



Live Quality Video over Cellular and Analytics

The winning combo

Baruch Altman

email: baruch@liveu.tv

Mobile: +972-52-6167882

Agenda

- Analytics basics: high quality video
 - Operational needs
 - What is “quality”
 - How reliable
- Quality video from the field: how
 - Traditional
 - Multi-SIM bonding
- A surprising novel use case for Live Quality Analytics
- Enhanced capabilities for Analytics using quality video
 - In the field
 - At the center

Operational Needs

- Image details
- Image changes
- Significance
- Real time
- Continuity
- Resiliency to environmental conditions == “any time”
- Remote from objects/subjects, longer ranges, less friction
- Remotely: in the center
- Minimal errors, false alarms
- Process automation
- Cost effective



Elementary:

Video “quality” significantly impacts the analytics availability & results

Quality & reliability

- Image details:
 - Full HD? 3D?
 - Resolution/pixels, fps, quantization, artifacts,
- Image changes
 - Object/camera movements,
- Significance
- Real time
 - Latency, PTZ
- Continuity
 - Breaks, recovery time,
- Resiliency to environmental conditions == “any time”
 - Equipment (camera, lighting, ...), physical (indoor/out, night/day, weather, distance, angle, ...)
- Remotely, from “anywhere”
 - Static, mobile, indoor/outdoor, rural/urban, airborne, ...
- Minimal errors, false alarms
- Process automation
- Cost effective



The problem

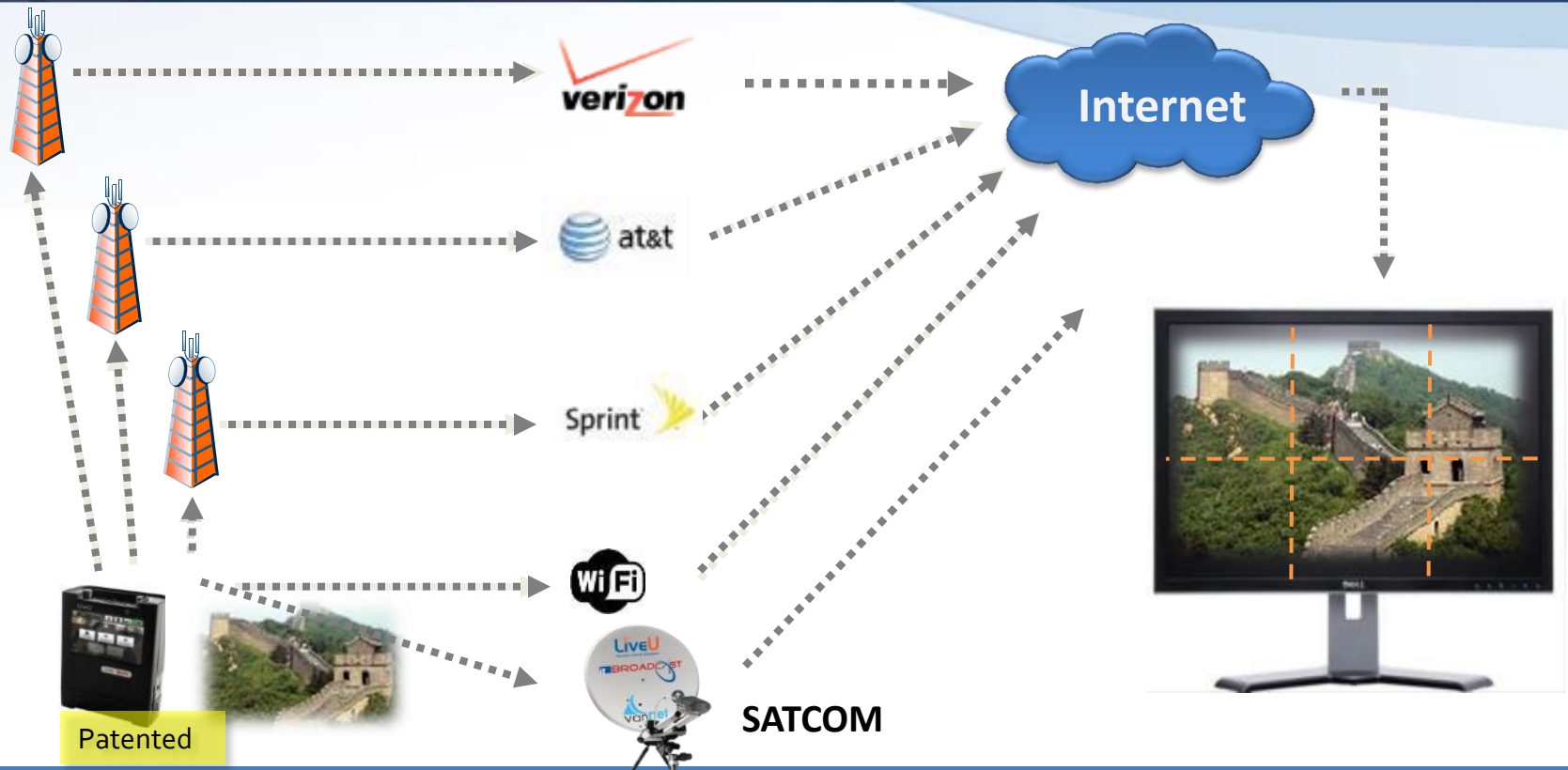
- Continuously improving and cost-reduced optics
- Continuously improving analytics (algorithms, performance, context, ...)
- Continuously demanding operational environments (number/type/durability of objects, lower friction, any weather...)
- Continuously increased demand in existing & new scenarios
- Bottle neck remains: mobile transmission of quality video to ENABLE analytics

Put the Video into “Video Analytics”

Traditional video transmission issues

- LAN/IP/Ethernet
 - Static
 - Specific locations
 - Bandwidth limitation
- Single cellular
 - Video quality (even in 4G/LTE)
 - Reliability
 - Not everywhere
- COFDM/MW
 - Short range
 - LOS, not anywhere
 - Quality
 - Cost
- Satellite
 - Cost
 - Static
 - Not indoors

Bonding: using multiple networks simultaneously



- Capacity:** Aggregates ALL detected networks
- Reliability:** Dynamic routing and load-balancing of video
- Mobility:** Portable, indoor or out, transmitting while on the move
- Accessibility:** Quick time-to-air, affordable pricing
- Transparency:** Network and protocol agnostic (Wi-Fi, 3G, 4G LTE, Satellite, etc.)

LiveU multi-link Bonding portfolio

LU70



7 modems inside
Analog, HDMI,
SDI camera
IP Camera



LU40S



LU40D

L2 Data Bridge
LU40 HW platform

4 modems inside
Analog, HDMI,
SDI camera



LU500

Latest Gen
8 modems inside
Analog, HDMI,
SDI camera

LU Center



SatCOM-
bonded



LU-Xtender

Remote/roof
mount
6 additional
modems + antenna

LU-Smart



Bonding app:
cellular+WiFi or
dual cellular

LU-Lite



Bonding software solution
for Win laptops

Multi-link bonding for video analytics

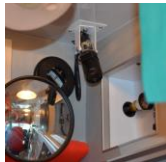


Live Quality Analytics: Medical

Live from ambulances en-route to Emergency Department



- Medic performs e-FAST using Sonosite
- Overhead video camera views patient



via LiveU:

- Ultrasound image is obtained from patient video. Built in GPS
- Patient vitals (future)



- Live stream transmission to ED trauma command center via secure hospital server

Development and Evaluation of a Novel, *Real Time Mobile Telesonography System in Management of Patients With Abdominal Trauma*, Study Protocol; Chinwe Ogedegbe, Herman Morchel, Vikki Hazelwood, William F Chaplin, Joseph Feldman; BMC Emerg Med. 2012;12(19) ; <http://www.biomedcentral.com/1471-227X/12/19> ;

Emergency Trauma Department, Hackensack University Medical Center, 30 prospect Avenue, Hackensack, NJ, 07601, USA
Department of Psychology, St. John's University, 8000 Utopia Parkway, Jamaica, NY, 11439, USA

Live mobile UltraSound Operational Need



“Systems are limited by their inability to securely transmit live video images ... with high quality resolution and detail. ... particularly relevant for medical personnel in the battlefield..”

“Among patients with abdominal trauma in the pre hospital setting, the goal of this study is to develop and evaluate the performance characteristics of a novel portable Telesonography..”

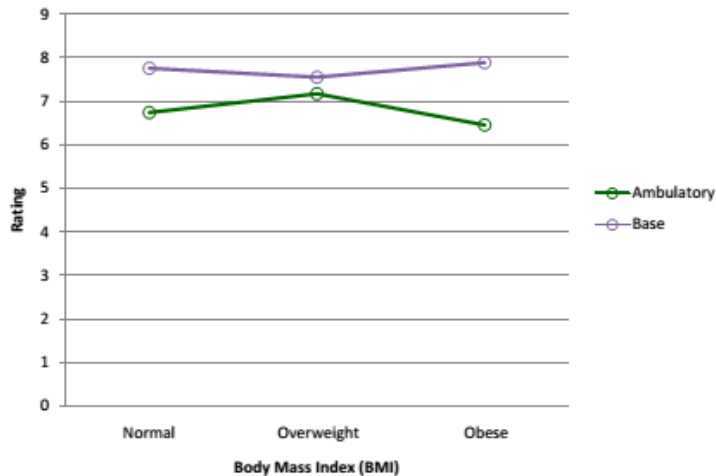
Live mobile UltraSound Analytics



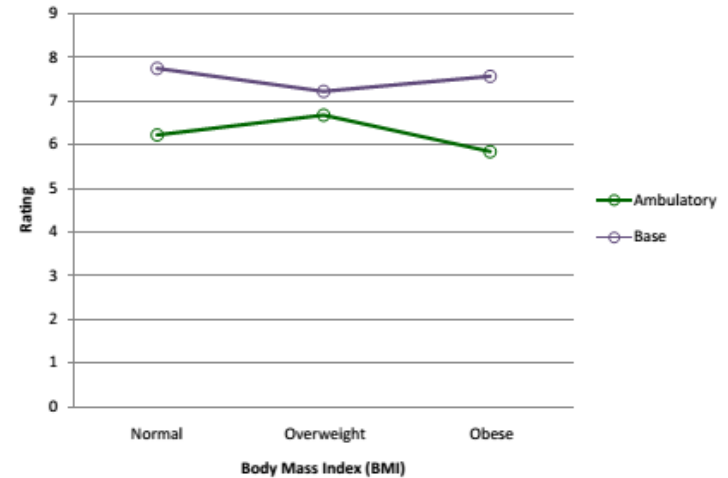
Analytics: The ultrasound images from the moving ambulance and ED were then evaluated by **20 UTPs (67% ED physicians, 19% radiologists and 14% surgeons)** using the well-validated QUIS **rating scale that has 12 items** grouped into three subscales: Overall Reactions (4 items); Screen Factors (3 items); and Multimedia Factors (5 items)

Live mobile UltraSound Preliminary Results

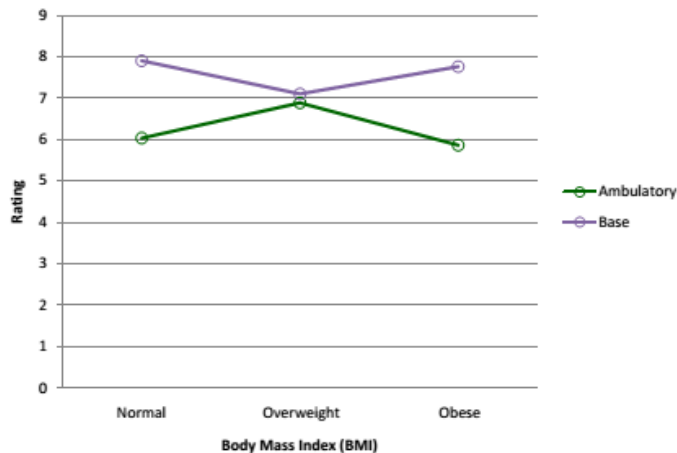
Screen Factors



Overall User Reaction to the System



Multimedia Factors



Over 75% of the raters thought the ambulatory images were useful; ranging from **76% for the obese images to 81% and 90%** for the normal and overweight images. **Over 66% of the UTPs** thought a diagnosis can be made from the ambulatory images.

Conventional Examples in Defence and HLS



*Japan Tsunami
Disaster management from helicopter*



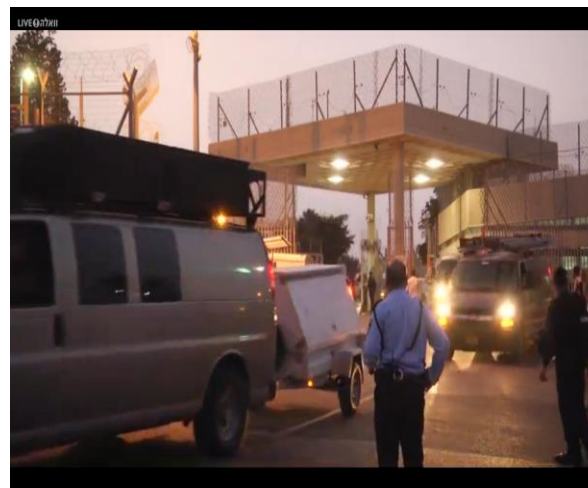
*Arab Spring
Demonstrations & riots*



Haiti Earthquake



During riots



Tactical intervention, event management



*LatAm
Crowd management*

Enabler of Analytics at the HQ

- Crowd-related events and disturbances
 - Face detection, numbers, areas, behaviors
- Surveillance & ISR
 - Faces/subjects/objects, LPR, patterns, context, associations/contact
- Mobile surveillance
 - From moving vehicles, man-carried video generation, airborne (drone, helicopter)
- Distance from objects
 - Less operational friction, use of better optics
 - Manned/unmanned surveillance
- High quality & reliability → improved process automation, fewer false alarms & failures



Summary

- Increase Operational Relevancy
- Free the bottleneck
- Add quality to Live Video for Video Analytics
- Bonded multi-SIM transmission is the enabler

Thank You



baruch@liveu.tv

Web: www.liveu.com Twitter: www.twitter.com/LiveU Facebook: www.facebook.com/LiveU.Fans