.632) 121 a
2.694000 121 t`
2.766000 (2.788) 121 a
2.856000 121 T
2.922000 121 a
2.958000 121 l
3.060000 121 a:
3.138000 121 T
3.228000 121 u:
3.270000 121 n
3.354000 121 a
3.444000 121 q
3.510000 121 a
3.588000 121 t
3.690000 121 i:
3.726000 121 l
3.804000 121 a
3.852000 121 n
3.960000 121 ?
3.978000 121 i
4.020000 121 r
4.116000 121 a:
4.212000 121 q
4.254000 121 i
4.308000 121 j
4.380000 121 j

4.446000 121 a
4.608000 121 n
4.884000 121 sil
4.968000 121 f
5.034000 (5.060) 121 i:
5.136000 121 s
5.178000 121 i
5.256000 121 l
5.352000 121 s
5.406000 121 i
5.460000 121 l
5.544000 121 a
5.598000 121 t
5.664000 121 i
5.760000 121 n
5.808000 121 m
5.832000 121 i
5.868000 121 n
5.928000 121 a
5.982000 121 l
6.054000 121 h
6.096000 121 a
6.174000 121 Z
6.234000 121 a
6.288000 121 m
6.396000 121 a:
6.474000 121 t
6.528000 121 i
6.564000 121 n
6.648000 121 a
6.702000 121 f
6.774000 121 f
6.846000 121 a
6.894000 121 D
6.972000 121 a
7.026000 121 h
7.140000 121 a:
7.206000 121 m
7.254000 121 u
7.338000 121 s
7.398000 121 a
7.470000 121 l
7.500000 121 l
7.548000 121 a
7.626000 121 X
7.728000 121 u:
7.776000 121 n
7.854000 121 a
7.926000 121 f
8.022000 121 i:

8.082000 121 m
8.136000 121 a
8.190000 121 d
8.262000 121 i:
8.304000 121 n
8.388000 121 a
8.448000 121 t
8.490000 121 i
8.580000 121 l
8.610000 121 l
8.688000 (8.713) 121 a
8.826000 (8.797) 121 t`
8.922000 121 i:
9.000000 121 f
9.060000 121 i
9.114000 121 j
9.174000 121 j
9.240000 121 a
9.342000 121 h
9.810001 121 sil
9.864000 121 ?
9.918000 121 a
9.966000 121 l
10.056000 121 w
10.140000 121 a:
10.218000 121 q
10.242000 121 i
10.356000 121 ?`
10.404000 121 a
10.464000 121 t
10.536000 121 i
10.590000 121 f
10.644000 121 i
10.692000 121 l
10.752000 121 m
10.800000 121 i
10.920000 121 n
10.986000 121 t`
11.058000 121 a
11.136000 121 q
11.226000 121 a
11.274000 121 t
11.322000 121 i
11.388000 121 l
11.448000 121 m
11.478000 121 a
11.574000 121 ?`
11.616000 121 r
11.706000 121 u:
11.790000 121 f

11.856000 121 a
11.922000 121 t
12.006000 121 i
12.054000 121 b
12.132000 121 i
12.186000 121 m
12.258000 121 u
12.348000 121 T
12.426000 121 a
12.498000 121 l
12.522000 121 l
12.588000 121 a
12.654000 121 T
12.726000 121 i
12.780000 121 l
12.858000 121 m
12.924000 121 a
13.020001 121 w
13.194000 121 t
16.020001 121 sil