Introduction to

HANA

HIGH-DEFINITION AUDIO-VIDEO NETWORK ALLIANCE

Jack Chaney: Samsung in San Jose, CA

Co Chairman HANA Technical WG

BOD 1394 Trade Association

Member WWG 1394/COAX dev

Chair R7 WG4 CEA-2027-B dev

Chair R7 WG10 CEA-931-C dev

HANA Members

Charter Communications
CableVision
Mitsubishi
NBC Universal
Samsung
Sun Microsystems
Texas Instrument
Warner Bros.
JVC
Agere Systems
Analog Devices
AMD
ARM
SES ASTRA
Digeo

Freescale Semiconductor
Marvell
NDS
Oxford Semiconductor
Pulse~LINK
TC Applied Technologies
VIA Technologies
Vidiom Systems
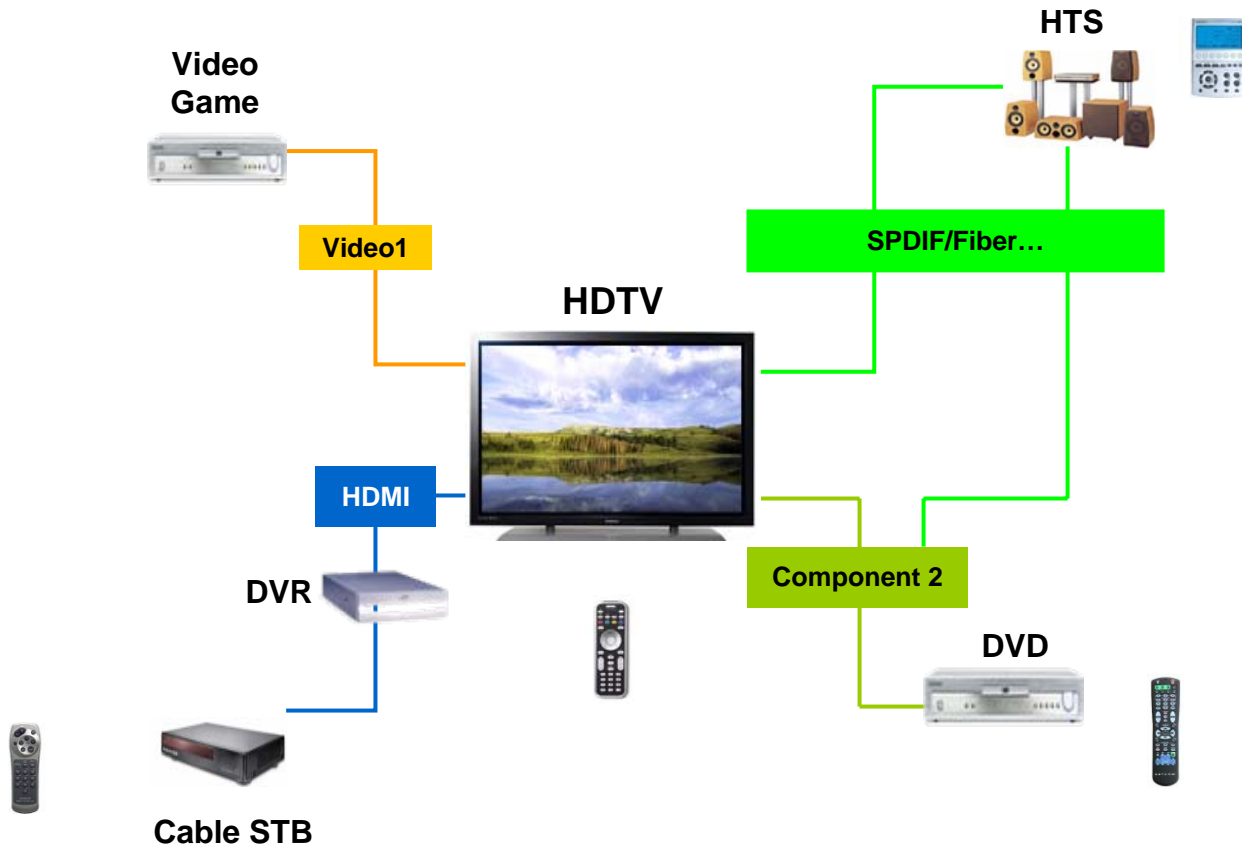Vivid Logic
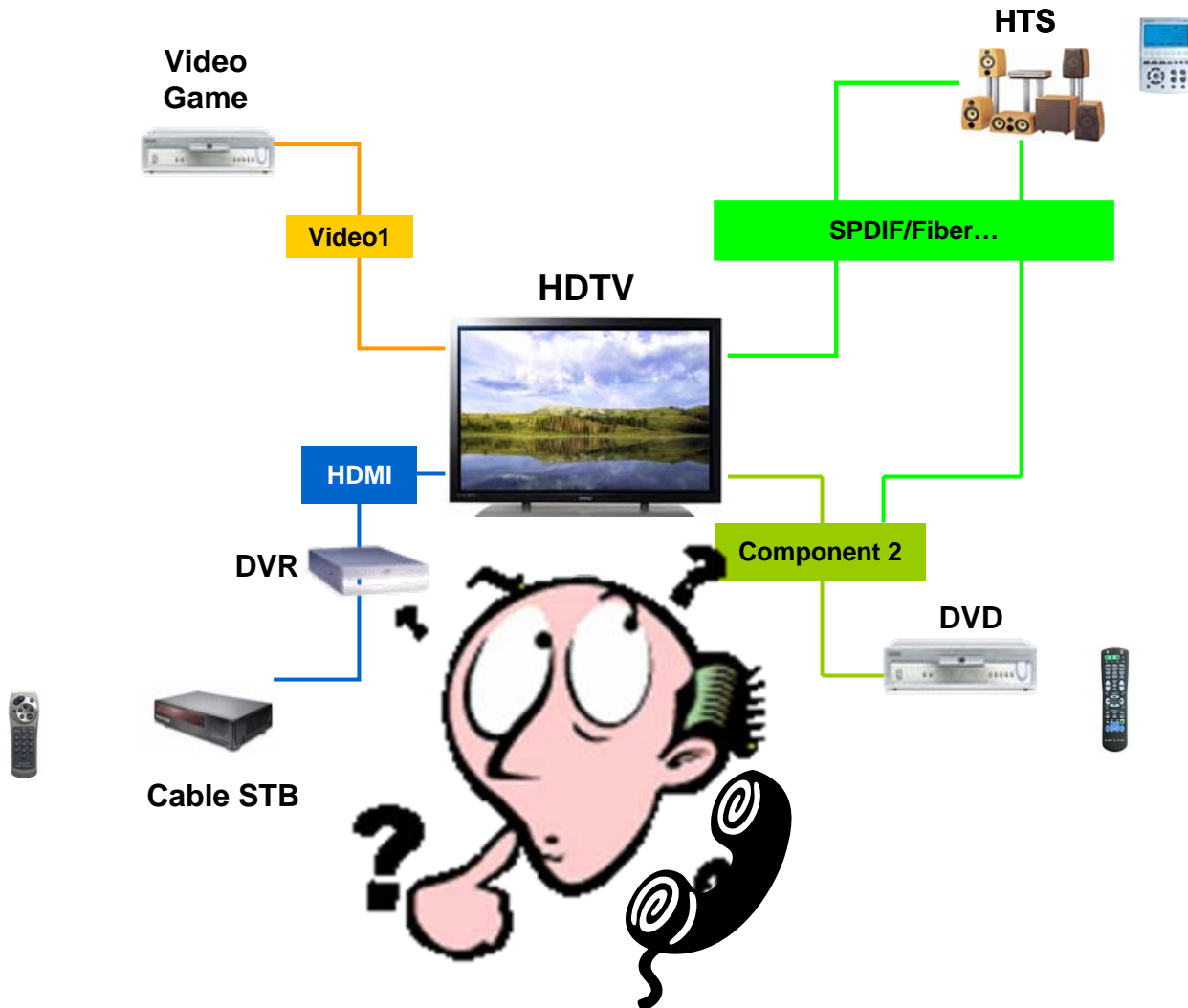Accelerated Technology
LifeSize
ATI
LRS Media
…

TV today

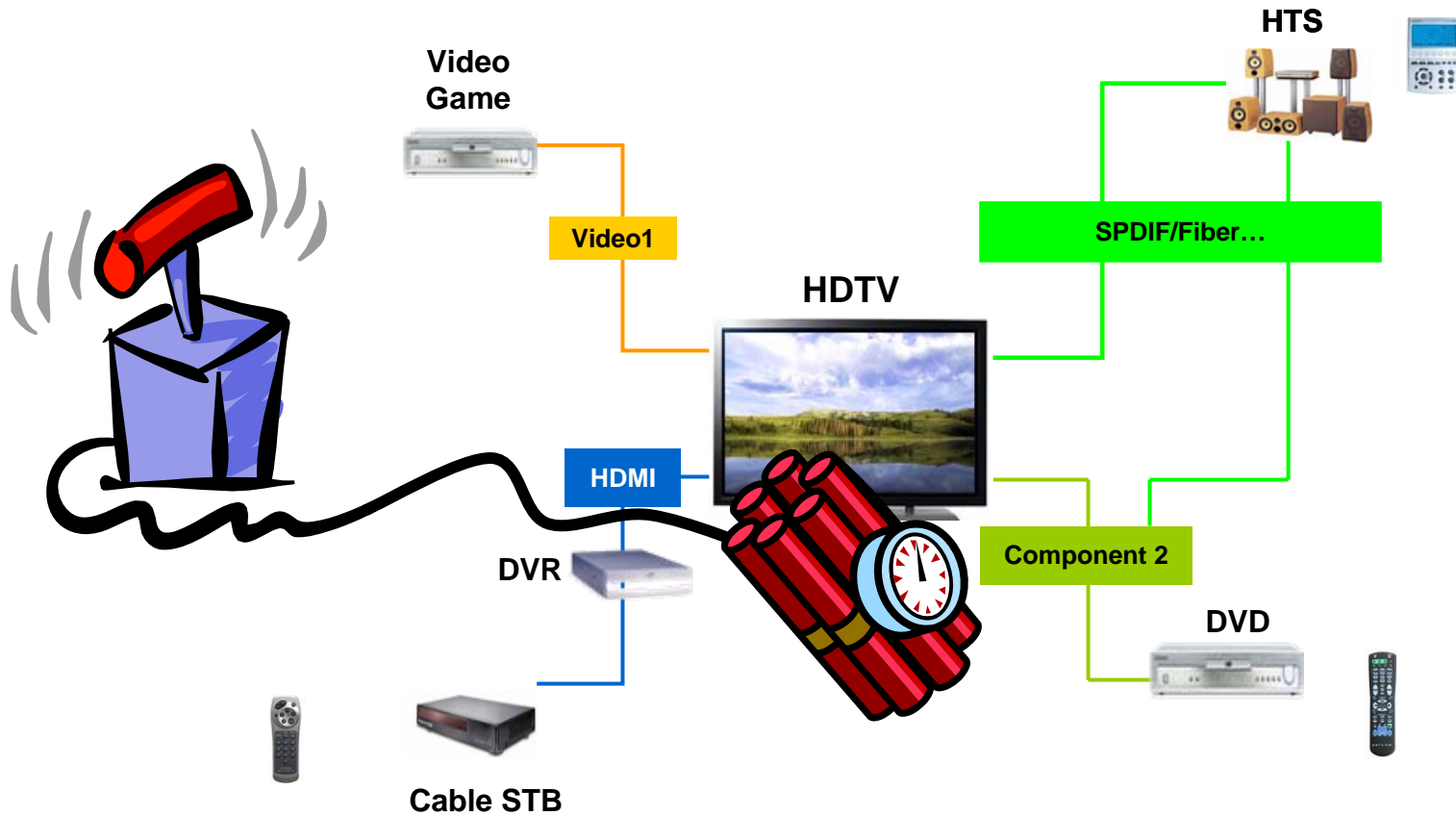**HTS**

Video Game

Video1

SPDIF/Fiber…

HDTV

HDMI

DVR

Component 2

DVD

Cable STB

TV today

HTS

Video Game

Video1

HDTV

SPDIF/Fiber…

HDMI

DVR

Component 2

DVD

Cable STB

TV today

Video Game

HTS

Video1

SPDIF/Fiber…

HDTV

HDMI

Component 2

DVR

DVD

Cable STB

Consumer Complaints

- "I can't figure out how to connect everything"

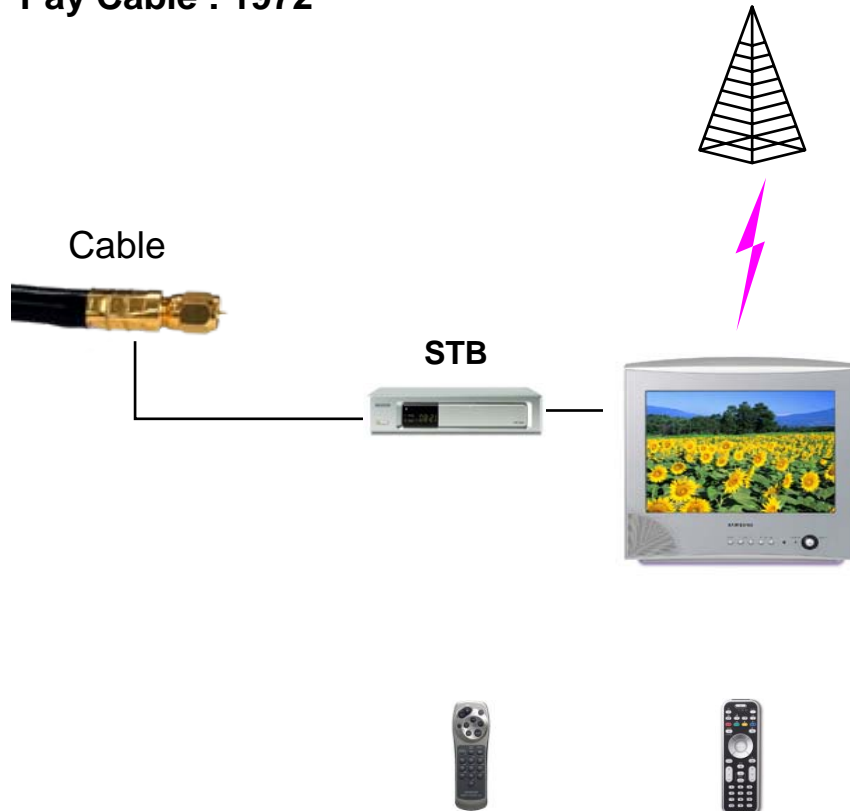- "I am the only person in the family who can make it work"

- "Too many remote controls"

History of TV

Commercial Terrestrial : 1960's
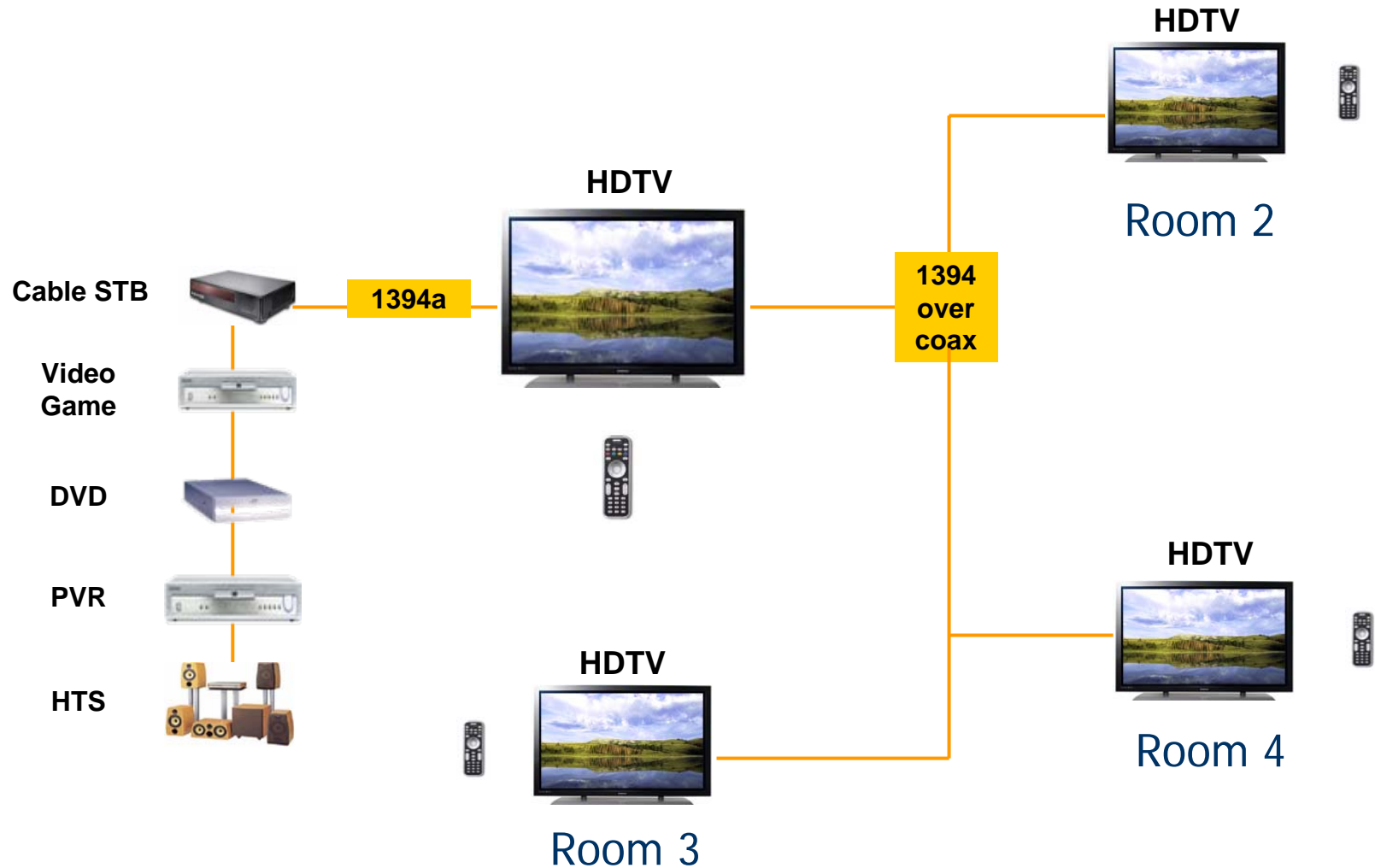
History of TV

Pay Cable : 1972

Cable

STB

Entertainment Using HANA

With HANA

HDTV

Cable STB — 1394 — **PVR**

Video Game

DVD

HTS

Multi-Room Using HANA

HDTV — Room 2

HDTV

Cable STB

1394a

1394 over coax

Video Game

DVD

PVR

HTS

HDTV — Room 3

HDTV — Room 4

HANA vs. DLNA

- HANA
  - IPv4 over 1394
  - xHTML
  - HTTP
  - XML
  - DHCP
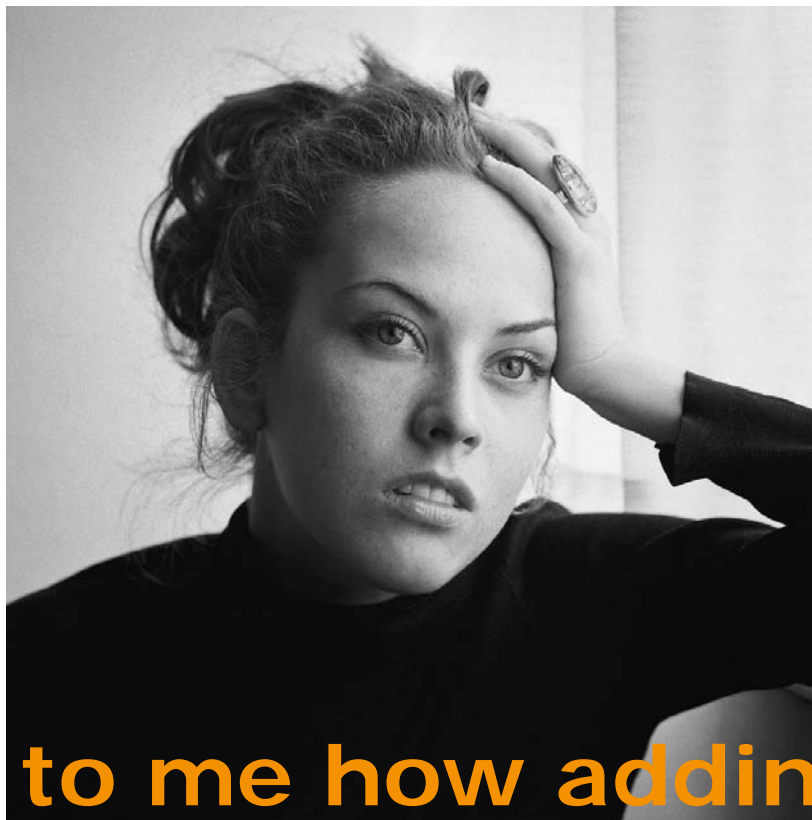 - DNS
  - ...

- DLNA
  - IPv4 over 802.3
  - xHTML
  - HTTP
  - XML
  - DHCP
  - DNS
  - ...

HANA vs. DLNA

- Both HANA and DLNA can utilize a Web Server / Web Browser architecture
  - HANA uses CEA-2027
  - DLNA has CEA-2014
  - Based on same the core browser specifications

Why Is HANA Necessary?

Reframe the Question From the Consumer's Perspective

Explain to me how adding more products, and connecting them using Ethernet, WiFi, USB and HDMI will simplify watching TV?

HANA vs. DLNA

HANA

- Entertainment centric
  - Connect A/V sources to A/V Sinks
- HD focus

DLNA

- PC centric
  - Connect anything to everything, everywhere
- No HD in sight

15

HANA vs. DLNA

Its not a question of one versus the other

- Complementary Approaches
    - HANA: Streaming Real-Time Entertainment
    - DLNA: Everything Time-Shifted
- Easy to Connect: Single Point Connection
    - Isolation of Applications/Bandwidth/Content
    - Separation of User Experience: PC, A/V
- Time To Market
    - The $$ are in HD **TODAY**

HANA Uses a CE Model

- The product may never change once it is shipped
  - No downloads, upgrades, configuration are required – possible but not required
- 8-10 year life expectancy
  - Products built today must connect to new products over its life without requiring new drivers

What is Needed to Make it Simple and Reliable?

- <u>Guaranteed</u> QoS
  - If the app starts, if must complete
    - What if you call for Trick Play?
    - What if the UI is HD and requires more BW?

- <u>Synchronous</u> Connections
  - Lip sync
  - Multi-room audio
  - Single audio, multiple video sinks
  - Single video, multiple audio sinks

Why 1394?

- Designed for Networked Streaming applications
- 1394 provides for simultaneously streaming up to 63 Videos
- Guaranteed Delivery (BER =1E-12)
- Synchronous (network clock)
- Has Asynchronous Channel with fairness algorithm for access
- Runs IP/1394 over Asynchronous Channel
- Local in room cluster uses short daisy-chained cables
- 1394/Air (wireless) in room under development
- Room to Room Solutions with at least 400 Mbps (all have 800 Mbps upgrades done or in work)
  - 1394/COAX – Pulse~Link – 70m (shown August 2006, see at CES 2007 avail Feb 2007)Whole home – no new wires – (RG59 + splitters + RG6).
  - 1394/Cat5 or Cat6 – Newnex & Eqologoc – 70 m-here this evening
  - 1394/Plastic Optical Fiber – FireComms -70m - see at CES 2007
  - 1394/Glass Optical Fiber – Newnex & TI & Samsung – 1000m - here this evening
- Reduces **system** cost and complexity

Why 1394 NOW?

- ## Cable STB Mandate
  - FCC now mandates 1394 in all HD STBs
  - This is a procurement mandate – can't buy new HD STBs w/o 1394

- ## All DTVs must include an ATSC Tuner
  - Requires MPEG decoder
  - Adding 1394 to the DTV exposes the decoder so MPEG can be distributed over from any source to the DTV

1394 Provides Cost Benefits

- Consumers
  - Fewer devices / components needed
    - Sources don't need a decoder
    - Eliminate buffers and associated delays
    - Share devices
- Manufacturers
  - Device resources can be shared increasing the value of the device
  - Shortens Time to Market

1394 Shortens Time To Market

- ## Off-the-shelf software
  - Web Browser / Web Server
- ## No complex middleware
  - Reduces development, testing, compatibility issues
- ## Minimizes Invention
  - Auto discovery, power management
  - Qos in HW, No complex QoS SW fixes required

Bundang Trial

❑ Bundang Time Bridge – a 'HANA' test bed in Korea

All Digital & Networked residence utilizing the most advanced technology

|	
Gross Area	**78,314㎡**
Floors	**4 stories below and 37 stories above ground**
Number of Households	**228 households**
Period of Construction	**36 months (by Sep. 2006)**
Facilities	**• Golf practice ranger, • Fitness Club, • Banquet hall, • Club Lounge, • Smart Studio, • Reading room**

Bundang Trial

- **Living Room** : SkyLife NIU + PVR + HANA TV + Internet Node
- **Room1** : HANA Repeater + HANA TV
- **Room2** : HANA Repeater + HANA TV Node + Legacy TV
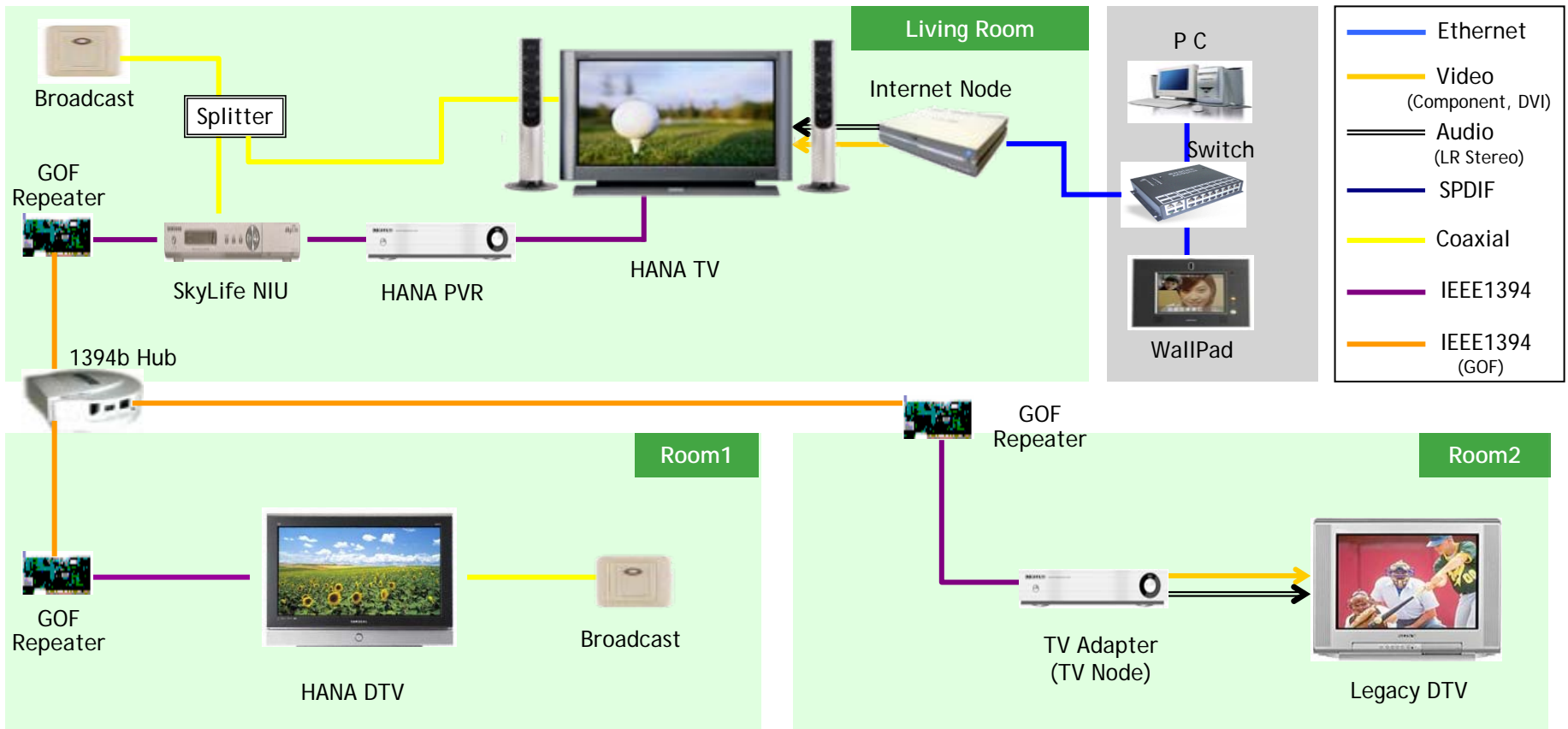
Web Browser / Server Model

- Command/Control/UI using IP over Asynch channel
  - DTV supports thin browser
  - Connected devices support thin server
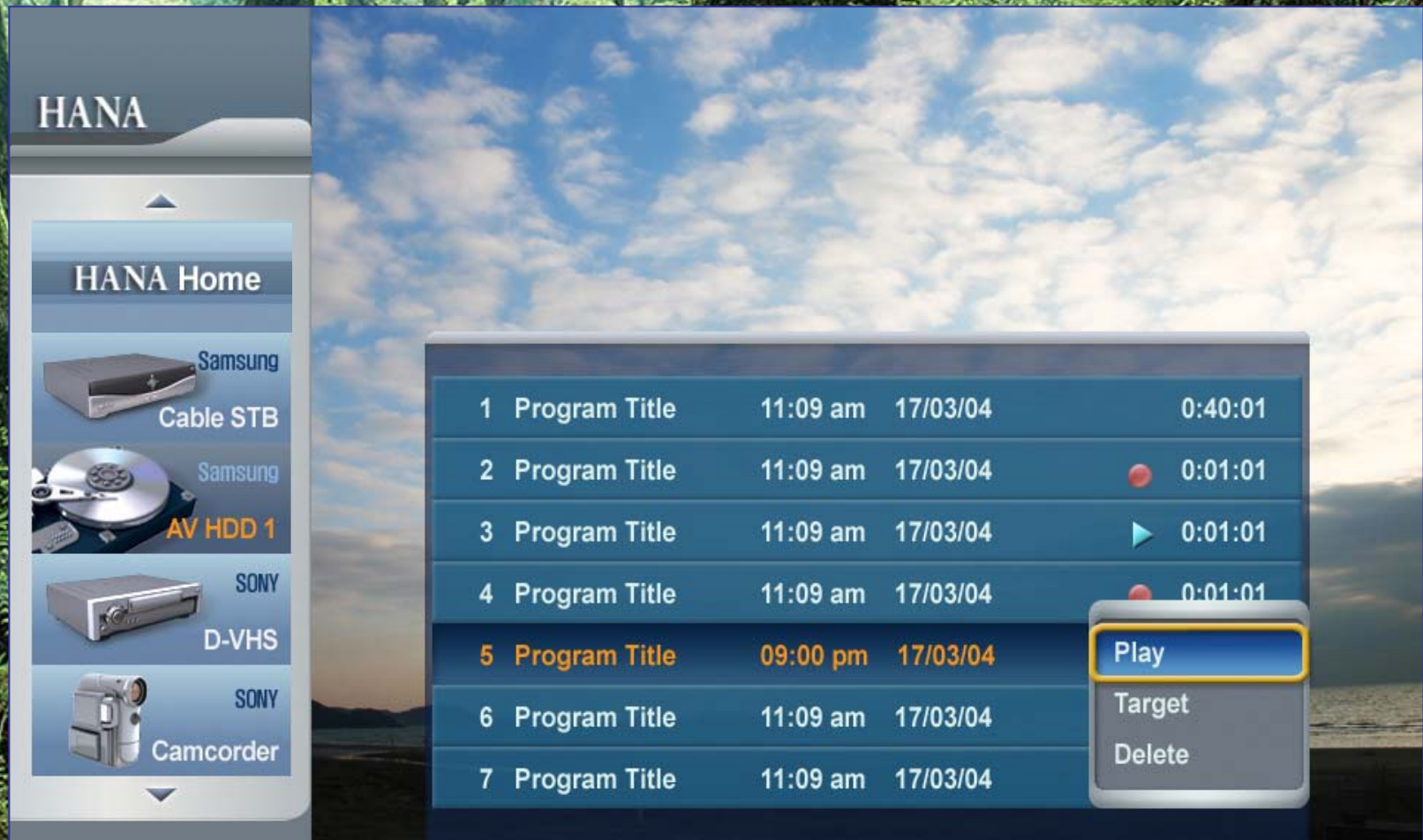 - AV/C commands over IP (CEA 931B/C)
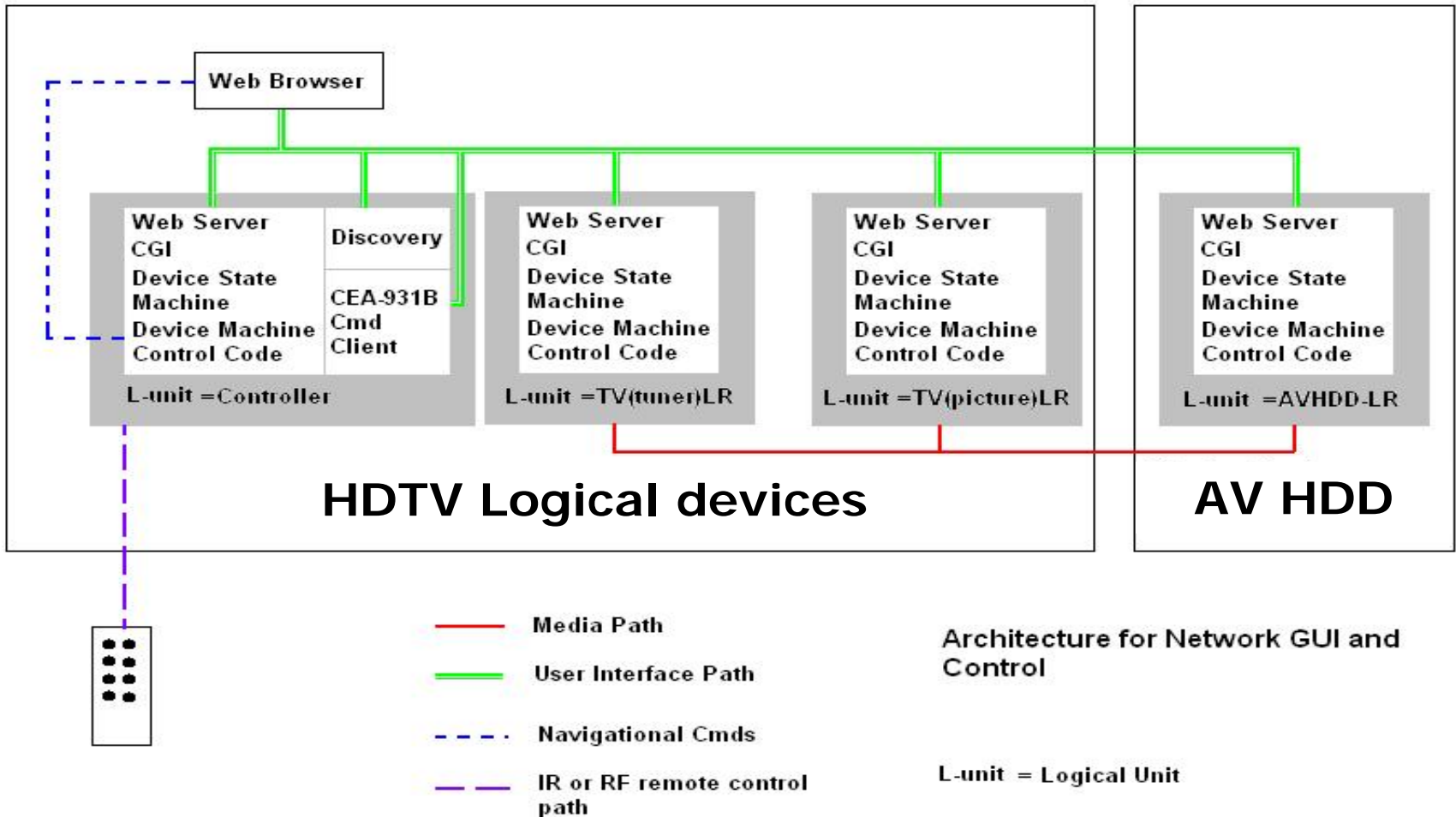
HANA GUI components

HANA GUI components

XHT GUI Components

CEA-2027 Architecture

HDTV Logical devices

AV HDD

Legend:
- Media Path (red line)
- User Interface Path (green line)
- Navigational Cmds (blue dashed line)
- IR or RF remote control path (purple dashed line)

Architecture for Network GUI and Control

L-unit = Logical Unit

CEA 2027 Stack - HDTV

HANA HDTV Display - Browser Stack		
Web Browser Display from XHTML, DOM1, CSS1, JPEG, GIF, PNG, JavaScript		
Web Server (virtual server for 2027 GUI controller and other 2027 logical unit services)		
CGI interface to Web Server and State Machine (also funnels incoming 931B remote control commands)	CEA-2027 Proxies (In HDTV) for DTVLink, HAVi, and AV/C Legacy devices	
HDTV state machine for dynamic HDTV logical unit control, network controller, and XHTML GUI services	HTTP	CCM over AV/C and IEC 61883

CEA-2027 Stack – HDTV IR

HANA HDTV IR receiver Stack		
NAVi Web Browser navigational input (Up, Down, Left, Right, Select, Exit, Back)	Local IR input queue (if local menus are on screen)	CEA-931-B HTTP command dispatcher (part of HDTV and Network controller code)
IR receiver driver		**HTTP/TCP/IP/1394**

CEA 2027 Stack – Service Side Devices

| HANA NIU for { Satellite | ATSC Broadcast | Digital Cable } A/V services | | |
|---|---|---|
| Web Server (virtual server for 2027 GUI controller and other 2027 logical unit services) | | |
| CGI interface to Web Server and State Machine (also funnels incoming 931B remote control commands) | HTTP | CCM over AV/C and IEC 61883 |
| | TCP/IP | AV/C |
| NIU state machine for dynamic NIU control and XHTML GUI services. | 1394 (IEEE 1394TA-2000) | |

Usage Scenarios

Ease of Use

- Control all AV devices with a single remote per room
- Access Contents via a rich TV GUI and EPG
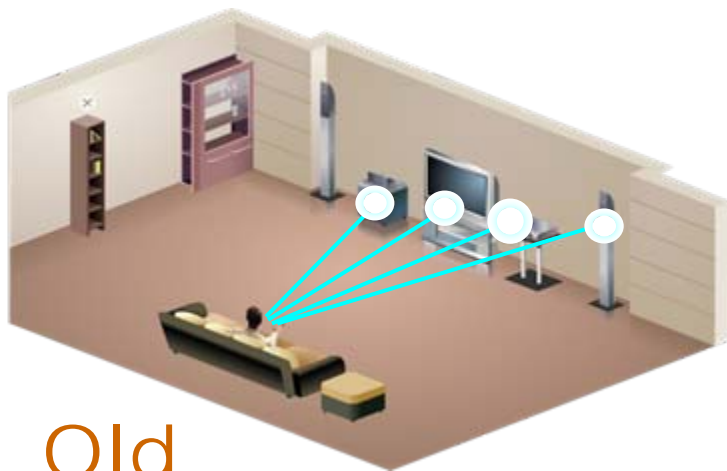
Old

New
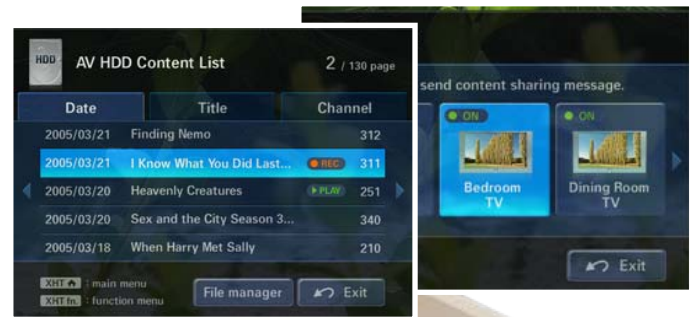
Usage Scenarios

HD Multi-Channel

- View, Pause and Record 5+ HD channels simultaneously with QoS

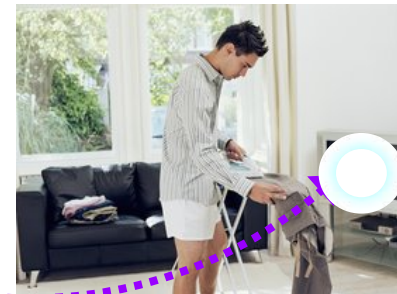**Multiple HD Programs**

Usage Scenarios

View, Pause and Record HD anywhere in home with just one STB

Room 2

Room 3

Room 1

36

Usage Scenarios

Contents Sharing

- Allow *Personal* Content to flow between the IT and AV networks but restrict *Commercial* Content to within the AV network

Digitally Connected

View

Share

Store

Control

Commercial Content

Personal Content

Service Provider Issues (Solved)

- No UI over 1394
  - Solved with Browser/Server solution
    - Charter Cable using MOXi UI
  - Future OCAP compatibility
    - JVM in DTV to run OCAP Apps
- No in-home wiring
  - CAT5/5e/6 (S100, S200, S400, S800)
  - Coax at S400, moving to S800
  - UWB (S800)

Service Provider Benefits

- Reduced CAPEX
  - Lower CAPEX = Higher Share Price
  - No decoder required
  - PVR becomes a retail buy
- Fewer Truck-Rolls
- Lower Customer Service costs
- Lower Customer Acquisition costs
  - Bundle DTV + NIU + Service at retail
- Reduced churn

Design Guidelines

- The first published HANA reference implementation will incorporate existing specifications and technology:
    - CEA 2027-B
    - CEA 931B/C
    - IEEE 1394
    - 1394 Localization

40

Design Guidelines

- Initial HANA reference implementations will enable:
  - QoS for HD content (+5 simultaneous, isochronous HD video streams)
  - Hot 'Plug & Play' with auto device discovery and configuration
  - Personal content (not part of trusted network)
  - Standard IP protocols using Bonjour
  - 1 Cable / 1 Remote

Compliance and Certification

- HANA will address compliance and certification testing:
  - HANA Third Party Interoperability Testing
  - HANA Interoperability Guide
  - HANA Developer's Conference
  - CEA and 1394TA Interoperability Events
  - SDK (Software Developers Kit)

Product Introductions

- HANA-ready product introductions at CES 2007
  - HDTVs
  - Personal video recorders / HD hard disk drives
  - Cable NIU
  - 1394 over CAT-5, coax
  - Digital home theater audio

Roadmap – Future Activities

- Continue to work with standards organization as needed (CEA, 1394TA, CableLabs)
  - CEA 931C
  - CEA 2027-x
  - 1394 over coax
  - OCAP harmonization and interfaces
- UPnP Bridging
- Enhanced content protection and trust models
- Enhanced compliance and certification testing
- Enhanced bridging to AV/C world

Summary

❑ **Content Owners**
- Time to market solution for HD with
  Trusted network environment

❑ **Service Providers**
- Easy installation
- Save CapEx (Capital Expenditure)

❑ **CE Manufacturers and IT Companies**
- New business opportunities with HANA devices

❑ **Consumers**
- Easy to connect (Single Wire)
- Easy to control (Single Remote Control)

For More Information on HANA

www.hanaalliance.org

Contact Jack Chaney at

jchaney@sisa.samsung.com

(408)544-5411 office phone

(408)504-3816 cell phone