

Cameras are one of the most cost-effective and efficient methods for incident verification.

**Cameras help TRAFFIC MANAGEMENT in an organized, planned, and coordinated effort to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible**

**Gerard Amato / CohuHD**

**[gamato@CohuHD.com](mailto:gamato@CohuHD.com) – (410) 381-5000**

# The Evolution of CCTV

## *Areas of Discussion...*

- **IP Cameras**  
Internal vs External Encoding
- **High Definition Video**  
What's all the hype?
- **H.264 Encoding**  
How is it Different?
- **Advanced Camera Functions**





## IP Cameras

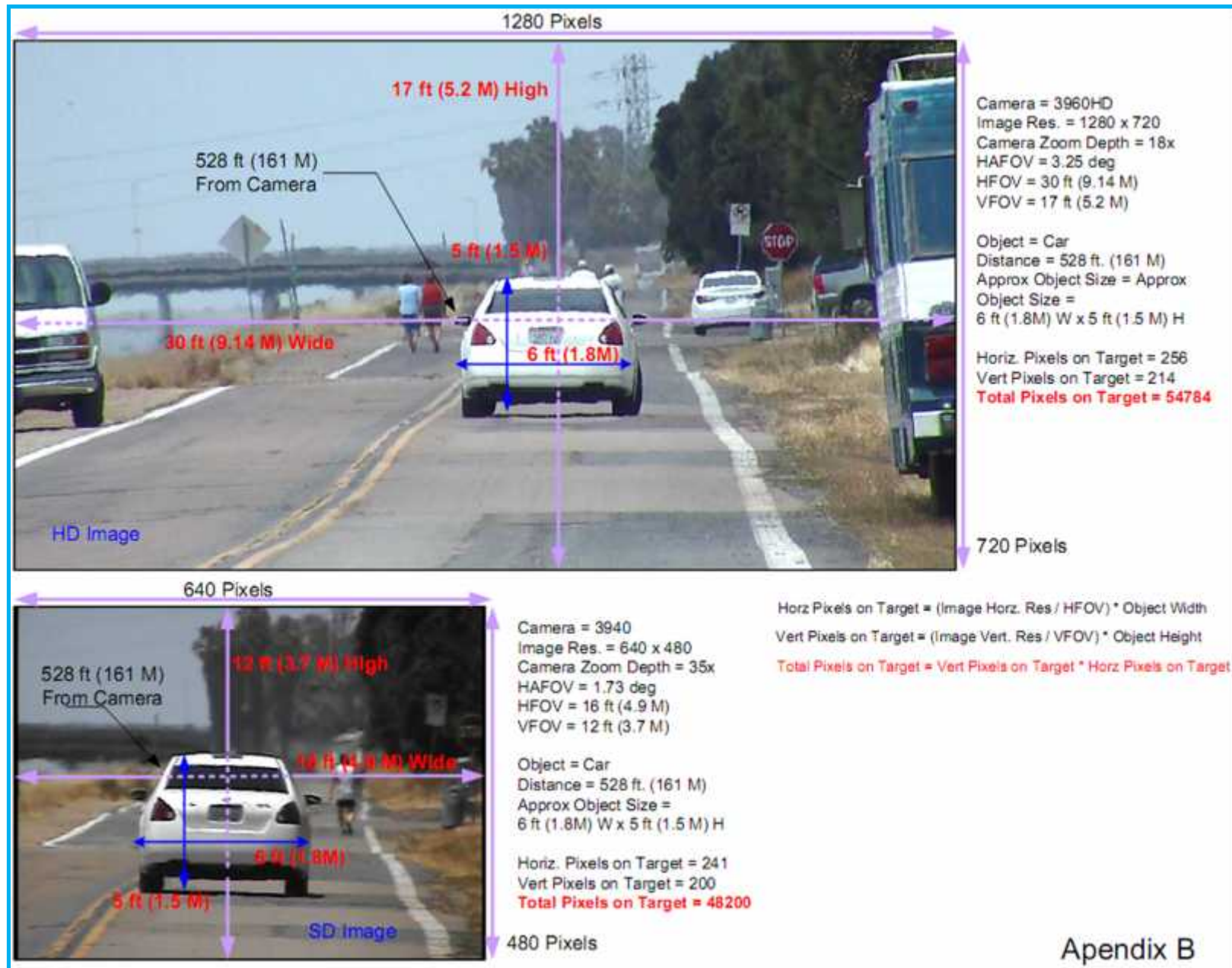


- Internally encoded analog video
  - Digitized, IP Ethernet Format, Compressed
- Getting over the Hurdle
  - Power, 10/100, serial, USB, Audio, Video, LED's
- Holding to Standards & Spec's
  - TS-2, Pressurized, Sealed
- Simplicity
  - Cable and Cabinet requirements

# Exploring HiDef Video

- HiDef is a Video Compliance Standard  
720p, 1080p, 16:9 Aspect Ratio
- Difference Between HiDef & Megapixel cameras  
Resolution equivalence
- Difference Between HiDef & SD (analog) Video  
Visible Differences

# HiDef Comparison to SD Video



# HiDef Comparison to SD Video



# A Look at the Network

I asked my dad where the children came from, he said people download them from the internet!



# The Holy Grail.....

Better Image Quality  
w/Less Bandwidth





# Effects on Networks

- Frame Rates
- Resolution
- Bandwidth



# Encoding Video



## The Physics of Encoding – Doing the Math...

- NTSC analog video is 640 x 480 pixels per frame
  - Total pixels per frame = 300,000
  - Times 30 frames p/sec = 9,000,000 pixels p/sec
  - Times 24 bits per pixel = 221,000,000 Mbits
  - Divide by 8 bits per byte = **27 MB** (uncompressed)
- 
- HDTV (720p) is 1280 x 720
  - **83 MB** (uncompressed)



# H.264 Video Compression



- Video Compression is Really Motion Compensation

The difference between consecutive frames in terms of where the previous frame has moved to. Subsequent frames have a lot of redundancy.

- What is H.264 ?

- MPEG4 Part 10 or AVC
- Covers low bit-rate Internet Streaming, to HDTV Broadcast & Digital Cinema
- Contains new features that allow it to compress video more effectively

- A Truly Open Format

Windows Browser, VLC, QuickTime

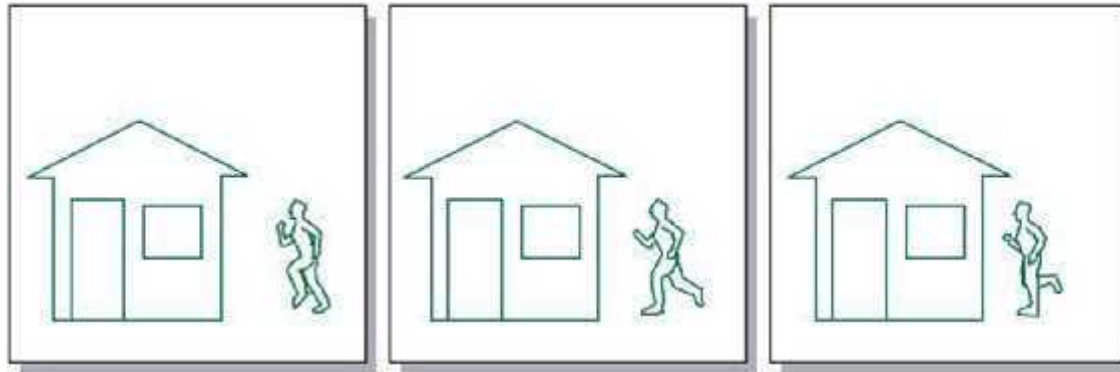


- Universal Usage

YouTube, Skype, Blu-ray, iPhone, iTunes Store



## VIDEO COMPRESSION



*With the MJPEG format, the three images in the above sequence are coded and sent as separate unique images.*



*With H.264 difference coding, only the first image is coded in its entirety. In the two following images references are made to the first picture for the static elements. Only the portions of the frame which have changed are re-coded.*

# What to look for in a camera



- Analog or IP Camera
- Standard versus High Definition
- Easily integrated in existing architecture
- Sealed / Pressurized
- Fixed position or PTZ camera
- Dome camera or Barrel camera



- Pan/Tilt
- Multi Focal
- Auto Focus
- Auto Iris

# Combining Technologies

## *H.264 & HDTV*

- Made available w/increase in processing power
- Until Recently, HD Video Over IP Performed Poorly Over Most LAN/WAN Networks
- H.264 & HiDef TV are Found in Nearly Every New Video Product in the Market Today
- ONVIF Makes it Compatible
  - **Consortium camera manufactures**
  - **For standardizing interoperability**
  - **Defines a common protocol how network video devices should exchange information**

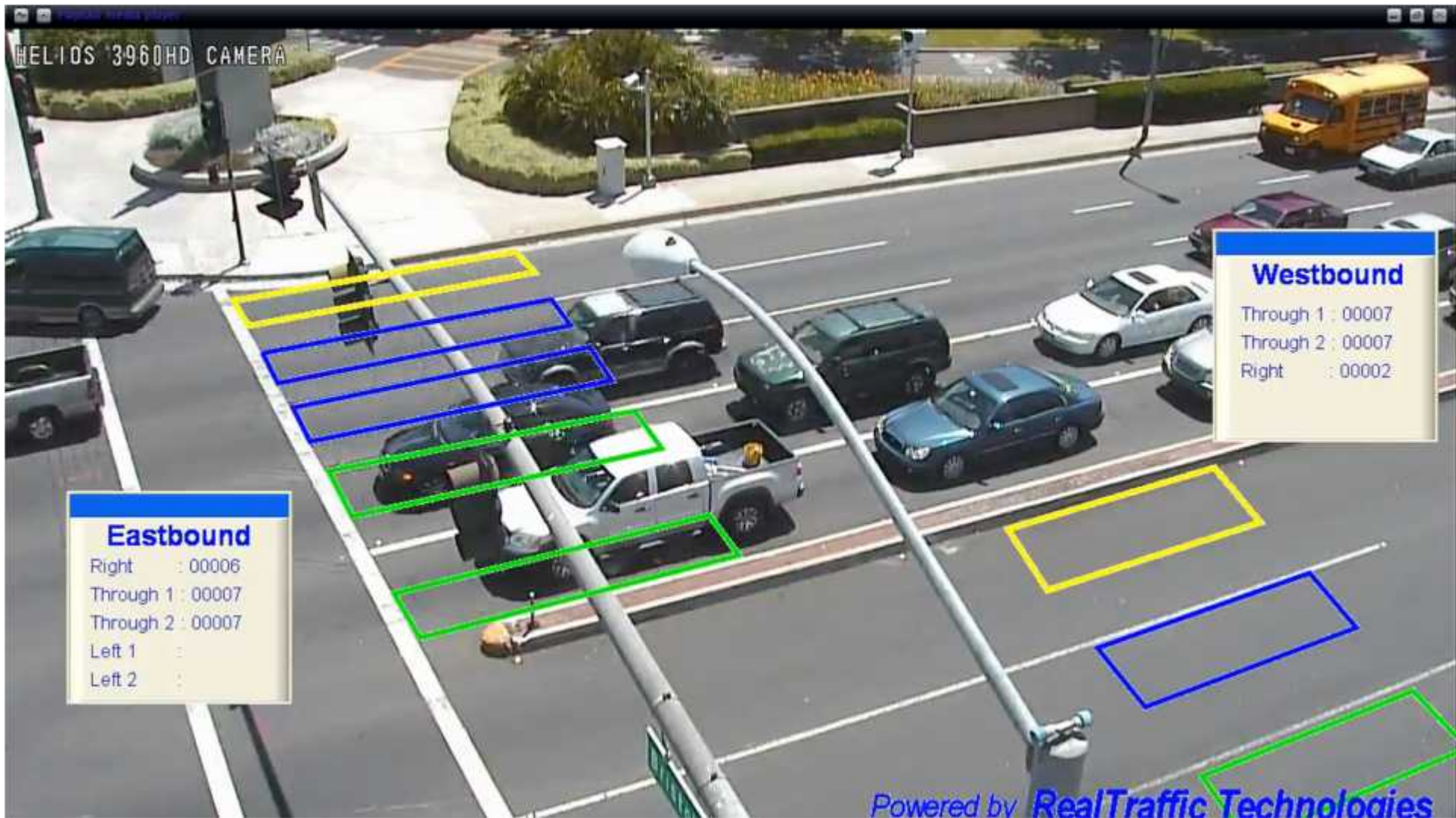


# Advanced Camera Functionalities...

- Traffic Analytics
  - Speed / Occupancy
- Wide Dynamic Range (WDR)
- Internal Web Server
  - Admin, Control, View
- Multiple Outputs H264, MJPEG & Analog Video
- Motion Detection
- NTCIP over IP







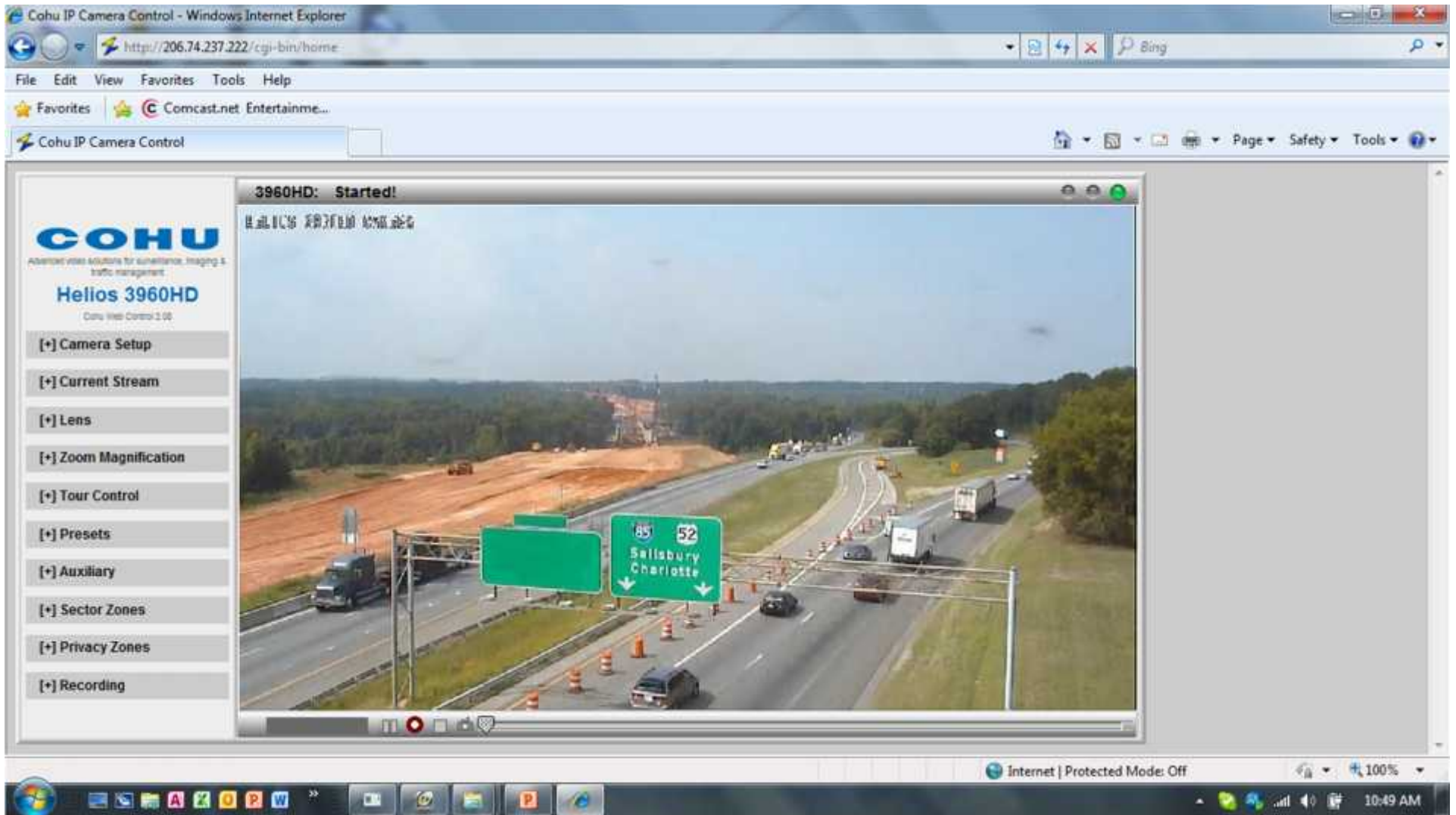
Traffic Analytics – Speed & Occupancy

## Wide Dynamic Range On



## Wide Dynamic Range Off





Internal Web Server User Interface

# QUESTIONS



Gerard Amato / CohuHD  
[gamato@CohuHD.com](mailto:gamato@CohuHD.com) – (410) 381-5000