

Evidence Submitted to:
The People's Tribunal on Sri Lanka - Dublin, Ireland

Authenticated Video Recording of a Extra-judicial Execution of Unarmed Prisoners



Artist's Rendition of the Execution of Tamil Prisoners by the Sri Lankan Military, July 18, 2009.

Evidence Documented by:



P.O. Box 529, Glen Echo
MD 20812-0529 , USA

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Abbreviations

A9	Major road that passes through the heartland of Tamil homeland
AV	Audio/ Video
AVI	Audio Video Interleave (a video file type)
GoSL	Government of Sri Lanka
HRW	Human Rights Watch
JDS	Journalists for Democracy in Sri Lanka
LTTE	Liberation Tigers of Tamil Eelam
ms	Millisecond (1/1000 th of a second)
MPEG	Motion Picture Expert Group (A video standards group)
SLA	Sri Lankan Army
SLE	Sri Lankan Experts defending SLA's innocence, a 4 member team composed of the following individuals: <ul style="list-style-type: none">- Mr. Siri Hewawitharana (A video expert)- Dr. Chathura Ranjan de Silva (Senior University Lecturer)- Brigadier Prasad Samarasinghe (SLA Head of Signal Corps)- Major P.A. Bandara (SLA Media Centre for National Security)
TAG	Tamils Against Genocide

Key Technical Words

AV-delay	Time delay between a video frame and the corresponding audio
device latency	Time delay due to electronic processing of sound or image
fps	Frames per second
frame interval	Time duration in between two adjacent video frames
<i>massacre.3gp</i>	Name of the file distributed to international community by JDS
meta-data	An embedded data set containing video parameters
.3gp	A video file type - 3 rd Generation Partnership Project

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1. Executive Summary

On August 25, 2009 a UK-based TV station (Channel 4) revealed a video showing summary execution of blindfolded prisoners by two men in Sri Lankan military uniform. The video panned to show 8 bodies of men already executed, and captured the systematic execution of two more men. The 9th victim is executed by one soldier 5 seconds into the video and the 10th victim is executed after 41 seconds by the second soldier. The two men in military uniform spoke casually in Sinhalese, the language of almost 100% of the Sri Lankan armed forces, as they carried out the executions.

The video was delivered to Channel 4 by a German-based exile organization, Journalists for Democracy in Sri Lanka (JDS). JDS is a multiethnic exile organization recently formed by journalists who fled Sri Lanka out to fear for their own life. The release of the video sent shock waves through international human rights groups.

Within 24 hours of the broadcast by Channel 4, the government of Sri Lanka (GoSL) refuted the video, calling it doctored in order to discredit the armed forces of Sri Lanka. Meanwhile, the GoSL moved quickly to secure all videotapes of the war front against the Tamils owned by members of the military.

On August 28, 2009 the UN Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Prof. Philip Alston, called for the immediate establishment of an independent inquiry into the authenticity of a video which purportedly depicts the extrajudicial execution of two men stripped naked with their hands tied behind their back by the Sri Lankan military and the presumed prior execution of others. On August 26, 2009 Human Rights Watch (HRW) issued a press release of its concern regarding the executions.

The summary executions, if proven, violate Common Article 3 to the Four Geneva Conventions of 1949, to which Sri Lanka is a contracting party, that in subsection I(d) prohibit, "... the carrying out of executions without previous judgment pronounced by a regularly constituted court..." Violations of the Geneva Conventions are war crimes according to Professor Francis A. Boyle of the University of Illinois College of Law.

Realizing the gravity of the military execution, the US-based non-profit group Tamils Against Genocide (TAG) authorized Image and Sound Forensics™ (ISF), USA to evaluate the video for its authenticity. After analysis of the video and extensive field testing with real ammunition (an AK-47 with 7.62x39 mm ammo) recorded by an array of different recording devices, ISF concluded that the video recording is authentic. A second company (Firearms & Ballistics), subcontracted by ISF, concluded that the blood flow, blood color, damage to central nervous system and posture of falling victims represented a real event of executions. In the same time period *The Times*, UK, employing an independent forensic expert, declared that the video is indeed authentic, and concluded that the fine details such

as the high speed expansion of gas following a rifle shot and the brain fluid exuding from a victim would be impossible to re-enact.

TAG provides a consolidated report on the military executions captured by the video footage. The report includes background material on digital recording technology, technical analysis, and research findings.

Based on extensive testing and analysis of all this material by multiple independent and expert sources, the authenticity of this videotape capturing a war crime committed by Sinhalese speakers in the uniform of the Sri Lankan armed forces is indisputable.

The authenticity of the video showing the massacre of naked bound, blindfolded Tamil men shot in the back imposes an obligation to those working on upholding justice to ensure that the culpable soldiers and their responsible superiors are brought to justice.

2. Background of the Massacre Video

Background: During the period of Nov. 2008 to May. 2009, the Sri Lankan army (SLA) captured major cities which were under the control of the LTTE. Intense aerial bombing and shelling of the Tamil areas by the Sri Lanka military during these crucial 6 months displaced more than 350,000 Tamil civilians, who have been until recently kept in SLA-supervised internment camps. More than 30,000 Tamil civilians were alleged to have perished during this period, mostly due to heavy shelling by the SLA. All of the top-tier leadership of the LTTE, including several leaders of the LTTE's political section who attempted to surrender were allegedly killed by the SLA during the last stages of the war. According to Sri Lanka Government estimates, 12,000 Tamils have been taken into specially isolated, military-controlled camps as suspected LTTE members. No neutral, independent monitors were allowed into the areas of fighting during or after the war, a deliberate attempt to provide impunity for war crimes and crimes against humanity by the Sri Lankan armed forces. No media or human rights organizations have been allowed access to the prisoners who are still held today.

In this backdrop of hostility, a group of journalists (Journalists for Democracy in Sri Lanka) with professional links to Sri Lanka released a 1 min and 17 second long video in August 2009. The video exposes the extrajudicial killing of prisoners by two men in SLA uniform. The massacre video provides **incontrovertible graphical evidence of extrajudicial execution** of unarmed prisoners by men in SLA uniform.

Link to the video: <http://www.tamilnet.com/img/publish/2009/08/massacrevideo.zip>

The massacre video distributed by JDS captures two specific executions. The first execution occurs 5 seconds into the video and the second execution occurs 41 seconds later. The video device also pans to show 8 other victims who had already been executed. The event likely took place either during the intense fighting period or following the aftermath of the war. Due to the risks involved, the JDS did not reveal the exact source of the original video, but said that JDS was given the footage by a Sri Lanka military officer who was "appalled by the video but did not take part in it."

The Government of Sri Lanka (GoSL) dismissed the video as a fake soon after Channel-4, UK broadcast it. Prof. Philip Alston, UN Rapporteur for Extrajudicial, Summary or Arbitrary Executions, said the video images were "horrendous and, if authentic, would indicate a serious violation of international law" (see Chapter 6). Prof. Alston also said on Sept. 17, 2009 that an impartial and independent investigation of the event is in order. He said, "this video seems to have **most of the characteristics of a genuine article**, and that in itself is sufficient to impose an obligation upon a Government [Sri Lankan] to undertake a sustained, effective, and impartial investigation to ascertain the truth...the images are gravely disturbing. They raise prima facie concerns about significant extra-judicial executions and a full-scale investigation should be undertaken,"

While Human Rights Watch (HRW) could not confirm the video's authenticity [within a day of the Channel-4 broadcast], an independent expert consulted by HRW found nothing in the

video that would dispute its authenticity. HRW said that the summary execution of prisoners is a violation of Common Article 3 of the Geneva Conventions of 1949 and a war crime (see Chapter 7). The GoSL reaction to the accusations has been one of outright denial, centered around technicalities of the massacre video. Not an iota of concern for the possibility that innocents, most likely civilians, had been killed in such terrible circumstances was expressed. Instead, on Sept. 3, 2009 GoSL enforced immediate control over all videotapes pertaining to the war, suspecting that some video tapes could have been smuggled out of Sri Lanka.

An overview of the video is presented for the reader. Video frames that are relevant to grasp the gravity of the incident are shown on this page. The forensic reports presented in Chapters 3-5 will shed more light into the authenticity of the video.

First Execution:



Frame just before the first execution



Frame just after the trigger

The audio of the first execution seen in the video appears a few frames later. Appendices A through D provide a detailed explanation of the time delay associated with this video, an issue raised by the GoSL in its denial.

Second Execution:



Frame just before the second execution



Frame just after the trigger

The audio of the second execution appears with a delay comparable to that of the first execution.

The audio recording further reveals that there were several rifle sounds occurring in the vicinity of this location, potentially implying simultaneous executions in progress.

A few more video frames capture details pertaining to the remaining 8 victims:



Frame-A

Frame-B

Frame-A shows blood pooling near the victims' heads. Note that the soil is fully soaked in water, which may affect the blood color and the rate of the blood's exposure to oxygen. Frame-B shows the only victim among the ten with clothes. Two bullet exit holes in the forehead of the clothed victim are visible in Frame-B.



Frame-C

Frame-D

Frame-C shows the position of the victim from the first execution who initially slumps back after the execution and eventually rolls to the right. Frame-D shows the bullet exiting near the left ear of the victim corresponding to the second execution.

Video Parameters: The original video distributed by JDS to international organizations, *massacre.3gp*, was recorded at an average rate of 7.248 frames per second (as per the meta-data of the file).

The massacre video is 1 minute and 17 seconds long and it contains about 558 distinct video frames. For broadcasting purposes, the 7.248 fps *massacre.3gp* file has been transcoded to 30 fps with various file types, notably AVI and Flash (Appendix D).

The meta-data for the video file distributed by JDS shows a recording date of July 18, 2009, potentially making the executions a post-war event. The JDS, however, said in the original release of the video that it was likely taken sometime in January 2009. They said a cellular phone was used to capture the executions. The exact location of the incident was not disclosed and the GoSL has blocked access to all locations where fighting took place in the last months of the war, which prevents independent investigations to ascertain the location.

TAG is exploring methods that use secondary shadows and geospatial techniques to identify the GPS co-ordinates of the crime location. The results of this analysis will be disclosed to the Tribunal in the near future. Using vegetation, soil coloring and other landmarks, local citizens familiar with the area can readily identify the location. TAG is exploring ways to find access to people with this ground level knowledge.

Analysis of the video file shows that the display had a resolution of 176 x 144 pixels, typical of conventional cell phones on the market. The cell phone brand and model number are, however, not part of the meta-data. Different cell phone models have different parameters, which has complicated the forensic effort. Extensive field testing with a multitude of cell phones is necessary to support the technical analysis required to establish the authenticity of the recorded video. One forensics expert thinks that there is a good likelihood that the video was taken on a Nokia cell phone .

There are specialized companies that are authorized and qualified to provide image and sound forensic and authentication services in the USA. TAG facilitated such an effort to get an unbiased authentication of the video. Chapters 3 and 4 summarize the findings of two private forensic companies.

Recent Photos and Cell phone Recordings by the SLA: The video of naked, bound Tamil prisoners executed by shots to the head from behind in question here is not the only video available of SLA members with recently killed Tamils. There is a vivid correlation between this video and one of Tamil combatants (both male and female) stripped naked by the SLA members and publically paraded in the streets of a major city after having been killed. Even more disturbing is a recent video of SLA members with the half-clothed bodies of female Tamil fighters. Please see Appendix F for selected photos and web-links of recent cell phone recordings by members of the SLA.

About Journalists for Democracy in Sri Lanka (JDS): Journalists for Democracy in Sri Lanka (JDS) is an action group of journalists, writers, and artists in exile who are campaigning for democracy, human rights and media freedom in Sri Lanka. Link: <http://jdsrilanka.blogspot.com/>

3. Authentication by Image and Sound Forensics™ (ISF), USA

The sealed document provided to the The People's Tribunal, Dublin, Ireland contains sworn affidavit and specific information about the company personnel. The sealed information should be kept as confidential information and be kept away from public.



A video frame from massacre.3gp



Preliminary field test by ISF, USA

Report Delivered to TAG by ISF on Date: November 23, 2009

1. The company is Image And Sound Forensics™, Automated Dispatch Systems, Inc., a Colorado Corporation. Mailing address is P.O. Box 490, Parker, Colorado 80134.
2. The ISF company makes these declarations based on the company's knowledge of the facts set forth herein.
3. On September 09, 2009, at 12:08 p.m., ISF received from the organization, Tamils Against Genocide ("Client"), located at, P. O. Box 529, Glen Echo, MD 20812-0529, the video file massacrevideo.3gp, via internet link: <http://www.tamilnet.com/img/publish/2009/08/massacrevideo.zip>. This file was downloaded, and unzipped. The unzipped file name was massacrevideo.3gp and will be referred to as "Video" and as "video" as defined in paragraph 5 below. The header information was examined and is listed in Exhibit A.
4. Client requested that a forensic examination be performed on the Video to assist in determining if the Video can be relied upon as being an accurate representation of events that the Video depicts.

5. For purposes of this report, the term “*Video*” refers to the video recording referenced in paragraph 3 above, however, excluding the frames that were added at the end of the video recording that contain the letter “A” against a red background. The term “*video*” refers to the entire video that includes these frames. The term “video” refers to the general term.
6. References to “Ballistics Report” refer to report issued by Firearms & Ballistics Consultants, dated 19 November 2009.

Final Report Summary of *Video*:

1. No evidence of tampering or editing was discovered with either the video or audio portions of *Video*.
2. The quality of the *Video* is consistent for some, if not most, camera cell phones that were in service during and before the date and times indicated in the *Video*'s header information in Exhibit “A”.
3. At the end of the *video* there are a number of frames that contain only a letter “A” against a red background. There are camera cell phones that do contain video editors. If such an editor was present, then it is possible that these frames were added by the operator.
4. The audio delay with respect to both gun shots' audio compared with each corresponding rifle recoil is consistent for some, if not most, camera cell phones that are capable of video recording.
5. The recorded audio bandwidth of approx. 4kHz is consistent with the audio 8kHz sample rate indicated in Exhibit “A”.
6. The recorded audio does not have artifacts around 60Hz or 50Hz, which would be consistent with the recording being made away from and in an area with a sparse electrical power network.
7. The exaggerated color brightness of the blood pools and blindfolds in the *Video* are recording artifacts that are consistent with some, if not most, camera cell phones.
8. Field testing with selected camera cell phones of similar audio and video qualities, that were in use prior to 18 July 2009 (per header information in Exhibit “A”), were able to record an AK-47 (Romanian manufacturer w/16” barrel, semi-auto operation), gun shot with factory 7.62x39mm ammo, with each camera cell phone being positioned in a similar camera field of view of the 2nd gun shot, or 10 feet away from the muzzle, without any distortion of the audio.
9. Ballistics Report confirms both victims' body responses to being shot, appear consistent with being shot with an AK-47 style rifle with 7.62x39mm FMJ ammunition.

10. Ballistics Report confirms that the bullet after exiting the first victim, struck the wet ground close to the left side of or on a previous victim down range to the first victim. Water spray consistent with the impact of a bullet onto the wet ground can be seen in the video, and the response of the previous victim's leg rising in the air when the first victim is shot and then slowly drops to its former position, is consistent with what could be expected by a dying person to another impact, ricochet or very loud noise (i.e. gun shot).

11. Ballistics Report confirms that the blood pooled around the previous victim with the white shirt and with the victim of the 2nd shooting appears to be consistent with blood from the brain, which would contain high amounts of oxygen giving the blood its bright color. The fact that it is still bright in color appears to be consistent with it being from a traumatic brain injury and being very recent. (However, it should be noted that the brightness of the blood is too bright and this is the result of a recording artifact consistent with some, if not most, camera cell phones).

12. Ballistics Report confirms that the blood pattern and two apparent exit wounds on the forehead of the victim wearing a white shirt are consistent with typical exit wounds fired from an AK-47 style weapon with 7.62x39mm FMJ ammunition, fired at close range, while this victim was in a sitting position when shot.

Final Report Conclusions:

The *Video* in question appears to be consistent with a video that was recorded on a camera cell phone.

The video and audio of the events depicted in the *Video*, were continuous without any evidence of start/stops, insertions, deletions, over recordings, editing or tampering of any kind.

The events being depicted by the *Video* are consistent with and appear to be quite authentic.

This summary report does not include a full and final statement of facts and opinions concerning the *Video* in question, and is subject to any later and/or final report(s).

This report summary shipped to Client on 23 November 2009 by email to TAGresearch@gmail.com. And by USPS Priority Mail on 24 November 2009.

[Upon request by The People's Tribunal, Dublin, Ireland a detailed final technical report containing ammunition field test data and analysis can be provided by TAG.]

Exhibit A: [Meta Data for the massacre.3gp file]

Format : MPEG-4
Format profile: 3GPP Media Release 4
Codec ID: 3gp4
File size: 1.61 MB
Duration: 1mn 17s
Overall bit rate: 175 Kbps
Encoded date: UTC 2009-07-18 09:06:47
Tagged date: UTC 2009-07-18 09:06:47

Video

ID: 2
Format: H.263
Format profile: BaseLine@4.5
Codec ID: s263
Duration: 1mn 17s
Bit rate mode: Variable
Bit rate: 160 Kbps
Width: 176 pixels
Height: 144 pixels
Display aspect ratio: 4:3
Frame rate mode: Variable
Frame rate: 7.248 fps
Minimum frame rate: 2.141 fps
Maximum frame rate : 7.576 fps
Bits/(Pixel*Frame): 0.873
Stream size: 1.47 MB (91%)
Writing library: PHLP
Encoded date: UTC 2009-07-18 09:06:47
Tagged date: UTC 2009-07-18 09:06:47

Audio

ID: 1
Format: AMR
Format/Info: Adaptive Multi-Rate
Format profile: Narrow band
Codec ID: samr
Duration: 1mn 17s
Bit rate mode: Variable
Bit rate: 12.4 Kbps
Channel(s): 1 channel
Sampling rate: 8 000 Hz
Resolution: 16 bits
Stream size: 117 KB (7%)
Writing library: Philips
Encoded date: UTC 2009-07-18 09:06:47
Tagged date: UTC 2009-07-18 09:06:47

4. Medical Report by Firearms & Ballistics Consultants, USA

The sealed document provided to The People's Tribunal, Dublin, Ireland contains sworn affidavit and specific information about the company personnel. The sealed information should be kept as confidential information and not made public.

Date of the report delivered to ISF: November 19, 2009

The company "Firearms & Ballistics Consultants" provides services in the following areas:

- Firearms Testing and Evaluation
- Firearms & Ballistics Technical Expertise
- Ballistics Research & Development
- Ballistic Threat Analysis & Evaluation

Referenced Video File: *massacre.3gp*

The personnel of *Firearms & Ballistics Consultants, CO, USA* have expertise in Firearms, Ballistics, and Terminal Effects (wounds inflicted by ballistic impacts). One of the members is an Assistant Chief Deputy Coroner of Douglas County, Colorado and has experience in blood pattern analysis and formal death investigation.

As requested by ISF, the Firearms & Ballistics Consultants (abbreviated as F&B) reviewed the above referenced video in detail, with specific focus on the two firearm discharges recorded on the video clip, responses of the alleged victims to those discharges, and observations regarding wounds, blood patterns, and other specifics related to firearms, ballistics, terminal effects, and the response of the human body to invasive incidents. In the interest of frugality, the company will not prepare a formal Affidavit unless directed by ISF to do so – F&B is assuming that ISF is seeking only confirmation of the authenticity of the events memorialized on the above referenced video clip. Despite the poor quality and resolution of the video clip, some events can be substantially corroborated.

F&B Company findings are summarized below:

- The response of victim # 1 was consistent with being struck in the central nervous system with a 7.62x39mm FMJ (full metal jacketed) round from a Kalashnikov – style semi or full automatic assault type rifle, which is what the firearm memorialized in the video appears to be;
- The bullet, after exiting victim #1, struck the wet ground close to the left side of another victim's head – this victim was already down in a supine position, close to victim #1's feet. The bullet appears to have impacted the ground between victim #1's left foot and the previous victim's head. Water spray consistent with the impact of a bullet onto wet ground can be seen in the video, and the response by the previous victim is consistent with what could be expected by a dying person to another impact (ricochet) or very loud noise;

- The two apparent exit wounds on the forehead of the victim wearing a white shirt (victim #3) are consistent with typical exit wounds from 7.62x39mm FMJ ammunition fired at close range;
- Blood patterns and pooling associated with all victims on the video also appears to be consistent with the volume and flow resulting from CNS (Central Nervous System) wounds, which permit the heart to continue to pump for a short period of time, and the wet condition of the ground. The blood pattern on the front of victim #3's shirt is consistent with he (or she) being in a sitting position at the time of the impacts, and the blood pattern on the back of the victim to the left of victim #1 is consistent with that from an entrance wound in that area of the body. The color of the blood seen on the ground appears to be somewhat brighter red than would be expected, even for highly oxygenated blood, which would be expected from a traumatic brain injury. The color of the blood on the bodies (not on the ground) appears to be of a color that would be expected;
- The body responses to the two impacts memorialized on the video (victim #1 and #2) appear consistent with single impacts to the central nervous system (brain), which typically result in an initial tensing of all voluntary muscles (specifically the stomach muscles in these incidents) in anticipation of the impact, and a gradual relaxing of those muscles as the brain loses communication with those muscles. This type of injury also results in significant blood loss from the wound, as the heart continues to pump for a time until it loses its supply of oxygenated blood due to the resultant hypovolemia. The blood emanating from the entrance wound on victim #2 can be clearly seen on the video, and appears quite authentic;

Director
Firearms & Ballistics Consultants

5. Authentication of the Video by a Member of FBI National Academy for *The Times*, UK

Authentication work performed by Grant Fredericks, an independent forensic video specialist who is also an instructor at the FBI National Academy. The following article was published *The Times* on December 15, 2009.

Link-3 : <http://www.timesonline.co.uk/tol/news/world/asia/article6956569.ece>

December 15, 2009

Sri Lankan war crimes video is authentic, *Times* investigation finds



The video footage appears to show Sri Lankan troops committing war crimes
Rhys Blakely in Mumbai

Video footage that appears to show Sri Lankan troops committing war crimes by summarily executing captured Tamil Tiger fighters on the battlefield was not fabricated, as claimed by the Sri Lankan Government, an investigation by *The Times* has found.

The findings come after General Sarath Fonseka, the former head of the army, alleged that Gotabhaya Rajapaksa, the Defence Secretary, had ordered that surrendering Tiger leaders be killed rather than taken prisoner in the final days of the brutal 26-year civil war that ended in May.

The claims, vehemently denied by the Government, added to a lengthy list of war crimes allegations against it.

The video of the alleged battlefield executions, which was aired on Channel 4 in August, shows a naked man, bound and blindfolded, being made to kneel.

Another man, dressed in what appears to be Sri Lankan army uniform, approaches from behind and shoots him in the head at point-blank range. "It's like he jumped," the executor laughs. The camera then pans to show eight similarly bound corpses.

It is impossible to confirm when and where the filming occurred or the identities of the men shown. Pro-Tamil groups alleged that the video was filmed by troops on a mobile phone in January, when they overran the Tiger stronghold of Kilinochchi in the north of the country. Those claims were denied by government officials, who said they had "established beyond doubt" that the footage was fake.

An analysis for *The Times* by Grant Fredericks, an independent forensic video specialist who is also an instructor at the FBI National Academy, suggests otherwise. He found no evidence of digital manipulation, editing or any other special effects. However, subtle details consistent with a real shooting, such as a discharge of gas from the barrel of the weapon used, were visible.

“This level of subtle detail cannot be virtually reproduced. This is clearly an original recording,” said Mr Fredericks, who was previously the head of the Vancouver police forensic video unit in Canada.

There was also strong evidence to rule out the use of actors. “Even if the weapons fired blanks, the barrel is so close to the head of the ‘actors’ that the gas discharge alone leaves the weapon with such force it would likely cause serious injury or death,” Mr Fredericks said.

The reactions of those executed was consistent with reality, he added. “The victims do not lunge forward . . . [they] fall backward in a very realistic reaction, unlike what is normally depicted in the movies.”

In Mr Fredericks’s opinion “the injury to the head of the second victim and the oozing liquid from that injury cannot be reproduced realistically without editing cuts, camera angle changes and special effects. No [errors] exist anywhere in any of the images that support a technical fabrication of the events depicted,” he said.

The Sri Lankan Government said in a statement in September that the footage was “done with a sophisticated video camera, dubbed to give the gunshot effect and transferred to a mobile phone.”

Mr Fredericks’s research showed that code embedded in the footage appeared to match with software used in Nokia mobile phones.” He said: “The recording is completely consistent with a cell phone video recording and there are no signs of editing or alterations.”

The strong evidence that the footage does show real executions could reinforce international calls for an independent war crimes investigation — something that the Sri Lanka Government has resisted. A Sri Lankan army spokesman requested that a copy of Mr Fredericks’s report be sent to him yesterday, but did not reply when it was.

Mr Fonseka, who resigned from the army last month after being sidelined, is campaigning to unseat President Rajapaksa, the Defence Minister’s brother, at elections next month.

6. Statement by Philip Alston

(UN Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions)

Sri Lanka: UN rights expert calls for probe into video of alleged executions

Link-4: <http://www.un.org/apps/news/story.asp?NewsID=31881&Cr=sri+lanka&Cr1=#>

UN News Centre, 28 August 2009 – A United Nations human rights expert today called for the immediate establishment of an independent inquiry into the authenticity of a video which purportedly depicts the extrajudicial execution of two naked and helpless men by the Sri Lankan military and the presumed prior executions of others.



Philip Alston, the UN Special Rapporteur on extrajudicial, summary or arbitrary executions, said he was aware that the Sri Lankan Government had categorically denied the allegations raised by the video, which has been aired this week.

“These images are horrendous and, if authentic, would indicate a serious violation of international law,” Professor Alston said in a statement, noting that the Government’s denial “makes it all the more important for an independent investigation to be set up.

“If the Government’s position is validated as a result of an inquiry, the international community can rest easy and the Government will have been vindicated. There is no justification for not moving ahead with such an investigation in view of the Government’s confidence that such atrocities were never perpetrated by its armed forces.”

Earlier this year Government forces declared victory over the rebel Liberation Tigers of Tamil Eelam (LTTE) after years of fighting in the small South Asian country.

Professor Alston added that he regretted that the Government had not yet issued him an invitation to make an official visit to Sri Lanka, despite a number of requests in recent years, but he hoped an invitation may come given the new allegations.

Like many other UN rapporteurs, Professor Alston reports to the UN Human Rights Council in Geneva and to the General Assembly and he serves in an independent and unpaid capacity.

In a later interview Alston said: “this video seems to have most of the characteristics of a genuine article and that in itself is sufficient to impose an obligation upon a Government [Sri Lankan] to undertake a sustained, effective, and impartial investigation to ascertain the truth...the images are gravely disturbing. They raise prima facie concerns about significant extra-judicial executions and a full-scale investigation should be undertaken,”

7. Statement by Human Rights Watch



Sri Lanka: Execution Video Shows Need for International Inquiry

No Action on Government Promises of Investigations to United Nations

August 26, 2009

(New York) - A disturbing video recently provided to the media showing the apparent summary execution of prisoners by Sri Lankan soldiers underscores the need for an international commission of inquiry into possible war crimes committed by both sides during the armed conflict in Sri Lanka, Human Rights Watch said today.

The video shows men in Sri Lankan army uniforms firing assault rifles point-blank at two naked, blindfolded, and bound men sitting on the ground. Eight other bodies are visible on the ground nearby, all but one unclothed. According to Journalists for Democracy in Sri Lanka, a multiethnic exile organization, the video was taken by a soldier with a cell phone in January 2009. While Human Rights Watch could not confirm the video's authenticity, an independent expert consulted found nothing in the video that would dispute its authenticity. The summary execution of prisoners is a violation of Common Article 3 of the Geneva Conventions of 1949 and a war crime.

"The blood, blindfolds, and mud of this apparent atrocity makes nonsense of President Rajapaksa's claims of a clean war against the Tamil Tigers," said Steve Crawshaw, UN director at Human Rights Watch. "An international inquiry needs to get to the bottom of this and other war crimes committed during the past year's fighting."

Human Rights Watch reported numerous violations of the laws of war by both the Sri Lankan armed forces and the separatist Liberation Tigers of Tamil Eelam during the 25-year-long armed conflict, which ended with the defeat of the Tamil Tigers in May. Because independent observers, including the media and human rights organizations, were prevented from operating near the war zone, the information available on the fighting and potential laws of war violations by both sides has been limited.

Before the government could launch an investigation, a Sri Lankan army spokesman already labeled the video a "fabrication."

Human Rights Watch has long criticized the government's failure to carry out impartial investigations and prosecutions of those responsible for the numerous human rights abuses committed by both sides during the conflict. There have been serious ongoing violations of human rights, and the backlog of cases of enforced disappearances and unlawful killings runs to the tens of thousands. Only a small number of cases have ended in prosecutions. Past efforts to address violations through the establishment of ad hoc mechanisms in Sri Lanka, such as presidential commissions of inquiry, have produced little information and few prosecutions.

Human Rights Watch called for the United Nations secretary-general or other UN body to create an independent international commission of inquiry to investigate violations of the laws of war by all parties to the armed conflict in Sri Lanka, and to make recommendations for the prosecution of those responsible. On May 23, President Mahinda Rajapaksa and the UN secretary-general, Ban Ki-moon, issued a joint statement from Sri Lanka in which the government said it "will take measures to address" the need for an accountability process for violations of international humanitarian and human rights law.

In a July interview with *Time magazine*, Rajapaksa said that during the war, "[t]here was no violation of human rights. There were no civilian casualties."

"Since telling the UN secretary-general three months ago that he'd conduct investigations, Rajapaksa has sat on his hands," said Crawshaw. "Ban should stop relying on the president's promises of domestic action and make it clear that an international commission is needed if the victims of Sri Lanka's bloody war are to find justice."

8. Reaction of Government of Sri Lanka to the Massacre Video

Summary: The GoSL reacted to the Channel 4, UK broadcast by rejecting the video as not being authentic. Four individuals participated in presenting their arguments on behalf of the GoSL. The arguments put forward by the 4 member team are presented below.

- Mr. Siri Hewawitharana (A video expert)
- Dr Chathura Ranjan de Silva (Senior Lecturer, Sri Lankan university)
- Brigadier Prasad Samarasinghe (SLA Head of Signal Corps)
- Major P.A. Bandara (SLA Media Centre for National Security)

Sri Lanka government proves that the Channel 4 video is fabricated:

Link: <http://www.lankamission.org/content/view/2576/49/>

By: Ministry of Disaster Management and Human Rights, Sept. 10, 2009

1. **Common:** Surprisingly the video carried on the JDS blog – that of the organization that is supposed to have distributed the original – is sourced from CNN.

[Quote]

- 1) the images were not captured by a mobile telephone but by a digital camcorder or similar equipment because the video is of high quality unattainable on a mobile phone (Channel 4 and several other outlets who carried the story such as *Timesonline* and www.Tamilnet.com, were categorical that the video was shot by a soldier using a mobile phone);
- 2) there has been editing of the video and that the audio track has been dubbed and there is evidence that the format of the original video has been converted to make it appear that it was captured on a mobile telephone;
- 3) If the video is an accurate depiction of an actual event, the gap in time evident on the video between the shot being fired and the sound thereof being recorded means that there would have to be a distance of over 100 meters between the discharged weapon and the recording device for the first shot and 38 meters for the second (at which distance a mobile telephone with a camera could not have recorded the images shown in the video). *[End quote]*

2. **Maj. A.P. Bandara** of the SLA's Media Centre for National Security then made a short presentation wherein he noted that when the video was slowed by 50%, several remarkable discrepancies and distortions became evident.

[Quote]

- 1) The leg of a dead person lying prone on the ground rises in the air when the first "victim" is shot. Thereafter the leg slowly drops to its former position. The second "victim", though shot in the head, continues to have stiff leg muscles

and reclines on his arms bound behind his back. Then he gradually leans back until he lies flat on the ground.

- 2) One of the other “victims” who lies dead in muddy ground wears a remarkably clean white shirt.
- 3) The “soldier” who supposedly kills the first “victim” is wearing a white T-shirt (vest) when the standard issue for Sri Lankan Army is of a different colour altogether.
- 4) The second “soldier” has a very unmilitary growth of hair.
- 5) Even though the bodies are lying in waterlogged or muddy ground, not all the “bloodstains” from the fatal injuries have spread in a manner consistent with one another...

3. **Dr. De Silva**, who presented next, made the following observations

- 1) The granularity of motion vectors and other inter-frame features indicate that the footage had been originally captured using a high-end camera (at least a digital camcorder) and not by an average mobile phone.
- 2) An analysis of the colour levels and saturation shows that the bloodstains in the film are unusually strong in colour and have texture mismatches - this is usually the result of post-recording modifications and the use of digital effects.
- 3) There is no recoil or movement of the weapon discharged.
- 4) Texture analysis of the image and possible over-lays shows evidence of tampering /digital effects in relation to enhanced bloodstains and one blindfold.
- 5) Evidence of audio dubbing
 - i. Lack of audio synchronization - audio is delayed for more than 1.5 seconds - this is not due to video compression or processing.
 - ii. Audio indicates presence of strong wind-noise. However, this is not evident in the video footage.
- 6) Transcript of the Sinhala dialogue has no relation to the images in the footage. There is no audio of victims screaming or any other related noise.
- 7) There was no indication that a zoomed view was used.

4. **Mr Siri Hewawitharana’s** analysis read by the Minister as summarized

- 1) The total length of the video clip is 1:02.781 (min)
 - i. The edited video stopped at 01:02.312 (min).
 - ii. The audio editing stopped at 01:02.125.

- iii. This indicates that the original video is edited since original layer stopped at 1:02.781 and video editing stopped at 01:02.312 and audio dub stopped at 1:02.152.
 - iv. If it is the original audio, it should have played all the way to 1:02.781 and should not have 2 video layers indicating an original and an edited version. The audio is added later in a clumsy fashion.
 - 2) It is said that the video came from a mobile phone video source. There are only two formats in mobile video formats. One is the old 3GPP format and the new one is the Mpeg4, H-264 part 10 which is a MP4 format that is highly processor intensive encoding. Because of this, mobile phones in today's market do not have high quality video capability since the processors in high end mobile phones like iPhones or smart phones are not powerful enough to capture good quality video. The Channel 4 video is much higher in quality than an existing smart phone can create today.
 - 3) Within H-264 coding there is also an extra component called Motion Vectors (VMC) which are used to predict motion on the temporal and spatial domain. Channel 4's video has quite high quality VMC and it appears that this VMC came from a video camera and not from a mobile phone source. Moreover, video from a mobile source also tends to be blocky in nature when it comes to motion.
 - 4) Since the original video was originally in AVI and QuickTime format, the whole video indicates that the original video is of high quality that originated from a video camera source since mobile formats does not use AVI or QuickTime which are high quality video formats. If a change of mobile format to AVI or QT format is attempted, then the resulting video is likely to be of very bad quality. However, in this case the video is of very high quality.
 - 5) The foregoing indicates that someone transferred the camcorder video to a computer for editing and sound was dubbed later. One can see that the gun shot was not in synchronization with the video. Normally audio is always ahead of the video since video processing takes more time and in this case audio is very late indicating very a amateurish video and audio editing.
5. **Brigadier Prasad Samarasinghe** of the Army's Signals Corps who conducted both a technical study and field tests agreed with the preceding presentations and made the following observations:
 - 1) The video has been edited to include additional details that have been added or some details deleted.
 - 2) A wide angle camera was used to capture the "incident".
 - 3) 30 Frames at the end of the video stream only contained a letter "A" against a blank background. This is not consistent with an original video from a mobile telephone source.

- 4) The video and audio streams were analyzed concurrently for consistency and several discrepancies were noticed which leads to the conclusion that the distance of the mobile telephone's microphone from the weapon was 102 meters in respect of the first shot and 38 meters from the second.
- 5) A field simulation test using several mobile telephone brands revealed that, in order to maintain the size of image in the Channel 4 video, the mobile telephone camera should have been at a distance of approximately 3 to 5 meters from the discharged weapon. *[End quote]*

9. TAG's Response to Remarks by Sri Lanka Government

Background: Following the broadcast of the massacre video on August 25, 2009 by Channel-4, UK, the government of Sri Lanka (GoSL) organized a press conference and presented its position. An analysis of the Channel-4 video was conducted by 4 individuals with academic and industry experience appointed by the GoSL. For brevity, the 4 individuals are collectively referred to as Sri Lankan Experts (SLEs).

TAG would like to note here the reaction of Philip Alston to Sri Lanka's response. Alston said, inter alia, "the most important question is whether the "four separate investigations" meet the criteria of impartiality. I would note that two of the experts are members of the Sri Lankan Army, the body whose actions have been called into question. A third report is by Dr. Chathura De Silva, BSc Eng Hons (Moratuwa), MEng (NTU), PhD (NUS), Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa, who has advised the Government in relation to a number of other similar issues in the past. And the fourth is by Siri Hewawitharana, a broadcast media specialist based in Australia, who is said to be the former head of Cisco's global broadcast and digital video practice. No other information has been provided by the government on Mr Hewawitharana, but it would appear that he is a member of a network of Sri Lankan Professionals."

From a technical viewpoint the overall integrity of the video recording has been substantiated by multiple authorized forensics experts from the USA. Nevertheless, TAG has taken an effort to elaborate on a select set of remarks put forth by the SLE. A search by forensic experts in the US uncovered that none of the SLEs are known to have any forensic certification. TAG refrains from commenting about the ethnicity of the SLEs who opted to defend the mono-ethnic SLA from alleged war crimes.

Qualitative aspects of the observations made by the GoSL, such as the hairstyle of the Sri Lankan Army, the absence of military insignia on the men carrying out the execution, etc. have already been answered by Channel-4 in a later broadcast with photographic evidence. TAG lists the Channel-4 responses for completeness at the end of this chapter.

Issue-1:

SLE Claim: *Gun shots were not in synchronism with the video ... (in this case) audio is very late indicating a very amateurish video audio editing. There is unacceptable time delay between video and audio.*

Key Issue: Is the time delay present between video and audio in the video unacceptably large, and if so, does this indicate "amateurish video/audio editing?"

TAG's Short Response: When key factors that contribute towards the overall or **total time delay** of the audio with respect to the video are taken into account, the said delay in the .3gp video file is within the realm of a consumer-quality multimedia device. Therefore, the claimed "delay" does not indicate that there had been a audio/ video tampering, as is also confirmed by the two independent analysts, the ISF, USA and the expert hired by the *The Times*, UK .

TAG's Statement:

The SLEs point to the first execution broadcast by Channel-4, UK with a 296 ms delay using a video analyzer. There is no reference to the second execution. It is not clear what the SLEs refer to when they say, "gun shots were not in synchronism with the video." TAG assumes that the SLEs expected the video of the gunshots to be at the same time as (in synchronism with) the audio.

With the four delay sources detailed below taken into account, the **total time delay** of the audio with respect to the video frames in each of the execution incident is within the realm of what consumer devices are capable of providing.

Four factors typically contribute to the **total time delay** between the audio and video in a recorded footage.

1. Delay due to the finite time sound takes to arrive at the camera (microphone) with respect to its corresponding video event. There will always be a time delay of the audio with respect to its corresponding video. The speed of sound is considerably lower than that of light (1135.6 feet per second at 25°C versus 186,000 miles per second).
2. The uncertainty in accurately determining from the video file when the event of interest actually occurred (especially with a low frame per second (fps) recording rate of the video). There will always be an uncertainty of one frame duration, which translates into a maximum uncertainty of 138 milliseconds with a 7.248 fps camera. This component of delay corresponds to **Delay Source-1** as defined in Appendix-A.
3. The recording-device specific delay, also referred to as latency, is attributed the level of sophistication used by the manufacturer in making the hardware and software elements of the device to multi-task efficiently at lowest cost. A smart phone, like iPhone 3GS has a latency of 110 ms. This is due to **Delay Source-2** as defined and quantified in Appendix-B.
4. The software tool (video analyzer or viewer) can add a finite delay to the audio with respect to its video frames while transcoding from 7.248 fps to 30 fps, which was done by Channel-4 for public broadcasting. There are no published industry standards as to how well a video analyzer/viewer will adjust the video and audio data. Comparing two different analyzers showed the delay can be as much as 92 ms. This is due to **Delay Source-3** as quantified in Appendix-C.

The consistency in recording of the two executions is an indicator that the video and audio streams have not been tampered with. As documented in Appendix-C for analyzer-1, the AV delay for each of the two shooting incidences is 210 milliseconds and 200 milliseconds, respectively. With analyzer-2, the AV delay for each of the two shooting incidences is 302 milliseconds and 276 milliseconds, respectively. Hence, an analyzer-induced shift of an

extra 92 ms (302-210 ms) will produce very similar estimates of the time delay for both executions in both analyzers.

Hence, the responsible answer to the “excessive-delay” assertion is that the impact of various delay-generating sources and digital artifacts must be taken into consideration prior to making any conclusion.

Issue-2:

SLE Claim: *If the video is an accurate depiction of an actual event, the gap in time evident on the video between the shot being fired and the sound thereof being recorded means that there would have to be a distance of over 100 meters between the discharge weapon and the recording device for the first shot, and 38 meters for the second (at which distance a mobile telephone with a camera could not have recorded images shown in the video). Thus, the audio track has been dubbed.*

Key Issue: Does the audio “delay” observed in the recording correspond with the distance between the weapon and the recording device?

TAG’s Short Response: The time delay between the audio and video is derived from 4 separate sources as discussed in Issue-1 above. SLE’s assumption that the audio delay, as measured from the recording, is only due to the delay from the speed of sound is incorrect. Hence, SLE’s derivation of the distance between the weapon and the recording device is an overestimate. Three other sources of delay must be isolated from the total time delay to obtain an estimate of the delay due to sound travel alone.

TAG’s Statement:

Cell phones are not scientific (precision) instruments designed to measure the distance of objects using the speed of sound. Cell phones are a cost-sensitive consumer product primarily meant to provide wireless audio communication. New features such as video recording are only offered as added options to the primary audio function. By using a drastically reduced video frame rate of 7.2 fps (a reduction by a factor of 4) from the desired 30 fps used in camcorders, the cost of electronics is reduced, but time delays between the audio and visuals can be increased.

Appendix-B demonstrates the fallacy of directly converting the **total time delay** into the estimated distance of an event. Three other possible delay causing sources must be properly isolated from the total time delay in order to extract the relevant time delay due to the speed of sound. Appendix B shows that even with high-quality smart phones, the device latency (see Delay-Source-2 above) could be as high as 110 milliseconds. One has to thereafter factor in the uncertainty in determining the exact time of occurrence (instant) of the event of interest (Delay-Source-1). Finally, the analyzer-induced shift (Delay Source-3) must also be accounted for.

Issue-3:

SLE Claim: *Normally audio is way ahead of the video.*

Key Issue: Is audio “way ahead of video” in typical recordings?

TAG’s Short Response: In an ideal recording device, the sound should always be recorded after the video. In this regard, the SLE statement is not precise. However, due to the low frame rate found in practical devices, the audio can indeed appear to be arriving sooner than the corresponding video frame, provided the device latency is substantially lower than the frame interval. In consumer devices the latency is typically greater than the frame interval, and audio cannot be expected to be way ahead of the video.

TAG’s Statement:

The only time in a video recording that the audio can come “ahead of the video” is when the video-recording frame rate of the camera is fairly low and the camera misses capturing the actual event of interest (instant) in the video (and the “after event” is what actually gets captured). In this case, it could appear that the audio is ahead of the video. The counter factor is that devices designed with a low frame rate concomitantly inherit a commensurate device latency which can only be measured through field testing as shown in Appendix-B.

With a 7.248 fps camera (where the time between two successive video frames, referred to as the frame interval, is 138 milliseconds), when an event of interest occurs right in front of the camera (i.e., zero time for audio arrival with respect to its corresponding video image), the camera can miss capturing the actual event and only capture the “after event” in its subsequent frame 138 milliseconds later. In this case, one can only infer that the incident occurred sometime after the previous frame was recorded but before the current frame. And, in this case, the audio can appear to be “ahead of the video” by a maximum of 138 milliseconds (assuming that there are no other delay contributions such as due to device latency).

Issue-4:

SLE Claim: *The video was of a high quality for a recording by a cell-phone camera. What I found strange was the high quality of the video Mobile phones in the present markets do not produce high quality video. Granularity of motion vectors indicate high quality camera. Original cannot be a mobile phone because of the high quality. The video never came from a mobile phone since the original video is of quite a high standard and motion vectors were of high quality. The images were not captured by a mobile telephone but by a digital camcorder or similar equipment because video is of high quality attainable on a mobile phone. There has been editing of the video, and that the audio track has been dubbed and there is evidence that the format of the original video has been converted to make it appear that it was captured on a mobile telephone. (Continued next page)*

Key Issue: Is the “quality” of the video “too high” to have been recorded on a cell phone, and if so, is there evidence that the format of the original video has been converted to make it appear that it was captured on a mobile telephone?

TAG’s Short Response: As to whether the quality of the video was too high to be from a cell phone or not is only a subjective perception. The forensic experts who have studied the original *massacre.3gp* video have concluded that the image quality is commensurate with that found in cellphones. The pixel count of the display [176x144] found in the said video is common in many cell phones.

TAG’s Statement:

The argument should not be whether the video was taken by a cell-phone camera or by a video recorder. What is important is to establish whether the video representing SLA executing unarmed prisoners is genuine or not in having recorded what actually took place (and is not a fake).

Most of the remarks by the SLE center around the format of the broadcast video, the “high quality” of the video, and their conclusion that the video could only have been taken by a camcorder and transferred to a computer for editing and dubbing sound.

The SLE do not indicate which version of the video was used in their analysis. TAG and Image and Sound Forensics™ (ISF) each used the *massacre.3gp* format video file that was originally distributed by JDS, a fact that JDS can confirm. TAG’s position is that analyzing any other file format is of limited value, as conversion would involve transcoding and this would most likely introduce artifacts that can distort the analysis.

Further, the SLE do not provide any analysis of the original *massacre.3gp* video. The two formats mentioned by SLE are the .avi and QuickTime (see Appendix-D). TAG asserts that the original video distributed was of .3gp format and, therefore, the SLE’s arguments related to quality do not relate to the original file, and are therefore not relevant to the issue at hand.

Additionally, as to whether the video was of “high quality” or not is a qualitative/ subjective perception. The original video is indeed a .3gp video file recorded at 7.248 fps with 176x144 pixel camera. This is confirmed by the metadata embedded in the file itself. It was also confirmed through reading the original video into a video analyzer (which transcodes 7.248 fps to 30 fps native rate), and determining the average distinct frames contained in a second of the transcoded recording (which is what a viewer actually sees). Hence, whatever image quality is seen when viewing the video frames is the quality of the actual recording (at 7.248 fps) itself. There is no evidence whatsoever to indicate that “the format of the original video [was] converted to make it appear that it was captured on a mobile telephone.”

Image and Sound Forensics (ISF), USA confirms that the “video and audio of the events depicted were continuous without any evidence of start/stops, insertions, deletions, over

recordings, editing or tampering of any kind” and that the “events being depicted are consistent with and appear to be quite authentic” (see Chapter 3. Authentication by Image and Sound Forensics™ (ISF), USA).

This conclusion was further confirmed by Firearms & Ballistics Consultants, USA (Chapter 4. Medical Report by Firearms & Ballistics Consultants, USA).

An analysis for *The Times* by Grant Fredericks, who is an independent forensic video specialist and also an instructor at the FBI National Academy, also confirms this conclusion (Chapter 5. Authentication of the Video Sponsored by *The Times*, UK)

In addition, the quantitatively computed audio-video (AV) delays as determined by two different software video-analyzers (Analyzer-1, and Analyzer-2) for each of the two shooting incidences recorded in the video indicate that they are consistent and within the realm of consumer-electronic devices operating at the frame rate of 7.248 fps.

Further, the research of *The Times*' expert Mr. Fredericks showed that code embedded in the video footage appeared to match software used in Nokia mobile phones. He also said, “The recording is completely consistent with a cell phone video recording and there are no signs of editing or alterations.”

Issue-5:

SLE Claim: *Mobile source also tend to be blocky in nature when it comes to motion. The video lacked cascading errors ... since Channel 4 uses Flash format on their website. What I found strange was the lack of cascading effects and motion blur associated with mobile video coding.*

Key Issue: Do mobile phone recorded videos typically look “blocky” and contain cascading errors showing motion blur? If so, does the footage under discussion contain blockiness and/or cascade errors, and if not, does the footage indicate that it was not recorded by a mobile phone?

TAG's Short Response: The SLE do not confirm that they analyzed the original *massacre.3gp* video. There are no .3gp video standards to avoid ‘blockiness,’ cascading errors and motion blur. How much blockiness, cascading error, and motion blur are sufficient to qualify a video to be from a “true .3gp cell-phone” is thus a very subjective perception.

TAG's Statement:

Please also see TAG's detailed response to Issue-4 above.

The original video (distributed by JDS) is in .3gp format and it is this original video that has to be analyzed. It should be noted that transcoding the .3gp (7.248 fps) video into AVI or Flash format for viewing introduces new frames and artifacts into the display stream. The introduction of new frames and, thereby, possible artifacts is by the transcoding process

itself through padding (i.e., by repeating adjacent frames as is), or by other means to meet the broadcast needs of 30 fps.

TAG analyzed each of the original frames in the .3gp video file, and determined that though it is converted to 30 fps for displaying (in a 'viewer' or analyzer), there are still only 7.248 distinct frames that are projected every second, and the remaining frames for a 30 frames-a-second stream are merely a repeat of adjacent frames as needed. Thus, what are actually seen through a viewer (Analyzer 1 and 2) are still 7.248 distinct (original) frames per second, though 30 frames/second are projected by the viewer for broadcast compatibility. Whether what is seen through a viewer or a broadcast is too good or not for the claimed 7.248 fps recording is only subjective.

The frame rate recorded in the .3gp metadata of the video file is 7.248 fps. Whatever form into which this video is transcoded for broadcast purposes at 30 fps still contains only 7.248 (distinct/ non-repeat) frames in one second.

Thus, the quality of the displayed video is that of a 7.248 fps video, at an effective frame rate of the same 7.248 fps. Whether the quality of what is seen is too good or not, whether it has cascading errors, motion blur, or blockiness is a qualitative/ subjective perception.

Issue-6:

SLE Claim: *Even though the bodies are lying in waterlogged or muddy ground, not all the "bloodstains" from the fatal injuries have spread in a manner consistent with one another. Further, an analysis of the color levels and saturation shows that the bloodstains in the film are unusually strong in colour and have texture mismatches – this usually the result of post recording modifications and the use of digital effects. Texture analysis of image and possible overlays shows evidence of tampering/digital effects in relation to enhanced bloodstains and one blindfold.*

Key Issue: Do the "inconsistent" spread of blood, "unusual" color levels of blood, and the blood texture mismatches indicate post-recording modifications of the video footage?

TAG's Short Response: Color, texture, and the spread of blood in the crime scene are consistent with the type of injuries as confirmed in the Medical Report by the Firearms and Ballistic Consultants. The relevant paragraphs from the report are repeated below.

TAG's Statement: (Please see Chapter 4 for more details.)

The Medical Report by the Firearms and Ballistic Consultants concludes that, " blood patterns and pooling associated with all victims on the video also appears to be consistent with the volume and flow resulting from CNS (Central Nervous System) wounds, which permit the heart to continue to pump for a short period of time, and the wet condition of the ground. The blood pattern on the front of victim #3's shirt is consistent with he (or she) being in a sitting position at the time of the impacts, and the blood pattern on the back of the victim to the left of victim #1 is consistent with that from an entrance wound in that area

of the body. The color of the blood seen on the ground appears to be somewhat brighter red than would be expected, even for highly oxygenated blood, which would be expected from a traumatic brain injury. The color of the blood on the bodies (not on the ground appears to be of a color that would be expected;”

and that, “The blood emanating from the entrance wound on victim #2 can be clearly seen on the video, and appears quite authentic.”

The Times forensic expert, Mr. Fredricks found “no evidence of digital manipulation, editing or any other special effects. However, subtle details consistent with a real shooting, such as a discharge of gas from the barrel of the weapon used, were visible. This is clearly an original recording.”

The same expert notes, “This level of subtle detail cannot be virtually reproduced.”

Issue-7:

SLE Claim: *The leg of a dead person lying prone on the ground rises in the air when the first “victim” is shot. Thereafter the leg slowly drops to its former position. The second “victim”, though shot in the head, continues to have stiff leg muscles and reclines on his arms bound behind his back. Then he gradually leans back until he lies flat on the ground.*

Key Issue: Do the “unusual” movements of the bodies of dead persons indicate that the scene was staged?

TAG’s Short Response: No. The Medical Report by the Firearms and Ballistic Consultants notes that the movements of the dying persons’ bodies are consistent with the impact of the bullets. The relevant paragraph of the report is reproduced below.

TAG’s Statement: (Please see Chapter 4 for more details.)

“The response of victim # 1 was consistent with being struck in the central nervous system with a 7.62x39mm FMJ (full metal jacketed) round from a Kalashnikov – style semi or full automatic assault type rifle, which is what the firearm memorialized in the video appears to be;

The bullet, after exiting victim #1, struck the wet ground close to the left side of another victim’s head – this victim was already down in a supine position, close to victim #1’s feet. The bullet appears to have impacted the ground between victim #1’s left foot and the previous victim’s head. Water spray consistent with the impact of a bullet onto wet ground can be seen in the video, and the response by the previous victim is consistent with what could be expected by a dying person to another impact (ricochet) or very loud noise;

The body responses to the two impacts memorialized on the video (victim #1 and #2) appear consistent with single impacts to the central nervous system (brain), which typically result in an initial tensing of all voluntary muscles (specifically the stomach muscles in

these incidents) in anticipation of the impact, and a gradual relaxing of those muscles as the brain loses communication with those muscles. This type of injury also results in significant blood loss from the wound, as the heart continues to pump for a time until it loses its supply of oxygenated blood due to the resultant hypovolemia.”

The Times expert Mr. Fredericks reported that the reactions of those executed was consistent with reality. “The victims do not lunge forward . . . [they] fall backward in a very realistic reaction, unlike what is normally depicted in the movies.”

In Mr. Fredericks’ opinion, “the injury to the head of the second victim and the oozing liquid from that injury cannot be reproduced realistically without editing cuts, camera angle changes and special effects. No [errors] exist anywhere in any of the images that support a technical fabrication of the events depicted.”

“There was also strong evidence to rule out the use of actors. Even if the weapons fired blanks, the barrel is so close to the head of the ‘actors’ that the gas discharge alone leaves the weapon with such force it would likely cause serious injury or death,” Mr. Fredericks concludes.

Issue-8:

SLE Claim: *There is no recoil movement of the weapon discharged.*

Key Issue: Is the movement of the weapon after discharge seen in the video inconsistent with expected movement of similar weapons in similar circumstances?

TAG’s Response: The Ballistic and Forensic reports confirm that the recoil is consistent with that of a AK-47 type rifle. Relevant paragraphs from the report are: “(i) audio delay with respect to both gun shots’ audio compared with each corresponding rifle recoil is consistent for some, if not most, camera cell phones that are capable of video recording. (ii) Ballistics Report confirms both victims’ body responses to being shot, appear consistent with being shot with an AK-47 style rifle with 7.62x39mm FMJ ammunition.”

Issue-9:

SLE Claim: *One of the other “victims” who lies dead in muddy ground wears a remarkably clean white shirt.*

Key Issue: Is the “clean white shirt” seen in a dead victim unusual, and does that indicate the event was staged?

TAG’s Response: No. The Medical Report by the Firearms and Ballistic Consultants note, “[t]he two apparent exit wounds on the forehead the victim wearing a white shirt (victim #3) are consistent with typical exits wounds from 7.62x39mm FMJ (full metal jacket) ammunition fired at close range. i.e., the impact of the bullets on the white-shirt attired victim is real.”

Issue-10:

SLE Claim: Soldier who supposedly kills the first victim is wearing a white T-shirt which is not standard for the SLA. The second soldier has a very unmilitary growth of hair. Soldiers are not wearing SLA insignia in their uniform.

Key Issue: Do the following anomalies in the SLA attire, (i) wearing white T-shirt under SLA green uniform, (ii) not wearing SLA insignia, and (ii) soldiers sporting “long” hair indicate the video footage is not authentic?

TAG’s Short Response: JDS through Channel-4 news has already responded to the three non-conforming elements raised, by showing photographs that confirm that SLA soldiers (i) do routinely wear white T-shirts under green uniforms, (ii) SLA soldiers routinely do not wear SLA insignia in their uniform (even during the presence of Sri Lanka’s President), and (iii) SLA soldiers do sport “long” hair.

TAG’s Statement:

Displayed below are the three photos, one for each of the anomalies raised by the SLE, and as broadcast by Channel-4.



(i) SLA in white T-shirts under uniform



(ii) SLA Soldiers without SLA insignia



(iii) SLA soldiers do sport “long” hair

Issue-11:

SLE Claim: “Edited Video stopped at 01:02:312” and “Audio dub Stopped at 1:02:125”.

Key Issue: Can a video and audio data stream be of different length in a video file (even by 200 ms negative delay)?

TAG’s Short Response: Yes. Audio and video streams have distinct functional blocks of electronics that implement input capture, and processing functions. In addition, different timers within these two distinct processing streams, and processing latencies within interrupt-routines that are triggered by user “start” commands are likely to result in “different” start record times for the audio and video streams relative to the command. Similar conditions will prevail for the “stop” command from the user. Device-specific misalignment on the order of 300 ms is not uncommon.

TAG’s Statement:

The SLE claimed that “Edited Video stopped at 01:02:312” and “Audio dub stopped at 1:02.125”. TAG’s own investigation with two different analyzers (Analyzer 1 and Analyzer 2) agrees among the two analyzer results, but contradicts the SLE’s figures in magnitude and direction.

Video analyzers themselves add repeated adjacent frames to the original in order to convert from a 7.248 fps video (.3gp) to their native 30 fps rate. This fact was verified by TAG by reviewing individual frames of the analyzer-adapted video (for each of the two analyzers). Analyzers can also add other artifacts when the video is decoded for presentation.

Using two different video analyzers, TAG obtained the following:

Analyzer 1: The last distinct video-frame was at 1:12:21 (Min:Sec:Frame# format). This frame is then repeated till 1:13:01 (Min:Sec:Frame# format) (when audio ends). The audio ends a little into 1:13:00 (Min:Sec:Frame# format). Converted to homogenous time units, they become (video ends at 21 frames * 33 ms per frame) 1:12.693 (Min:Sec) and (audio ends at) 1:13.000 (Min:Sec). Thus, unlike what the SLE say, the audio ends later than the video, and by (1:13.000 - 1:12.693) 307 ms.

Analyzer 2: The last distinct video frame was at homogeneous time units 1:12.686 (Min:Sec format). This frame is then repeated till the audio ends. The audio ends at 1:13.046 (Min:Sec format) homogeneous time units. Thus, unlike what the SLEs say, the audio ends later than the video, and by 1:13.046 - 1:12.686 = 360 ms.

However, according to the SLEs, the audio stopped ahead of the video by (01:02.312 - 1:02.125) 187 ms.

The system (camera, analyzer) controller waits until both the audio and video end, and until then repeats the video frames (these are design specific, and their frame rate is also 138 milliseconds per frame). The reason for the time delays was discussed earlier.

Further, the audio actually started at 00:00:09 (Min:Sec:Frame# format) (9 frames * 33 milliseconds per frame) = 297 ms into the video for Analyzer 1, and at 00:00.253 (Mins:Sec format) = 253 ms into the video for Analyzer 2. Since the audio recording was delayed, the audio ending point is also accordingly delayed (and in the right direction) – the original delay gets carried into the recording till the end. This quantifiable start delay (associated with **Delay Source-2**) contributes to **the total time delay** for each of the shooting incidences (Appendix-C).

10. Concluding Remarks by TAG

Following the statement from Philip Alston (United Nations Special Rapporteur on Extrajudicial, Summary and Arbitrary Executions) to the Permanent Representative of Sri Lanka's Mission to the United Nations in Geneva, the disturbing images "raise prima facie concerns about significant extra-judicial executions and a full-scale investigation should be undertaken," two independent forensic experts have positively determined that the events recorded in the video under discussion are real events and that the "video and audio of the events depicted in the *Video*, were continuous without any evidence of start/stops, insertions, deletions, over recordings, editing or tampering of any kind."

In addition, in this document TAG has provided rebuttals based on verifiable technical principles that disprove, without any reasonable doubt, issues raised by the GoSL that question the authenticity of the video footage. Most of the SLE's positions have been shown to be based on either erroneous technical analyses, or arbitrary and/or unsubstantiated assertions.

Therefore, TAG places the following as facts before this Tribunal, and appeals to the Judges and interested organizations to undertake appropriate legal steps to bring charges against the killers appearing in the video, and their superiors who had command responsibility over these soldiers:

- The 10 bodies seen in the video were most probably summarily executed by the individuals shown wearing SLA uniform. Two of the executions were captured live on the video.
- Aggravating circumstantial evidence militating in favor of establishing that the executioners were SLA soldiers:
 - Executioners spoke Sinhala language
 - Executioners were wearing Sri Lanka Army uniforms
 - Killings occurred during a widespread and systematic pattern of attacks on the Tamil civilian population, first in the areas west of the A9 highway, and then to the east of the A9 in the Vanni region
- The circumstantial evidence also indicates that there is a rebuttable presumption the 9 of the 10 men were forcibly stripped naked and blind-folded by the assassins themselves, or their known or unknown co-conspirators. This is also consistent with historical SLA tactics used during torture and detention against Tamil combatants and non-combatants in the Northeast under conditions of armed conflict.
- The killings are historically consistent with sixty years of the majority Sinhala government not investigating crimes committed against Tamil civilians in the Northeast by the SLA under conditions of armed conflict, and thereby, aiding and abetting crimes committed by the Sri Lanka security forces.

- The Sri Lanka Government's omission of genuine investigation or post-execution judicial proceedings into the incident, after the matter was nationally and internationally covered, creating a sufficient basis to assert knowledge, is legally cognizable as a failure to investigate, identify, and punish the perpetrators of the crime.
- The government's presumption of innocence and refusal to investigate, despite evidence establishing beyond reasonable doubt the occurrence of the summary execution, would make the denial culpable and this resistance to investigate is admissible as an act of omission which creates conditions encouraging both perpetration and immunity for the crime, and attempts to exonerate the assassins by simply paralyzing any semblance of a judicial process.

While the place of occurrence, and the identity of soldiers are yet to be determined, and this would necessarily require full cooperation and assistance of the Sri Lanka Government officials and the present Sri Lanka Army commander, TAG urges the Tribunal to establish an independent commission to investigate into the incident, and to demand that full access to the armed forces is given to carry out an impartial investigation as the UN's Prof. Alston has recommended.

TAG would like the Judges of *The People's Tribunal*, Dublin, Ireland to note that a video of Serb paramilitary soldiers, the Scorpions, caught in the act of murdering six Bosnian Muslim youths in July 17, 1995, near the town of Trnovo, Srebrenica, discovered 10 years later, shocked Serbia and led to the arrest and later conviction of the soldiers. The six Muslim men and boys were forced to lie down with their hands tied before being shot in the back by their captors in an eerily similar fashion to that seen in the Sri Lanka video. Two of the Bosnian victims were 17, while the others were in their 20s and 30s. A Belgrade war crimes court sentenced four Scorpions to a total of 58-years in prison.

The massacre video (massacre.3gp) imposes an obligation to those working on upholding justice to ensure that the culpable soldiers and their responsible superiors are similarly brought to justice.

Appendix-A Digital Artifacts of the Video Recording Process

Summary: Basic elements of a video recording process in the context of establishing reliable evidence of the massacre are considered in this Appendix. A recording device, such as a cellular phone or a camcorder, digitizes a dynamic event periodically and stores the data for later retrieval. The time dependent real world images are recorded as distinct video frames, usually at a much slower rate. Because the visual sensitivity of human eyes is optimum for video frames rates around 30 frames per second, it has now become an industry standard (note that all movies are produced with 24 frames per second). Furthermore, images take up substantial storage space. The corresponding audio is digitized at a much faster rate (8 kHz) because audio does not demand large memory space. Leveraging the interdependency between the video and audio data stream for better human perception is the key to a successful product design. Various time delays associated with digitization and the coordination of video and audio data streams play an important part in recreating a real world event. A finite sampling rate, however, produces digital artifacts that contribute to a shift between video and audio data streams. Understanding the varied sources of delay is important for an educated interpretation of the time delay observed in a digital video recording system.

Introduction: Digital video recording technology permeates all hand-held devices such as cellular phones, smart phones and portable camcorders. Dynamic events are captured by two streams of information: 1). Image (video), and 2). Sound (audio). Since video frames require substantial memory compared to a sound wave form, the recording process requires a compromise. Images are captured at lower rate (10 to 15 frames per second) than sound (8 kHz). While digitized images are easy to transmit, store and display without loss of information, they become vulnerable to artifacts that arise from a finite sampling rate and limited memory space. Cellular phones, especially, are a cost sensitive consumer product that is primarily meant to provide audio communication. New functions such as video recording are offered as additional features to the phone's primary audio function. Hence the frame rates of a cellular phone tend to be near 7.5 to 15 fps, whereas a camcorder with large storage capacity is designed to support 30 fps.

Since the relative time delay between the recorded video and audio is of interest in the authentication effort, a set of schematic diagrams are now referenced in the following pages. The ultimate intent of the video file analysis is to capture the "instant" when a rifle is fired and the instant when the corresponding sound wave is received by a recording device. Since this real world event is prone to judgmental errors, a new experiment is constructed to address the key issue of the "time-delay." A bouncing ball on a hard floor generates a clear visual "event" of impact and an associated sound wave. A series of experiments were conducted to characterize the time-delay performance of various recording devices as discussed in Appendix-B. In this appendix, the sources that contribute to the time delay between audio and video components are now considered.

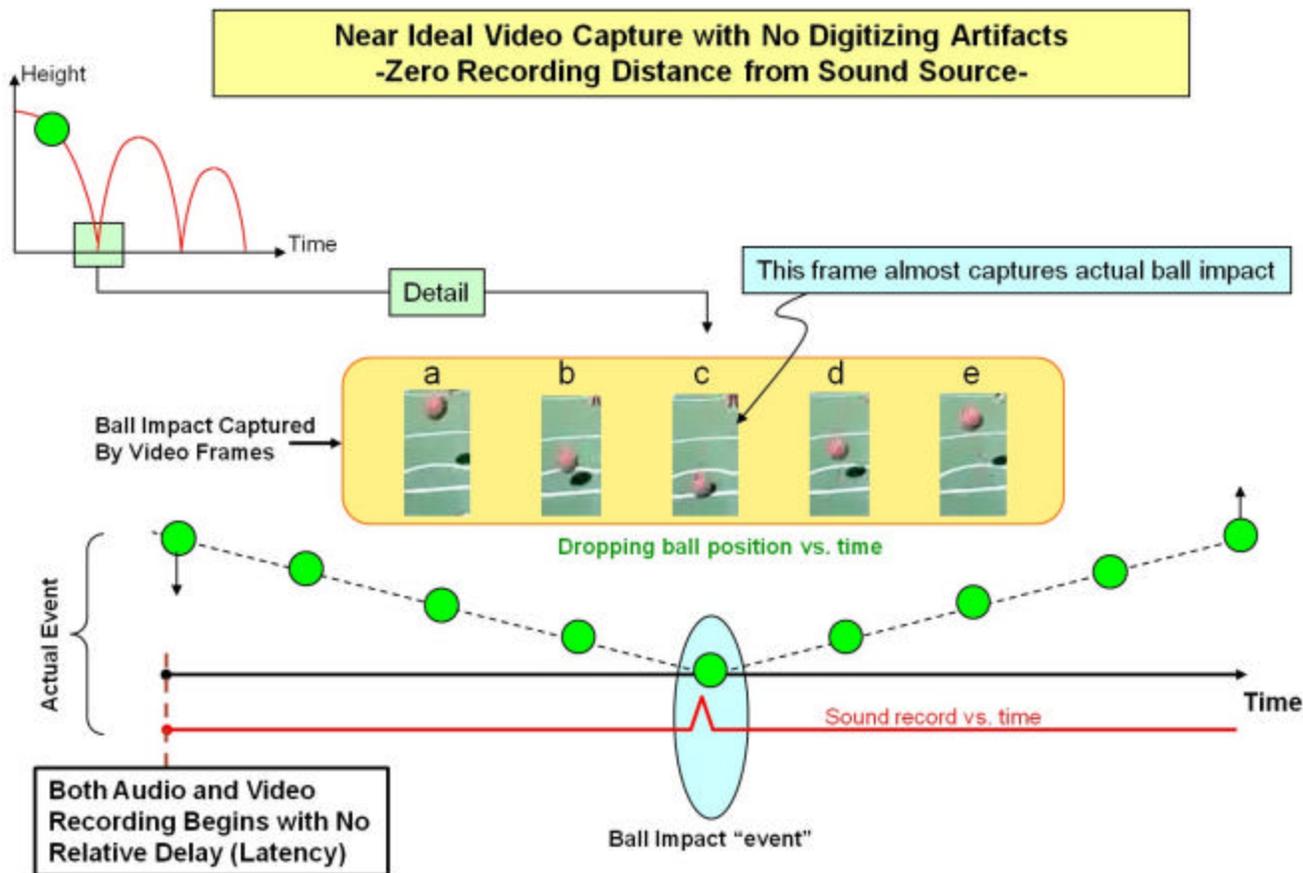


Figure-A1 Video capture of a bouncing ball.

Figure-A1 shows the position of a ball (brown sphere) approaching a floor as a function of time. The video frames a-through-e show 5 instantaneous positions of a ball captured by a 15 fps cellular phone (LG-VX855) with 174x144 pixel video identical to the device that captured *the massacre.3gp* file. In this example the video, by chance, captures the exact moment the ball strikes the floor. Therefore, the video is captured without any digital artifact. The corresponding impact-sound is captured by the audio channel schematically shown by the red trace. The ball positions are idealized by the green spheres schematically. In the illustration, the distance of the recording device from the audio source is considered negligible.

In the following Figure A-2 a second attempt is made to reproduce the bouncing event. This is case-2 in comparison to the ideal case-1 . It is easy to observe that the video frames a1-through-e1 miss capturing the actual impact event. Using the physics of motion, it is indeed possible to reconstruct the moment of bounce for this specific example, but it is not an easy task to pinpoint the actual event, such as a rifle shot where the smoke is suppressed for other reasons. Hence, there is an uncertainty associated with determining the instant of actual impact. This is a **Delay Source-1** (see report page 27), which value is required to estimate the “true” sound delay, and it is function of frame-rate. The lower the frame rate, the wider the **Delay Source-1** related error will be. The Source-1 type delay tends make the audio appear ahead of the video frame (i.e., negative delay).

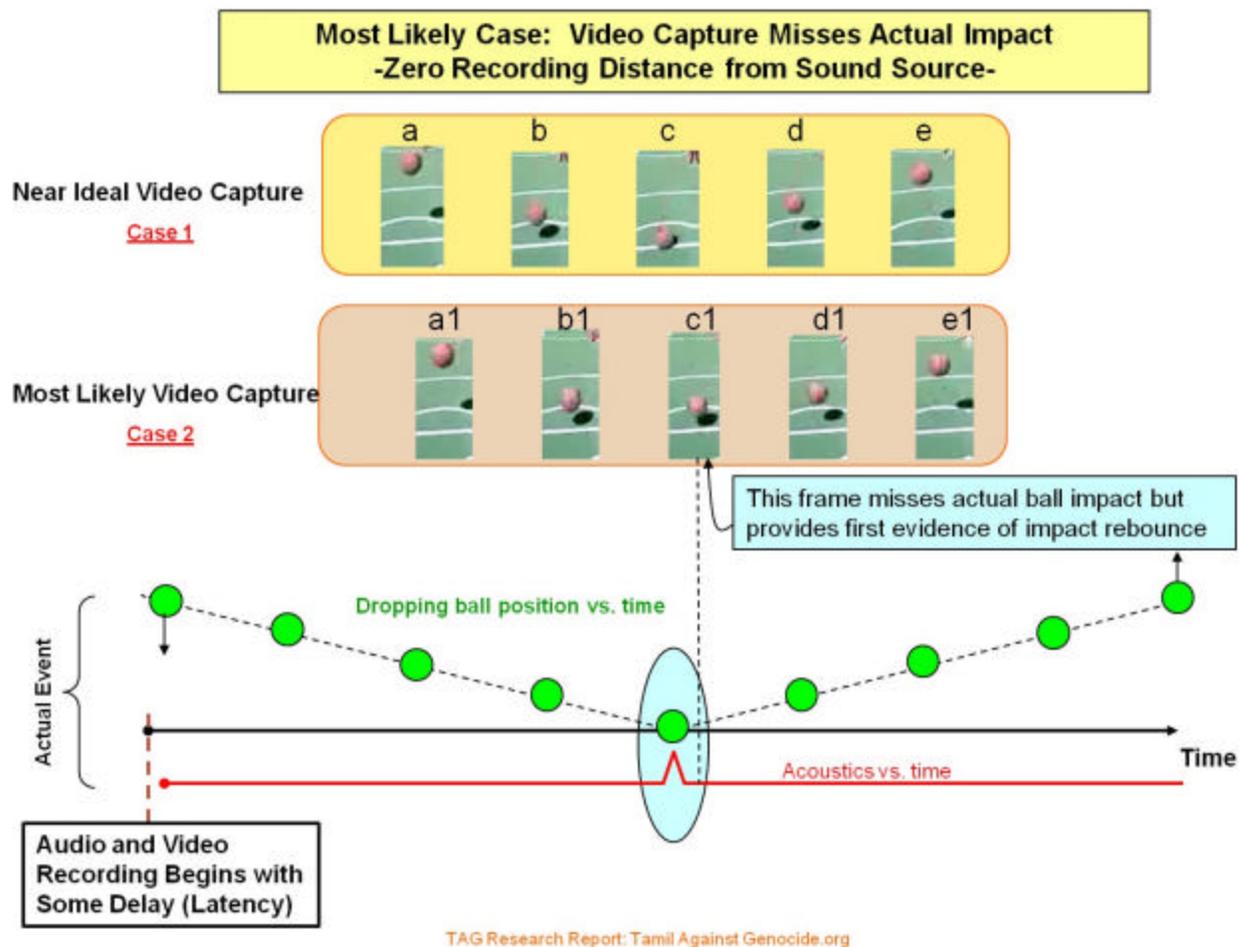


Figure A-2: Video capture of a bouncing ball “misses” the exact moment of impact.

Assuming an ideally synchronized audio/video process, the audio pulse from the bounce motion will start to arrive at the microphone (of the recording device) with a delay corresponding to the travel distance for the sound wave (at 25 C, the speed of sound is 1135.6 ft/s). However, consumer-oriented multimedia products are not scientific instruments designed to measure the speed of sound. Cost-minimized cellular phones inevitably generate a non-ideal and a non-trivial “device dependent delay” because time efficient hardware-oriented video and sound processing functions are accomplished through software whenever feasible – which costs time.

Human perception is known to be acutely sensitive to negative delay, i.e., a viewer is less tolerant to sound arriving sooner than the image – especially when it comes to the movement of lips (lip-syncing). Viewers are comfortable to sound arriving later than light. Thus, to avoid a poor viewing experience and perception due to a lower frame rate-induced video artifact, electronic designers strive to build a finite delay into the audio recording to guarantee a positive delay. Without requiring an intimate knowledge of a specific video recorder, a simple experiment, as discussed in Appendix-B, can readily reveal the device dependent delay (latency).

In Appendix-B, the device delay is determined by means of a simple experiment. For example, the experiments conducted by TAG on an advanced smart phone model (iPhone-3GS) produces a device latency of 110 ms, whereas a BlackBerry shows a delay of 30 ms. Thus, the device-dependent delay can be substantial, and is referred as **Delay Source-2**. Figure A-3 shows the interaction of three delay sources contributing to the **total delay** between the video and audio data. In order to estimate the “true” time delay due the distance travelled by a sound wave, Delay Source-1 and Delay Source-2 must be isolated from the total delay observable by a video-analyzer.

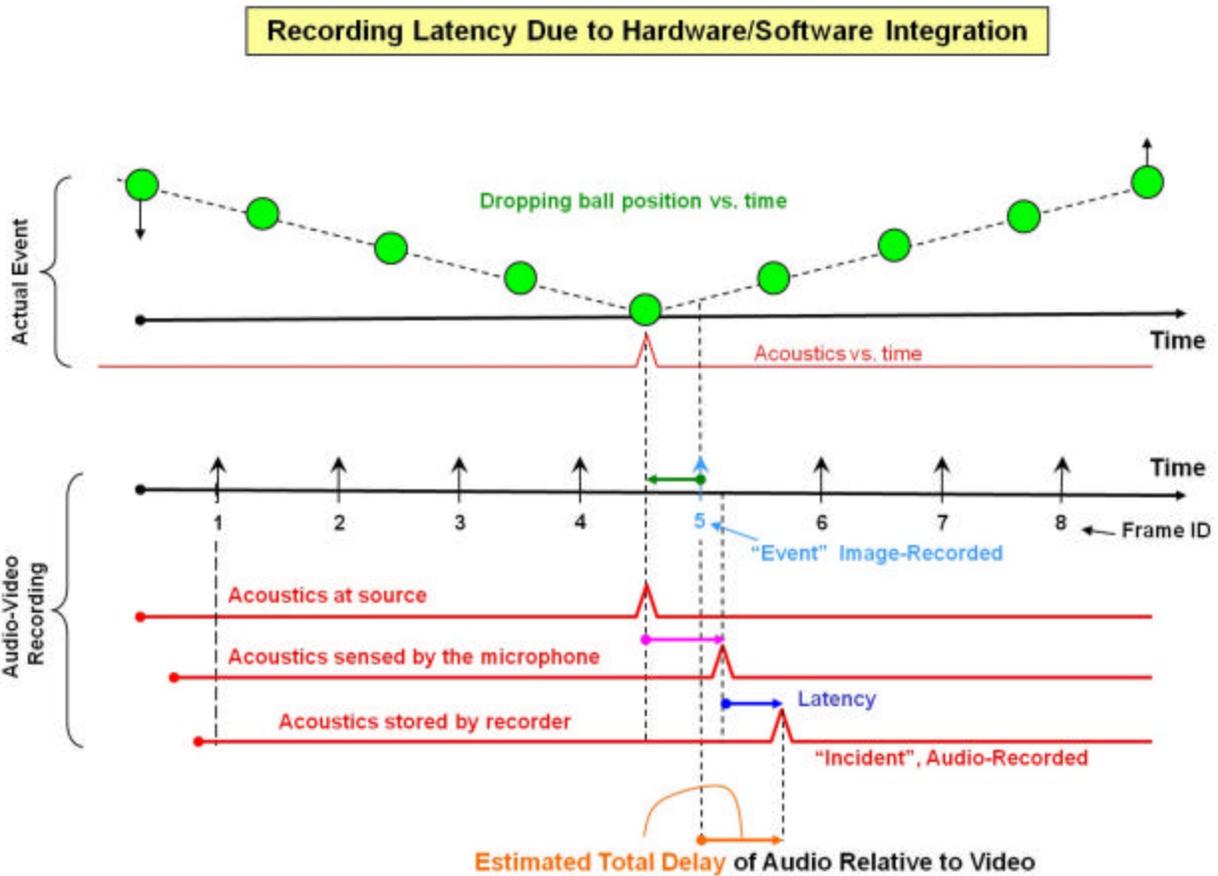


Figure A-3: Three components of delay between video and audio signal.

Summary: There are three sources that contribute to a delay between a video image and its corresponding audio record in addition to the “true-delay” due to the speed of sound. **Delay Source-1** tends to reduce the total delay. Device latency produces **Delay Source-2**, which may include an intentional bias-term targeted to counteract the Source-1 delay, especially encountered in low frame-per-second recorders. Finally, the video analyzer itself is found to shift the audio in relation to video data and the magnitude of the shift is vendor specific. This **Delay Source-3** is a fixed component and the audio data stream is shifted by a fixed amount relative to the video frames. This property ensures that the difference in delay between two similar events (such as

execution-1 and execution-2) is not substantial. Figure-A4 captures the three sources of delay that need to be isolated from the **total-delay** (with proper magnitude and sign) in order to extract the “true” delay due to the speed of sound. Note that the effect of Delay Source-2 and Delay Source-3 on the total delay is very similar and is difficult to separate or properly attribute unless standardized calibration signals are provided in the same video and audio data stream.

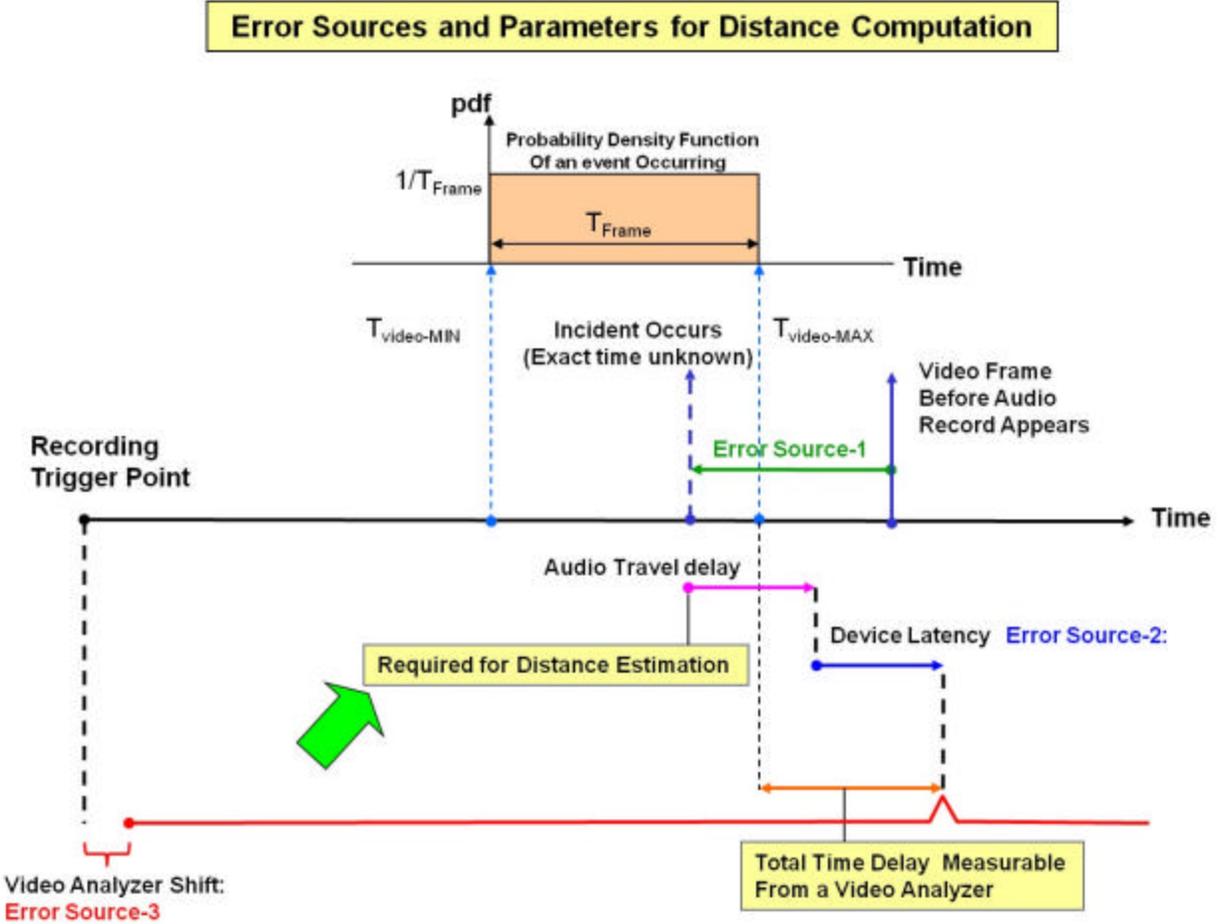


Figure A-4: The probabilistic representation of total delay.

Appendix-B Time Delay Analysis of Consumer Multimedia Products

Summary: The components of the **total time delay** between the audio and video of a recorder can be estimated using a simple experiment. By repeating an easy-to-identify event at a known distance from a recording device, a statistical average of the delay is obtained for a specific distance. By correlating the delay vs. distance data by repeating the experiment, the latency of the recorder is readily estimated. A smart phone, the iPhone 3GS, produces a **Delay Source-2** delay of 110 ms.

Time Delay Measurement: It is important to differentiate between consumer-oriented multimedia (video/audio) products and a “true” sound delay measuring instrument. (Detailed technical research by ISF employed high quality sound recording instruments to determine and contrast the effect of recording a rifle shot.) To simplify the discussion, TAG constructed an experiment in which a selected set of recording devices was used. The delay observed in the bouncing ball experiment was plotted as a function of distance. Figure B-1 shows the observed delay corresponding to an iPhone 3GS.

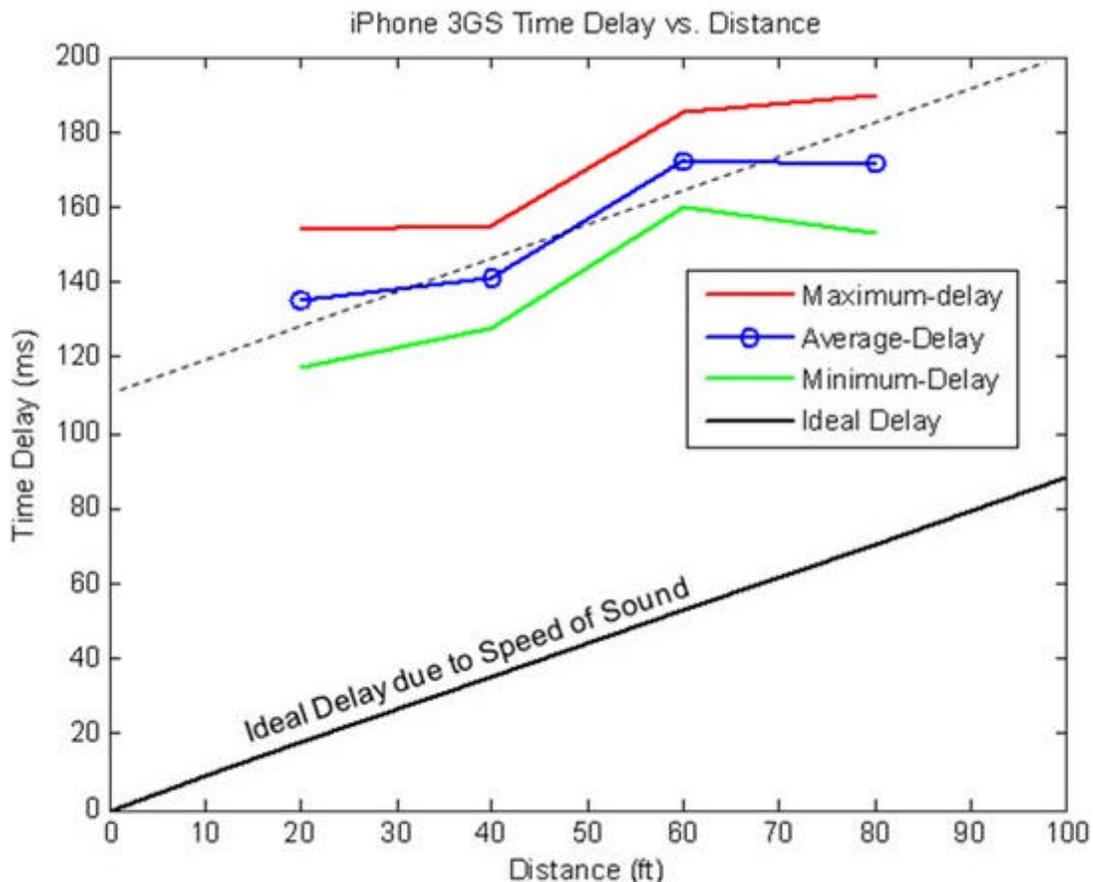


Figure B-1: Measured time delay vs. distance of an iPhone 3GS

The iPhone-3GS used a frame rate of 30 fps. Yet, the adjoining figure shows that there is a built-in delay of about 110 ms (a delay corresponding to 0 distance).

Fig. B-1 also shows the potential for gross error in computing the distance from the total time delay. For example, at 20 ft true distance, the time-delay of 130 ms is equivalent to 147 ft apparent distance! The blue-plot is the average delay between the minimum-and-maximum delay where the minimum and maximum corresponds to Delay Source-1. For the convenience of the reader, the metafile of the iPhone-3GS is shown in Table B-1.

In order to capture the statistical nature of the time delay, a digital camcorder was used. A video recording at a fixed distance of 10 ft from the bouncing ball was made. Sixteen repeated bouncing trials were conducted. Figure B-2 shows that the time-delay is distributed over 0 to 43 ms. The Sony Camcorder [Model DCR-TRV250] (30 fps) produces a mean delay (red-dot in the figure) of 17 ms which twice as much as the 9 ms delay expected for sound to travel 10 ft. Therefore, making a distance estimate based on a single time-delay sample can produce erroneous results as it is demonstrated to be statistical by this experiment even with a 30 fps native recording speed.

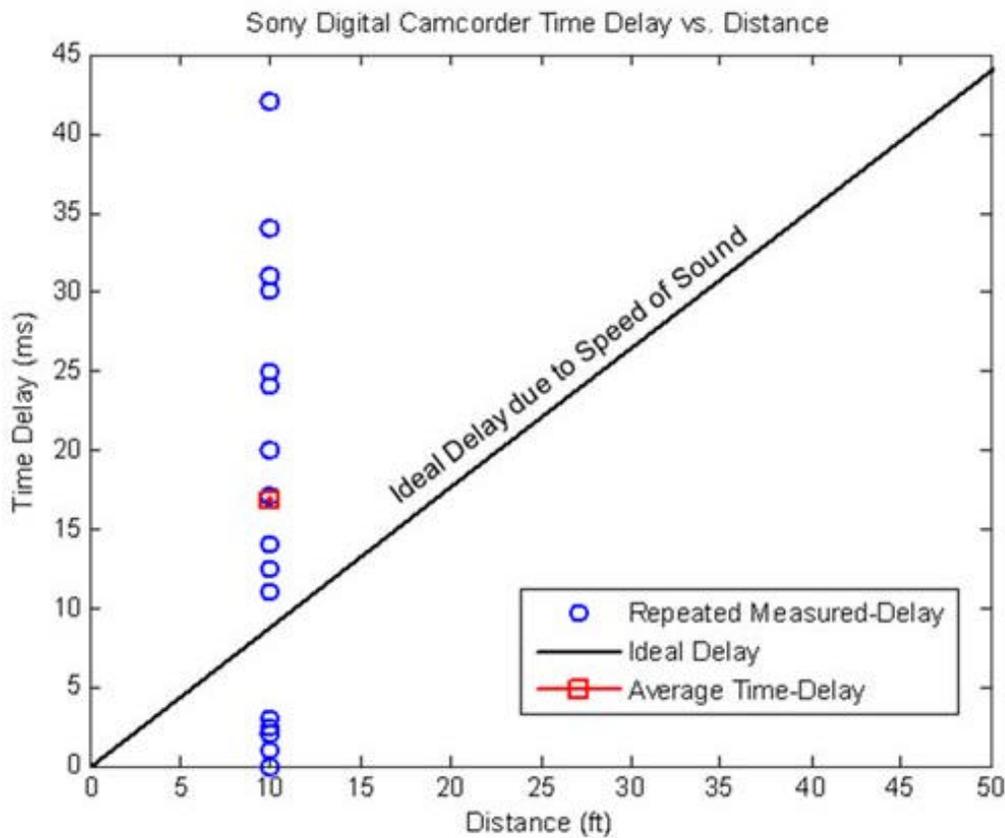


Figure B-2: Sony Camcorder at 10 ft – Statistical nature of the time-delay is evident.

iPhone Metafile:

Format : MPEG-4
Format profile : QuickTime
Codec ID : qt
File size : 5.78 MiB
Duration : 12s 979ms
Overall bit rate : 3 733 Kbps
Encoded date : UTC 2009-xx-22 22:38:31
Tagged date : UTC 2009-xx-22 22:38:43
Writing application : 3.1
Writing library : Apple QuickTime
Model : iPhone 3GS
©xyz : +xyz
Make : Apple

Video

ID : 1
Format : AVC
Format/Info : Advanced Video Codec
Format profile : Baseline@L3.0
Format settings, CABAC : No
Format settings, ReFrames : 1 frame
Codec ID : avc1
Codec ID/Info : Advanced Video Coding
Duration : 12s 928ms
Bit rate mode : Variable
Bit rate : 3 672 Kbps
Width : 640 pixels
Height : 480 pixels
Display aspect ratio : 4:3
Rotation : 90°
Frame rate mode : Variable
Frame rate : 30.000 fps

iPhone Recording xx/22/2009 IMG_320.MOV

Minimum frame rate : 28.571 fps
Maximum frame rate : 31.579 fps
Resolution : 24 bits
Colorimetry : 4:2:0
Scan type : Progressive
Bits/(Pixel*Frame) : 0.398
Stream size : 5.66 MiB (98%)
Title : Core Media Video
Encoded date : UTC 2009-xx-22 22:38:31
Tagged date : UTC 2009-xx-22 22:38:43

Audio

ID : 2
Format : AAC
Format/Info : Advanced Audio Codec
Format version : Version 4
Format profile : LC
Codec ID : 40
Duration : 12s 979ms
Bit rate mode : Constant

BlackBerry MetaFile:

Format : MPEG-4
Format profile : Base Media
Codec ID : isom
File size : 451 KiB
Duration : 7s 560ms
Overall bit rate : 488 Kbps
Encoded date : UTC 2009-xx-27 22:27:55
Tagged date : UTC 2009-xx-27 22:27:55

Video

ID : 1
Format : MPEG-4 Visual
Format profile : Simple@L4a
Format settings, BVOP : Yes
Format settings, QPel : No
Format settings, GMC : No warppoints
Format settings, Matrix : Default (H.263)

Codec ID : 20
Duration : 7s 533ms
Bit rate mode : Variable
Bit rate : 475 Kbps
Maximum bit rate : 556 Kbps
Width : 480 pixels
Height : 352 pixels
Display aspect ratio : 4:3
Frame rate mode : Variable
Frame rate : 23.895 fps
Minimum frame rate : 10.000 fps
Maximum frame rate : 30.000 fps
Resolution : 24 bits
Scan type : Progressive
Bits/(Pixel*Frame) : 0.118
Stream size : 436 KiB (97%)
Encoded date : UTC 2009-xx-27 22:27:55
Tagged date : UTC 2009-xx-27 22:27:55

Audio

ID : 2
Format : AMR
Format/Info : Adaptive Multi-Rate
Format profile : Narrow band
Codec ID : samr
Duration : 7s 560ms
Bit rate mode : Constant
Bit rate : 12.8 Kbps

Table B-1: Metafiles of iPhone-3GS and BlackBerry

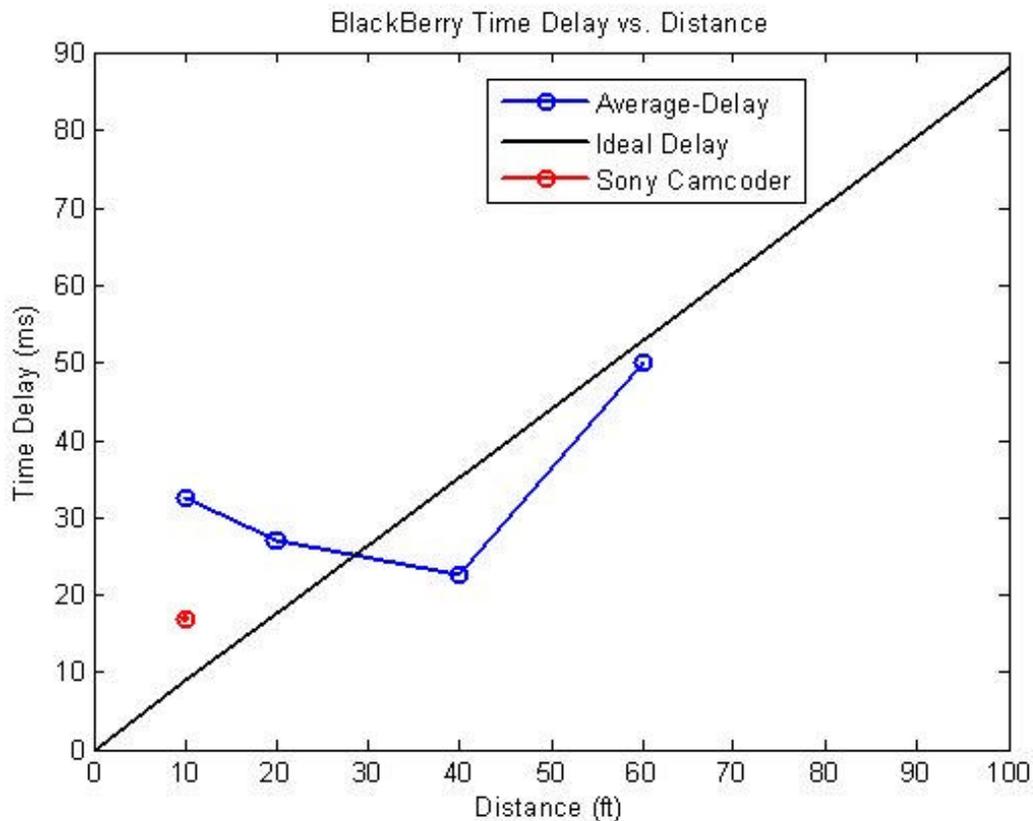


Figure B-3: BlackBerry Time Delay Experiment

Figure B-3 corresponds to a BlackBerry smart phone (24 fps). Each delay-data point corresponds to the average of several repeated trials. It can be seen that the total delay of the BlackBerry approaches an ideal delay line at 60 ft, but at a closer range (10-40ft) the device-dependent delay, or latency clouds the distance estimates. Interestingly, the total delay magnitude reduces with increasing distance for BlackBerry up to 40 ft.

Conclusion: It can be thus concluded that device latency is highly dependent on a specific recorder. In order to isolate the delay sources contributing to **total time delay**, the statistics of the total delay value must be established. To infer the “true” distance of a recording device from the sound source scientifically, the parameters of **Delay Source-1, Source-2 and Source-3** must be known *a priori*. Otherwise, over estimation of the distance is the likely outcome if these factors are not properly accounted for.

Appendix-C Time Delay Analysis of the Specific massacre.3gp Video

Summary: The “total time delay” between the video frames and the audio signal of the massavre.3gp file is summarized in this appendix. Several video analyzers were considered to evaluate the time delay. The first execution occurs with a nominal delay of 277 ms and the second execution with a delay of 267 ms. For a recording device with 7.2 fps (138 ms frame interval), a total time delay of 276 ms is 2x the frame interval. [As a reference, for the iPhone-3GS with 30 fps (33 ms frame interval) Delay Source-2 was 110 ms (3x).] In addition, the delays for both executions are comparable in magnitude and sign, a basic consistency check. Given the proximity of both victims, one would expect the delays to be comparable.

First Execution: Figure C-1 contains the video frame information of the first execution, which occurs after 5 seconds from the beginning of the video. Frame #15 after 5 seconds (denoted 5:15) is the first distinct frame just before the rifle is fired, and frame #19 (denoted 5:19) captures the frame immediately after the rifle is fired. The uncertainty about the time of the exact firing moment is therefore (4 frames x 33.3) 133 ms wide. The audio signal appears after frame 5:25. The audio signal occurs 11 ms following frame 5:25. Since the exact moment of the rifle shot is not known, a most likely moment of fire can be considered as the geometric center of the frames 5:15 and 5:19, while bounding the value with maximum and minimum time limits. The most likely time delay, based on one video-analyzer, is 277 ms with the minimum and maximum being 210 ms and 343 ms, i.e. the total time delay = [210 < **277** < 343] ms.

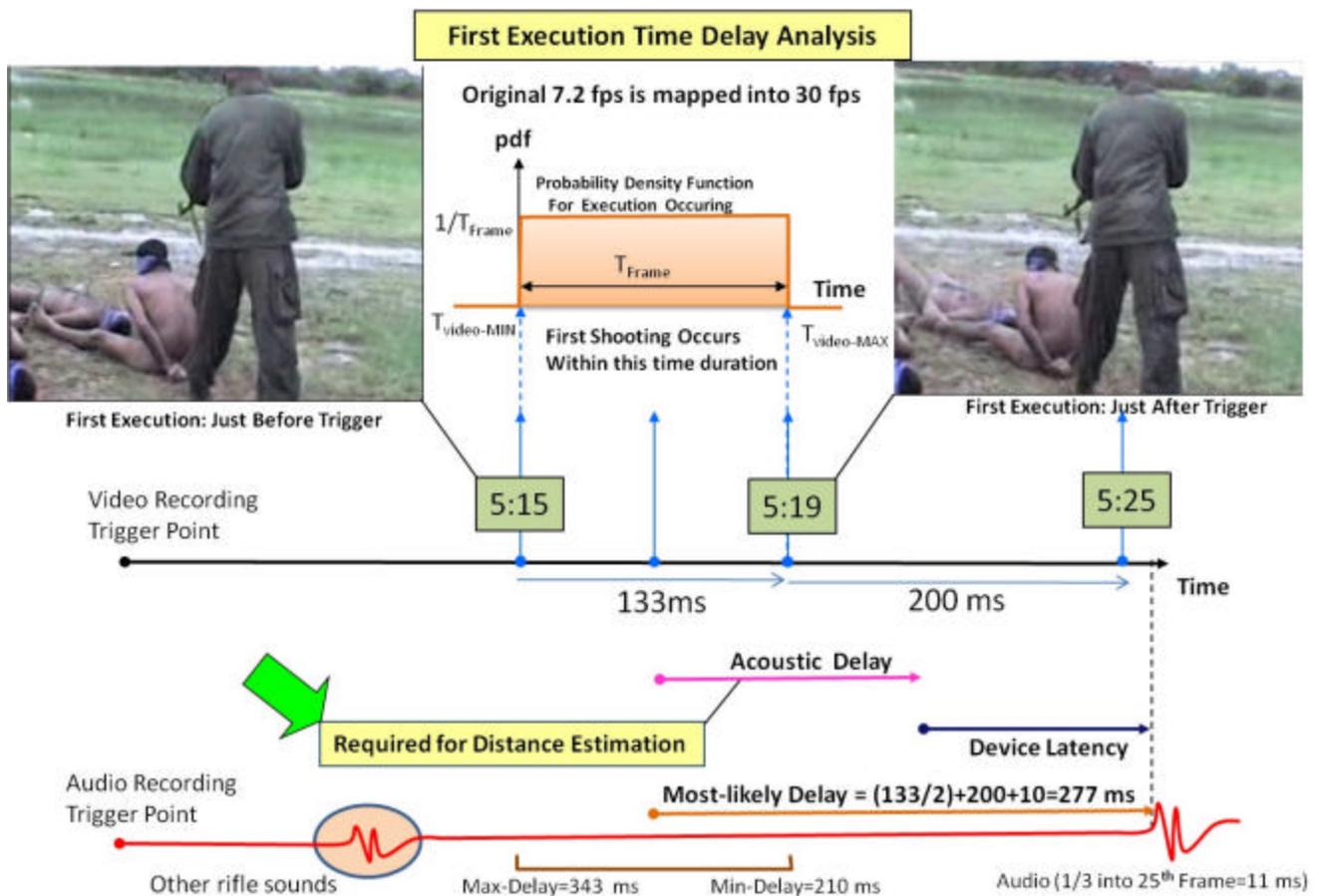


Figure C-1 Total time delay for the first execution is 277 ms.

Second Execution: The second execution occurs after 41 seconds from the beginning of the video. Frame #10 after 41 seconds (denoted 41:10) is the first distinct frame just before the rifle is fired, and frame #14 (denoted 41:14) captures the frame immediately after the rifle is fired. Again, the time uncertainty of the exact firing moment is therefore (4 frames x 33.3) 133 ms. The audio signal appears almost at frame 41:20. The most likely time delay based on one video-analyzer is 267 ms with minimum and maximum being 200 ms and 333 ms. i.e., the total time delay = [200 < **267** < 333].

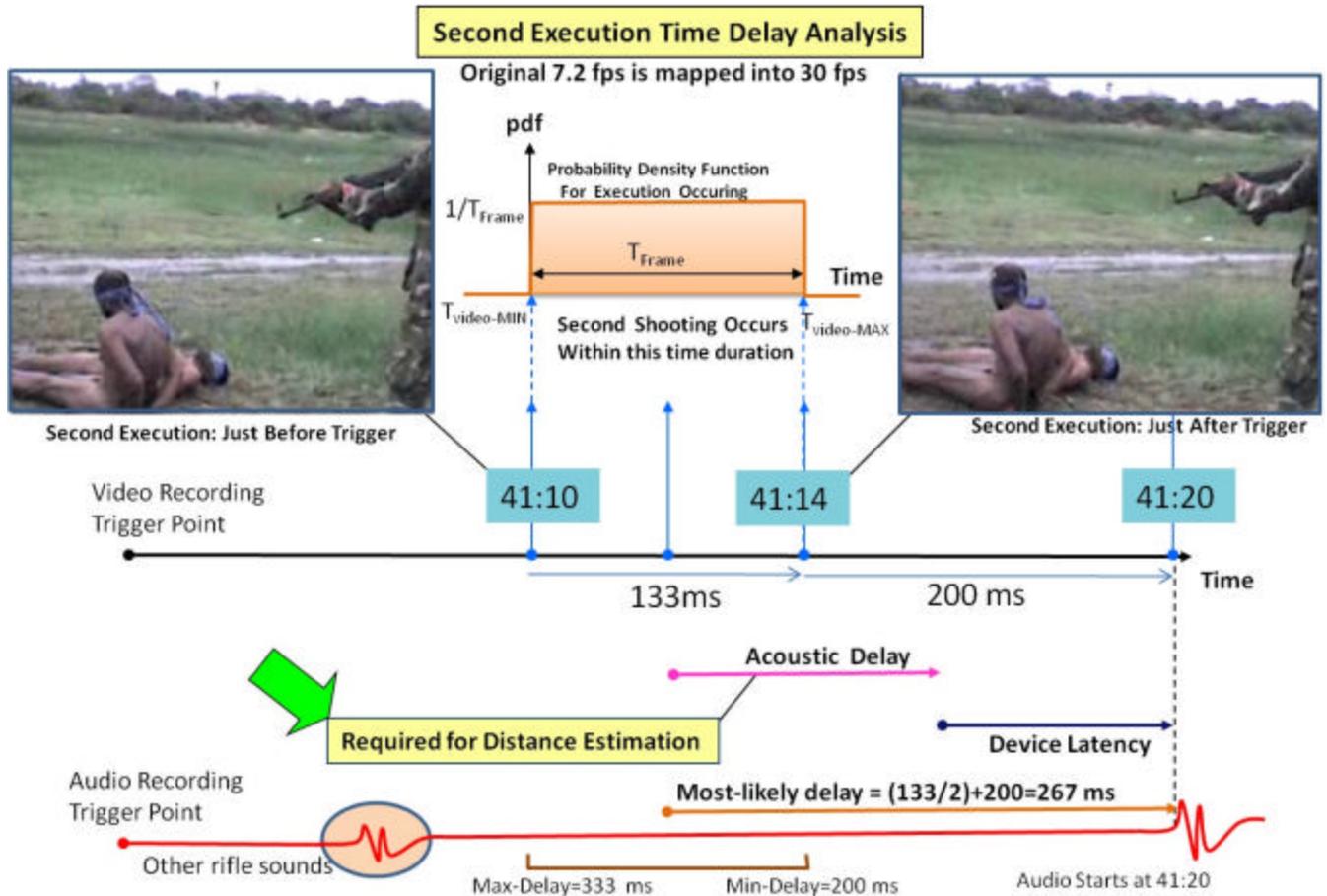


Figure C-2 Total time delay for second execution is 267 ms.

In summary, the first video analyzer produces the following time delay:

First Execution: Total time delay = [210 < **277** < 343] ms

Second Execution: Total time delay = [200 < **267** < 333] ms

Delay difference between execution 1 and 2 = 277-267= 10 ms

Observe that the difference in time delay between the first and second executions is 10 ms, which indicates that the executions took place within an 11 ft difference in distance for each victim. However, the statistical nature of the total delay can make the 10 ms difference a less reliable measure to project the difference in locations of the victims. In addition, in the video one can see that the second victim is closer to the video recording device than the first one, so the reduction by 10 ms in the delay for the second victim is surprisingly consistent.

Time Delay Analysis of a Second Video Analyzer: A second video analyzer was evaluated with the *massacre.3gp* file. The summary of the results are shown in Table C-1. The second analyzer uses absolute time scales to denote the frames and no explicit frame numbers are employed by its vendor. The median as well as the min-max range corresponding to the second video analyzer are listed below:

First Execution time delay = [302 < **369** < 437]

Second Execution time delay = [276 < **343** < 412]

Delay difference between executions 1 and 2 = 369-343= 26 ms

	Frame	Audio/ Video Abs. Time	Comment	Audio Minus Video Time (milli-seconds)	Difference in Change (milli-seconds)
First Shooting:					
Video	New Frame	5.453	No Smoke	Max=437	
Video	New Frame	5.588	Smoke	Min=302	
Audio		5.890	Audio Begin	Ave= 369	
Second Shooting:					
Video	New Frame	41.332	No Smoke	Max=412	
Video	New Frame	41.468	Smoke	Min=276	
Audio		41.744	Audio Begin	Ave=343	369-343=26
					Video/ Audio

Table C-1: Total Time Delay Estimates Using a Second Video Analyzer

The two analyzers reveal that the time delay between the two executions is consistent, i.e. the first (execution) time delay and the second are comparable (implying similar rifles at similar distances are used to execute both victims). However, the analyzers themselves introduce a fixed, but finite amount of delay (or shift in time record of the audio relative to the video frames) producing an error **Delay Source-3** into the estimation of the “true” delay from the “total-time delay.” For example, the first analyzer estimates 277 ms for the first execution, whereas the second analyzer estimates 369 ms for the same execution, an additional delay of 369-277= 92 ms. Comparative analysis confirms that each vendor of a given video analyzer implements a non-standardized procedure to align the audio and video data at the start of the video frame while preserving the time continuity of the audio throughout the record.

Conclusion: Once the three **Delay Sources 1, 2 and 3** as discussed in previous appendices are determined through elaborate field tests of comparable cellular phones and other consumer recording devices, the “true” delay term can be computed. Calculating the distance from the observed total delay, which in turn is based on a single (rifle-shot) sample can lead to arbitrary conclusions. An integrated or holistic study of the objects involved in a video-audio record, hence, becomes extremely important in making an educated judgment about its authenticity.

Appendix-D

Image Quality and Format Standards of Video Recordings

Summary: The Sri Lankan Experts (SLEs) mainly discuss AVI and QuickTime formats, while TAG's focus has been in the JDS-distributed video footage in .3gp container format. TAG's position is that analyzing any other file formats is only of secondary importance as "conversion" from the distributed original format to any other formats would involve transcoding, and this would likely introduce artifacts that can distort the analysis.

However, to provide the reader with the tools necessary to understand the technical jargon used in the SLE analysis, a background to different container and video formats are provided in this appendix.

Background to container formats: Container formats define a wrapper format around data encoded into other standard video and audio formats. While several container formats to carry video and audio data are available, only three formats are relevant to this discussion. The containers of interest are:

1. 3gp format TAG maintains (and JDS can confirm), that this is the original format of the video-footage distributed by JDS.
2. AVI format: SLEs mention this as the possible original recording, and erroneously assume that this is a "possible" original format.
3. QuickTime: SLEs mention this as another possible original recording, and erroneously assume that is another "possible" original format.

A fourth container, Flash Video, is added for completeness, as TAG has seen .flv versions of the discussed video footage in some of the SLE presentations.

From the comparison in Table D-1, and SLEs technical discussions, the contention is on the use of H.263 (the equivalent to MPEG-4 part-2/ASP) and H.264 (equivalent to MPEG-4 part-10/AVC). SLEs assume the original video was recorded in H.264 (SLEs assume that this format is being used in .avi and/or .qt), but TAG asserts that H.264 is not at issue, as the original .3gp was recorded in H.263 as displayed in the 3gp file's meta-data.

One can reasonably conclude that since the video format employed is H.263, any perception of high/low-quality is a user's subjective view, and cannot be used to argue for fakeness of the video. But as the SLEs point out, mobile phones have not commonly started using H.264.

Container Format	Standards owned by	VBR-audio, VFR-video, B-frame support	Video formats supported	Audio formats supported
3gp (.3gp)	3GPP (3 rd Generation Partnership Project)	yes	H.263, (MPEG-4 part 2/ASP), H.264 (MPEG-4 Part 10/ AVC)	AMR (NB, WB), AAC and other versions
AVI (.avi) (Audio Video Interleave)	Microsoft	Some limitations	No native support for H-264 B-frames; user implemented workarounds	Most formats
Quicktime (.mov, .qt)	Apple	yes	Most formats	Most formats
Flash Video (.flv/.f4v)	Adobe systems	Limitation in VBR-audio	VP6, H.264 (MPEG-4 Part 10/AVC), and a few others	MP3, AAC, ADPCM and others

Table D1: Comparison of the four video formats:

Note:

- VBR – Variable Bit Rate
- VFR – Variable Frame Rate
- B-Frame – Bi-predictive inter-frame
- AMR – Adaptive Multi Rate
- NB, WB – Narrow Band, Wide Band
- AAC - Advanced Audio Coding
- MPEG-4: Moving Picture Experts Group (ISO/IEC standards)
- H.263, H.264: ITU-T standards
- ASP – Advanced Simple Profile
- AVC – Advanced Video Coding

H.263 and H.264 Standards: A brief technology background is necessary on the above two video standards to place some of the technical terms in context. Detailed specifications for H.263 and H.264 can be found in Reference [D-1].

SLEs say, “Channel 4 video has high quality VMC” – by VMC it is assumed the SLEs mean Motion vectors and/or Motion compensation, and the SLEs add that “it appears that VMC came from a video camera and not from a mobile phone,” a statement without any reference.

Encoders form a prediction of macroblocks (e.g.16x16 pixels) based on previously coded data, either from a current frame (intra-prediction), from other frames that have been coded and transmitted (inter-prediction) or from “future frames.” In H.264, methods supported are more flexible than previous standards, providing a 50% efficiency in compression as compared to H.263. The inter-prediction model which is formed by shifting samples from a reference frame, also known as motion compensated prediction, uses motion vectors to code the predicted block (residual of). H.264 allows support for a range of block sizes (down to 4x4) and fine sub-pixel motion vectors (1/4 pixel in the luma component).

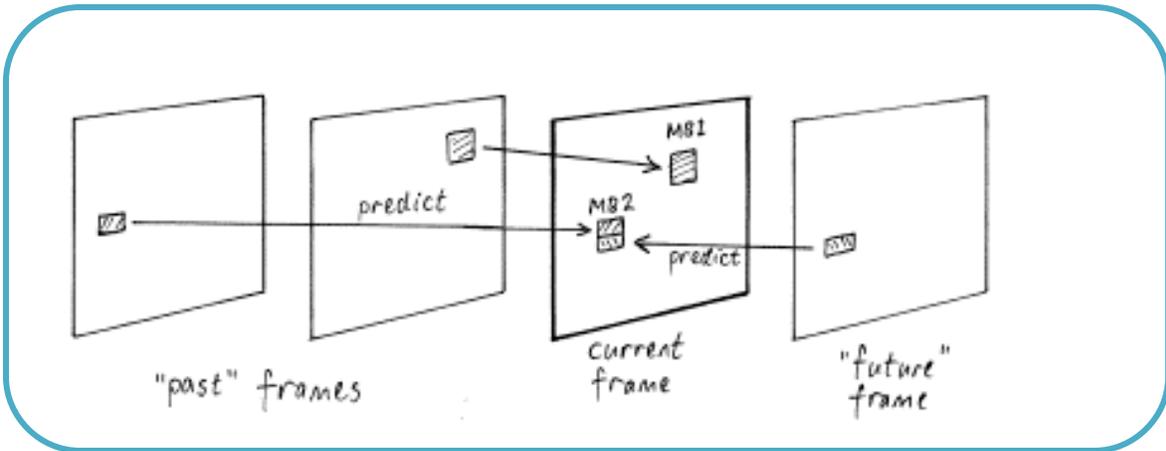


Figure D- 1. View of how macroblocks in the current frame are referenced from past, future frames. (coded as motion vectors) (Courtesy: www.vocodex.com)

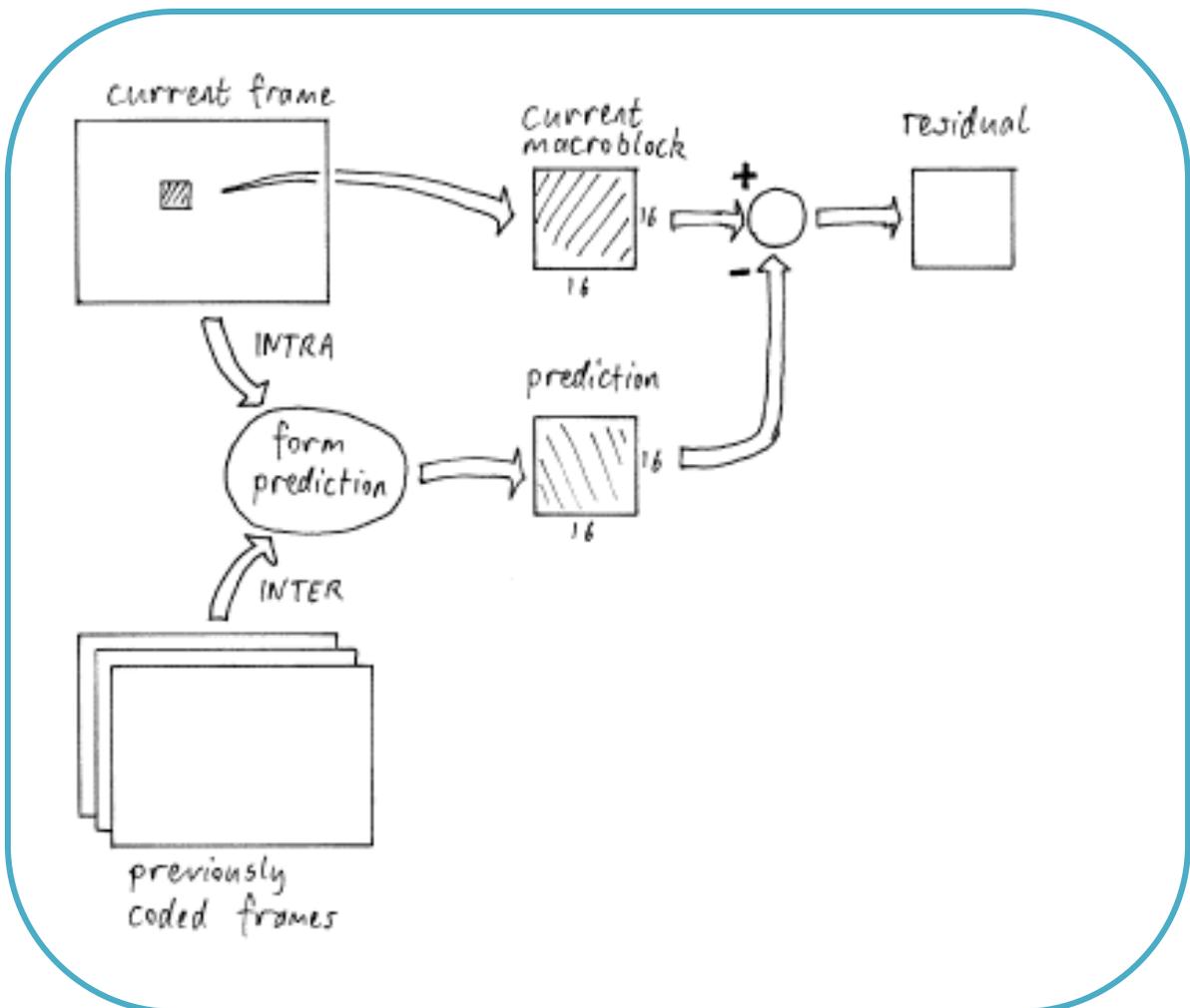


Figure D-2. Residual formation from prediction block (Courtesy: www.vocodex.com)

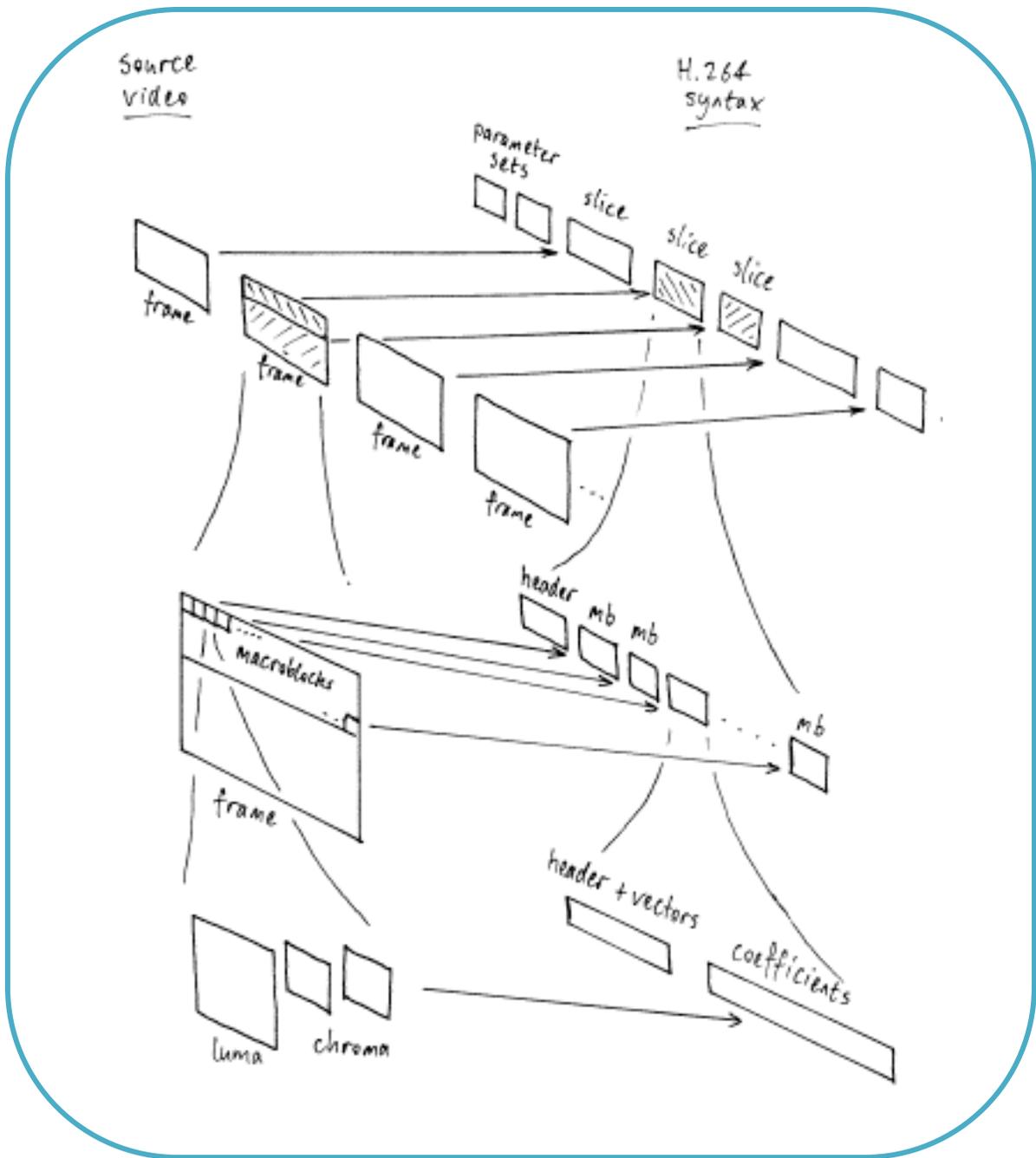


Figure D-3. H.264 – Slice, microblocks and coded vectors/coefficients (where slice is a partial/full coded video frame) (Courtesy: www.vocodex.com)

While the above brief description points to the algorithms used to render technical superiority to H.264, and the SLEs have widely referenced some of the techniques above, for the issue at hand, the above details appear irrelevant. In the 3gp version, H.263 coding is used, and motion vector techniques are not part of H.263.

Reference: D1: <http://www.itu.int/rec/T-REC-h>

Appendix-E: Timeline on Channel 4 video coverage

1. 25th August 2009: (First screening of the video)

Title: Execution video: is this evidence of 'war crimes' in Sri Lanka?

Source: Channel 4

http://www.channel4.com/news/articles/world/asia_pacific/execution%20video%20is%20this%20evidence%20of%20war%20crimes%20in%20sri%20lanka/3321087

Summary: The group said the video was taken in January by a soldier using a mobile phone, at the time when government forces overwhelmed the stronghold of the Liberation Tigers of Tamil Eelam (LTTE) at Kilinochchi.,

"The High Commission of Sri Lanka categorically deny that the Sri Lankan armed forces engaged in atrocities against Sri Lankan Tamil community. They were only engaged in a military offensive against the LTTE."

2. 26th August 2009:

(a) Title: Sri Lanka calls 'war crimes' video a fake

Source: Channel-4

http://www.channel4.com/news/articles/world/asia_pacific/sri+lanka+calls+aposwar+crimesapos+video+a+fake/3321507

Summary: Sri Lankan army spokesman Brigadier Udaya Nanayakkara said the footage – broadcast by Channel 4 News last night– was a fabrication designed to discredit security forces.

The Sri Lankan High Commission told Channel 4 News: "The High Commission has noted that in many instances in the past, various media institutions used doctored videos, photographs and documents to defame the Sri Lankan Government and armed forces."

(b) Title: "Channel 4" video false and fabricated - Govt.

Source: Sri Lanka Defence website

http://www.defence.lk/new.asp?fname=20090826_05

The video footage recently aired on 'Channel 4' UK claiming to display alleged atrocities committed by Sri Lankan forces against Tamils is absolutely false and fabricated. It has been deliberately put together to

bring disrepute to the Government of Sri Lanka, states the Presidential Secretariat in Colombo.

3. 27th August 2009

Title: Absolutely false, deliberately sinister – Sri Lanka

Source: Sri Lanka Policy Research and Information Unit (PRIU)
http://www.priu.gov.lk/news_update/Current_Affairs/ca200908/20090827channel4_absolutely_false.htm

Sri Lanka's High Commissioner in UK, Justice Jayasinghe's letter to Channel 4.

"I categorically denied that the Sri Lankan government forces engaged in atrocities against the Sri Lankan Tamil community during the recently concluded military offensive against the LTTE. The policy of the government of Sri Lanka when carried out military offensive was 'Zero casualties' of the innocent civilian population."

4. 31st August 2009

Title: Channel 4 video: The technical truth

Source: Sri Lanka Defence website
http://www.defence.lk/new.asp?fname=20090831_05

A "specialist in video coding," Sri Hewavitarne's first analysis of the video published in *The Island* and copied at the Sri Lanka Defence website.

"Looking at the results, I can say this video never came from a mobile phone since the original video is of quite a high standard and motion vectors were of high quality. (That never comes from a mobile phone). I also found that Tamilnet had tried to put this video on 3GPP format associated with mobile phones."

5. 2nd September 2009

Title: Demonstration and online petition against Channel 4 News UK

Source: Sri Lanka Defence website
http://www.defence.lk/new.asp?fname=20090902_13

British Sri Lankan Forum (BSLF) organizes demonstration against Channel 4.

6. 3rd September 2009

Title: Technical analyst exposes 'C- 4' gutter journalism

Source: Sri Lanka Defense website
http://www.defence.lk/new.asp?fname=20090903_05

Sri Lanka's "expert" Siri Hewavitarne's second article, says "since original video is from AVI and QuickTime format, the whole video scenario indicates that ORIGINAL video is of high quality that came from a video camera source since mobile formats does not use AVI or Quicktime which are high quality video formats."

7. 7th September 2009

Title : Findings of professional analysis pertaining to Channel 4 video footage

Source: Sri Lanka official news portal
http://www.news.lk//index.php?option=com_content&task=view&id=11369&Itemid=44

Press conference at the Media Center for National Security elaborates the outcome of the analysis by "independent experts" selected by Colombo.

8. 8th September 2009

Title: The Channel 4 canard

Source: Sri Lanka Defence website
http://www.defence.lk/new.asp?fname=20090903_04

Attack against Channel 4 and Jonathan Miller.

9. 9th September 2009

Title: Rebut or regret

Source: Sri Lanka Defense website
http://www.defence.lk/new.asp?fname=20090909_02

"Minister Mahinda Samarasinghe says the Government is going to ask the retraction of the controversial execution video from Channel 4, as comprehensive investigations and analysis conducted by four experts on

the video have provided scientific evidence to prove that it was a fake and a heavily tampered video.”

10.10th September 2009

Title: Sri Lanka government proves that the Channel 4 video is fabricated

Source: Sri Lanka Geneva Mission website
<http://www.lankamission.org/content/view/2576/49/>

Complete presentation of Sri Lanka's selected four experts' analysis results.

11.11th Sept 2009

(a) Title: Interview: Prof Rajiva Wijesinha

Source: Channel 4
http://www.channel4.com/news/articles/politics/international_politics/interview+prof+rajiva+wijesinha/3340897

“I'm sorry, but we don't have to have so-called independent inquiries into any Tom, Dick and Harry allegation. We pointed out to him that we had an extra-judicial killing a couple of weeks ago. We are sorry he wasn't concerned about that. But that's because it was not grist to the mill of LTTE...”

(b) Title: Sri Lanka steps up death video rebuttal

Source: Channel 4
http://www.channel4.com/news/articles/politics/international_politics/sri+lanka+steps+up+death+video+rebuttal/3340612

Channel 4 rebuts the Sri Lankan Government claims related to SLA soldiers not wearing white undershirts, not having long hair, and always wearing insignia.

12.17th September 2009

Title: Sri Lanka should permit an impartial investigation into the 'Channel-4 videotape', says UN expert

Source: UNHCR
<http://www.unhcr.ch/hurricane/hurricane.nsf/view01/452A1D22B1428720C125763400459661?opendocument>

Philip Alston, after asserting that the criteria to be met by international law for the video is a "thorough, prompt and impartial investigation," says he accepts Sri Lanka's response to be prompt, but that he is not in a position to comment on the thoroughness. On impartiality, Alston concludes that "the investigations undertaken cannot be characterized as "impartial"". In deciding on this element, Alston notes, "that two of the experts are members of the Sri Lankan Army, the body whose actions have been called into question. A third report is by Dr. Chathura De Silva, BSc Eng Hons (Moratuwa), MEng (NTU), PhD (NUS), Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa, who has advised the Government in relation to a number of other similar issues in the past. And the fourth is by Siri Hewawitharana, a broadcast media specialist based in Australia, who is said to be the former head of Cisco's global broadcast and digital video practice. No other information has been provided by the government on Mr Hewawitharana, but it would appear that he is a member of a network of Sri Lankan Professionals. I would welcome more information on how he was identified and selected by the government as an independent expert."

13.20th October 2009

Title: True or False

Source: *Sunday Leader*

<http://www.thesundayleader.lk/2009/10/20/true-or-false/>

Sunday Leader publishes TAG's report from an independent forensic analysis firm from Colorado confirming the authenticity of the video.

Note: *Sunday Leader* has removed the article from the website. TAG has a pdf version of the story.

14.24th October 2009

Title: And now they come for us

Source: *Sunday Leader*

<http://www.thesundayleader.lk/2009/10/24/and-now-they-come-for-us>

Munza Moshtaq who wrote the story on the authentication of the video in the *Sunday Leader* receives a death threat.

Note: *Sunday Leader* has removed the story from the website. TAG has a saved pdf version of the article.

15.15th December 2009

Title: Sri Lankan war crimes video is authentic, Times investigation finds

Source: Times On Line (UK)

<http://www.timesonline.co.uk/tol/news/world/asia/article6956569.ece>

“Video footage that appears to show Sri Lankan troops committing war crimes by summarily executing captured Tamil Tiger fighters on the battlefield was not fabricated, as claimed by the Sri Lankan Government, an investigation by *The Times* has found.”

16.18th December 2009

Title: IFJ Mission Identifies Key Challenges for Sri Lanka's Media after War's End

Source: International Federation of Journalists (IFJ) website

<http://www.ifj.org/en/articles/ifj-mission-identifies-key-challenges-for-sri-lanka-s-media-after-war-s-end>

Saved copy of the report:

<http://www.tamilnet.com/img/publish/2009/12/Doc15Report.pdf>

“On October 22, senior *Sunday Leader* staff - news editor Munza Mushtaq, under whose byline the report was published, and editor Frederica Jansz - received identical letters threatening to kill them and slice them into pieces if they continued to publish. The *Sunday Leader* management submitted the letters to a handwriting expert, whose analysis revealed a close resemblance with the hand that composed the last letter of threat received by Lasantha Wickrematunge, founding editor of the newspaper, before he was murdered on January 8.”

Appendix F: Display & Cell Phone-Recording of Tamil Bodies by SLA

The Sri Lankan army has a track record of displaying naked bodies of combatants killed in combat. A few photographic samples are provided to establish this trend. The photo in Fig. F-1 is one of several photos published in the country's media where naked bodies of men and women were paraded among the public before they were cremated. Observe several cameramen vying to video record the event on the left side of the tractor-wagon.



Figure F-1: SLA parading unclothed bodies of Tamil combatants following the Anuradhapura attack on Sept/09/2008 (for more photos: <http://www.tamilnet.com/art.html?catid=13&artid=23582>)

The following video frames are from a combat event in which several Tamil female fighters were killed. One of them was stripped naked and a video of her body was circulated by SLA members.



Figures F-2 Still video frames of a young female Tamil fighter taken by an SLA member on a cell phone (Dec/27/2007).

(cell phone recording: http://downloads.ziddu.com/downloadfile/2450150/Atrocities_of_SLA.3gp.html)

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Appendix-G

Company Background

Company and Facilities:

Automated Dispatch Systems, Inc., Founded 1986 as a corporation in the state of Colorado

Overall operations to include:

- Audio and Video Forensics, Enhancement and Authentication Services
- Voice Identification/Comparison Services
- Design and Development Services in Electronics and Computer Applications
- Fully equipped Audio, Video and Voice Signal Processing Laboratory
- Fully equipped Design and Development Facility
- Magneto-Optical Imaging Services for Magnetic Recording Tape

Registered Trade Marks:

- Image And Sound ForensicsTM (Federal and Various States)
- Professional Attorney Support ServicesTM (State of Colorado)
- Colorado Forensic JournalTM (State of Colorado)

Education of Associated Personnel:

Law Enforcement & Emergency Services Video Association (LEVA):

Level II Forensic Video Analysis & The Law – Certificate of Completion, June 2008

Level I Forensic Video Analysis & The Law – Certificate of Completion, May 2008

c/o University of Indiana

Institute of Electrical and Electronics Engineers (IEEE):

Continuing Education – 2004, 2008

Audio Engineering Society (AES):

Audio Forensics Conference, 2008

Exhibitor – Magneto-Optical Indicator Film Imaging System & Imaging Services for audio recording tape.

Audio Forensics Conference, Certificate of Completion, 2005

American College of Forensic Examiners Institute (ACFEI):

Continuing Education, Certificates of Completion, 2005 - 2008

Enhanced Audio Inc.:

Forensics Audio Enhancement/Authentication Training,

Certificate of Completion, 2005, 2008, 2009

New York Institute for Forensic Audio (NYIFA):

Forensic Audio, Video and Voice Identification – Certificate of Completion, 2005

c/o Western Kentucky University

Voice Identification Inc. (VII):

Certificate In Process – 2005 to present

University of Colorado, Undergraduate 48 credit hours in EE/CS

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Affiliated Organizations:

American College of Forensic Examiners Institute (ACFEI),
American Board of Recorded Evidence – Member, www.ACFEI.org
Audio Engineering Society (AES) – Member, www.AES.org
Institute of Electrical and Electronics Engineers (IEEE) - Member, www.IEEE.org
International Association for Identification, Rocky Mountain Division, www.RMDIAI.org
Society of Motion Picture and Television Engineers (SMPTE) - Member, www.SMPTE.org
Professional Private Investigators Association of Colorado (PPIAC) - Member, www.PPIAC.org
Colorado Press Association – Associate Member – www.ColoradoPressAssociation.com

Case/Project History:

As of Nov 2009 for last five years. Cases or projects that are in process or out of North America may not be listed. Individual Client names have been removed from list or abbreviated for confidentiality.

Date	ID#	Docket # / Court	Case Caption, State, Type	Work Products
2009 NOV	20091114		,CO,CV, Voice Mail Transfer	M, AE
2009 OCT	20091020	FN: 15077-3	,CO,, 911 Recordings	M, AE
2009 OCT	20091001	2:2009CV00121	Brummell v. Wimsboro, et al., TX, CV	M, AE, VE
2009 SEP	20090902		,TX,CV	M, AE
2009 AUG	20090802		,CO, CV, MP3 Recording of Hearing	M, AE
2009 APR	20090409	09-004CC	,CA, CV, Internal Affairs	M, AE, TS
2009 JUL	20090716		,KS,CR, Voice ID	VI, DE
2009 APR	20090401		,NJ, Voice Identification, 5 cases	VI, DE
2008 DEC	20081201		, NE	M, AE
2008 SEP	20080926		, CO, CV	M, AE
2008 AUG	20080829		, OR, CV,	M, AE
2008 AUG	20080822		, CO, CV	M, VE
2008 AUG	20080809	2008113775U	, FL, CV, Unemployment Appeals Commssr	AA, RA, A, TH
2008 AUG	20080807	07CR33358	State of Colorado v. Gary Carricc	AE
2008 JUN	20080628	AFC 08-9026	Tennison v. City & County of San Francisc	M, MI
2008 MAY	20080508	06CV0432	McLean v. Robinson, et al., CO, CV	M, AE
2008 MAY	CA91523NBC		, CA, N, AM/COMM VLR-446 Restoration	ER
2008 APR	20080318	W9423-G6039	Merrell v. Wal-Mart Stores, Inc.,MT, CV	M, VE
2008 MAR	20080305		, CO, CV, USAA	M, AE
2008 FEB	20080211		, UT, CR, "Draper beats Beard"	M, VE
2008 JAN	20080107		, CO	M, AE
2007 DEC	20071218		, MN, N, Audio Restoration, Gray Audogram	M, AE
2007 DEC	20071217	07-159-R	State v. Fred Allen Goens, WY, CR	M, AE
2007 NOV	20071103	06-C-00598-4 KNT	State v. Curtis Rose, WA, CR	M, AE, TS
2007 NOV	20071102		, CO	M, VE
2007 NOV	20071101		, CO, CV, Digital Audio	M, AE
2007 OCT	20071001	07CR105	State v. Evan Ebel, CO, CR	M, RA, A
2007 SEP	20070928		, CO	M, VE, AE
2007 SEP	20070927	07CR3046 State	State v. Kristena Tolmich, CO, CR	VI
2007 SEP	20070926	CR-05-069-VAP, US	USA v. Murillo, et al., CA, CR	M, VE
2007 SEP	20070912		, MN	M, AE
2007 AUG	20070802		, CO, CV	M, AE
2007 JLY	20070704		, FL	M, AE
2007 JLY	20070703	03-1315 Univ. of WY	, WY, CV, Certified Copy and Transfer	M, CC, RA, A
2007 JNE	20070702	07CV516 Adams Co.	Dawn Miller v. Brian D. Steele, et al., CO, CV	M, CP
2006 JNE	20070601-01		, VA, , MC60 Cassette / Magnetic Imaging	M, MI
2007 MAY	20070601		, KY	M, AE
2007 MAY	20070506		, VA, , MC60 Cassette / Magnetic Imaging	M, MI
2007 MAY	20070505		, SC	M, VE
2007 MAY	20070504		, TX	M, VE
2007 MAY	20070503	05-16130 FC 28	Krugly v. Krugly, FL, CV	M, AE
2007 MAY	20070502		, TN	M, AE

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Date	ID#	Docket # / Court	Case Caption, State, Type	Work Products
2007 APR	20070410			M, AE
2007 APR	20070409		, WA	M, VE
2007 APR	20070408		, CO	M, VE
2007 APR	20070407		, AR	M, AE
2007 APR	20070406		, WY, , Data CD Examination	M, CD, RA, A
2007 MAR	20070328		, VA, ,Digital Audio, Olympus DVR DS-330	M, AE
2007 MAR	20070322		, VA, ,Eyretel E1000 Tape / Magnetic Imaging	M, MI
2007 MAR	20070301	06CV433	Mary Williams v. Safeway, Inc., CO, CV	M, VE
2007 FEB	20070224		, TX	M, AE
2007 FEB	20070203		, CO	M, AE
2007 FEB	20070202		, FL	M, AE
2007 JAN	20070109		, CA	M, VE
2007 JAN	20070108		, IN	M, AA
2007 JAN	20070107		, IN	M, AE
2007 JAN	20070106		, NJ	M, VE
2007 JAN	20070105		, CA	M, AE
2007 JAN	20070104		, TX	M, AE
2007 JAN	20070103		, CO	M, AE
2007 JAN	20070102		, IL	M, AE
2007 JAN	20070101		, IN	M, AA
2006 DEC	20061230		, CA	M, VE, AE
2006 DEC	20061228	A518710 Clark County	Ozawa v. Vision Airlines, NV, CV	M, AE, RA, A
2006 DEC	20061211		, CO	M, AE
2006 DEC	20061208		, TX, CR, Inventory Theft	M, VE, FS
2006 DEC	20061206		, MI	M, AE
2006 NOV	20061120			M, AE
2006 NOV	20061114		, GA	M, AE, VE
2006 SEP	20060924		, IL	M, AE
2006 SEP	20060923		, IA	M, AE
2006 SEP	20060922		, WA	M, AE
2006 SEP	20060921	021079403SEA	State v. Bobby Joe Lyons, WA, CR	M, AE
2006 SEP	20060909		, AL	M, AE
2006 SEP	20060906		, CO	M, AE
2006 AUG	20060807		, NC	M, VE
2006 AUG	20060806		, WY	M, AE
2006 OCT	20060805		, GA	M, AE
2006 SEP	20060804		, CA	M, AE
2006 JLY	20060609		, KY	M, AE
2006 JLY	20060608		, KS	M, AE
2006 AUG	20060607		, OR	M, AE
2006 JNE	20060606	04CR2929 State	People v. Andrew Plancarte, CO, CR	M, VE
2006 JNE	20060604		, CA	M, AE
2006 JNE	20060601		, CO	M, AE
2006 MAY	20060522		, MT	M, AE
2006 MAY	20060521		, NY	M, AE
2006 MAY	20060520		, LA	M, AE
2006 MAY	20060519		, MI	M, AE
2006 MAY	20060518		Willingham, et al. v. Miskel, et al., MO, CV	M, VE
2006 MAY	20060513		, NY	M, AE
2006 MAY	20060503		, ON	M, AE
2006 MAY	20060501		, OH	M, AE
2006 APR	20060425		, CA	M, AE
2006 APR	20060424		, KY	M, AE
2006 APR	20060421		, CO	M, AE
2006 APR	20060407		, CA	M, VE
2006 MAR	20060327		, CO	M, AE
2006 MAR	20060316		, CO	M, AE, RA
2006 MAR	20060312			M, AE
2006 MAR	20060301		, CA	M, AE
2006 JAN	20060131		, CO	M, AE
2006 JAN	20060119		, CA	M, AE
2006 JAN	20060117		, LA	M, VE
2006 JAN	20060110	05F21050X	Nevada v. Chambliss, NV, CR	M, VE
2005 DEC	20051219		, MO	M, AE

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303-805-5301

Date	ID#	Docket # / Court	Case Caption, State, Type	Work Products
2005 DEC	20051212		, WY	M, AE
2005 NOV	20051130		, NH	M, AE
2005 NOV	20051101		, , Insurance Interview	M, AE
2005 OCT	20051024		, NJ	M, AE
2005 OCT	20051005	02GS-512772	People v. Newman, CO, CR	M, AE
2005 SEPT	20050916		, NC	M, AE
2005 SEPT	20050829		, CA	M, AE
2005 JLY	20050728		, CA	M, VE
2005 JLY	20050712		, CT	M, AE
2005 JLY	20050706		, GA	M, AE
2005 JNE	CA94303DMI		, CA	M, AE
2005 MAY	20050429		, CO	M, AE
2005 MAR	20050426		, NY	M, AE
2005 MAR	20050420			M, AE
2005 APR	20050419		, GA	M, AE
2005 MAR	05031401			M, AE
2004 OCT	20041020	Douglas County	, CO, CR, Key Bank	M, VE

Type Key:

CV – Civil Court
N – Not applicable

CR – Criminal Court
‘ ‘ – (Blank) Not applicable/Unknown

SC – Small Claims Court

Work Products Key:

A – Affidavit
CC – Certified Copies
D – Deposition
FS – Forensic Sketch
PR – Peer Reviewed
TH – Testimony at Hearing
VA – Video Authentication

AA – Audio Authentication
CD – CD /DVD Forensic Examination
DE – VI Decision Only
M – On Media (Tape/CD/DVD)
RA – Report and Analysis
TS – Transcription
VE – Video Enhancement

AE – Audio Enhancement
CP – Cell Phone Examination
ER – Equipment Restoration
MI – Magnetic Development/Imaging
T – Testimony at Trial
V – Video Deposition
VI – Voice Identification

Appendix-H

Firearms & Ballistics Consultants

2433 N. Perry Park Rd.

Sedalia, CO 80135

phone: (303) 660-6603

Firearms Testing and Evaluation
Ballistics Research & Development

Firearms & Ballistics Technical Expertise
Ballistic Threat Analysis & Evaluation

SUMMARY

AREAS OF EXPERTISE:

Testing and Evaluation of firearms, ammunition, body armor and other law enforcement equipment; Hi-velocity and Hyper-velocity Ballistics; Terminal Ballistics; Firearms Design, Manufacture, Maintenance and Optimization; Law Enforcement/Security and Fire/EMS Management; Law Enforcement Firearms Instruction; Fire Investigation & Arson Detection; Death Investigation; Engineering Management; Product Development; Design Assessment; Design Optimization; Electro-Mechanical Design; Structural Analysis; Dynamics; Thermodynamics; Fluid Dynamics; Aerodynamics; Kinematics; Emergency Medical Technology.

EXPERIENCE:

- 3 1/2 years serving as **Technical Advisor** for law enforcement and corrections agencies worldwide on weapons, ballistics, ballistic body armor, firearms training and related issues under a program of the National Institute of Justice implemented by the National Law Enforcement & Corrections Technology Centers.
- 1 year as **Test Coordinator/Ballistics Range Manager** at the National Institute of Science and Technology - Office of Law Enforcement Standards developing new ballistics testing techniques and procedures for the testing and certification of ballistic armor, reviewing and revising various NIJ Standards for the testing of law enforcement equipment, certifying ballistics testing laboratories, conducting ballistics research, providing law enforcement and corrections agencies with expertise on firearms, ballistics, protective equipment and training programs
- 2 years as **Weapons Technology Manager** at the National Law Enforcement and Corrections Technology Center – Rocky Mountain Region working with the National Institute of Justice and the Office of Law Enforcement Standards at the National Institute of Standards & Technology reviewing and revising various NIJ Standards for the testing of law enforcement equipment, conducting ballistics research, providing law enforcement and corrections agencies with expertise on firearms, ballistics, protective equipment and training programs.

- 6 years as a **Public Safety Officer** with Castle Pines Emergency Services - A Public Safety agency responding to criminal, fire, and EMS incidents within its service area.
- Over 30 years experience as a **Design Engineer** involved in all aspects of mechanical engineering design and analysis of firearms and other weapons systems, research & development of spacecraft (manned and unmanned), ground transportation vehicles, vehicle subsystems, robotics, remote sensing equipment, special laboratory equipment, vehicle braking systems, vehicle power systems, etc.
- Over 30 years as a **Gunsmith**, proficient in the design, manufacture, repair and restoration of all types of rifles and handguns. Experienced at performing ballistics and terminal effects experiments. Developed several innovative special purpose small arms projectiles and weapons subsystems.
- Currently serving as **Firearms & Ballistics Technology Director** at Firearms & Ballistics Consultants, providing firearms and ballistics expertise to armor manufacturers, districts attorney and law enforcement agencies, as well as performing firearms related research for attorneys.
- Currently serving as **Deputy Coroner/Assistant Chief Deputy Coroner** for the Douglas County Coroner's Office in Castle Rock, Colorado, investigating deaths falling under the jurisdiction of the Douglas County Coroner, including shooting deaths.
- Deposed and/or testified and accepted as an **Expert Witness in Firearms and Ballistics** in firearms and/or body armor cases in Florida, Pennsylvania, California, Massachusetts, Kansas, Pennsylvania, Colorado, Florida, Montana and Maryland.

Additional confidential data is provided to The People's Tribunal, Dublin, Ireland as sealed information.