Changes:

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| --- | --- | --- |
| Version | Changes | Date |
| V4 – edits after 5/1 call |  | 5/1/2015 |
| V4 – Brant – edits from Brant Candelore |  | 5/1/2015 |
| V5 – edits after 5/4 call including comments from Milo Medin | Accepted v4 changes, rebuilt document using Outline tools | 5/8/2015 |
| V6 – edits after 5/11 call | included additions from AT&T, consolidated items in Part I section I, and begin assignments and simplification in Part I sections I, II and III | 5/11/2015 |

REPORT OF WORKING GROUP 4 TO DSTAC, April 29, 2015

Introduction

Working Group 4 (WG4) was formed out of the larger DSTAC to address the topic of device platforms, variability, and interfaces.

Working Group Members

|  |  |
| --- | --- |
| **WG4 Members** | **FCC Liaisons** |
| Brant Candelore, Sony (Co-editor) | Scott Jordan |
| John Card II, DISH (Co-editor) | John Kiefer |
| Ahmad Ansari, AT&T | Alison Neplokh |
| Matthew Clark, Amazon |  |
| Bob Clyne, Cablevision |  |
| Brad Love, Huappauge |  |
| Ken Lowe, Vizio |  |
| John McCoskey, MPAA |  |
| Milo Medin, Google |  |

Guidance Description

**(Part I)** The working group will identify existing devices and technologies that receive MVPD and OTT service, such as DVRs, HDTVs, personal computers, tablets in home, connected mobile devices, take-and-go mobile devices, etc., and identify the salient differences important to implementation of the non-security elements of a system to promote the competitive availability of such devices based on downloadable security.

**(Part II)** For each category of existing device identified above, the working group will identify a system comprising minimum standards, protocols, and information other than security elements to enable competitive availability of devices that receive MVPD services.

**(Part III)** The working group may identify alternative systems as appropriate to promote the availability of different categories of navigation devices, consistent with the Commission’s instruction to recommend an approach that would allow consumer electronics manufactures to build devices with competitive interfaces and an approach under which MVPDs would maintain control of the user interface.

Product

The working group will deliver and present its findings to the full DSTAC.

It will present an outline of its work at the May 13, 2015 meeting, a first draft of its report at the July 7, 2015 meeting, and a final report for full DSTAC discussion and consideration at the August 4, 2015 meeting.

OUTLINE

All sections below should be interpreted to have an “etc.” at this time – this outline is an attempt to cast a wide net that will be narrowed through WG4 analysis and discussion.

Part I: Existing Devices and Technologies

Identify the salient differences important to implementation of the non-security elements of a system to promote the competitive availability of such devices based on downloadable security.

# Devices that receive MVPD or OTT service:

Discussion of important features of specific devices

## Standard/High Definition STB

Includes IP STB, broadcast STB, not DVR

## High Definition and 4K Ultra HD TV – for IP and other delivery paths

## RVU certified TV

## VidiPath certified TV

## Home Video Gateway from MVPD, Residential Gateways (RG), Home Media Server

AT&T DSL gateway includes wifi access

## Digital Transport Adapter (DTA)

## Simple Digital Video Recorder from MVPD

## Digital Video Recorder from Retail (TiVo)

## Media Player Box from Retail (Roku, Apple TV, Amazon, WD)

## Media Player Sticks (USB/HDMI)

## Connected Tablet with Data Plan

## Connected Tablet with Wi-Fi

## Connected Smart Phone with Data Plan

## Connected Smart Phone with Wi-Fi

## Broadband Connected Blu-Ray Players

## Notebook or Laptop Computer (Apple, Windows, Linux)

## All-in-One or Desktop Computer (Apple, Windows, Linux)

## Gaming Consoles (PS4, Xbox)

## Connected AV Receivers

## Internal/External Tuners (Hauppauge, Silicon Dust, Sat-IP)

# Technologies (Network) that enable the reception of MVPD or OTT service (see WG2 report):

Discussion of important features of specific technologies

## Operator Network Technologies

### Hybrid Fiber Coax (HFC) Network QAM Tuners

### Hybrid Fiber Coax (HFC) Network DOCSIS Tuners

### Fiber-to-the-Home (FTTH) Optical Network Terminals (APON, BPON, EPON, etc.)

### Digital Subscriber Line (DSL, VDSL, ADSL, IPDSL) Network Terminals

### Direct-to-Home (DTH) Satellite Dish (small dish)

Alaska special case

### Commercial (Ku-band/C-band Satellite Dish (large dish)

### Cellular Wireless Receivers

### Over-the-Air Network Antenna Tuners (ATSC)

Deployed in DBS receivers, possibly in retail+ devices

### Microwave Transmission Antenna Tuners

## Home Network Technologies

### MoCA

### Wi-Fi Receivers

Also includes Wi-Fi – a, b, g, n, ac, ad, etc., and WiFi Direct (point-to-point) networking

### Ethernet

### Bluetooth

Networking and control technology

### HPNA

### HomePlug AV and other powerline transmissions

# Modes of end-subscriber Use Cases reception of MVPD or OTT service

Discussion of both transport layer details and user experience:

## Streaming – Multicast, Unicast, and Broadcast

## Download-to-go

## DVR Purchase

## TV Everywhere

# Technologies (Functional) that enable the reception of MVPD or OTT service:

These are usage of devices technologies from above as applied to MVPD or OTT service reception.

## Gateways and MVPD Provided Devices and Environments

### Home Network Video Gateways (Includes RG)

### Broadband Gateways (Modems/Routers)

### Standalone Set-top Boxes

### Digital Video Recorders (DVR)

### Cloud or Network DVRs

### Server and Uverse STB running Mediaroom application

## Application on Retail Device

### Apple Store (iOS) Internet Applications

### Android Play Internet Applications

### Smart TV Internet Applications

### HTML5 EME

### Personal Computer Internet Streaming Applications

## Standalone Retail Devices

### HDTV endpoint

### DVR endpoint

### Portable Media/Digital Downloads (SD Card, Mobile Hard Drives)

# Technologies (Standards/Protocols) that enable the reception of MVPD or OTT service:

WG4 collecting list of technologies for now. This section may become list of references, or may include necessary analysis.

## Internet Protocol (IP) TV

## QAM

## DOCSIS

## DVB-S2

## Turbo 8-PSK

## MPEG-2

## DSS

## CVP-2 (VidiPath)

## HTTP Unicast Internet Streaming

## HTTP Multicast Internet Streaming

## Adaptive Bit-Rate Streaming (DASH)

## Slingbox

## RVU

## Sat-IP

## Internet protocol (IP)

## User Data Protocol (UDP)

## Real-Time Transport Protocol (RTP)

## Transmission Control Protocol (TCP)

## Instant Channel Change (ICC) protocol

## Resilient UDP (RUDP) protocol

## MPEG-4 Part 10 (H.264)

## VoIP?

Does the DSTAC work also cover VoIP? – initial FCC staff answer “only if also implicated in video delivery”

# OTT Services

WG4 creating an exhaustive list during its work, and then WG4 will pare down and group the list for the final report into those services that matter in their salient features.

## Amazon Prime

## Netflix

## Hulu Plus

## YouTube

## SlingTV

## PlayStation Vue

## Vudu

## HBO Now

## CBS All Access

## Apple’s Streaming Service

## QuickPlay

## Uverse.com

# Essential Customer Experiences

Include messaging and protocols that enable these experiences during analysis.

## Provisioning

## Customer Support with Problem

## EAS

## Guide Data

## Day-to-day Operation

### Session Initialization

### Media Selection

#### Live Television

#### Streaming Video

#### PPV Purchase

#### VOD Subscription

#### VOD Purchase

#### Applications

#### Music

#### Blackout use case

Blackout of new event starts on event boundary

### Streaming Start

#### “Simple” tune or multicast join

#### Instant Channel change (ICC)

#### “Catch up”

### Interactive TV

### EAS delivery

### Session Completion

#### Transfer

#### Suspension

#### Termination

## Management

CAS management or key management or CAS selection interfaces need to be analyzed

### Subscription

### Device and Content

### Network Access and Authentication

### Stream management in-home

In the case of resource constraints, e.g. request for N+1 tuners

### Session management (with network elements)

Includes system activity, diagnostics, and handshaking and is supplementary to above “Day-to-day Operation”

# Salient Differences to implementation of non-security elements

Analysis and conclusions go here.

## HTML 5 RUI

## Web-based Applications

### Media Source Extension (MSE)

### Encrypted Media Extensions (EME)

### DASH

## Android Applications

## Apple Applications

## Smart TV Operating Systems

## Native Applications

## Remote Desktop Protocol (RDP) Applications

Part II: Systems that Enable Competitive Availability of Devices

Identify systems comprising minimum standards, protocols, and information other than security elements to enable competitive availability of devices that receive MVPD services.

# Protocols and messages that enable competitive devices

Metadata, authorization, key management are included protocols and features

# System-1 Description

## Standards

## Protocols

## Information

## Applicable Devices

# System-2 Description

## Standards

## Protocols

## Information

## Applicable Devices

# SAT-IP

One example system

## Standards

## Protocols

### IP Protocol

## Information

### HTTP://en.wikipedia.org/wiki/sat-ip

## Applicable Devices

Part III: Alternative Systems that Enable New Categories of Navigation Devices

Identify alternative systems as appropriate to promote the availability of different categories of navigation devices.

# CE Device Competitive Navigation Alternative Systems:

Preliminary list, to be addressed after Parts I and II

## Home Networks

### RVU

#### RVU Extensions

### VidiPath

#### VidiPath Extensions

## Cloud Networks

### VidiPath

#### MSE, EME

### Open Internet

#### MSE, EME

## End-to-End DRM

### HTML5 EME

### Passage Technology

# MVPD User-Interface Controlled Alternative Systems:

1. Preliminary list, to be addressed after Parts I and II

## Home Networks

### RVU

#### RVU Extensions

### VidiPath

#### VidiPath Extensions

### Application Infrastructure

#### On retail devices

#### On MVPD provided devices

## Cloud Networks

### VidiPath

#### MSE, EME

### Open Internet

#### MSE, EME

# Implementation Analysis

Note: Evaluation of burden might also appear in Part II

Section is both evaluation of burden and analysis of implementation on legacy devices for the systems described above in this part.

## System 1

### Implementation Details

### Legacy Device Implementation

### Evaluation of Burden

## System 2

### Implementation Details

### Legacy Device Implementation

### Evaluation of Burden