

1 M. ELIZABETH DAY (SBN 177125)

2 eday@feinday.com

3 DAVID ALBERTI (SBN 220265)

4 dalberti@feinday.com

5 SAL LIM (SBN 211836)

6 slim@feinday.com

7 MARC BELLOLI (SBN 244290)

8 mbelloli@feinday.com

9 **FEINBERG DAY ALBERTI LIM &**  
10 **BELLOLI LLP**

11 1600 El Camino Real, Suite 280

12 Menlo Park, CA 94025

13 Tel: 650.618.4360

14 Fax: 650.618.4368

15 Attorneys for Uniloc 2017 LLC and Uniloc

16 Licensing USA LLC

17 UNITED STATES DISTRICT COURT

18 CENTRAL DISTRICT OF CALIFORNIA

19 UNILOC 2017 LLC and UNILOC  
20 LICENSING USA LLC

21 Plaintiffs,

22 v.

23 HULU, LLC,

24 Defendant.

CASE NO. 8:18-cv-01953

**COMPLAINT FOR PATENT  
INFRINGEMENT**

**DEMAND FOR JURY TRIAL**

1 Plaintiffs Uniloc 2017 LLC and Uniloc Licensing USA LLC (collectively  
2 “Uniloc”), by and through the undersigned counsel, hereby file this Complaint and  
3 make the following allegations of patent infringement relating to U.S. Patent Nos.  
4 6,519,005, 6,895,118 and 9,721,273 against Hulu, LLC (“Hulu”) and allege as  
5 follows upon actual knowledge with respect to themselves and their own acts and  
6 upon information and belief as to all other matters:

7 **NATURE OF THE ACTION**

8 1. This is an action for patent infringement. Uniloc alleges that Hulu  
9 infringes U.S. Patent Nos. 6,519,005 (the “’005 patent”), U.S. Patent No. 6,895,118  
10 (the “’118 patent”) and 9,721,273 (the “’273 patent”) copies of which are attached  
11 hereto as Exhibits A-C (collectively, “the Asserted Patents”).

12 2. Uniloc alleges that Hulu directly infringes the Asserted Patents by  
13 making, using, offering for sale, selling and/or importing products and services that:  
14 (1) perform a method for motion coding an uncompressed (pixel level) digital video  
15 data stream; (2) perform a method of coding a digital image comprising  
16 macroblocks in a binary data stream and (3) perform a method for providing  
17 content via a computer network and a computer system. Uniloc seeks damages and  
18 other relief for Hulu’s infringement of the Asserted Patents.

19 **THE PARTIES**

20 3. Uniloc 2017 LLC is a Delaware corporation having places of business  
21 at 1209 Orange Street, Wilmington, Delaware 19801 and 620 Newport Center  
22 Drive, Newport Beach, California 92660.

23 4. Uniloc Licensing USA LLC is a Delaware corporation having places  
24 of business at 1209 Orange Street, Wilmington, Delaware 19801 and 620 Newport  
25 Center Drive, Newport Beach, California 92660.

26 5. Uniloc holds all substantial rights, title and interest in and to the  
27 Asserted Patents.

28



1 Estimation For Digital Video,” issued on February 11, 2003. A copy of the ’005  
2 patent is attached as Exhibit A.

3 12. Pursuant to 35 U.S.C. § 282, the ’005 patent is presumed valid.

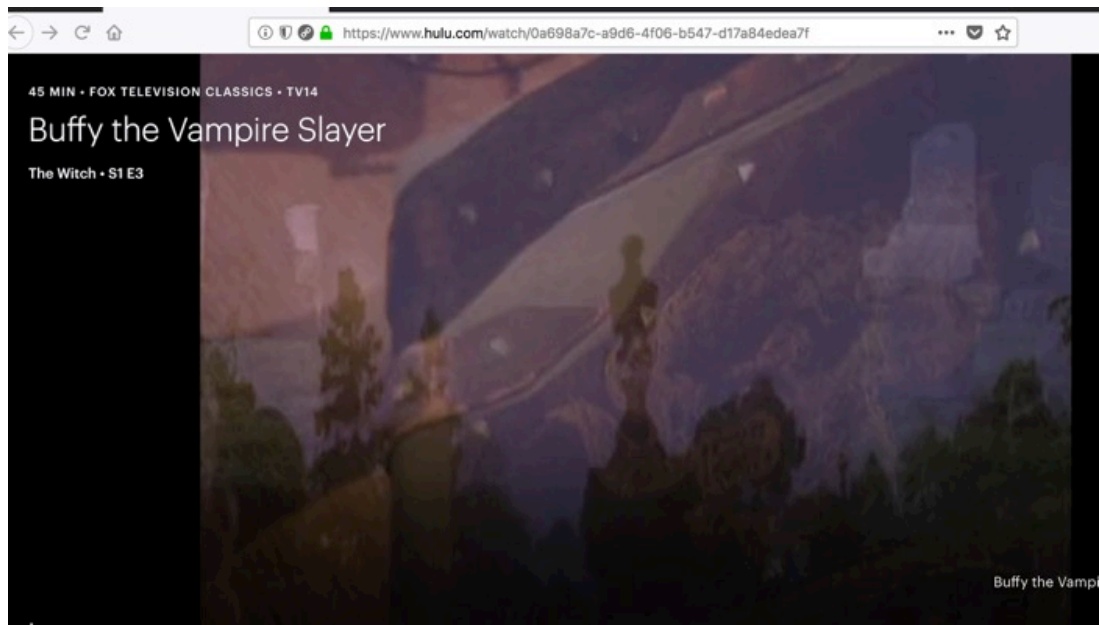
4 13. Upon information and belief, Hulu makes, uses, offers for sale, and/or  
5 sells in the United States and/or imports into the United States products and  
6 services such as its H.264 encoders that practice a method for motion coding an  
7 uncompressed digital video data stream (collectively the “Accused Infringing  
8 Devices”).

9 14. Upon information and belief, the Accused Infringing Devices infringe  
10 at least claim 1 in the exemplary manner described below.

11 15. The Accused Infringing Devices provide a method for motion coding  
12 an uncompressed (pixel level) digital video data stream. The Accused Infringing  
13 Devices receive input video streams which are then encoded and/or transcoded  
14 using at least the H.264 (AVC1) standard. The H.264 standard is a widely used  
15 video compression format with decoder support on web browsers, TVs and other  
16 consumer devices. Moreover, H.264 uses motion compressor and estimator for  
17 motion coding video streams.

18 16. The Accused Infringing Devices stream content using the DASH  
19 format, as shown by the mpd manifest sample below. The manifest file includes  
20 references to the AVC1 (H.264) video codec. The AVC1 designator is the IETF  
21 identifier for H.264.

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Source: <https://www.hulu.com/watch/0a698a7c-a9d6-4f06-b547-d17a84edea7f>

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<Representation id="118062286" codecs="avc1.640015" bandwidth="770435" startWithSAP="1" width="480" height="360">
  <hulu:ProfileBandwidth>650</hulu:ProfileBandwidth>
  <hulu:Cdn>dv</hulu:Cdn>

<BaseURL>https://http-v-darwin.hulustream.com/263/1874263/agave1874263_54431862_H264_650_54433310_video.mp4?end=20181011004836&amp;
p;authToken=0646f72016a7797b1aef4</BaseURL>
  <SegmentBase indexRange="1535-8082" indexRangeExact="true">
    <Initialization range="0-1534"/>
  </SegmentBase>
</Representation>
<Representation id="118062286" codecs="avc1.640015" bandwidth="770435" startWithSAP="1" width="480" height="360">
  <hulu:ProfileBandwidth>650</hulu:ProfileBandwidth>
  <hulu:Cdn>de</hulu:Cdn>

<BaseURL>https://http-e-darwin.hulustream.com/263/1874263/agave1874263_54431862_H264_650_54433310_video.mp4?expire=1539218916&amp;
;token=0468ed447f20d0f588738f2a1f3604cc</BaseURL>
  <SegmentBase indexRange="1535-8082" indexRangeExact="true">
    <Initialization range="0-1534"/>
  </SegmentBase>
</Representation>
<Representation id="118063714" codecs="avc1.64001E" bandwidth="1222775" startWithSAP="1" width="640" height="480">
  <hulu:ProfileBandwidth>1000</hulu:ProfileBandwidth>
  <hulu:Cdn>dv</hulu:Cdn>

<BaseURL>https://http-v-darwin.hulustream.com/263/1874263/agave1874263_54431863_H264_1000_54433637_video.mp4?end=20181011004836&
mp;authToken=009c6afc7b92b627c6490</BaseURL>
  <SegmentBase indexRange="1535-8082" indexRangeExact="true">
    <Initialization range="0-1534"/>
  </SegmentBase>
</Representation>
```

Source: <https://manifest.hulustream.com/dash/1874263.mpd>



1 When the first element of a value is a code indicating a codec from  
 2 the Advanced Video Coding specification [[AVC](#)], specifically one of  
 3 the sample entries defined in [[AVC-Formats](#)] (such as 'avc1', 'avc2',  
 4 'svcl', 'mvcl', and 'mvc2') -- indicating [AVC \(H.264\)](#), Scalable Video  
 5 Coding (SVC), or Multiview Video Coding (MVC), the second element  
 6 (referred to as 'avcoti' in the formal syntax) is the hexadecimal  
 7 representation of the following three bytes in the (subset) sequence  
 8 parameter set Network Abstraction Layer (NAL) unit specified in  
 9 [[AVC](#)]:

- 10 (1) profile\_idc,
- 11 (2) the byte containing the constraint\_set flags (currently  
 12 constraint\_set0\_flag through constraint\_set5\_flag, and the  
 13 reserved\_zero\_2bits), and
- 14 (3) level\_idc.

15 Source: <https://tools.ietf.org/html/rfc6381>

## 16 0.6 Overview of the design characteristics

17 This subclause does not form an integral part of this Recommendation | International Standard.

18 The coded representation specified in the syntax is designed to enable a high compression capability for a desired image  
 19 quality. With the exception of the transform bypass mode of operation for lossless coding in the High 4:4:4 Intra,  
 20 CAVLC 4:4:4 Intra, and High 4:4:4 Predictive profiles, and the I\_PCM mode of operation in all profiles, the algorithm  
 21 is typically not lossless, as the exact source sample values are typically not preserved through the encoding and  
 22 decoding processes. A number of techniques may be used to achieve highly efficient compression. Encoding algorithms  
 23 (not specified in this Recommendation | International Standard) may select between inter and intra coding for block-  
 24 shaped regions of each picture. Inter coding uses motion vectors for block-based inter prediction to exploit temporal  
 25 statistical dependencies between different pictures. Intra coding uses various spatial prediction modes to exploit spatial  
 26 statistical dependencies in the source signal for a single picture. Motion vectors and intra prediction modes may be  
 27 specified for a variety of block sizes in the picture. The prediction residual is then further compressed using a transform  
 28 to remove spatial correlation inside the transform block before it is quantised, producing an irreversible process that  
 typically discards less important visual information while forming a close approximation to the source samples. Finally,  
 the motion vectors or intra prediction modes are combined with the quantised transform coefficient information and  
 encoded using either variable length coding or arithmetic coding.

### 29 0.6.1 Predictive coding

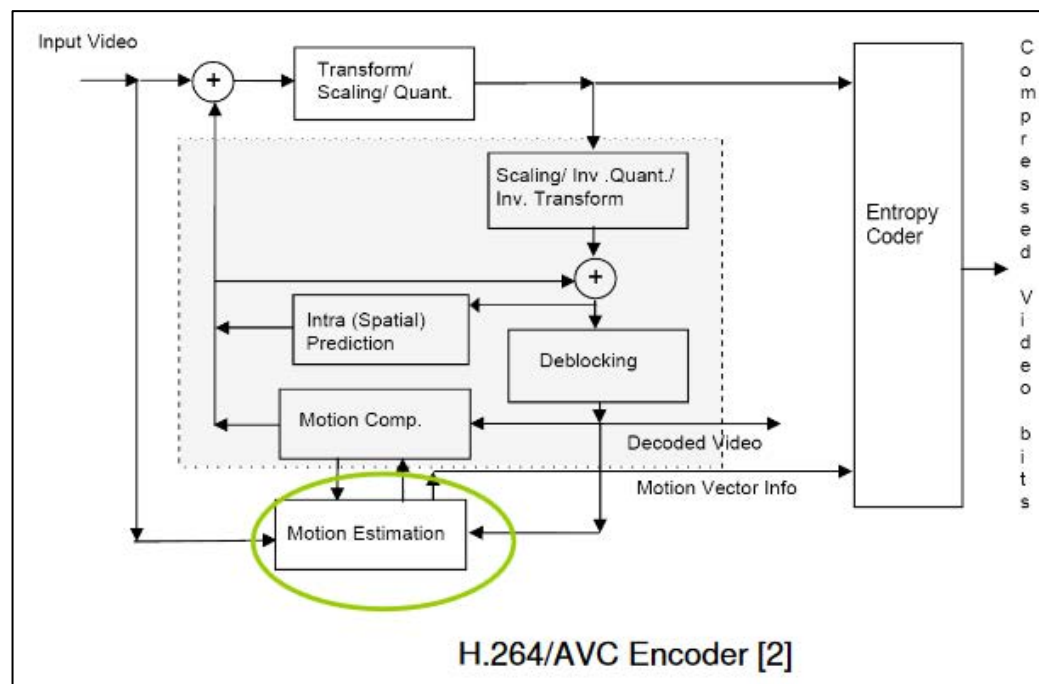
30 This subclause does not form an integral part of this Recommendation | International Standard.

31 Because of the conflicting requirements of random access and highly efficient compression, two main coding types are  
 32 specified. Intra coding is done without reference to other pictures. Intra coding may provide access points to the coded  
 33 sequence where decoding can begin and continue correctly, but typically also shows only moderate compression  
 34 efficiency. Inter coding (predictive or bi-predictive) is more efficient using inter prediction of each block of sample  
 35 values from some previously decoded picture selected by the encoder. In contrast to some other video coding standards,  
 36 pictures coded using bi-predictive inter prediction may also be used as references for inter coding of other pictures.

37 The application of the three coding types to pictures in a sequence is flexible, and the order of the decoding process is  
 38 generally not the same as the order of the source picture capture process in the encoder or the output order from the  
 decoder for display. The choice is left to the encoder and will depend on the requirements of the application. The

decoding order is specified such that the decoding of pictures that use inter-picture prediction follows later in decoding  
 order than other pictures that are referenced in the decoding process.

## 39 H.264 Encoder Block Diagram



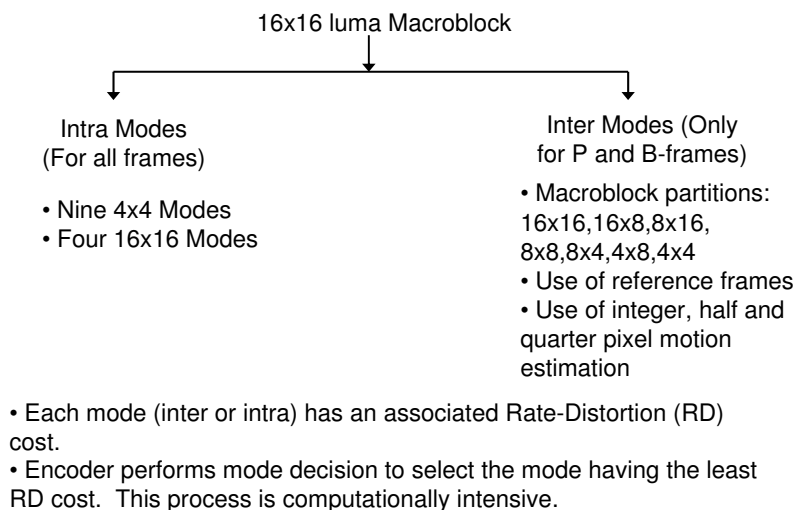
Source: <https://courses.cs.washington.edu/courses/csep590a/07au/lectures/rahullarge.pdf>

17. The Accused Infringing Devices provide a method for comparing pixels of a first pixel array (e.g., a macroblock) in a picture currently being coded with pixels of a plurality of second pixel arrays in at least one reference picture and concurrently performing motion estimation for each of a plurality of different prediction modes in order to determine which of the prediction modes is an optimum prediction mode.

18. H.264 uses different motion estimation modes in inter-frame prediction. These modes are commonly referred to as inter-frame prediction modes, or inter modes. Each inter mode involves partitioning the current macroblock into a different combination of sub blocks, and selecting the optimum motion vector for the current macroblock based on the partition. The inter-frame prediction modes, or inter modes, can be further categorized by the number and position of the reference frames, as well as the choice of integer pixel, half pixel and quarter pixel values in motion estimation. The Hulu H.264 encoders concurrently perform motion estimation of a macroblock for all inter-modes and select the most optimum prediction mode with least rate distortion cost.

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# Mode Decision

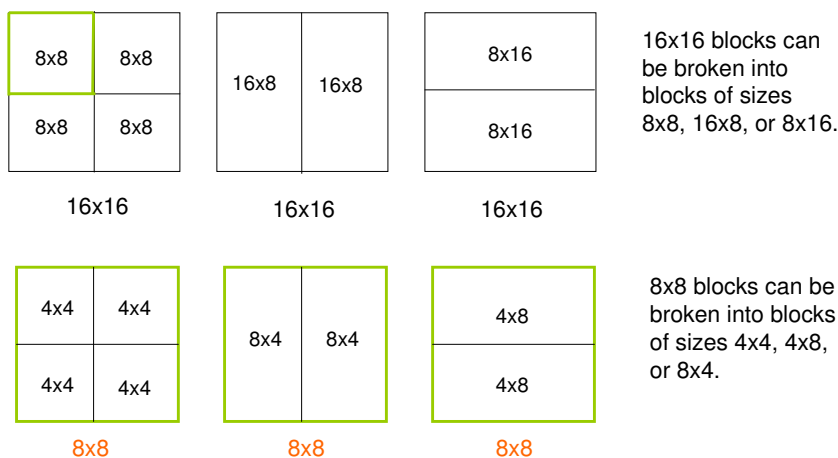


Source: <https://courses.cs.washington.edu/courses/csep590a/07au/lectures/rahullarge.pdf>, p. 30

19. H.264 provides a hierarchical way to partition a macroblock, with the available partitions shown in the following two figures. An exemplary inter-frame prediction mode, or inter mode, can be for a macroblock to be partitioned to encompass a 16x8 sub block on the left, and two 8x8 sub blocks on the right.

## Macroblock partitions for inter-frame prediction modes

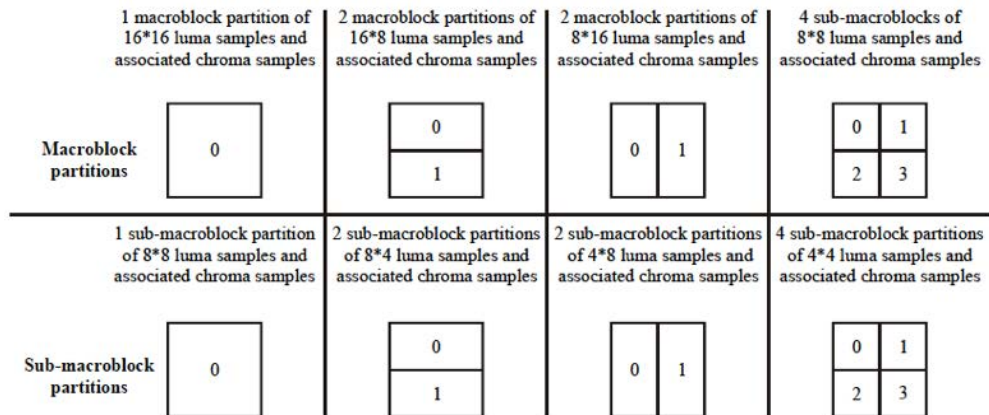
### Macroblock Partitions



Source: <https://courses.cs.washington.edu/courses/csep590a/07au/lectures/rahullarge.pdf>, p. 4



**H.264 provides macroblock partitions for inter-frame prediction modes**



H.264(09)\_F6-9

Figure 6-9 – Macroblock partitions, sub-macroblock partitions, macroblock partition scans, and sub-macroblock partition scans

Source: H.264 Standard (03-2010) at p. 26

20. The optimum prediction mode as chosen for the current macroblock is embedded in the compressed bit stream of H.264, as shown in the following two syntaxes.

**Macroblock prediction syntax in H.264**

## 7.3.5.1 Macroblock prediction syntax

	C	Descriptor
mb_pred( mb_type ) {		
if( MbPartPredMode( mb_type, 0 ) == Intra_4x4    MbPartPredMode( mb_type, 0 ) == Intra_16x16 ) {		
if( MbPartPredMode( mb_type, 0 ) == Intra_4x4 )		
for( luma4x4BlkIdx=0; luma4x4BlkIdx<16; luma4x4BlkIdx++ ) {		
<b>prev_intra4x4_pred_mode_flag</b> [ luma4x4BlkIdx ]	2	u(1)   ae(v)
if( !prev_intra4x4_pred_mode_flag[ luma4x4BlkIdx ] )		
<b>rem_intra4x4_pred_mode</b> [ luma4x4BlkIdx ]	2	u(3)   ae(v)
}		
<b>intra_chroma_pred_mode</b>	2	ue(v)   ae(v)
} else if( MbPartPredMode( mb_type, 0 ) != Direct ) {		
for( mbPartIdx = 0; mbPartIdx < NumMbPart( mb_type ); mbPartIdx++ )		
if( ( num_ref_idx_l0_active_minus1 > 0    mb_field_decoding_flag ) && MbPartPredMode( mb_type, mbPartIdx ) != Pred_L1 )		
<b>ref_idx_l0</b> [ mbPartIdx ]	2	te(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < NumMbPart( mb_type ); mbPartIdx++ )		
if( ( num_ref_idx_l1_active_minus1 > 0    mb_field_decoding_flag ) && MbPartPredMode( mb_type, mbPartIdx ) != Pred_L0 )		
<b>ref_idx_l1</b> [ mbPartIdx ]	2	te(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < NumMbPart( mb_type ); mbPartIdx++ )		
if( MbPartPredMode( mb_type, mbPartIdx ) != Pred_L1 )		
for( compIdx = 0; compIdx < 2; compIdx++ )		
<b>mvd_l0</b> [ mbPartIdx ][ 0 ][ compIdx ]	2	se(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < NumMbPart( mb_type ); mbPartIdx++ )		
if( MbPartPredMode( mb_type, mbPartIdx ) != Pred_L0 )		
for( compIdx = 0; compIdx < 2; compIdx++ )		
<b>mvd_l1</b> [ mbPartIdx ][ 0 ][ compIdx ]	2	se(v)   ae(v)
}		
}		

Source: H.264 Standard (03-2010) at p. 57

## Sub-macroblock prediction syntax in H.264

### 7.3.5.2 Sub-macroblock prediction syntax

Code	C	Descriptor
sub_mb_pred( mb_type ) {		
for( mbPartIdx = 0; mbPartIdx < 4; mbPartIdx++ )		
sub_mb_type[ mbPartIdx ]	2	ue(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < 4; mbPartIdx++ )		
if( ( num_ref_idx_l0_active_minus1 > 0    mb_field_decoding_flag ) && mb_type != P_8x8ref0 && sub_mb_type[ mbPartIdx ] != B_Direct_8x8 && SubMbPredMode( sub_mb_type[ mbPartIdx ] ) != Pred_L1 )		
ref_idx_l0[ mbPartIdx ]	2	te(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < 4; mbPartIdx++ )		
if( ( num_ref_idx_l1_active_minus1 > 0    mb_field_decoding_flag ) && sub_mb_type[ mbPartIdx ] != B_Direct_8x8 && SubMbPredMode( sub_mb_type[ mbPartIdx ] ) != Pred_L0 )		
ref_idx_l1[ mbPartIdx ]	2	te(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < 4; mbPartIdx++ )		
if( sub_mb_type[ mbPartIdx ] != B_Direct_8x8 && SubMbPredMode( sub_mb_type[ mbPartIdx ] ) != Pred_L1 )		
for( subMbPartIdx = 0; subMbPartIdx < NumSubMbPart( sub_mb_type[ mbPartIdx ] ); subMbPartIdx++ )		
for( compIdx = 0; compIdx < 2; compIdx++ )		
mvd_l0[ mbPartIdx ][ subMbPartIdx ][ compIdx ]	2	se(v)   ae(v)
for( mbPartIdx = 0; mbPartIdx < 4; mbPartIdx++ )		
if( sub_mb_type[ mbPartIdx ] != B_Direct_8x8 && SubMbPredMode( sub_mb_type[ mbPartIdx ] ) != Pred_L0 )		
for( subMbPartIdx = 0; subMbPartIdx < NumSubMbPart( sub_mb_type[ mbPartIdx ] ); subMbPartIdx++ )		
for( compIdx = 0; compIdx < 2; compIdx++ )		
mvd_l1[ mbPartIdx ][ subMbPartIdx ][ compIdx ]	2	se(v)   ae(v)
}		

Source: H.264 Standard (03-2010) at p. 58

21. The Accused Infringing Devices provide a method for determining which of the second pixel arrays (e.g., macroblock) constitutes a best match with respect to the first pixel array (e.g., macroblock) for the optimum prediction mode.



Fig. 2.4: Motion estimation. For each MB the best matching block in the reference frame is found. The encoder codes the differences (errors) between the MBs and their best matching blocks. Arrows indicate motion vectors and are labeled by the vector coordinates. In this example the shapes are identical but their colors are slightly larger/darker.

**Source:** B. Juurlink et al., Scalable Parallel Programming Applied to H.264, Chapter 2: Understanding the Application: An Overview of the H.264 Standard, p. 12

22. For example, the encoder performs mode decision to select the most optimum prediction mode with least rate distortion cost.

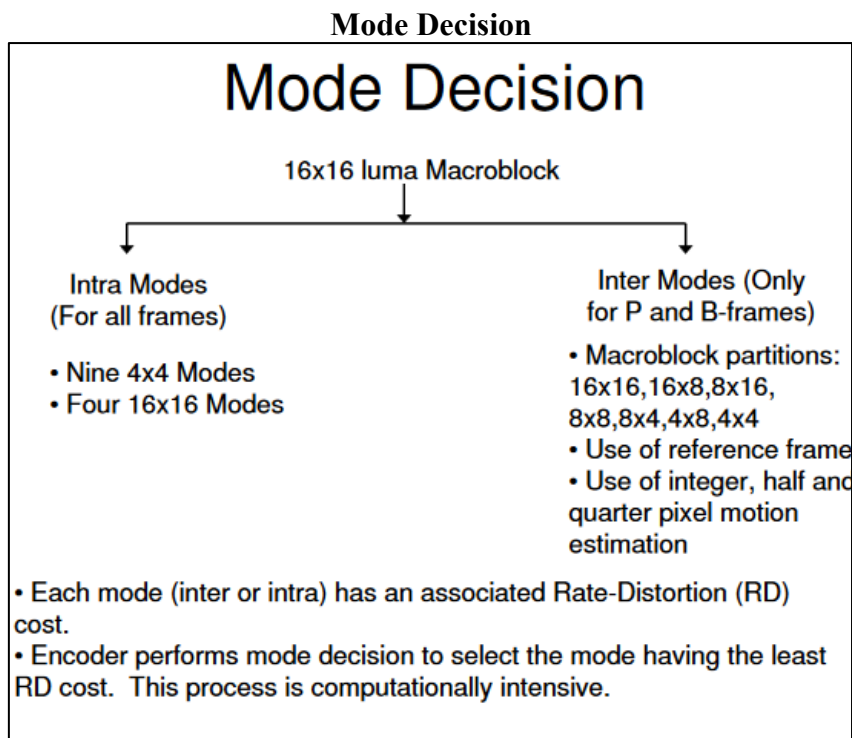
### Macroblock layer semantics

The following semantics are assigned to the macroblock types in Table 7-13:

- P\_L0\_16x16: the samples of the macroblock are predicted with one luma macroblock partition of size 16x16 luma samples and associated chroma samples.
- P\_L0\_L0\_MxN, with MxN being replaced by 16x8 or 8x16: the samples of the macroblock are predicted using two luma partitions of size MxN equal to 16x8, or two luma partitions of size MxN equal to 8x16, and associated chroma samples, respectively.
- P\_8x8: for each sub-macroblock an additional syntax element (`sub_mb_type[ mbPartIdx ]` with `mbPartIdx` being the macroblock partition index for the corresponding sub-macroblock) is present in the bitstream that specifies the type of the corresponding sub-macroblock (see subclause 7.4.5.2).
- P\_8x8ref0: has the same semantics as P\_8x8 but no syntax element for the reference index (`ref_idx_10[ mbPartIdx ]` with `mbPartIdx = 0..3`) is present in the bitstream and `ref_idx_10[ mbPartIdx ]` shall be inferred to be equal to 0 for all sub-macroblocks of the macroblock (with indices `mbPartIdx = 0..3`).
- P\_Skip: no further data is present for the macroblock in the bitstream.

**Source:** H.264 Standard (03-2010), p. 100

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Source: <https://courses.cs.washington.edu/courses/csep590a/07au/lectures/rahullarge.pdf>, p. 30

23. The Accused Infringing Devices provide a method for generating a motion vector for the first pixel array in response to the determining step. The encoder calculates the appropriate motion vectors and other data elements represented in the video data stream.



Fig. 2.4: Motion estimation. For each MB the best matching block in the reference frame is found. The encoder codes the differences (errors) between the MBs and their best matching blocks. Arrows indicate motion vectors and are labeled by the vector coordinates. In this example the shapes are identical but their colors are slightly larger/darker.

Source: B. Juurlink et al., Scalable Parallel Programming Applied to H.264, Chapter 2:



Understanding the Application: An Overview of the H.264 Standard, p. 12

**Motion Vector Derivation is described below**

1. The derivation process for motion vector components and reference indices as specified in subclause 8.4.1 is invoked.

Inputs to this process are:

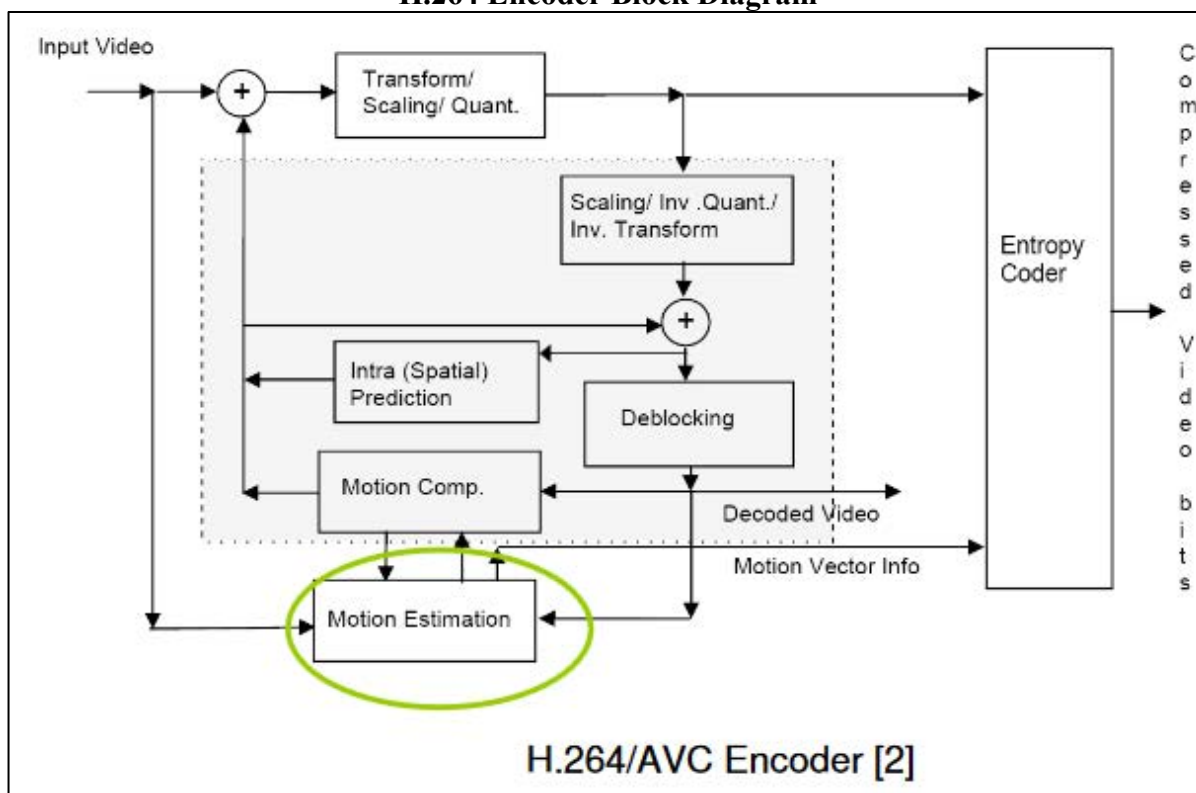
- a macroblock partition mbPartIdx,
- a sub-macroblock partition subMbPartIdx.

Outputs of this process are:

- luma motion vectors mvL0 and mvL1 and when ChromaArrayType is not equal to 0, the chroma motion vectors mvCL0 and mvCL1
- reference indices refIdxL0 and refIdxL1
- prediction list utilization flags predFlagL0 and predFlagL1
- the sub-macroblock partition motion vector count subMvCnt.

Source: H.264 Standard (03-2010), p. 151

**H.264 Encoder Block Diagram**



Source: <https://courses.cs.washington.edu/courses/csep590a/07au/lectures/rahullarge.pdf>, p. 2

24. Hulu has infringed, and continues to infringe, at least claim 1 of the '005 patent in the United States, by making, using, offering for sale, selling and/or

1 importing the Accused Infringing Devices in violation of 35 U.S.C. § 271(a).

2 25. Upon information and belief, Hulu may have infringed and continues  
3 to infringe the '005 patent through other software and devices utilizing the same or  
4 reasonably similar functionality, including other versions of the Accused Infringing  
5 Devices.

6 26. Hulu's acts of direct infringement have caused and continue to cause  
7 damage to Uniloc and Uniloc is entitled to recover damages sustained as a result of  
8 Hulu's wrongful acts in an amount subject to proof at trial.

9 **COUNT II- INFRINGEMENT OF U.S. PATENT NO. 6,895,118**

10 27. The allegations of paragraphs 1-9 of this Complaint are incorporated  
11 by reference as though fully set forth herein.

12 28. The '118 patent, titled "Method Of Coding Digital Image Based on  
13 Error Concealment," issued on May 17, 2005. A copy of the '118 patent is attached  
14 as Exhibit B.

15 29. Pursuant to 35 U.S.C. § 282, the '118 patent is presumed valid.

16 30. Upon information and belief, Hulu makes, uses, offers for sale, and/or  
17 sells in the United States and/or imports into the United States products and  
18 services such as H.264 encoders that practice a method for coding a digital image  
19 comprising macroblocks in a binary data stream (collectively the "Accused  
20 Infringing Devices").

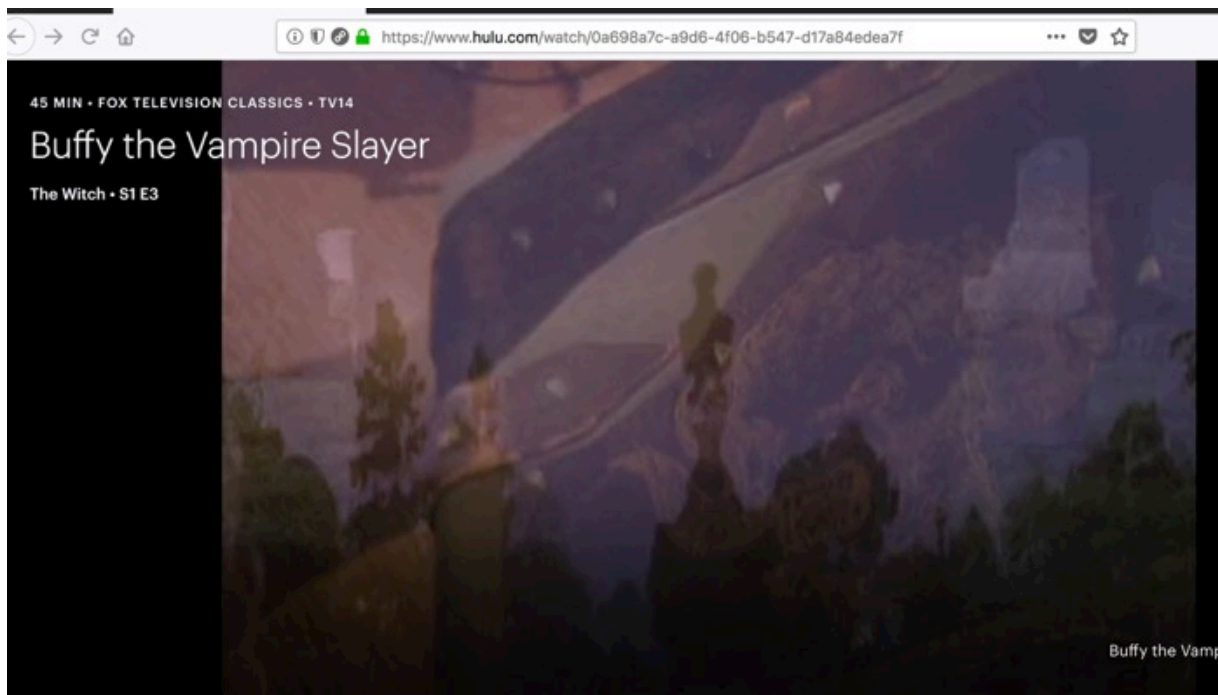
21 31. Upon information and belief, the Accused Infringing Devices infringe  
22 at least claim 1 in the exemplary manner described below.

23 32. The Accused Infringing Devices use H.264 (AVC) streams for coding  
24 video data (digital images) including macroblocks embedded in a binary stream.

25 33. H.264 is a widely used video compression format with decoder support  
26 on web browsers, TVs and other consumer devices. Moreover, H.264 codes digital  
27 images comprising macroblocks streams.

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1           34.       The Accused Infringing Devices stream content using the MPEG-  
2 DASH format, as shown by the mpd file (manifest) sample below. The manifest  
3 file includes references to the video codec: AVC1 (H.264). The AVC1 designator  
4 is the IETF identifier for H.264. The binary (byte stream) format is specified in  
5 Annex B of the H.264 specification.



18       **Source:** <https://www.hulu.com/watch/0a698a7c-a9d6-4f06-b547-d17a84edea7f>

```

1      <Representation id="118062286" codecs="avc1.640015" bandwidth="770435" startWithSAP="1" width="480" height="360">
2      <hulu:ProfileBandwidth>650</hulu:ProfileBandwidth>
3      <hulu:Cdn>dv</hulu:Cdn>
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5      <BaseURL>https://http-v-darwin.hulustream.com/263/1874263/agave1874263_54431862_H264_650_54433310_video.mp4?end=20181011004836&am
6      p;authToken=0646f72016a7797b1aef4</BaseURL>
7      <SegmentBase indexRange="1535-8082" indexRangeExact="true">
8      <Initialization range="0-1534"/>
9      </SegmentBase>
10     </Representation>
11     <Representation id="118062286" codecs="avc1.640015" bandwidth="770435" startWithSAP="1" width="480" height="360">
12     <hulu:ProfileBandwidth>650</hulu:ProfileBandwidth>
13     <hulu:Cdn>de</hulu:Cdn>
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15     <BaseURL>https://http-e-darwin.hulustream.com/263/1874263/agave1874263_54431862_H264_650_54433310_video.mp4?expire=1539218916&am
16     p;token=0468ed447f20d0f588738f2a1f3604cc</BaseURL>
17     <SegmentBase indexRange="1535-8082" indexRangeExact="true">
18     <Initialization range="0-1534"/>
19     </SegmentBase>
20     </Representation>
21     <Representation id="118063714" codecs="avc1.64001E" bandwidth="1222775" startWithSAP="1" width="640" height="480">
22     <hulu:ProfileBandwidth>1000</hulu:ProfileBandwidth>
23     <hulu:Cdn>dv</hulu:Cdn>
24
25     <BaseURL>https://http-v-darwin.hulustream.com/263/1874263/agave1874263_54431863_H264_1000_54433637_video.mp4?end=20181011004836&a
26     mp;authToken=009c6afcf7b92b627c6490</BaseURL>
27     <SegmentBase indexRange="1535-8082" indexRangeExact="true">
28     <Initialization range="0-1534"/>
29     </SegmentBase>
30     </Representation>

```

Source: <https://manifest.hulustream.com/dash/1874263.mpd>

When the first element of a value is a code indicating a codec from the Advanced Video Coding specification [AVC], specifically one of the sample entries defined in [AVC-Formats] (such as 'avc1', 'avc2', 'svc1', 'mvc1', and 'mvc2') -- indicating AVC (H.264), Scalable Video Coding (SVC), or Multiview Video Coding (MVC), the second element (referred to as 'avcoti' in the formal syntax) is the hexadecimal representation of the following three bytes in the (subset) sequence parameter set Network Abstraction Layer (NAL) unit specified in [AVC]:

- (1) profile\_idc,
- (2) the byte containing the constraint\_set flags (currently constraint\_set0\_flag through constraint\_set5\_flag, and the reserved\_zero\_2bits), and
- (3) level\_idc.

Source: <https://tools.ietf.org/html/rfc6381>

This Recommendation | International Standard was developed in response to the growing need for higher compression of moving pictures for various applications such as videoconferencing, digital storage media, television broadcasting, internet streaming, and communication. It is also designed to enable the use of the coded video representation in a flexible manner for a wide variety of network environments. The use of this Recommendation | International Standard allows motion video to be manipulated as a form of computer data and to be stored on various storage media, transmitted and received over existing and future networks and distributed on existing and future broadcasting channels.

Source: <https://www.itu.int/rec/T-REC-H.264-201704-I/en>, p. i



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As in previous video coding Recommendations and International Standards, a macroblock, consisting of a 16x16 block of luma samples and two corresponding blocks of chroma samples, is used as the basic processing unit of the video decoding process.

A macroblock can be further partitioned for inter prediction. The selection of the size of inter prediction partitions is a result of a trade-off between the coding gain provided by using motion compensation with smaller blocks and the quantity

Source: <https://www.itu.int/rec/T-REC-H.264-201704-I/en>, section 0.6.3

**Annex B**

**Byte stream format**

(This annex forms an integral part of this Recommendation | International Standard.)

This annex specifies syntax and semantics of a byte stream format specified for use by applications that deliver some or all of the NAL unit stream as an ordered stream of bytes or bits within which the locations of NAL unit boundaries need to be identifiable from patterns in the data, such as Rec. ITU-T H.222.0 | ISO/IEC 13818-1 systems or Rec. ITU-T H.320 systems. For bit-oriented delivery, the bit order for the byte stream format is specified to start with the MSB of the first byte, proceed to the LSB of the first byte, followed by the MSB of the second byte, etc.

Source: <https://www.itu.int/rec/T-REC-H.264-201704-I/en>, Annex B

35. The Accused Infringing Devices’ H.264 coding supports skipped macroblocks. Before a macroblock is coded, an estimation is made of whether that macroblock can be reconstructed with an error concealment method by examining its motion characteristics, and checking to see that the resulting prediction contains no non-zero (i.e. all zero) quantized transform coefficients. This estimation provides an indication of the capacity for the macroblock to be reconstructed from properties of neighboring macroblocks, allowing the missing block to be concealed by inferring its properties.



**Skipped Mode:**

In addition to the macroblock modes described above, a P-slice macroblock can also be coded in the so-called skip mode. If a macroblock has motion characteristics that allow its motion to be effectively predicted from the motion of neighboring macroblocks, and it contains no non-zero quantized transform coefficients, then it is flagged as skipped. For this mode, neither a quantized prediction error signal nor a motion vector or reference index parameter are transmitted. The reconstructed signal is computed in a manner similar to the prediction of a macroblock with partition size  $16 \times 16$  and fixed reference picture index equal to 0. In contrast to previous video coding standards, the motion vector used for reconstructing a skipped macroblock is inferred from motion properties of neighboring macroblocks rather than being inferred as zero (i.e., no motion).

Source: <http://mrutyunjayahiremath.blogspot.com/2010/09/h264-inter-predn.html>

36. The Accused Infringing Devices' H.264 encoders perform a decision step to determine if a macroblock should be excluded from coding (skipped), with the decision to exclude made on the basis of its capacity to be reconstructing by inferring its motion properties from neighboring macroblocks, and based on all zero quantized transform coefficients.

**Skipped Mode:**

In addition to the macroblock modes described above, a P-slice macroblock can also be coded in the so-called skip mode. If a macroblock has motion characteristics that allow its motion to be effectively predicted from the motion of neighboring macroblocks, and it contains no non-zero quantized transform coefficients, then it is flagged as skipped. For this mode, neither a quantized prediction error signal nor a motion vector or reference index parameter are transmitted. The reconstructed signal is computed in a manner similar to the prediction of a macroblock with partition size  $16 \times 16$  and fixed reference picture index equal to 0. In contrast to previous video coding standards, the motion vector used for reconstructing a skipped macroblock is inferred from motion properties of neighboring macroblocks rather than being inferred as zero (i.e., no motion).

Source: <http://mrutyunjayahiremath.blogspot.com/2010/09/h264-inter-predn.html>

**3.139** skipped macroblock: A *macroblock* for which no data is coded other than an indication that the *macroblock* is to be decoded as "skipped". This indication may be common to several *macroblocks*.

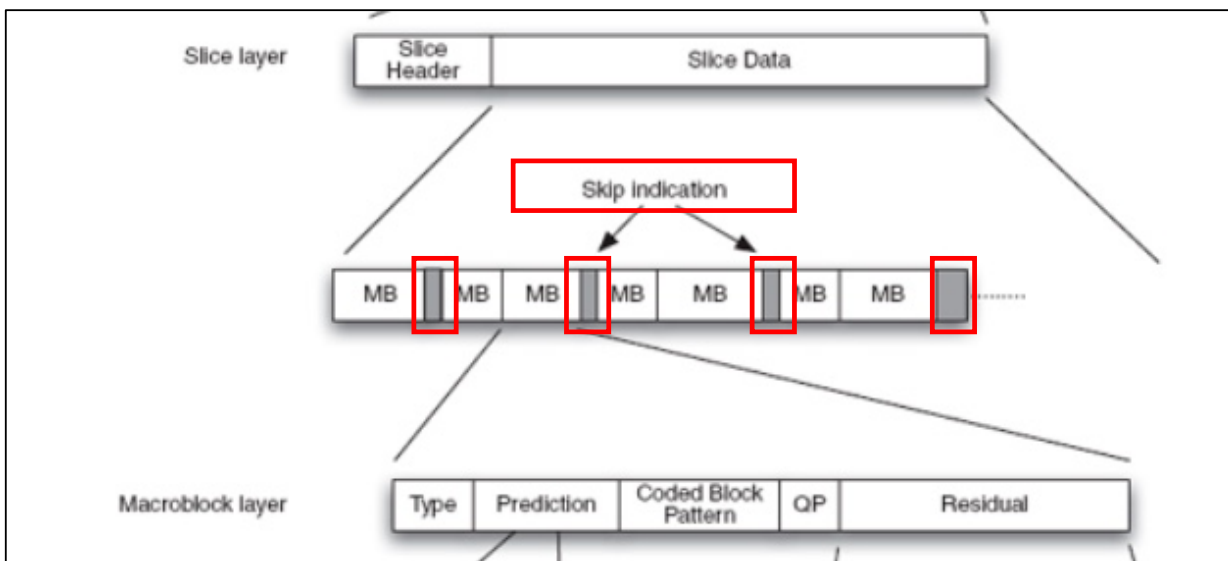
Source: <https://www.itu.int/rec/T-REC-H.264-201704-1/en>, p13

37. Skipped macroblocks are communicated with an `mb_skip_flag = 1` (resynchronization marker at the point where the macroblocks are not coded

1 (skipped)) in the binary data stream.

2  
3 **3.139 skipped macroblock:** A macroblock for which no data is coded other than an indication that the macroblock is to be decoded as "skipped". This indication may be common to several macroblocks.

4 **Source:** <https://www.itu.int/rec/T-REC-H.264-201704-I/en>, p13



15 **Source:** [https://www.oreilly.com/library/view/the-h264-advanced/9780470516928/ch05.html#macroblock\\_layer](https://www.oreilly.com/library/view/the-h264-advanced/9780470516928/ch05.html#macroblock_layer)

17 mb\_skip\_flag equal to 1 specifies that for the current macroblock, when decoding a P or SP slice, mb\_type shall be inferred to be P\_Skip and the macroblock type is collectively referred to as P macroblock type, or for which, when decoding a B slice, mb\_type shall be inferred to be B\_Skip and the macroblock type is collectively referred to as B macroblock type. mb\_skip\_flag equal to 0 specifies that the current macroblock is not skipped.

19 **Source:** <https://www.itu.int/rec/T-REC-H.264-201704-I/en>, p96

20  
21 38. Hulu has infringed, and continues to infringe, at least claim 1 of the  
22 '118 patent in the United States, by making, using, offering for sale, selling and/or  
23 importing the Accused Infringing Devices in violation of 35 U.S.C. § 271(a).

24 39. Upon information and belief, Hulu may have infringed and continues  
25 to infringe the '118 patent through other software and devices utilizing the same or  
26 reasonably similar functionality, including other versions of the Accused Infringing  
27 Devices.

1 40. Hulu’s acts of direct infringement have caused and continue to cause  
2 damage to Uniloc and Uniloc is entitled to recover damages sustained as a result of  
3 Hulu’s wrongful acts in an amount subject to proof at trial.

4 **COUNT III– INFRINGEMENT OF U.S. PATENT NO. 9,721,273**

5 41. The allegations of paragraphs 1-9 of this Complaint are incorporated  
6 by reference as though fully set forth herein.

7 42. The ’273 patent, titled “System and Method For Aggregating And  
8 Providing Audio And Visual Presentations Via A Computer Network,” issued on  
9 August 1, 2017. A copy of the ’273 patent is attached as Exhibit C.

10 43. Pursuant to 35 U.S.C. § 282, the ’273 patent is presumed valid.

11 44. Upon information and belief, Hulu makes, uses, offers for sale, and/or  
12 sells in the United States and/or imports into the United States products and  
13 services that practice a method for providing content via a computer network and a  
14 computer system (collectively the “Accused Infringing Devices”).

15 45. Upon information and belief, the Accused Infringing Devices infringe  
16 at least claim 1 in the exemplary manner described below.

17 46. The Accused Infringing Devices perform a method for providing  
18 content via a computer network and computer system. In particular, Hulu operates  
19 a streaming service that delivers TV shows and movies to subscribers over the  
20 Internet.

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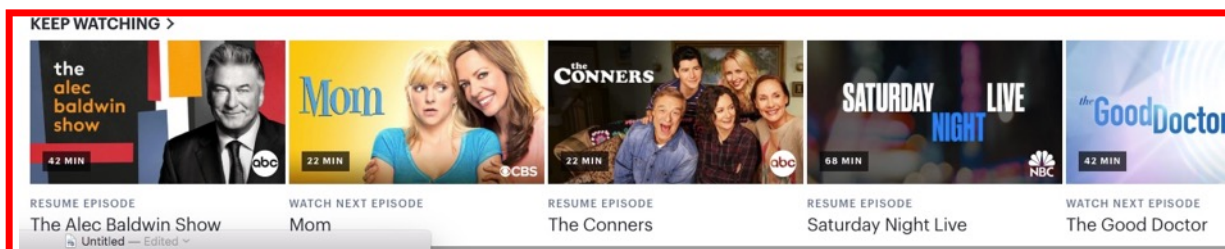
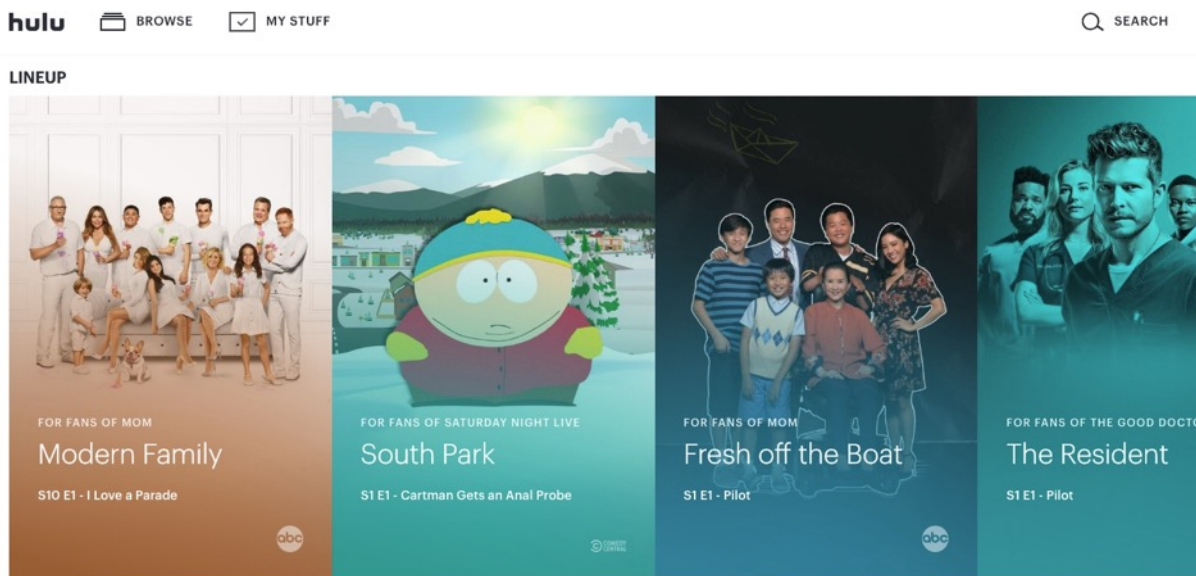


Source: <http://www.hulu.com>

47. The Accused Infringing Devices store presentation data that represents content of a first collection of one or more presentations using the computer system. In particular, Hulu maintains a collection of presentations that a user has started, but not finished, watching. Such a collection can be displayed in several contexts, including on the Hulu homepage as well as while browsing categories such as “Kids.”



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### Kids



Source: <http://www.hulu.com>

48. The Accused Infringing Devices store data indicative of the first collection of presentations so as to be associated with the presentation data. In particular, the Accused Infringing Devices store viewing data indicating the amount

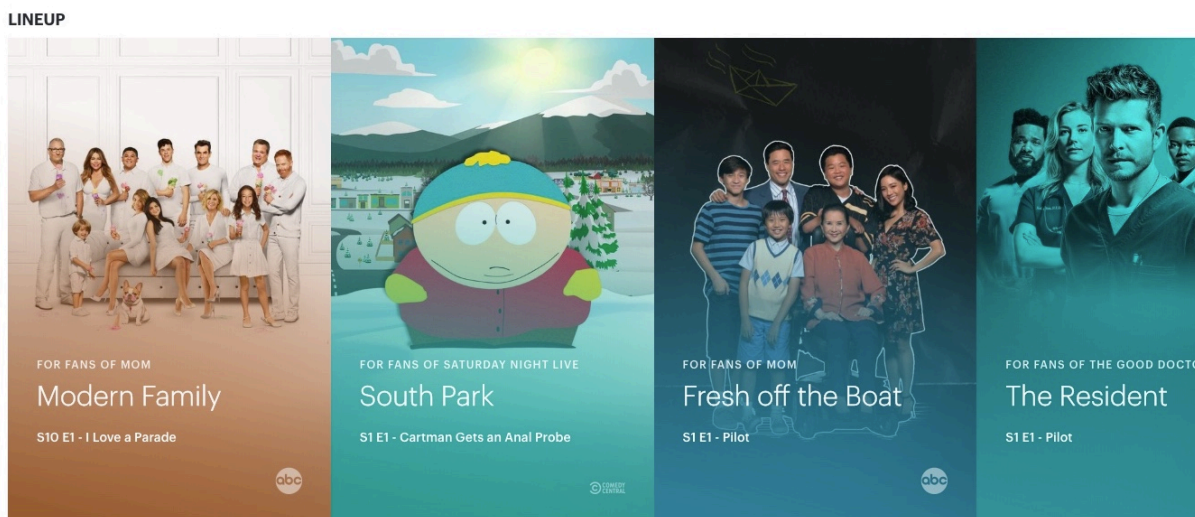


1 of time the user has watched each program in the “Keep Watching” row.



10 **Source:** <http://www.hulu.com>

11  
12 49. The Accused Infringing Devices store feed data that represents a  
13 collection of one or more feeds using the computer system. The Accused  
14 Infringing Devices store feed data representing TV shows and movies that have  
15 been recommended to the user. For example, "Line Up" is a collection of  
16 presentations recommended to the user.



26 **Source:** <http://www.hulu.com>

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1 50. “For You” is another example of a collection of presentations  
2 recommended to the user through the browse category pages.

3 Kids



8

9 KEEP WATCHING >



12 DuckTales (2017)

13 Source: <http://www.hulu.com>

14 51. The Accused Infringing Devices store feed data in connection with the  
15 operation of their recommendation engine. In the case of displaying the Hulu  
16 homepage, the client queries the discover.hulu.com host to identify a second  
17 collection of presentations (*i.e.*, recommendations labeled “Line Up”). The  
18 recommendations are identified by id numbers, such as “2b4f6451-b084-450a-  
19 a6d7-f116ecc85af6” (corresponding to “Chicago Med”). This operation reflects the  
20 storage of feed data corresponding to the second collection by Hulu, prior to  
21 transmission of the id numbers to the client.

```

1  ▼ {_type: "hub", id: "urn:hulu:hub:home",...}
2  ▼ components: [{_type: "collection", id: "135",...}, {_type: "collection", id: "282",...},...]
3  ▼ 0: {_type: "collection", id: "135",...}
4  artwork: {}
5  device_context_failure: false
6  href: "https://discover.hulu.com/content/v3/hubs/home/collections/135?schema=3"
7  id: "135"
8  is_fallback: false
9  items: [{_type: "view", id: "2b4f6451-b084-450a-a6d7-f116ecc85af6",...},...]
10 ▼ 0: {_type: "view", id: "2b4f6451-b084-450a-a6d7-f116ecc85af6",...}
11 ▶ actions: {playback: {eab: "EAB::9b2dd699-11ec-4464-b973-122b59311637::61117927::26004819",...}, browse:
12 device_context_failure: false
13 ▼ entity_metadata: {genre_names: ["Medical", "Drama", "Romance", "Action"], premiere_date: "2018-05-15T
14 ▶ genre_names: ["Medical", "Drama", "Romance", "Action"]
15 premiere_date: "2018-05-15T00:00:00Z"
16 ▶ rating: {code: "TV14"}
17 series_description: "Executive producer Dick Wolf delivers the newest installment of the compelling
18 id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
19 ▼ metrics_info: {reco_tags: "ncr|nr|uf", entity_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6", entity_type
20 entity_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
21 entity_name: "Chicago Med"
22 entity_type: "series"
23 promo_text_format: "Start Watching"
24 reco_reasons: "For Fans of The Good Doctor"
25 reco_tags: "ncr|nr|uf"
26 target_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
27 target_name: "Chicago Med"
28 target_type: "series"
▶ personalization: {bowie_context: "cover_story", eab: "EAB::9b2dd699-11ec-4464-b973-122b59311637::6111
view_template: "cover_story_standard"
▶ visuals: {artwork: {_type: "artwork_orientation",...}, headline: "Chicago Med", action_text: "Start Wat
_type: "view"

```

**Source:** Screenshot of Chrome Developer Tools showing the file containing data that supports the user's experience from Hulu.com.

52. In the case of displaying a browse category page, the client queries the discover.hulu.com host to identify a second collection of presentations (*i.e.*, recommendations labeled “For You”). The recommendations are identified by id numbers, such as “671bc3fd-114f-4044-986b-b961ca527024” (corresponding to “Teen Titans Go!”). This operation reflects the storage of feed data corresponding to the second collection by Hulu, prior to transmission of the id numbers to the client.



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```

"device_context_failure": false,
"components": [
  {
    "type": "collection",
    "id": "113",
    "href": "https://discover.hulu.com/content/v3/hubs/kids/collections/113?schema=3",
    "p3h_href": "https://discover.hulu.com/content/v3/hubs/kids/collections/113?schema=3&eab_ids=EAB:4077c039-314f-4dfc-8dc1-
c533a76e8a07:NULL:NULL,EAB:671bc3fd-114f-4044-986b-b961ca527024:NULL:NULL,EAB:4f96cfd5-73b9-4975-8021-
ea504d4c5780:NULL:NULL,EAB:4d1be259-c261-45e7-bf79-72cdf44fb9ad:NULL:NULL,EAB:2a70a30b-3ba2-4b7e-aaeb-
384e56596a19:NULL:NULL,EAB:f2f9e217-801f-460c-9a53-4e92ee82fe92:NULL:NULL,EAB:c4636d35-eb1b-4ac3-bf02-
cb83dce0ecf6:NULL:NULL,EAB:253eaa4-50d0-4b28-ab4b-1c0c015e0fa0:NULL:NULL,EAB:38364d89-c44f-47ce-985b-
a37a360f2b7e:NULL:NULL,EAB:bc47d2cf-6f24-4ea7-9219-1cb7ea84daba:NULL:NULL,EAB:3cb3f3c4-e908-45f8-8db8-
5d43031995e6:NULL:NULL,EAB:45e51af5-3da2-4129-a715-51cdd5a34ccf:NULL:NULL,EAB:aaed007e-c365-4509-9eab-
d3713a19eab8:NULL:NULL,EAB:39dedbce-8fcd-431b-ac3f-15b562b9c742:NULL:NULL,EAB:27cefa35-f959-45df-a87b-
7622bec3d18f:NULL:NULL,EAB:115dd69e-a60c-4c00-8ba0-166715fb21a2:NULL:NULL,EAB:bffd458e-794f-4cb3-b748-
6df6ad452b7f:NULL:NULL,EAB:6f39a5a0-6e20-4bbf-b8b7-364025897b03:NULL:NULL,EAB:b86922f3-5c46-4871-adc0-
071e48d2d611:NULL:NULL,EAB:01b0d3e4-8b57-4cbe-9b74-e379bc60ac5a:NULL:NULL,EAB:ec95e86e-ee98-4726-9794-
e9dea449757c:NULL:NULL,EAB:bc455c45-a11d-43fe-ac7d-3afdfc264909:NULL:NULL,EAB:a996307f-0d34-4376-86e6-
b2132be03f68:NULL:NULL,EAB:7b4bf05d-a7dc-47a7-85c8-82d7a69be484:NULL:NULL,EAB:03db8986-d082-45dc-a45b-
586f9f85c82b:NULL:NULL,EAB:9b75f792-44c6-4a49-a2a2-48a746c6c26d:NULL:NULL,EAB:0721150b-9e72-4970-b83a-
f2db08fbae54:NULL:NULL,EAB:eb0bb177-6278-48ec-902d-4efb916a7a39:NULL:NULL,EAB:b7833196-8dab-411e-8728-
46759d8402ba:NULL:NULL,EAB:14dcb999-615b-4a66-835c-4c1d00717df8:NULL:NULL,EAB:87e268f4-1dc3-4fd3-8e41-
41dc246eed02:NULL:NULL,EAB:139507fa-07d2-43ca-8991-370d5306989d:NULL:NULL,EAB:f20a0f3e-b96b-48d1-bfaf-
13eb4616b504:NULL:NULL,EAB:c8b9c799-b81e-4522-a05b-40212f69e7a6:NULL:NULL,EAB:d072c7a0-5570-45bd-80fb-
227ff42aca49:NULL:NULL,EAB:031f9f6e-6de8-4482-866c-e6682208b63e:NULL:NULL,EAB:3c0bf4eb-2d7a-4b7c-a9a4-
668427a22aba:NULL:NULL,EAB:9626bd57-00a7-4d44-8629-543811e439ee:NULL:NULL,EAB:8baef83e-f316-4846-8ba2-
21cdf4c40823:NULL:NULL,EAB:5c5f6041-ff38-4670-a7f8-30033a28f4bc:NULL:NULL,EAB:7983e75d-2897-4259-8f1d-
50be6d2ca263:NULL:NULL,EAB:eea4f209-0f98-4b51-8b2e-ec2b2fbbd058:NULL:NULL,EAB:a4a06e0c-c4d8-4b34-a55e-
a28c57ecc429:NULL:NULL,EAB:5d931e25-bd29-46f2-9baf-b5a0b4c001f8:NULL:NULL,EAB:6cfcd220-59c1-4a89-b187-
e990b4c51b08:NULL:NULL,EAB:b4f327be-b835-4e82-99cd-40ab04543a2d:NULL:NULL,EAB:a5481b97-adb7-4583-af31-
d89772d93eb9:NULL:NULL,EAB:8a15de0d-8c39-4a94-bc8f-0bfe73062d7d:NULL:NULL,EAB:4b8401fa-eb03-4871-8da0-
e821012cf43:NULL:NULL,EAB:17afce6-e552-491c-86be-6a422f518c68:NULL:NULL&bowie_context=browse",
    "name": "For You",
    "theme": "collection_theme_3",
    "artwork": {},
    "personalization": {
      "bowie_context": "browse"
    }
  }
]

```

Source: Screenshot of Chrome Developer Tools showing the file containing data that supports the user’s experience from Hulu.com.

53. Each of the feeds identifies a corresponding second collection of one or more presentations being accessible via the computer network, and includes no data representing the video/audio content of the second collection of presentations. As shown above, the feed data includes the identifiers and other metadata associated with the presentations, which is not the video/audio content of the presentations. In addition, the “Line Up” feed data includes other information that is apart from the video/audio content, such as the reason(s) for recommending a particular presentation to the user and tags associated therewith.

```

1  ▼ {_type: "hub", id: "urn:hulu:hub:home",...}
2  ▼ components: [{_type: "collection", id: "135",...}, {_type: "collection", id: "282",...},...]
3  ▼ 0: {_type: "collection", id: "135",...}
4  artwork: {}
5  device_context_failure: false
6  href: "https://discover.hulu.com/content/v3/hubs/home/collections/135?schema=3"
7  id: "135"
8  is_fallback: false
9  ▼ items: [{_type: "view", id: "2b4f6451-b084-450a-a6d7-f116ecc85af6",...},...]
10 ▼ 0: {_type: "view", id: "2b4f6451-b084-450a-a6d7-f116ecc85af6",...}
11   ▶ actions: {playback: {eab: "EAB::9b2dd699-11ec-4464-b973-122b59311637::61117927::26004819",...}, browse:
12     device_context_failure: false
13   ▼ entity_metadata: {genre_names: ["Medical", "Drama", "Romance", "Action"], premiere_date: "2018-05-15T
14     ▶ genre_names: ["Medical", "Drama", "Romance", "Action"]
15     premiere_date: "2018-05-15T00:00:00Z"
16     ▶ rating: {code: "TV14"}
17     series_description: "Executive producer Dick Wolf delivers the newest installment of the compelling
18     id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
19   ▼ metrics_info: {reco_tags: "ncr|nr|uf", entity_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6", entity_type
20     entity_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
21     entity_name: "Chicago Med"
22     entity_type: "series"
23     promo_text_format: "Start Watching"
24     reco_reasons: "For Fans of The Good Doctor"
25     reco_tags: "ncr|nr|uf"
26     target_id: "2b4f6451-b084-450a-a6d7-f116ecc85af6"
27     target_name: "Chicago Med"
28     target_type: "series"
     ▶ personalization: {bowie_context: "cover_story", eab: "EAB::9b2dd699-11ec-4464-b973-122b59311637::6111
     view_template: "cover_story_standard"
     ▶ visuals: {artwork: {_type: "artwork_orientation",...}, headline: "Chicago Med", action_text: "Start Wat
     _type: "view"

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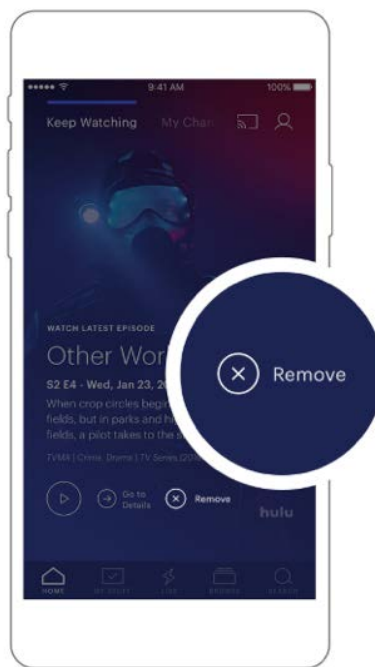
14 **Source:** Screenshot of Chrome Developer Tools showing the file containing data that supports  
 15 the user's experience from Hulu.com.

16 54. The Accused Infringing Devices automatically and periodically access  
 17 each of the feeds to identify each of the corresponding second collection of  
 18 presentations using the computer system. In particular, Hulu's catalog of TV shows  
 19 and movies is constantly changing. <https://www.hulu.com/press/new-this-month/>.

20 55. The Accused Infringing Devices also provide a recommendations  
 21 engine that automatically and periodically provides updated recommendations.  
 22

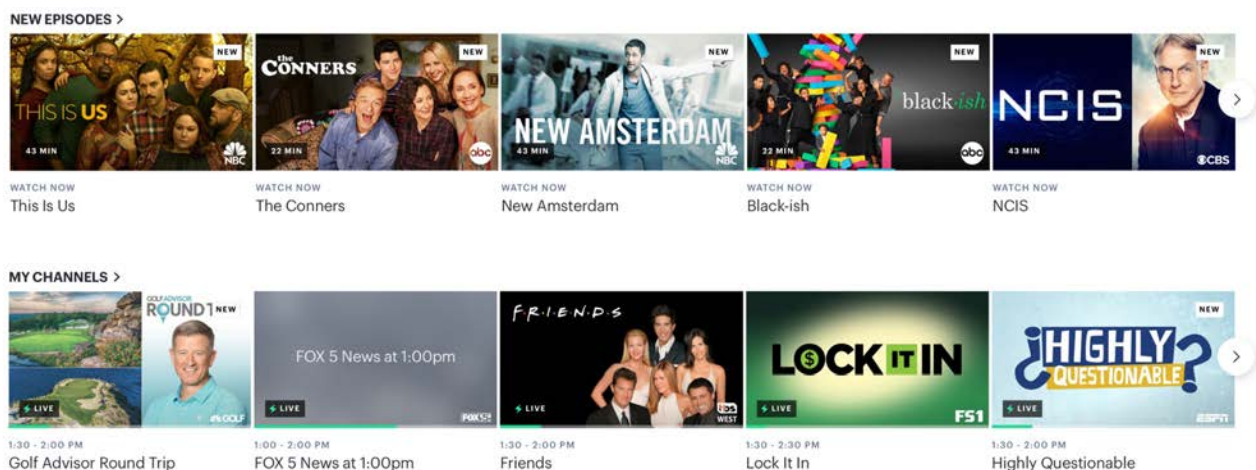


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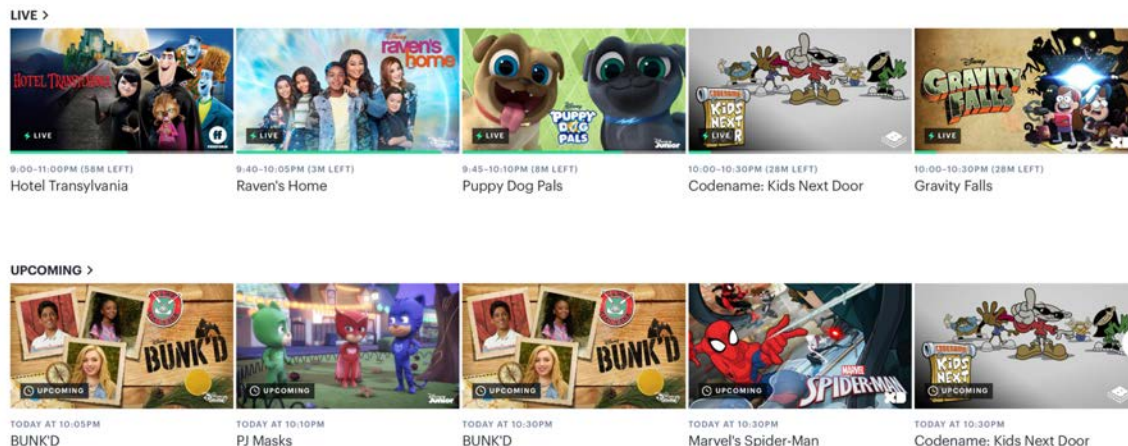
Source: <https://www.hulu.com/press/hulu-update/mobile-features-and-your-new-web/>

56. The Accused Infringing Devices store data associated with a third collection of one or more presentations. In particular, the Accused Infringing Devices display additional rows, each corresponding to a separate collection of presentations. For example, on the Hulu homepage, Hulu stores data associated with “New Episodes” and “My Channels.”



Source: <https://hulu.com>

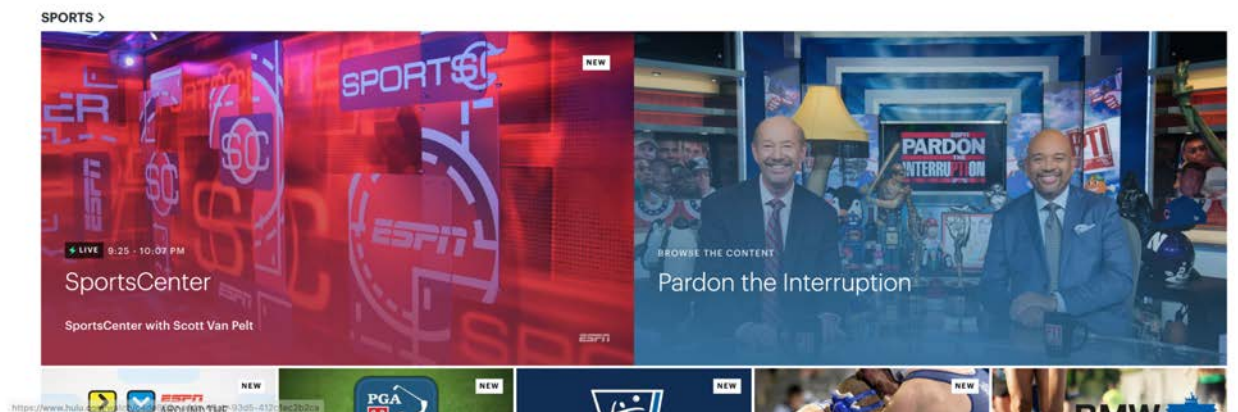
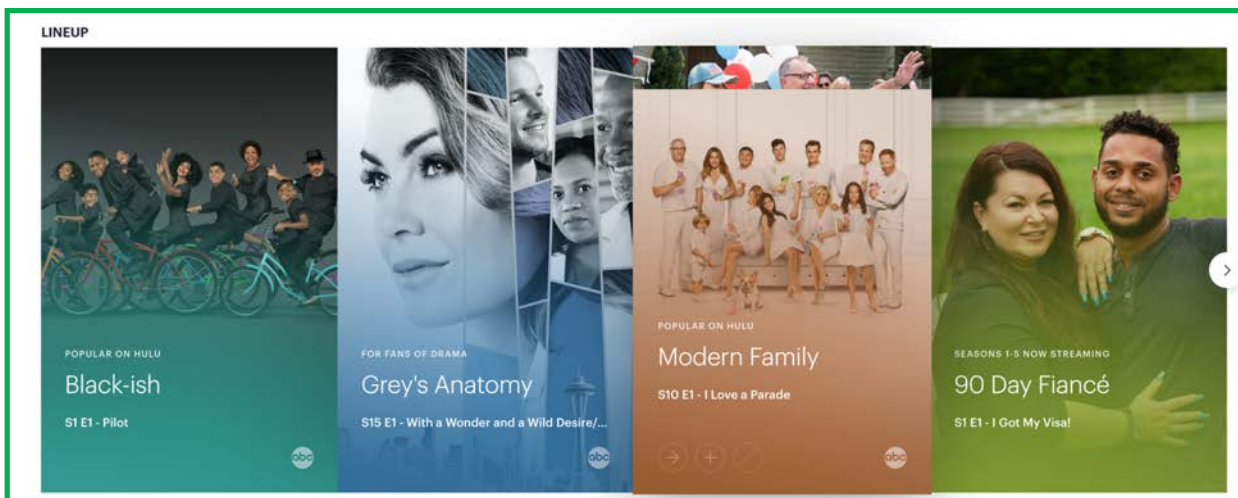
1 57. In addition on the browse category pages, the Accused Infringing  
2 Devices store data associated with collections of “Live” and “Upcoming” TV  
3 shows.



13 Source: <https://hulu.com>

14 58. The Accused Infringing Devices aggregate the first, second, and third  
15 collections of presentations for delivery via the computer network using a common  
16 web page. Both the Hulu.com homepage and browse category pages include rows  
17 corresponding to first, second, and third collections of presentations.

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Source: <https://hulu.com>



# Kids

## FOR YOU >



## KEEP WATCHING >



DuckTales (2017)

## LIVE >



## UPCOMING >



## MOVIES >



Source: <https://hulu.com>

1 59. Hulu has infringed, and continues to infringe, at least claim 1 of the  
2 '273 patent in the United States, by making, using, offering for sale, selling and/or  
3 importing the Accused Infringing Devices in violation of 35 U.S.C. § 271(a).

4 60. Upon information and belief, Hulu may have infringed and continues  
5 to infringe the '273 patent through other software and devices utilizing the same or  
6 reasonably similar functionality, including other versions of the Accused Infringing  
7 Devices.

8 61. Hulu's acts of direct infringement have caused and continue to cause  
9 damage to Uniloc and Uniloc is entitled to recover damages sustained as a result of  
10 Hulu's wrongful acts in an amount subject to proof at trial.

11 **PRAYER FOR RELIEF**

12 WHEREFORE, plaintiffs Uniloc 2017 LLC and Uniloc Licensing USA LLC  
13 respectfully pray that the Court enter judgment in their favor and against Hulu as  
14 follows:

15 a. A judgment that Hulu has infringed one or more claims of the  
16 '005 Patent literally and/or under the doctrine of equivalents;

17 b. A judgment that Hulu has infringed one or more claims of the  
18 '118 Patent literally and/or under the doctrine of equivalents;

19 c. A judgment that Hulu has infringed one or more claims of the  
20 '273 Patent literally and/or under the doctrine of equivalents;

21 d. That for each Asserted Patent this Court judges infringed by  
22 Hulu this Court award Uniloc its damages pursuant to 35 U.S.C. § 284 and any  
23 royalties determined to be appropriate;

24 e. That this be determined to be an exceptional case under 35  
25 U.S.C. § 285 and that Uniloc be awarded enhanced damages up to treble damages  
26 for willful infringement as provided by 35 U.S.C. § 284;

27 f. That this Court award Uniloc prejudgment and post-judgment  
28



1 interest on its damages;

2 g. That Uniloc be granted its reasonable attorneys’ fees in this  
3 action;

4 h. That this Court award Uniloc its costs; and

5 i. That this Court award Uniloc such other and further relief as the  
6 Court deems proper.

7 **DEMAND FOR JURY TRIAL**

8 Uniloc hereby demands trial by jury on all issues so triable pursuant to Fed.  
9 R. Civ. P. 38.

10  
11 Dated: October 31, 2018

FEINBERG DAY ALBERTI LIM &  
BELLOLI LLP

12  
13 By: /s/ M. Elizabeth Day

M. Elizabeth Day

14  
15 Attorneys for Plaintiffs  
16 Uniloc 2017 LLC and Uniloc Licensing  
17 USA LLC  
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