RECORDINGS EXAMINATION REPORT

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1. Investigated Material:

In June 2009 I received an envelope containing a DVD-ROM and an instructions letter. The DVD included audio material of 8 tapped conversations and a readme file. The audio content was arranged in 8 separate WAV files.

The audio content I received was claimed to include tapped telephone calls held in October - November 1997 between a person I shall call "B", the subject of the tapping, using one or more cellular phones, and other parties, using a landline or cellular phones.

The tapping method and the location of the tapping system were unknown to me. The recording was used as part of evidence in legal proceedings held against "B".

According to the readme file, out of the 8 conversations there were 2 digital recordings (i.e. digitally encoded and stored in digital media) and 6 analog recordings (i.e. intercepted and recorded on analog tape recorders).

The digital recordings were supposedly those which I copied myself from the presumably original digital storage media, by playing the digital media on a similar tapping system into an analog output and then re-digitizing and collecting the analog signal into digital form.

As opposed to this copying process, the analog media was described to have been converted to digital form by a Dutch expert lab using the following process:

1. The analog tapes were played on a tape recorder with motor speed much higher than the original recording speed (about 8 times faster).
2. The magnetic head of the playing machine had twice the width of the recording machine's head, but supported stereo recording. The original recordings were performed in mono, but used half the tape width and the recording tape was "flipped" when one side was complete. As a result, the produced signal had "forward" and "backward" recording sessions as the left and right channels of the stereo playback, where the right channel was reversed in time.
3. The analog signal was sampled at a rate of 44.1KHz into digital form
4. In order to compensate for the increased playback speed, and in order to separate the "forward" and "backward" sessions and reverse the "backward" session, the expert lab used professional audio processing software called "ProTools", which is commonly used in recording studios.

Reviewing the material I first received, I noticed clear signs of frequency aliasing in the analog material, indicating improper processing of the original material.
Exploring the process performed while digitizing the material, I could point out as follows:

1. The material was digitized at 44.1KHz, implying a Nyquist anti-aliasing low-pass-filter of 22.05KHz was applied prior to sampling. As the original material was played at a speed 8 times faster than the recording speed, the frequency band was stretched by a factor of 8. If the original signal had telephone signals with bandwidth up to 3.6KHz, as is customary for telephone channels, then the stretched signal had frequency contents up to 3.6 x 8 = 28.8KHz. The frequencies above 22.05 were cut in the sampling process. Effectively, the original signal was low-pass filtered at an equivalent frequency of 22.05 / 8 = 2.756KHz.
2. The speed of the digitized material was altered using ProTools, however not by changing the sampling rate but by using some proprietary voice manipulation feature of ProTools used for pitch changing. Such processing introduces non-linear affects, warps the time domain and could generate diversified and unknown artifacts into the signal.

As a result, I have requested the material to be resent as it was after digitizing, without separating the left and right channels, without reversing the left channel and without changing the playback speed. I have performed all of those steps myself, using CoolEdit software.

I would like to emphasize, however, that since the sampling of the original analog recordings could not be repeated, the spectrum of the material I received was effectively cut at about 2.7KHz (as explained above), which chopped off some part of the relevant telephone frequency band (and of course the frequency band above 3.6KHz, which was supposed to have no contents, however this could not be verified).
As a result, I could not search for anomalies in the upper band contents of the analog material, which I would consider a natural and principal part of my examination.

2. Investigation Target:

In the letter attached to the DVD and the readme file, I was asked to provide an opinion, based on my expertise, regarding possible manipulation of these taps. For some of the material the target questions were explicitly specified as follows:

#	File	Analog / Dig.	Specific Questions
1	a4-34-20h45-1dec97.wav	D	
2	a3-24-22h24-14nov97.wav	D	
3	a1-1-kant-2-b-3281-tijd1.31-1.33-gesprek-17h16-9nov97.wav	A	Are there (signal) indications about the source of the call?
4	a1-3-kant-1-b-3285-tijd3.09-3.17-gesprek-21h59-9nov97.wav	A	Is this possibly a concatenation of two separate conversations?
5	a1-4-kant-1-b-3285-tijd3.17-4.03-gesprek-22h53-9nov97.wav	A	Is this possibly a concatenation of two separate conversations?
6	a1-5-kant-2-b-3281-tijd1.49-1.57-gesprek-11h51-10nov97.wav	A	
7	kant-1-a-3285-tijd0.45-9.45-gesprek-20h45-5okt97.wav	A	
8	kant-2-b-3281-tijd3.48-3.52-gesprek-15h24-12nov97.wav	A	

In addition, I was asked to provide my opinion for each of the calls regarding the following questions:

1. Are there clear signs of alterations and/or discontinuities? If so, their precise location and the nature of the anomaly.
2. From telecom perspective, are the dial tones and other audio characteristics (frequencies, signal-noise ratios) as they should be in the relevant countries at that time?

3. Caller Identification (CID) Information

A possible way to identify the identity of the parties of each call and the date and time of call is by decoding the CLIP (also called Caller ID or CID) signals transmitted on the telephone network before- or immediately after the first ring (depending on the applied telecom standard). The CLIP signal includes digital data such as the calling telephone number, and, sometimes, also the caller's name (as registered in the public telephone directory), the date and time of the call, and possibly additional data.

In special cases like a private caller, or a long distance call, the CLIP data will still be transmitted and provides a reason for the absence of information (such as "private caller").

CLIP information is a standard applicable for many years, including both domestic and international telephony, and defined by several international standard institutes, such as ITU, TIA, ETSI and BT (British Telecom).

Unfortunately, although (to the best of my knowledge) telephone exchanges in the NL were already all digital in 1997, **there is no sign of CLIP data transmission in even a single call of the 8 tapped calls I received**. Such a CLIP signal would have been very instrumental in the authentication of these calls, especially their origin, destination, date and time..

The lack of any sign of CLIP transmission could be explained in one of two ways:

1. The CLIP data not being available at the interception point.
2. The CLIP data having been removed artificially from the tapped material by manipulating the audio data.

Consider option 1:
We know there is CLIP data available to the call interception point, since (a) digital calls intercepted only one month later by the digital system (replacing the analog tapping system in the middle of November 1997) had CLIP data available and logged; and (b) the CLIP data must have been available also to the analog tapping system in order to generated a log of the call activity (like the presumed call's date, time and parties' numbers).

We know that the exchange nearest to the call destination can block the CLIP signal to the destination depending on whether the user is subscribed to the CLIP service. However, the playback of ringing tones on a wireless line before the call starts proves that the interception point is in the telephone network and not the "last mile", since a cellular audio link does not play ringing tones for an incoming call.

The calls were therefore intercepted on the digital telephone network, where the CLIP data is available (and call activity was also logged by an unknown mechanism). A typical connection node into a digital PCM trunk behaves like a small and autonomous exchange: it streams out the requested audio channel-of-interest and adds the proper exchange signaling associated with this channel to convert it into a simple analog line. CLIP is a part of that signaling, providing the call details. We expect that the CLIP signal had been super-imposed on the analog line used for the tapping, however there is no CLIP signal in any of the calls.

We could therefore conclude the following:

1. The CLIP information was available during the recordings
2. The CLIP information was logged by both the analog and the digital tapping systems. Yet, I did not see any explanation of how the call activity log was generated for the analog calls, since CLIP is missing from ALL the analog recordings. If it was registered somehow automatically by a "side logging channel" then there should have been additional logging media documenting the alleged calling numbers, destinations, dates and times. I have not been provided with such media, and I have not been notified of its existence.
3. If a standard interface node was used to stream out the analog data from the digital telephone trunk, then we would expect to see CLIP signals in all the recorded calls. The explanation for their absence could be that the CLIP signals had been removed at a later stage to erase traces of the call details.

I cannot find a satisfactory explanation for the absence of CLIP information from all the recordings. Either the CLIP data was erased from the recordings, or there should be another media which was not made available to me that logged the call activity. In the latter case a non-typical interface was used to connect into the telephone network, which needs to be further investigated.

4. Analog Call Termination Signals:

Throughout the analysis presented in this report, and specifically in the calls recorded by analog tapping system on magnetic tapes, I have repeatedly had to address the signals associated with call termination. Since this issue has a significant impact on the conclusions of my analysis, and since there is importance in comparing the call termination pattern of the various calls (recorded during a short period of several weeks) I shall provide here a focused discussion of analog call termination, and shall cite it later in my analysis.

While a digital tapping system records the tapped material with a log of the time and numbering information, an analog system records calls serially on an analog media. I did not have access to the analog system used to collect the analog material, and therefore needed to apply common practice to figure out some of its characteristics. In the analog tapping system, the call timing was attached to each call by recording an audio "talking clock" before and after each call. The talking clock did not have date information, only time information, and included information on neither the called nor the calling number. This prohibits the authentication of the call schedule, identity and location of the parties compared to the claimed data.

On some – but not all – of the ANALOG calls, there is a "busy tone" played after the termination of the call. Here is the description of these signals by call identification:

Call	File	Analog / Digital	Termination tone	Freq	On	Off
1	a4-34-20h45-1dec97.wav	D	NO			
2	a3-24-22h24-14nov97.wav	D	NO			
3	a1-1-kant-2-b-3281-tijd1.31-1.33-gesprek-17h16-9nov97.wav	A	YES	~417Hz		
4	a1-3-kant-1-b-3285-tijd3.09-3.17-gesprek-21h59-9nov97.wav	A	YES	~417Hz	0.25s	0.25s
5	a1-4-kant-1-b-3285-tijd3.17-4.03-gesprek-22h53-9nov97.wav	A	NO			
6	a1-5-kant-2-b-3281-tijd1.49-1.57-gesprek-11h51-10nov97.wav	A	YES	~417Hz	?	?
7	kant-1-a-3285-tijd0.45-9.45-gesprek-20h45-5okt97.wav	A	YES	425Hz	0.25s	0.25s
8	kant-2-b-3281-tijd3.48-3.52-gesprek-15h24-12nov97.wav	A	YES	425Hz	0.25s	0.25s

The source of this signal is unknown. We should therefore consider two options:

1. The standard "busy tone" marks a known situation in landline phones, where the calling party hangs up the line, and the called party leaves his phone offhook. After a certain delay the exchange nearest to the called party starts playing a busy tone to alert the called party of the termination of the call. In cellular networks the call is terminated and hung-up automatically.
2. The "busy tone" is generated by the interception system to alert the recording system of the termination of the call, so the recording system can switch on the "talking clock" and stop the recording.

Assuming option (1) creates some un-explained peculiarities which makes this option unlikely:

(a) Why were the calls not terminated automatically, since at least one of the parties, "B", is using a cellular phone.

(b) The busy tone does not match the local telecom standard of "busy tone" for the claimed call destination, which means either this is not a telecom signal or the call destination is different than the claimed.
Moreover, all the busy signals have the same frequency and pattern.

(c) There is no delay at all from the call termination to the start of the busy tone. This would not be possible by telecom standards, since in the telecom world a temporary hangup has a legitimate meaning, so there must be some delay before a hangup situation is interpreted as call termination.
(d) In some calls the call termination is abnormal, in the middle of the talk. This would not be typical to a case of unilateral hangup.
(e) Why do all the "busy tones" have approx. the same frequency and cadences despite the fact the calls are made with several different countries?

If the case is (2), it cannot be explained:
(a) If the signal is generated by the tapping system, why is it missing in one of the calls?
(b) Why were some of the calls (more than one!) cut in the middle of a sentence or a word?
(c) Why does a signal generated by the same system have different characteristics – in one call it has an AGC pattern with increasing gain, while in other calls it has a constant amplitude?

I therefore conclude that there is no satisfactory unified explanation for the pattern of the termination signals demonstrated in the calls. Based on this conclusion and the questions it creates, the termination of at least some of the calls is unreliable.

5. **Disclaimers:**
   1. I approached this analysis with limited knowledge about the case history, and especially the background of the material I have analyzed and its collection.

   2. Most of the material includes conversations using unknown language(s) that I am unfamiliar with. The translation of these conversations was not available to me during my analysis, which could have had limited affect on my opinion.

   3. The total time I was given to investigate the material and write this report was limited to 40 hours. I have made every effort to complete my work within this time scope, however more time would have allowed a more in-depth investigation and possibly more findings.

   4. Occasionally I have had to make observations based on my subjective expert opinion rather than based on objective facts. I have tried to point out to such subjective assessments.

   5. Certain observations related to telecom signals are based on international telephony standards. The investigated material presumably includes taps made in 1997 in Europe. During the 90's Europe has undergone substantial changes of its telephone network infrastructure, driven by the replacement of analog switches by digital systems, and the simultaneous installation of cellular networks and their gradual upgrade from analog standards to digital standards. As a result, some of my observations have limited certainty, since they may be overlooking some non-standard networks which were later abandoned and phased out.

Call no. 1, File: a4-34-20h45-1dec97.wav
December-1-1997, 20:45
Reportedly outgoing conversation from "B" mobile phone 06-51357183 in NL to mobile phone number 0090-53-23217789 in Istanbul, Turkey.

Observations:

1. The signal has very high distortion on both parties' phones. The distortion does not demonstrate clipping or amplitude limiting, but simply inherent distortion. This is abnormal for digital recording intercepted from a digital cellular network. There is no explanation for this distortion.
   Having been present on site when this call was played from the optical disk on a tapping system, I recall that the distortion was not due to the signal duplication setup but was already present in the original playback. The heavy distortion makes deeper analysis of the call very difficult.

2. The ring cadence is ~ 1.7s on and at least 1.957s off (after which the call was answered). The ringing tone is 403Hz =~ 400Hz.
   The ringing tone standard in Turkey is 450Hz with cadence=2s on, 4s off.
   The Dutch ringing tone is 425Hz.
   The ringing in this signal matches neither the destination telephone network in Turkey (which is supposed to be generating the ringing signal), nor the Dutch network.
   A Ringing tone of 400Hz would be possible either with a call destination other than Turkey or with an old exchange in Turkey, which would have then taken place earlier than 1997[1]. Hypothetically, the ringing signal could have been spliced and artificially attached to the recording, or the call's destination is simply not Turkey.

3. There is some low level speech present after the first ring, mixed with various 'click' noises. It seems the call was not yet answered at that time, since there is no signal indicating that. According to the title, "B" was calling another party, and in such a case it would be impossible to hear the other party's speech before the call was established. On the other hand, the low level speech prior to the beginning of the call does not sound like "B"'s voice. There are therefore three options:
   - The call was answered before the low level speech. Then, there is no off hook signal seen before it.
   - The low level speech is generated on the other party's side. Since there is no signal indicating the off hook before this speech, it could mean "B" was not the one who initiated the call, unlike the claim, and in contradiction to the identity of first party saying "hallo" (which would naturally be the called party – in this case not "B" but the other party).
   - The low level speech is generated on "B"'s side. However, not only this speech signal does not sound like "B"'s voice, some cellular phones do not transmit audio before the call was established and the cellular audio link was opened.

   In view of that, the low level speech remains unexplained.

4. There are 'click' noises spread along the call, such as 2:04.854s after the beginning of the call. There is another click at 9:33.88s and the signal fades around it, indicating this is not an acoustical noise.

5. At 2:10.814s ~ 2:10.937s the signal is cut, but it does not seem that any part of the signal is missing(!). In addition, the other party's pitch changes sharply from 130Hz to 103Hz, which is quite irregular. This could potentially be a trace of splicing.

[1] http://www.itu.int/ITU-T/inr/forms/files/tones

6. At 9:17.081s ~ 9:17.381s the signal is cut. The two parts before and after the signal cut do not seem to be continuous as before, and the pitch before and after the cut are different, meaning this is a different discrepancy than the previous one above.

7. At 14:10.71s the recording is cut abruptly in the middle of the conversation, after what sounds like "B" posing a question. This is quite irregular for a call termination.

8. The noise spectrum seems to be constant along the call.

Conclusions:

1. Based on the above observations, the signal shows several different anomalies with respect to both international telecom standards and audio signal analysis. As a result, it is argued that the call was likely not made from NL to Turkey as claimed.

2. Some of the discrepancies establish concerns for potential splicing of the call

Call no. 2, File: a3-24-22h24-14nov97.wav
November-14-1997, 22:24
Reportedly outgoing conversation from "B" mobile phone 06-51357183 in NL to mobile phone number 0097-250-200000 in Israel.

Observations:

1. The ringing tone is approximately 400Hz with a cadence of on/off=1s/3s. This suits the standard in Israel, the claimed destination of the call. While the country code matches Israel and the area code matches the prefix of the cellular carrier then active in Israel (called "Pelephone"), the cellular number seems invalid. If the call was initiated by the other party we could have potentially explained it as a Caller ID data malfunction, but in this case it is claimed that "B" initiated the call, so the number data came from "B"'s dialing which was available to the tapping system. It therefore remains unexplained why this awkward number was registered as the destination of this call.

2. The background noise level changes sharply in many places, such as at 5:52.74s. This however could potentially be the impact of half-duplex communications, where the side of "B" had a lower noise level.

3. At 0:47.765s there is a major signal discontinuity – the signal and pitch are instable. Then, at 0:48.6s~0:49.42s the signal is garbled and non-continuous. The word "hallo" is followed by a syllable "yie" which is chopped and out of context. This could be an indication of splicing or manipulation.

4. At 1:29.887s there is an unexplained click noise

5. At 1:30.35s there is a strong interference

6. At 2:13.05s there is a major signal discontinuity: the background noise level changes abruptly and the speech seems to be garbled and un-intelligible. The speech cannot be understood.

7. At 2:13.05s the other party's signal level increases abruptly by about 6dB until about 2:18.4s where it slides back to the previous level. The spectral characteristics of the speech also change during this period. At the same time the noise level also changes, implying that the increase in signal level is not a result of the other party raising his voice. This could be an indicator of splicing, unless the recording level or the playback level were changed during this time. However, due to the garbling of the speech at 2:13.05s and the change in signal characteristics the option of change in playback level is unlikely, and signal anomaly would be a more reasonable option.

8. At 2:23.777s and until 2:23.981s a part of the signal is missing. This seems like an interference of an unknown source causing the masking of the signal. It sounds to me like the time axis is continuous, i.e. no indication of splicing.

9. At 3:56.647s and 3:56.925s there are audible clicks. Between them the background noise level is decreased. The speech is cut, and speech on both sides of the gap does not connect smoothly. The pitch is different before and after the gap. It seems that the time axis is not continuous. This could be an indication of splicing.

10. At 6:46.54s there is a major signal discontinuity – the signal fades out nearly to zero, and then the pitch is inconsistent and some part of the speech is clearly missing or garbled. This could be an indication of splicing or manipulation.

11. At 10:03.159s and 10:03.57s there are clicks which, unlike the previously mentioned clicks do not present a change in background noise level or any speech cutoff.

12. At 12:34.012s there is a click with sudden fade out. The speech is not continuous before and after the fade. This could be an indication of splicing.

13. At 13:25.47s to 13:26.52s the other party's speech is cut. Although this is not a regular pattern in this call, this could be due to half duplex communications.

14. At 13:40.37 the recording is terminated abruptly in a most un-natural way. "B"'s speech prior to termination of the call sounds un-natural and un-intelligible. "B" is cut while speaking although as the calling party he could decide when the call is terminated. It is very unlikely that this is the natural end of the call. It seems either the recording was terminated un-naturally, or that the end of the call was tampered with.

15. From approximately 10:30 minutes the other party says "and all, all you need is to locate (...?) him and make him call, that's all?" and "B" answers "that's all, that's all, yeh, that's all".
    At the time point 10:36.703s , in the middle of the third time "B" says "that's all", there is a discrepancy in the signal, sounding as a mild 'click' sound.

Conclusions:

1. The destination number is unlikely a real Israeli cell-phone number, hence the call data is unreliable. Since there is no CLIP data available it cannot be verified.

2. This call shows many discrepancies and anomalies with respect to signal continuity, noises, pitch curve, etc. Some of these discrepancies are major, and create grave reservations for signal manipulation and splicing.

3. Clearly, some segments of the speech are non-continuous, and could be spliced from separate speech segments.

4. The call is terminated un-naturally, in a way that is un-reasonable especially given the caller allegedly hung up while he was talking.

Call no. 3, File: a1-1-kant-2-b-3281-tijd1.31-1.33-gesprek-17h16-9nov97.wav
November-9-1997, 17:16
Reportedly incoming conversation to "B"'s mobile phone 06-55382210 in NL, from an unknown source.

Observations:

1. This is an analog recording. The proper calculated sampling rate based on the recorded time stamp is 5430Hz.

2. The ringing tone is 421Hz and has a cadence of on/off = 0.6s / >3s. According to the international inter-switch protocol dominant in 90's the ringing tone is generated by the switch closest to the destination. In this case, we would expect the frequency and cadence to match the standard of NL which is 425Hz 1s/4s. However, the ringing cadence does no match NL. It could therefore be argued that the call was not made to a NL telephone network. Either the call was made to a different destination, or the ringing segment was spliced to the rest of the recording, or the first "on" segment was cut to 0.6s for an unknown reason.

3. There is no CLIP signal present before or during the rings, which could have indicated the source of the call. Please notice my detailed discussion of this point above.

4. There is crosstalk present in various locations along the call, such as 1:19.749. The presence of crosstalk implies an analog system, since crosstalk would not be expected in a digital telephone networks. However, to the best of my knowledge, in 1997 all the NL telephone network was already completely digital. This may indicate that the call was made from a country where some of the network was still analog (and had crosstalk leakage into this call), or the call was actually performed before 1997.

5. When "B" answers the call there is a short tone of 1894Hz and 0.184s length. That tone is connected to the pickup pulse. According to my inquiry, this tone has no meaning associated with telecom signaling. It could be the result of an acoustic feedback created in some cheap landline telephone models when lifting off the handset from its cradle. This would not be seen with a cellular phone that "picks up" the phone electronically and therefore has soft, noiseless switching. This does not match the claimed distance of the call being "B"'s mobile phone.

6. At the beginning of the call "B" says "hallo" and the signal has a strong echo, but this echo then disappears abruptly when he speaks again. There is no sign of adaptive convergence of an echo cancelling algorithm. On the other hand, there are two clicks right after the "hallo". This could imply splicing.

7. During most of the recording "B"'s voice is heavily distorted. However, at 1:14.383 there is a short extraneous harmonic sound of an unknown nature, followed by a segment of speech signal with different spectral characteristics and sound color, and nearly no distortion. This segment ends around 1:19.686. Then, there is a slight change in the background noise signal and a start of some cross talk signal (which is not heard before).
   If the translation of "B"'s speech does not show that he was talking during this time to someone else away from the telephone (and then still the

harmonic sound at 1:14.383 remains un-explained), this could be a spliced segment.

8. At time 2:08.03 the call is hung up, followed by a busy tone signal marking the call termination, as discussed in detail at the top of this report. It should, however, be notified that the busy tone demonstrates an AGC pattern which was not seen anywhere else in the call, nor in other calls. This is unusual, and I cannot find any explanation to that.

9. Many clicks are scattered along the recording.
   Strong click at 1:40.828, the voice of "B" changes its color before and after the click (for the same word: "he?").
   Very strong click with discontinuous bias at 1:45.50 having a strong low-frequency contents well below 300Hz, which indicates that the click was not present on the frequency-limited telephone line but was introduced later.
   Another adjacent pair of clicks at 1:46.294 and 1:46.450 without any speech between them, implying signal discrepancy and potential splicing.
   A click on 1:44.417 followed by exceptionally low SNR and an abrupt signal ramp up at 1:44.478, imply signal discrepancy and possible splicing.
   Additional clicks measured at:
   1:06.948 click
   1:12.424, followed by 1:12.583 click pair
   1:13.096 a click with 4 sub-clicks in a raw having similar characteristics
   1:18.136, followed by 1:18.292 click pair
   1:23.767, followed by 1:23.297 click pair
   1:24.310 click
   1:25.308 click with mechanical nature
   1:29.33 - a series of dense clicks, sounds like electro-mechanical switch
   1:29.556, followed by 1:29.628 click pair
   1:30.477 click
   1:31.080, followed by 1:31.182 followed by 1:31.256 triple click
   1:34.202 click
   1:35.032, followed by 1:35.188 click pair

10. The signal-to-noise (SNR) occasionally exceed 52dB (including the noise of the analog recording and the tape duplication and sampling), which seems to be somewhat too good for a GSM phone line

11. There are abrupt changes in the characteristics of the background noise – including both crosstalk and level of background noise – such as from 1:48.079 to 1:48.882

Conclusions:

1. This call shows many discrepancies and anomalies with respect to standard telecom signaling, date of recording, SNR, etc. Some of these discrepancies are major, and create grave reservations for signal manipulation.

2. Some segments of the speech are non-continuous, and could have been spliced from separate speech segments.

3. The recording has many irregular noises like clicks, bias changes, out-of-

band signals. Some of the clicks come in pairs located before and after a non-speech period. We would not expect to find such noises in a regular telephone call.

4. Some findings doubt whether the call destination was indeed a Dutch telephone and the date of recording was 1997. Furthermore, there is a reason to argue that this call was made to a landline phone rather than a mobile phone.

5. The beginning of the call and the end of the call show specific inconsistencies, and pose concerns that these specific parts have been tampered with.

Call no. 4, File: a1-3-kant-1-b-3285-tijd3.09-3.17-gesprek-21h59-9nov97.wav
November-9-1997, 21:59
Reportedly outgoing conversation from "B"'s mobile phone 06-51357183 in NL, presumably to London.

Observations:

1. The proper sampling rate based on the recorded time stamp is 5414Hz.

2. The ringing cadence is: 0.8s on, 0.2s off, 0.4s on, 1.98s off, 0.4s on, 0.2s off, 0.4s on, 1.98s off. The ringing includes DTMF frequencies. This matches the ringing signaling standard in the UK.

3. The call's termination is followed by a busy tone signal, as discussed in detail at the top of this report.

4. At 6:51.604, just prior to the end of the call, there is a click, followed by a sudden drop in noise background level, and another click at 6:51.719, followed by a short segment of speech which seems to be out of context. Then, at 6:52.210 there is a series of 5 adjacent clicks, then followed by a ramping up signal of unidentified nature from 6:52.521. This signal is cut sharply at 6:52.714, and is followed immediately by the busy tone that marks the end of the call.
   This sequence of events at the end of the call is abnormal, and does not seem to be a regular call termination pattern, neither from speech contents nor from signaling point of view. A correlation with the translation could further strengthen this point.

5. Typically, the busy tone starts after some delay from the end of call. The actual line disconnection would typically be identified by a click (for mechanical hangup) or sudden decrease in background noise (for electronic hangup, like in cellular phones). Typically there is some delay from the time the call ends until one of the parties first hangs up. Then it would take some time until the telephone network responds to the hangup event. In our case, the busy tone starts while the speech is still active (and the call audio stops in the middle of a ramp up signal). This again marks an abnormal and unrealistic call termination signal.

6. I have pointed out additional locations of irregularities throughout the call:

1:39.818 - the voice of the distant side bursts in abnormally, irregular volume and ramp-up characteristics

1:58.212 – a strong click just before the start of speech, with sharp change in background noise intensity

2:02.737 – sudden change in background noise level and color.

2:53.575 – sudden change in background noise level and color

3:21.332 click, then at 3:22.563 followed by a sudden increase in the distant caller's speech level, with a change also in voice color. At the same time, decrease in "B"'s voice level. It could be correlated with the transcription of the call to see if the sudden change in speech characteristics are supported by the speech contents.

3:41.251 to 3:42.175 abnormal speech segment, sounds like repetition or fading with a "vocoder" (robotic sound) effect. This could be the result of an interference which caused some lost data to be artificially restored at the cellular base station connected to the interfered telephone (if indeed a mobile phone).

3:44.382 to 3:47.010 completely abnormal speech segment, speech garbled for both sides of the call (which eliminates the possibility of mobile interference that is very unlikely to occur on both sides of the call simultaneously!). The noise level is unstable, and changes abruptly on 3:45.931. Then some background voices also suddenly appear in the background. On 3:46.723 there is another speech segment which sounds un-naturally cut, with abnormal ramp-up and ramp-down dynamics. Unless the physical tape is damaged at this point, this could be the footprint of rough manipulation

4:06.921 strong click

4:08.957 – sudden change of pitch and voice level during a long and stable vowel of "B". This would not be found in normal speech patterns.

4:55.990 to 4:57.165 distorted speech, musical effect (vocoder)

5:11.453 a strong background conversation is introduced, which then completely disappears after 5:16.078, where a signal distortion appears with abrupt change in the pitch pattern.

5:30.937 to 5:31.847, "B" says "ehhhh" which should be a stable and smooth vowel, but the recording sounds as if it is composed of three different segments like "eh—e—e". Furthermore, the background noise level and color change in the middle of this segment at 5:31.418, and is significantly higher after it.

6:04.248 the noise level increases abruptly. The increased noise spectrum has a flat band under 350Hz (where it should have been reduced substantially under 350Hz) down to around 60Hz, which would be impossible for a noise intercepted from a telephone line.

Conclusions:

1. The call has many types of anomalies including sudden changes in speaker's pitch and color, un-natural speech patterns such as sudden termination or sudden ramp-up of speech, sudden changes in background noise level and color, sudden introduction and disappearance of background voices, un-explained clicks and distortions in the middle and between speech segments, as well as some very un-natural artificial speech effects like "robotic" speech and repeated segments.

2. Furthermore, the call termination is abnormal, and creates a concern that the call consists of more than a single call.

3. Even without having access to the transcribed contents of the call and correlating it with the un-natural patterns demonstrated in the call, the above findings put a question mark over the reliability of this call. The number of findings, their nature and diversity put a heavy concern whether the call was not "cooked" by splicing segments from more than one (and possibly more than two) calls, while overlaying the splicing points (to blur the gluing

points) and possibly adding some artificial noise to cover splicing marks.

Call no. 5, File: a1-4-kant-1-b-3285-tijd3.17-4.03-gesprek-22h53-9nov97.wav
November-9-1997, 22:53
Reportedly outgoing conversation from "B"'s mobile phone 06-51357183 in NL, probably to Turkey.

Observations:

1. The proper sampling rate based on the recorded time stamp at the end of the call is 5472Hz. However, due to the length of the call and the fact it was recorded on a magnetic tape recorder it is possible that the speed of the tape at the beginning of the call was different than at the end of the call.
   The time stamp at the beginning of the call has only one "beep", and hence does not allow calibration of the speed by measuring the 10s gap between beeps. Instead, we compare the tone frequency of the beep between the time stamp at the end of the call and the time stamp at the beginning of the call. This is important to calculate the frequency ad cadence of the ringing signal. Based on sampling rate of 5472Hz at the end of the call, the time stamp at the end has a tone frequency of 793Hz. Based on the same sampling rate, the time stamp at the beginning has a tone frequency of 798.8. We should therefore compensate our measurements at the beginning of the call by a factor of 1/1.0073.

2. The ringing signal has a frequency of 438Hz (resembling 440Hz) with cadence of 1.67s / 3.23s. This cadence is very rare and special.
   The ringing signal in Turkey, the claimed target of the call, is 450Hz and 2s / 4s.
   The ringing signal in the NL, the originator of the call is 425Hz, 1s / 4s.
   The call was therefore not made to Turkey, or hypothetically the call is very old, before Turkey adopted its ringing standard. I could not find traces to specific time in the past in which Turkey had different ringing standard.
   The countries which use similar ringing standard are Republic of Benin, Burkina Faso, Cameroon, Chad, French Polynesia, Gabon, Madagascar, New Caledonia, Niger and Rwanda. All of them use 440Hz with cadence of 1.7s / 3.3s.

3. At 3:33.368 a sound similar to "nord" is repeated twice, with irregular pitch pattern and abnormal signal pattern. This looks like un-normal speech segment, possibly a splicing of two separate signals.

4. From 3:35.320 to 3:36.885 there is some click noise and background speech.

5. At 4:08.794 "B" finishes saying "ehhh", but there is a sudden increase in pitch followed by an abrupt cut of the speech signal. This looks like the speech was cut in the middle of a word, where some part was erased.

6. At 4:12.612 there is a click, followed by a change in the pitch that is so dramatic that a "Donald Duck" effect can be heard. The voice sounds very un-natural, not human.

7. At 4:43.706 there is a strong click, and is followed by a segment of speech that has completely different color than any other speech segment around the same time. It sounds almost as a different speaker. This speech segment does not look belonging to this call.

8. At 4:54.934 there are three consecutive clicks sounding like lips smacking noise. This is followed by a change in background noise.

9. At 5:09.778 there is another click that sounds like lips smacking.

10. From 5:13.588 to 5:14.071 there is crosstalk heard in the background.

11. At 5:42.978 to 5:43.081 there is a very short speech segment that is out of any context or other speech pattern, since nobody speaks in that time or any time close to that. This clearly looks like a sliced piece of speech signal cut from another location. Immediately after this sliced segment at 5:43.147 there is again a lips smacking sound followed by some other low frequency noise in series.

12. At 5:43.708 the other party starts speaking, but he is heard twice, with some delay between the first and second repetition. Furthermore, the first and second signals have different pitch, so this clearly could not an echo.

13. At 6:39.748 "B"'s speech stops, and starts again at 6:39.827. The gap seems to be too short and the speech dynamics is abnormal. The noise at this gap goes almost to zero. This awkward gap looks like a connection point of two separate speech recordings.

14. At 7:20.624 there is again the lips smack noise.

15. At 7:32.909 a series of strong clicks. It could be just air puff or some crosstalk of a switching signal.

16. At 9:38.516 a segment of speech starts where both parties speak at the same time. Throughout this speech segment the background noise level gets considerably lower, yet gradually. This gradual decrease continues further for the next 20 seconds. A gradual change in background noise (such as the one we observe here) could imply that one of the parties is in movement, such as driving. A translator should be consulted for this time period to examine any anomalies in speech content.

17. At 9:54.732 there is a sudden increase in background noise level. Shortly after this increase both parties start speaking at the same time, and then the background noise returns to its previous lower value. The noise increase does not look like an AGC pattern, and there are no AGC patterns I could notice.Of course, when the two parties speak at the same time the noise level should remain the same as for one speaker. Therefore, this is a potential trace of splicing point, where the splicing was performed by 'soft switching', i.e. overlaying two speech segments instead of switching from one part to another. The increase in noise marks the point where the two parts were summarized.

18. At 10:57.216 there is a sudden increase in background noise level. Again, shortly after this increase in background noise both parties speak at the same time and then the noise level is back to its previous level, for a long time. The noise increase does not look like an AGC pattern. It is therefore a potential reminder of splicing point, like the previous one.

19. At 12:00.403 there is a click. Shortly after that, at 12:01.330 there is a short "swoosh" noise. This could have different reasons and I cannot point a specific one.

20. At 12:10.282 there is a sudden increase in background noise. Immediately after that, that other party starts speaking, but with what sounds like awkward stuttering, or some unintelligible out-of-context speech segment. A translator could help in assessing whether this is stuttering or random meaningless speech segment. However, for sure, such stuttering is very untypical to this speaker over this call, and it sounds strange even for stuttering.

21. From 13:07.239 to 13:08.044 the background noise abruptly changes its color a few times. This is unnatural for a real noise pattern.

22. At 13:13.727 speech starts abruptly with no ramp up, in a way that sounds to me unnatural.

23. From 13:41.928 to 13:42.102 and from 13:43 to 13:43.3 there is a burst of wideband background noise of an unknown nature. This could be an RF interference.

24. At 14:24.636 there is a click noise followed by a transient in the bias. This occurs in the middle of a silence interval, and has no obvious reason I could point to.

25. From 14:43.73 to 14:45.197 there is a silence period where the background noise is unstable and changes abruptly a few times.

26. From 25:03.49 to 15:03.638 there is again the "swoosh" wideband background noise.

27. At 15:58.676 ends a speech segment where both parties speak together. Then there is a series of clicks: a click is heard at 15:59.135 followed by a "swoosh" noise at 15:59.305. A click with mechanical nature is heard at 16:00.245. Then from 16:00.385 there are four clicks with a fixed distance of about 0.154s apart. They sound to me like a mechanical disturbance or RF interference. Then there is another click noise at 16:01.152.
Both parties say "hallo" after this sequence.

28. A click is heard at 16:12.032.

29. At 16:51.637 a word spoken by "B" finishes with the syllable "et". Then just this syllable is repeated twice: "...et...et..." with a very low pitch and artificial rhythm. This already sounds neither like "B" nor like the other party. It is quite obvious that these two segments do not belong to the call.

30. The other party then says "Uh... Ehhh..." and then there is a "swoosh" noise heard while the person does not speak, at 16:54.028, followed by another "swoosh" noise at 16:55.027. These noises could be explained by RF interference, but it remained unexplained how come the noise starts and stops exactly when the other person stops speaking.

31. At 17:36.19 there is a small click. There is another small and similar click at 17:54.11.

32. Another "swoosh" noise exists at 18:26.51 there is another "swoosh" noise.Right after that, at 18:28.0 there is a click noise. Again, there is no explanation why the two noises are at the beginning and ending of a silence segment.

33. Another click is located at 18:28.27, and provides two click boundaries to the word, before and after the word.

34. At 18:44.14 there is another tiny click. After the following phrase, another click is located at the end of the phrase at 18:46.11 and another click at 18:46.17. The last click is followed by an increase in background noise that does not match the pattern of background noise demonstrated elsewhere in the file. I could not determine positively if this background noise is the line noise or a breathing sound. However, after this click the two parties start speaking together, as was demonstrated before in places where certain peculiarities were observed.

35. At 18:49.20 a "swoosh" noise is heard.

36. At 18:58.01 there is a pitch inconsistency and signal discontinuity which sound as a click.

37. At 19:02.17 there is a strong click.

38. From 19:14.06 to 19:14.17 there is a "swoosh" background noise.

39. From 19:15.10 to 19:15.16 there is a "swoosh" background noise.

40. At 19:34.11 there is a sudden increase in background noise. Immediately following this the two parties start speaking together.

41. From 20:39.01 to 20:39.08 there is an cross-fade of "B"s voice with itself. It sounds like there are two people having "B"'s voice that are talking on top of each other. I have no explanation for this cross-fade other than splicing blurred by cross-fade.

42. The phrase spoken by "B" from 20:47.10 to 20:51.23 includes three interferences that introduce a "vocoder" artifact, i.e. a robotic sound. I could not notice a missing part of speech or another abnormal effect, hence I deduct this is a genuine interference.

43. At 21:02.13 and 21:02.22 there is a pair of clicks.

44. At 2:18.23 during a silence period there is a "swoosh" noise followed immediately by a click at 21:19.09.

45. At 21:30.03 until 21:31.26 there are a series of "swoosh" noises, sounding like an RF interference.

46. From 21:49.24 to 21:50.05 there is a speech segment which sound completely out of context as well as un-natural. The pitch sounds artificial, the spoken contents is unclear and the voice sounds like not belonging to any of the speakers. The volume is also very different than the volume of the speakers.

47. At 21:57.29 the other party stops speaking and at 21:58.03 he starts again. However, during this short time the speaker's pitch period has been raise very sharply, from 139Hz to 319Hz (!). Not only a pitch of 319Hz would be exceptionally high for this speaker, it is unrealistic that a speaker would make such a sharp change in pitch in the normal course of speech. Again, this could be an indication of splicing or manipulation.

48. At 22:11.207 and 22:12.322 there is a pair of "swoosh" noises.

49. At 22:51.108 and 22:51.180 there is a pair of clicks. Following the next spoken confirmation "heh", there is another click at 22:52.277. Then another pair of clicks follows the next phrase at 22:54.671 and 22:54.744.

50. From 22:57.318 to 22:59.390 somebody is speaking which is not the other party, but it also sounds very different than "B"'s voice, especially compared to the 'neighboring' speech of "B" at 22:51.532 and 23.04.10. Who is talking here?

51. The speech segment at 23:08.597 to 23:09.649 is garbled. It does not sound to me like normal continuous speech. A translator could further stress this point in view of the content of this segment. Furthermore, the background noise level before this segment and after the end of this phrase (from 23:10.35) is different. And, after the segment with increased noise, there is (again) a segment of mixed speech of both parties, as we already met before. The increased noise returns shortly after that to normal level.

52. At 23:26.633, exactly at the end of a speech segment, a strong hum noise appears with frequency of 50Hz. This noise disappears at 23:31.216, again just at the end of a phrase. Such noise is not passed through a telephone line, and was therefore generated either in the recording or during the playback and duplication process. The questions are: (a) how did this hum noise enter the recording? (b) why does it start and stop in the middle of this recording? Could it be an indication that the segment with the hum was spliced into the call? (c) how come is starts and stops right on the edge of a recorded prompt?

53. The hum noise appears again at 23:41.838, at the end of a word, and disappears again at 23:46.789.

54. The hum noise appears again at 23:57.183 and disappears again at approx. 24:02.621.

55. The hum noise appears again at 24:27.801 and disappears again at 24:33.462.

56. Following this phrase there is a "swoosh" noise at 24:33.750, then "B" says "mmm" and then there is a click at 24:34.554 followed by a "swoosh" noise at 24:34.742.

57. At 24:38.343 the other party's speech is cut in the middle and "B"'s voice barges in. This sounds quite awkward and unrealistic. The line has full-duplex characteristics, so the switching is not due to switching from one party to another.

58. At 24:55.982 the background noise increases. Shortly thereafter, the two speakers are heard talking simultaneously.

59. At 25:15.702 the background noise increases and after "B" says "eh" there is a click at 25:16.338.

60. A click appears at 25:27.632. Following, hum noise appears at 25:28.441 and ending at approx. 25:33.535.

61. A click appears at 26:33.877.

62. A pair of clicks appear at 29:19.792 and 29:20.093.

63. At 31:32.261 and 31:33.506 there is a pair of "swoosh" noises.

64. At 31:58.821 there is a click and the background noise level decreases.

65. Between 33:08.800 and 33:11.169 there is a long silence period. The background noise changes its level and color abruptly four times during this period.

66. The speech segment from 33:27.802 to 33:28.334 has an irregular pitch, and sounds to me out-of-context and abnormal. A translator should further assess if this speech segment sounds natural in the spoken language and in view of the spoken contents.

67. At 33:39.802 there is a click.

68. From 33:50.107 to 33:50.248 there are three very strong clicks which were not demonstrated before in this file. Their nature is unknown.

69. From 35:25.721 to 35:25.883 there is a noise which masked the audio link. A translator should judge if the spoken contents is continuous and no part is missing also considering the noisy period.

70. At 35:33.237 to 35:33.490 "B" is saying "pis". Then at 35:33.490 there is a click and "B" is heard repeating this part "pis", this time connected to the next of the phrase. The transition from the first pronunciation of "pis" to the second pronunciation seems to me to be un-natural and forced. A translator could apply better judgment to this point

71. At 35:54.854 there is a click and a speech segment is heard. This segment is out-of-context, its beginning is cut, and its pitch, volume and color are different from the connected preceding phrase. Furthermore, the articulated syllables sound like the preceding syllables, but have different intonation pattern, so this is not a plain repetition of syllables. It is a spliced part of speech which has the same contents as the preceding speech segment.

72. From 36:40.511 to 36:42.437 there is a silence period. However, in the middle of the silence, at 36:41.026, the color of the background noise changes. Then, the speakers do not sound the same before and after the silence period. For example, compare "B" voice before the silence at 36:38.312 and his voice after the silence at 36:44.632 which sounds louder,

more excited and having substantially higher pitch. These two parts before and after the silence could belong to different calls.

73. The speech segment from 37:51.418 to 37:51.822 has an exceptionally low pitch to a level it does not sound natural human voice. This sounds like a manipulated speech syllable.

74. At 38:23.034 the background noise increases, where it sounds like wind noise or an aircraft takeoff. This noise changes slowly throughout the rest of the file

75. At 40:33.595 and 40:33.815 there is a pair of clicks.

76. At 4:45.423 the background noise increases abruptly, then at 41:45.686 "B" confirms saying "mmm.." and then the noise decreases again. This points out that the speech segment could have been spliced here.

77. A series of three clicks at 42:55.497, 42:55.581 and 42:55.664

78. The speech from 44:19.054 to approx. 44:19.473 sounds out of context. A translator might be capable of judging it better.

79. At 44:25.255 the call is terminated prematurely in the middle of a speech segment. Unlike other calls, there is no busy tone, which poses the question what caused the talking time stamp to be switched in. This call termination is abnormal.

Conclusions:

1. The number of abnormal observations in this call, their type and diversity speaks for itself.

2. Even when ignoring all the unexplained click noises and "swoosh" noises, and after considering the length of the call, the number of peculiarities is remarkably high. From my point of view, some of them have unquestionable meaning as to the call being a manipulated voice track cooked from speech fragments taken from different sources.

3. Some of the observations are so exceptional and obvious that the conclusion as to the authenticity of the call is essentially inevitable.

4. The call termination is abnormal from both speech content and termination sequence perspectives

5. Based on the ringing pattern, the call was either made to another country (and not Turkey) or it consists of an old recording, or it was artificially spliced into the call

Call no. 6, File: a1-5-kant-2-b-3281-tijd1.49-1.57-gesprek-11h51-10nov97.wav
November-10-1997, 11:51
Incoming conversation to "B"'s mobile phone 06-55382210 in NL, unknown source.

Observations:

1. The proper sampling rate based on the recorded time stamp is 5427Hz.

2. The ringing signal consists of tones at 421Hz with cadence of 0.6s on and >3s off. The frequency resembles the NL ringing cadence, being 425Hz, but the cadence in the NL is 1s / 4s, and here the 'on' time was just 0.6s. The call was answered after just one ring. It could therefore be argued that the call was not made to a NL telephone network. Either the call was made to a different destination, or the ringing segment was spliced to the rest of the recording, or the first "on" segment was cut to 0.6s for an unknown reason.

3. There is no CLIP signal present before or during the rings. Please notice my detailed discussion of this point at the beginning of the report.

4. The speech of "B" has strong echo throughout the call.

5. The call has a high SNR, sometimes exceeding 56dB. At certain points throughout the call the noise level nears zero (despite the playback and duplication of the material, and the background noise of the original recording). This would be a slightly too good SNR for a cellular GSM call.

6. At 1:05.805 the speech of "B" is cut abnormally in the middle of a word. There is no sign of interference causing this cut.

7. At 1:45.809 there is a sudden and unnatural increase in background noise by more than 0dB. This strong background noise then ramps down gradually and at about 1:47.5 is goes back to the previous level.

8. At 1:50.026 and 1:50:965 there are clicks. Between these clicks there is a garbled speech segment which sounds like an overlay of spliced segments that have partial speech data.

9. From 1:52.280 there is a series of clicks, followed by "B" saying some garbled speech segment and the from 1:53:531 there is a short, out of context segment of the caller's voice saying something like "taa". This again sounds like an overlay of several segments.

10. At 1:55.472 the caller is saying something that starts with the sound "kh", but the sound appears twice, as if the caller was stuttering.

11. At 2:02.808 the noise level increases abruptly, followed by a pair of clicks at 2:03.078 and 2:03.203.

12. At 2:05.016 there is a garbled and out-of-context speech segment which has irregular pitch contour and ends at 2:06.051.

13. At 2:37.526 there is some noise (like a swoosh noise, not a click), and then "B" says "hallo" without any specific cause. Furthermore, the caller continues to speak freely but "B" says "hallo" again. This sounds as if the two parties

are not on the same call. The pattern is strange and seems out of context. It should be judged with respect to the transcribed contents of the call.

14. From about 2:38.274 the caller says a word that sounds to me like "azaana". The word is repeated twice. The rhythm and pitch pattern of the two repetitions sound to me robotic and unnatural.

15. These two words are then followed by a speech segment from 2:38.993 to 2:39.261. Although I do not know which language is spoken, this segment sounds to me out of context. It should be reviewed with respect to the transcribed contents of the call.

16. At 2:39.693 there is cross talk in the background, implying the call was at least partially transferred over an analog network. Since the calling location is unknown, either the call was originated from a location where the telephone network has not been upgraded to digital (probably outside of Europe), or the call was recorded before 1997.
Notice that the crosstalk signal and rotary switch noises do not show up at the first part of the call, before "B" says "hallo". This implies that the part before the "hallo" could potentially be a different call, with respect to the previous points discussed.

17. At 2:41.631 a segment of the caller's speech starts abnormally, without a natural ramp up. This sounds like the speech is chopped. The segment continues until around 2:42.35 with a speech rhythm that sounds abnormal.

18. At around 2:44 there is rotary switching noise in the background which again implies an analog line.

19. At 3:34.718 there is a click noise.

20. At 3:49.691 there is a click noise.

21. At 3:50.769 there is a click noise.

22. At 3:53.796 there is inconsistent pitch, which sounds like a connection of two speech segment having different pitch. The pitch is inconsistent again at 3:53.865.

23. At 3:58.467 the signal has some interference.

24. The speech segment from 4:11.755 to 4:13.469 has a metallic coding effect and a sound color different than the rest of the signal. I cannot see why the color of the signal coding effect would change in the middle of the call.

25. At 4:33.637 there is a "swoosh" noise, but "B"s voice is heard in the background. Still it is not a complete word, just a partial speech segment. Immediately after that, at 4:34.478 there is another "swoosh" noise, this time the caller's voice is heard in the background, also articulating some partial and virtually meaningless speech segment. These noises are isolated from other speech segments, and are therefore out of any context. I cannot explain the nature of the noises except splicing that was blurred using artificial noise.

26. At 4:36.22 there is a click noise.

27. 6:46.267 crosstalk with some digital transmission, sounds like a modem.

28. At 7:20.025 the call is terminated abnormally in the middle of a word while "B" is talking. Usually there is then a busy tone marking the termination of the call and consisting of several cycles with cadence of 0.25/0.25. In this case, the busy signal is extremely short, and does not even have a single "on" segment of 0.25s. This is awkward, since how did the system identify the termination signal and activate the time stamp recording?
It seems possible that there is a missing part of the call, from the time the speech is cut and until the end of the call including some part of the termination busy tone.

Conclusions:

1. This call shows many discrepancies and anomalies. The call termination is abnormal, and creates a concern that the recording possibly consists of more than a single call.

2. Furthermore, the call has many anomalies including sudden changes in speaker's pitch and color, un-natural speech patterns such as sudden termination or sudden ramp-up of speech, sudden changes in background noise level and color, un-explained clicks and distortions in the middle and between speech segments, as well as some very un-natural artificial speech effects like "robotic" speech and repeated segments.

3. The "hallo" pattern in the middle of the call and the appearance of crosstalk noise only after this point marks this point as a possible connection between two separate calls.

4. Even without having access to the transcribed contents of the call and correlating it with the un-natural patterns demonstrated in the call, the above findings put a question mark over the authenticity of this call. The number of findings, their nature and diversity makes it realistic that the call was actually "cooked" by splicing segments from more than one (and possibly more than two) calls, by overlaying the splicing ends and occasionally adding some artificial noise to blur the splicing points.

Call no. 7, File: kant-1-a-3285-tijd0.45-9.45-gesprek-20h45-5okt97.wav
October-5-1997, 20:45
Several Call Setups with "B"'s mobile phone 06-51357183. Start of tape.

Observations:

1. For this file I did not receive the raw playback recording. Therefore, please refer to the introduction to this report for the implications of analyzing the material after the processing of the Dutch lab. As a consequence, I did not refer to the spectral contents of this recording. I further assumed that the change in sampling rate was performed correctly, so the time scale for 44.KHz sampling rate has been preserved.

2. The file starts with an unanswered call following "B"'s dialing, made to an unknown country. I assess the automatic answering has some German / Austrian / Swiss accent. The ringing tone has a frequency of approx. 440Hz and cadence of approx. 1s / 3s. I could not find a country with such a ringing cadence. This cadence could be the result of the processing by Pro Tools.

3. The call termination is normal, and the following time stamp is complete.

4. At 1:46.421 there is a click followed by a call termination signal. It seems that "B" dialed a number and hung up.

5. At 2:04.489 another recording starts, and terminates without any significant signal.

6. At 2:42.801 another recording starts, and terminates after 12 rings without being answered. The ringing signal has a frequency of approx. 440Hz and a cadence of 1.67 / 3.2. This suits some countries with ringing of 440Hz 1.7/3.3, such as Republic of Benin. Burkina Faso, Republic of Cameroon, Republic of Chad, French Polynesia, Gabonese Republic, Madegascar, New Caledonia, Niger and Rwanda. Notice again, the ringing signal may have been distorted by the Pro Tools processing.

7. At 4:29.283 another recording starts, and terminates without any significant signal.

8. At 4:48.951 another recording starts. The call was unanswered. The call termination is normal with complete time stamp.

9. At 5:37.407 another recording starts. The ringing signal is distorted and incomplete. It is impossible to decode the destination of the call by the ringing signal. This call was answered.

10. At 6:01.457 the distant party says "hello". The pitch is very low and abnormal. At 6:02.188 there is another "hello". This time the pitch frequency is very high and abnormal. At 6:04.053 there is again another "hello" with unrealistically high pitch.
    These voices were clearly changed, although it could be a result of the ProTools manipulation. I would need to see the raw signal before it was processed by ProTools to see if this abnormal pitch is present also in the original recording.

11. From 6:06.935 to 6:07.055 there is a short speech segment which seems to be out of context, and have a different amplitude than the rest of the speech. This speech fragment should be inspected against the transcription to identify if it has a meaning. Otherwise it could point out to potential splicing.

12. At 6:20.177 there is a fast series of clicks which sound like switching noise of an analog exchange or rotary switch. This would not be possible in the NL in 1997, so either the call is older or the other party was located in a country which still used analog telephone network.

13. At 7:08.508 a period of silence starts. At 7:12.055 "B" says "hallo". There is a shadow of another "hallo" in the background, having a much lower pitch (hence not being an echo of the first "hallo"). This is very unusual, and the only explanation I could find is that the other party was saying "hallo" at the exact same time, and was masked by the half-duplex communication dominated by "B"'s "hallo". It Should be inspected in the raw file before processing by ProTools.

14. At 8:13.530 there is a very strong 'click' sound. The speech signal is discontinuous. Immediately, at 8:13.603 there is yet another click. This could be either a strong interference or a manipulation trace.

15. The call terminates at approx. 8:24.427 by a termination busy tone. However, there is no hangup signal, and there is very short delay from the end of speech to the start of the termination signal. The speech ends at approx. 8:24.3, only about 0.13s before the termination signal starts. This would be unreasonable time to hangup the call.

Conclusions:

1. This file has several unsuccessful calls without any special observation except some peculiar ringing signal in one of the call attempts.

2. There is one call in this file which shows a few discrepancies. Some of these discrepancies could be associated with the ProTools processing, and this could be compared against the raw files which were not available to me.

3. Main findings are several click-pairs with discontinuous speech. This could be a trace of splicing, and should be examined by comparison to the transcription of the call. Another major finding is an un-natural pitch (sometimes too high, sometimes too low). This could be the result of the Pro Tools processing, or some other manipulation of the signal. It is for sure not a normal speech signal.

4. The call termination is too short, and creates a concern that the call was actually dropped or cut in the middle.

5. It is recommended that the raw file is revised before it was processed by ProTools, like I did with the other files.

Call no. 8, File: kant-2-b-3281-tijd3.48-3.52-gesprek-15h24-12nov97.wav
November-12-1997, 15:24
Outgoing conversation from "B"'s mobile phone 06-55382210 to the UK.

Observations:

1. For this file I did not receive the raw playback recording. Therefore, please refer to the introduction to this report for the implications of receiving the material after processing by ProTools. As a consequence, I did not refer to the spectral contents of this recording. I further assumed that the change in sampling rate was performed correctly, so the time scale for 44.KHz sampling rate has been preserved.

2. The last call starts with a ringing tone consisting of DTMF frequencies, and with cadence of 0.4s / 0.2s / 0.4s. This matches the ringing according to the UK standard, being 0.4s on / 0.2s off / 0.4s on / 2.0s off. The call was therefore presumably made to the UK, and this matches the British English dialect spoken by the other party.

3. The call was hung up by both parties at 4:10.333, with a preceding mechanical noise denoting on-hook. A busy tone follows 0.785s later. The time stamp is complete and has several cycles. This sequence demonstrates a normal call termination.

4. The rest of the call does not demonstrate any special findings.

Conclusions:

1. This file does not demonstrate any questionable or suspicious findings.

Report_Oct_09.docAppendix:

Shlomo Peller - Resume

Shlomo Peller received a BSc degree in Electrical Engineering from Tel Aviv University, and an MSc degree in Electrical Engineering from Tel-Aviv University, where he graduated both with honors. He was a Research Assistant and a Teaching Assistant for 5 years with the Department of Electronic Systems in the Engineering Faculty, Tel Aviv University, specializing in digital signal processing and digital speech processing. His MSc dissertation considered improvements of digital speech compression algorithms.

In 1995, Mr. Peller founded Rubidium Ltd. (www.rubidium.com). In his capacity as the company's founder he developed by himself the first generation of the company's proprietary technology, consisting of miniaturized speech recognition and speech compression algorithms and chips. Mr. Peller is heading the Company's R&D, focusing in speech processing chips and software, mostly for telephony and Bluetooth applications.

Mr. Peller's prior experience include management of Digital Signal Processing (DSP) related software and hardware projects in leading Israeli companies such as Teledata Communications and Tadiran Telecom, now part of ECI Telecom (NASDAQ: ECIL).

Mr. Peller also served as a DSP Algorithm Architect with Nexus Telecom (NASDAQ:NXULF), and a member of the founding team of Algotec, a medical imaging startup, now a subsidiary of Kodak.

Prior to that, Mr. Peller served for 4 years in the Israeli Defense Forces, were he was part of an elite R&D team.