



Connected TV SUMMIT

A NEW CHAPTER FOR WHOLE-HOME DVR

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In collaboration with the RVU Alliance, DIRECTV and Samsung



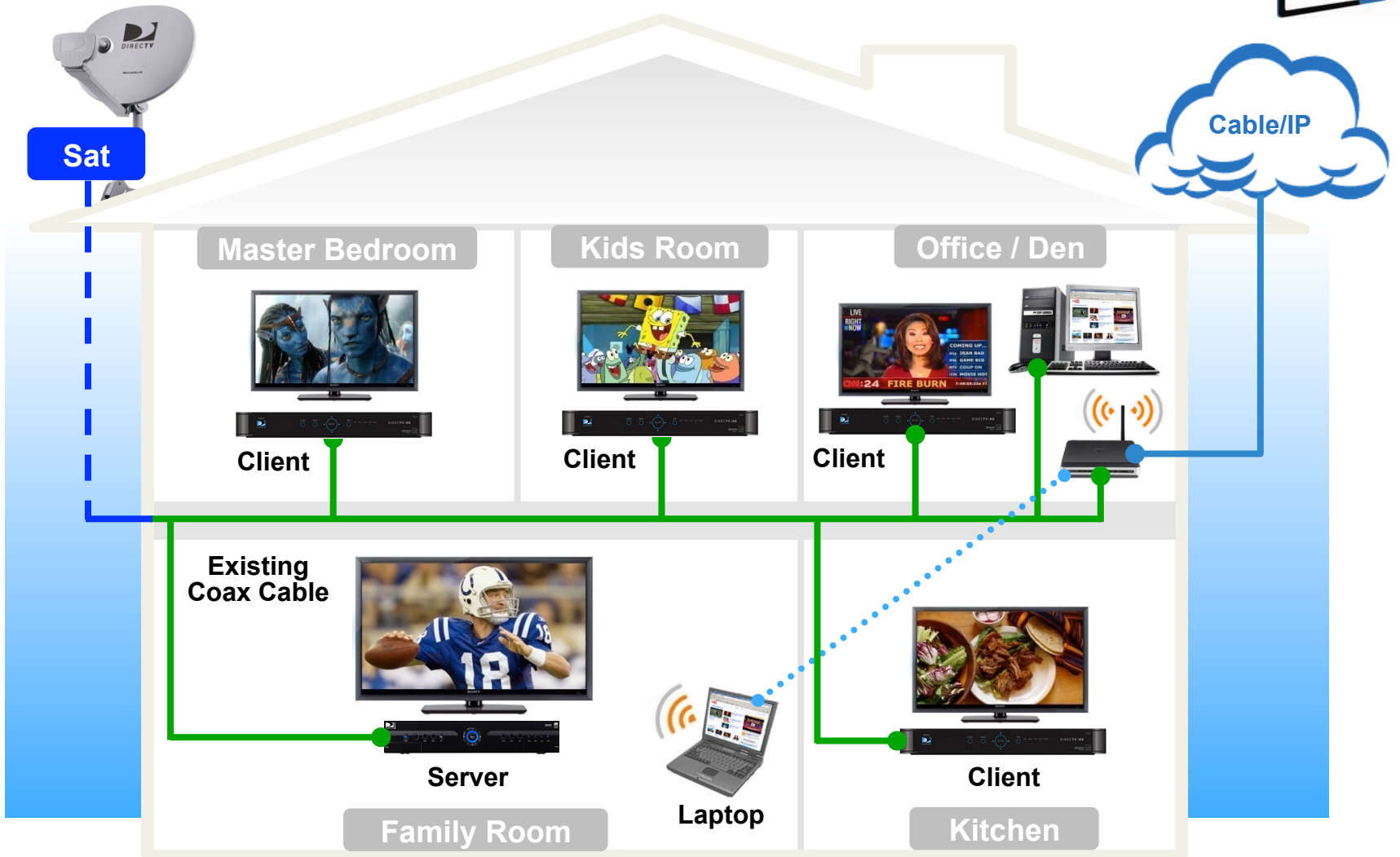
JetHead Development

- An embedded systems software company
- California-based, private company since 2003.
- Employs over 50 full-time highly skilled developers
- Located near San Diego, CA (USA)
- STB software experience back to 1994.
- Specialists in LINUX, C/C++, drivers, A/V and RUI
- JetHead has clients world-wide
- JetHead builds long term relationships

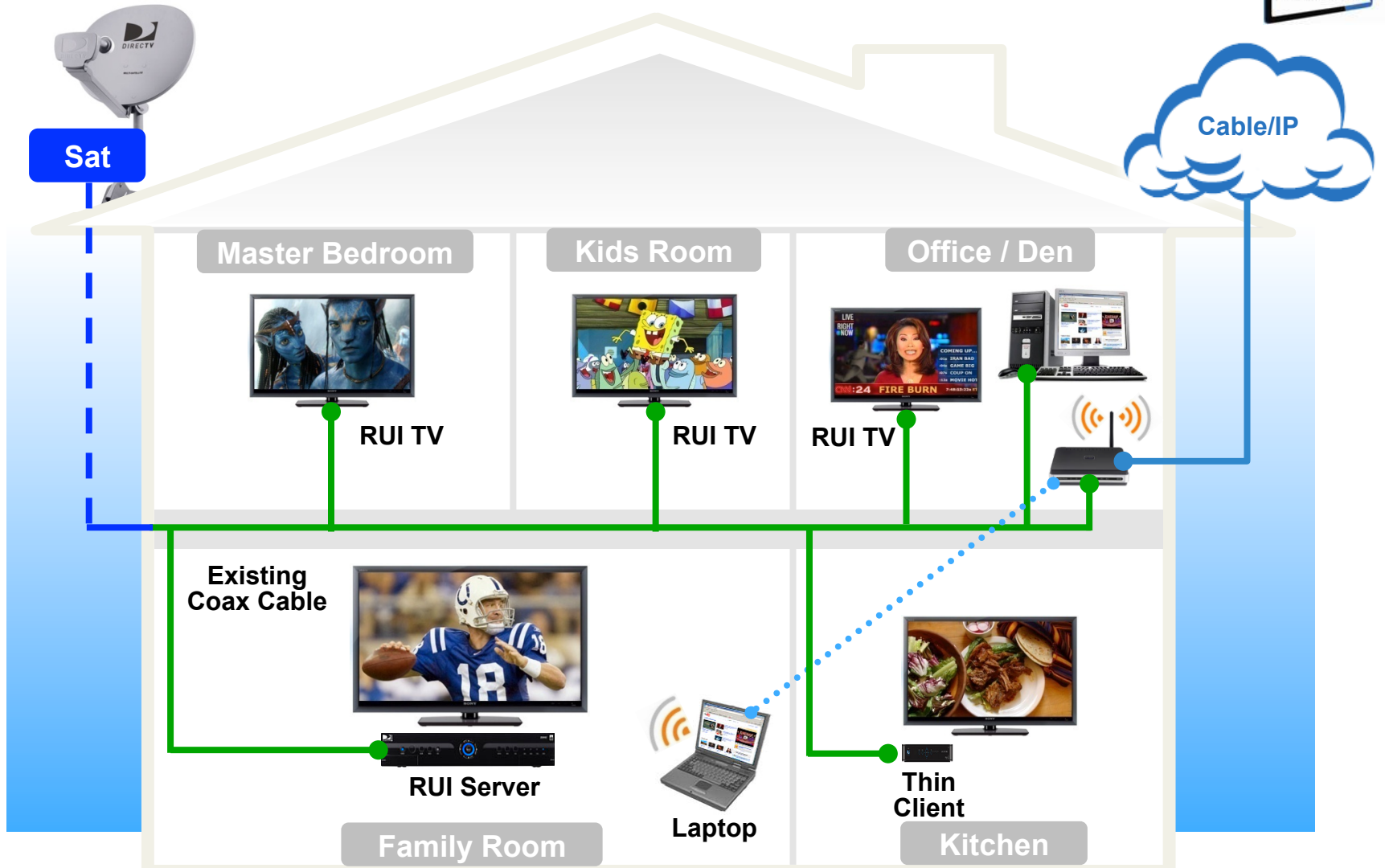


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Whole-Home DVR solution



Next Generation Whole-Home DVR with RUI





Features of the required RUI

- Pixel accurate rendering on client to ensure consistency
 - Less customer calls and easier support by customer service
- Easy to convert existing server applications to support RUI
 - Retain the investment in your existing server middleware and apps
- Simple protocol creating a low cost client implementation
 - Client software can be built on low cost hardware, low end TV etc
- Built on existing protocol standards where possible
- Network agnostic. Works over any type of home network.
- All this leads to the development of RVU
 - Pixel accurate RUI (bit-mapped assets, cached & composited at client)
 - Easy to add RVU under existing server widget library and export a UI
 - Clients only require low-end SoC with 2D-blitter and no tuner/demod
 - Uses DLNA, UPnP and DTCP-IP all which are low cost

How RVU works



Content



Head End

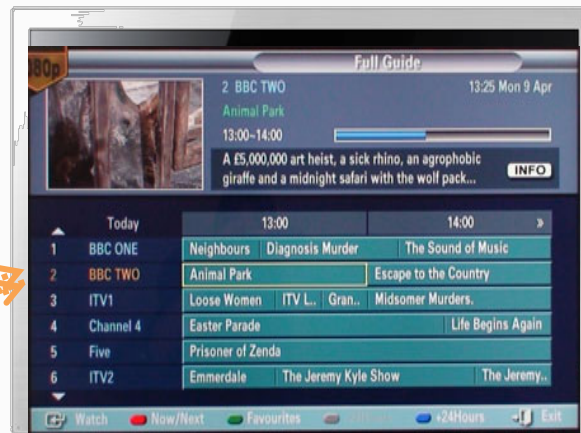


Content delivery

Optional delivery to mobile devices



Galaxy S/Tablet



RVU Client

2
Server announces itself to the network
Delivers metadata and playback state



Client devices and server devices 'find' each other with UPnP

3
User input



User

5
Server renders UI screen



RVU Server

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What does RVU run on?



- **Version 1.0 of the RVU spec concentrates on “static” devices**
 - Smart TVs, Gaming platforms, OTT boxes, Blu-ray players, etc.
 - Supports HD UI, 3D TV, trick-modes.
- **Version 2.0 is coming in 2012**
 - Additional support for mobile devices
 - Expands support for 3D graphics, performance enhancements, etc.



The Smart TV – Entertainment Hub



Consumers want all their content on their Smart TV

RVU is another App option, used to connect the highest value operator content (news, sports, premium movies and the latest shows) into the Smart TV experience.



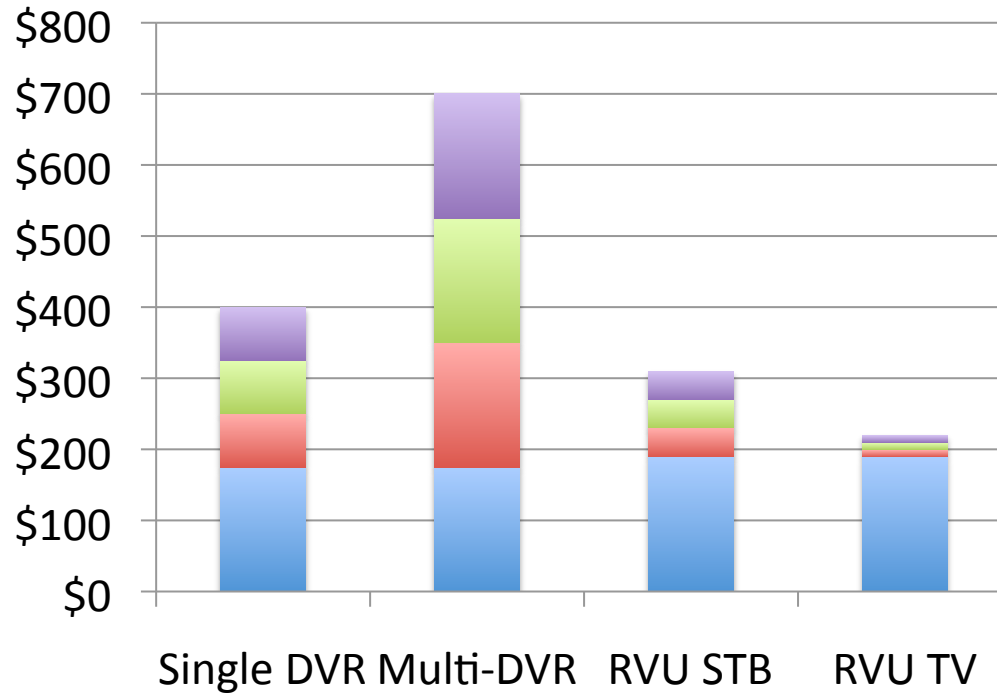
RVU – Advantages for everyone

<p><u>CE Manufacturers</u></p> <p>Increases CE product “value add” to Pay TV</p> <p>Low complexity solution, all in software</p> <p>One software solutions for many operators</p> <p>Takes advantage of existing DLNA compliant networked TV software and hw features</p> <p>Operator provides high bandwidth connectivity</p> <p>Co-marketing: Operators promote the CE device</p>	<p><u>Service Providers</u></p> <p>Enables user experience management to ensure a consistent experience at all viewing points</p> <p>Lowers the cost of deployment (STB/RC etc)</p> <p>Reduce installation and service costs</p> <p>Enables rapid introduction of new features and applications since only the server is updated.</p> <p>Protects the high value content with DTCP-IP</p>
<p><u>Consumers</u></p> <p>Cost effective “Whole-Home DVR” solution</p> <p>Financial and ergonomic benefits by decreasing number of boxes, cables and remote controls</p> <p>Subscriber based content, UI and upgrades available on all compatible devices</p> <p>Low power for additional cost savings</p>	<p><u>Industry</u></p> <p>Drives next generation CE device adoption with connected content available on multiple devices</p> <p>Expandable solution based on existing standards to minimize implementation cost</p> <p>Lowers power to meet government mandates</p> <p>More content on more devices to more people</p>



RVU cost savings are significant

Typical Savings for 4 TV Household



	STB Solution
Single DVR	1 HD DVR 3 HD Zapper
Multi DVR	4 HD DVR
RVU STB	1 HD DVR (RVU server) 3 RVU client STB
RVU TV	1 HD DVR (RVU server) All other RVU CE clients

- For a 4 TV household, an RVU system gives the same functionality as 4 HD DVRs at about 30% of the cost
- Lower power consumption, saving cost for the consumer.

RVU Alliance - Background



- The **RVU Alliance** (RVUA) is a standards body created to manage the **RVU protocol** standard.
- Founding members: Broadcom, Cisco Systems, DIRECTV, Samsung Electronics and Verizon.
- The RVU protocol allows entertainment devices within the home to share their content with each other across a home network.
- Provides for a consistent pixel-accurate user interface on all connected devices.
- Built substantially upon the pre-existing Digital Living Network Alliance (DLNA) standards.
- Assures inter-operability between devices through an existing proven certification program.
- More information:

www.rvualliance.org



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From Launch to Mass Market



Mass volume of RVU servers and clients

RVU becomes standard
“App” on connected devices

RVU 2.0 spec coming
Portable device support
Second TV client launch
Product expansion
Market expansion

Certification program live
First RVU server launched Oct'11
First RVU TV launched 2011
DLNA Guidelines approved Mar'12

2011

2012

2013

RVU launch in 2011 provides a solid baseline to grown RVU for the future

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Worldwide RVU Alliance Membership



Founding Members



Promoter Members



Contributor Members



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RVU Technical Specifications

- RVU is based on industry standard specs
 - Device, Service Discovery and Control
 - UPnP
 - Content Streaming and Media Format Interoperability
 - DLNA DMR with HTTP Transport
 - Digital Content Protection
 - DTCP-IP link protection
- RVU RUI
 - Low-overhead pixel-accurate remote bitmap RUI, including remote control commands
 - Adopted into DLNA Guidelines (March 2012)





RVU Alliance Benefits

- Discussion Groups (to evolve RVU Technology):
 - MWG: Marketing Working Group
 - TWG: Technical Working Group
 - CWG: Certification Working Group
 - WWG: Wireless Working Group
- Face to Face meetings (networking)
- Plugs Fests (to check inter-operability)
- RVU Alliance Test Server (Developed by JetHead)
- RVU Certification Test Tool (RCTT)
- Partnership with UNH-IOL for certification testing
- www.rvualliance.org



DEMONSTRATION

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Samsung RVU-client TV Demo

LIVING ROOM



HDMI Cable



DIRECTV HR34
Home Media Center



BEDROOM



Samsung Smart TV

HOME NETWORK

Ethernet



Conclusions

- The Remote UI is the future of Multi-Room services
- RVU RUI is mature, uses existing standards and has a certification program
- RVU offers considerable benefits to Users, Operators and CE Manufacturers
 - Lower cost, full experience, less complexity (cables, STB, Remote)
- Operators can deploy RVU RUI based multi-room today using existing MW
- CE manufacturers can integrate RVU RUI today using existing SoC's
- A great opportunity for CE industry to partner with the Pay TV operators
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