CLAIMS

1. A method of transporting media data, the method comprising, by a file-based protocol sending unit of a source device:

receiving a stream of data comprising Segments of media data from a segmenter of the source device that forms the Segments, each of the Segments comprising a respective individually retrievable file associated with a unique uniform resource locator (URL) or uniform resource identifier (URI);

determining locations of media delivery events (MDEs) in the stream of media data, wherein the MDEs include data for at least a portion of one of the Segments;

determining one or more transmission time requirements for the MDEs representing times at which the MDEs are to be sent to a client device; and

providing the MDEs and data representing the transmission time requirements to a physical layer sending unit of the source device according to available delivery slots for the physical layer sending unit.

2. The method of claim 1, wherein determining the locations of the MDEs comprises determining the locations of the MDEs using pattern matching.

3. The method of claim 2, wherein the media data comprises video data, and wherein determining the locations of the MDEs using pattern matching comprises:

obtaining data defining a cadence for video frames of the stream, wherein the defined cadence represents an order in which types for the video frames are sent, the types for the video frames including intra-predicted video frames and inter-predicted video frames; and

determining at least some of the MDEs based on the defined cadence such that the MDEs are between respective video frame boundaries.

4. The method of claim 2, wherein the media data comprises audio data, and wherein determining the locations of the MDEs using pattern matching comprises:

determining a fixed number of audio frames of the stream to be included in each of the MDEs; and

determining at least some of the MDEs to each include the fixed number of audio frames from the stream.

5. The method of claim 1, wherein determining the locations of the MDEs comprises determining the locations of the MDEs using rules, comprising:

receiving data representing one or more rules defining one or more of audio frames, video frames, and timed text instances;

determining locations of at least one audio frame, video frame, or timed text instance based on the rules; and

determining the MDEs based on the locations of the at least one audio frame, video frame, or timed text instance.

6. The method of claim 1, wherein determining the locations of the MDEs comprises determining the locations of the MDEs based on timing information for physical layer synchronization of the physical layer sending unit.

7. The method of claim 1, wherein determining the locations of the MDEs comprises analyzing a hint track including metadata representative of locations of playable data within the stream.

8. The method of claim 1, wherein determining the transmission time requirements comprises determining an earliest transmission time for one of the MDEs based on a system configuration for the source device.

9. The method of claim 1, wherein determining the transmission time requirements comprises determining a latest transmission time for one of the MDEs based on a segment availability time for a Segment for which data is included in the one of the MDEs, the method further comprising determining segment availability time from a manifest file for the stream of data.

10. A source device for transporting media data, the source device comprising:

a segmenter configured to form a stream of data comprising Segments of media data, each of the Segments comprising a respective individually retrievable file associated with a unique uniform resource locator (URL) or uniform resource identifier (URI);

a physical layer sending unit implemented in circuitry and configured to deliver media delivery events (MDEs) to a client device according to transmission time requirements for the

MDEs, wherein the MDEs include data for at least a portion of one of the Segments, wherein the physical layer sending unit is configured with available delivery slots for receiving data to be delivered; and

a file-based protocol sending unit implemented in circuitry and configured to:

receive the stream of data comprising the Segments of media data from the Segmenter;

determine locations of the MDEs in the stream of media data;

determine one or more of the transmission time requirements for the MDEs representing times at which the MDEs are to be sent to the client device; and

provide the MDEs and data representing the transmission time requirements to the physical layer sending unit according to the available delivery slots for the physical layer sending unit.

11. The source device of claim 10, wherein the file-based protocol sending unit is configured to determine the locations of the MDEs using pattern matching.

12. The source device of claim 11, wherein the media data comprises video data, and wherein to determine the locations of the MDEs using pattern matching, the file-based protocol sending unit is configured to:

obtain data defining a cadence for video frames of the stream, wherein the defined cadence represents an order in which types for the video frames are sent, the types for the video frames including intra-predicted video frames and inter-predicted video frames; and

determine at least some of the MDEs based on the defined cadence such that the MDEs are between respective video frame boundaries.

13. The source device of claim 11, wherein the media data comprises audio data, and wherein to determine the locations of the MDEs using pattern matching, the file-based protocol sending unit is configured to:

determine a fixed number of audio frames of the stream to be included in each of the MDEs; and

determine at least some of the MDEs to each include the fixed number of audio frames from the stream.

14. The source device of claim 10, wherein the file-based protocol sending unit is configured to use rules to determine the locations of the MDEs, and wherein to use the rules, the file-based protocol sending unit is configured to:

receive data representing one or more rules defining one or more of audio frames, video frames, and timed text instances;

determine locations of at least one audio frame, video frame, or timed text instance based on the rules; and

determine the MDEs based on the locations of the at least one audio frame, video frame, or timed text instance.

15. The source device of claim 10, wherein the file-based protocol sending unit is configured to determine the locations of the MDEs based on timing information for physical layer synchronization of the physical layer sending unit.

16. The source device of claim 10, wherein to determine the locations of the MDEs, the file-based protocol sending unit is configured to analyze a hint track including metadata representative of locations of playable data within the stream.

17. The source device of claim 10, wherein to determine the transmission time requirements, the file-based protocol sending unit is configured to determine an earliest transmission time for one of the MDEs based on a system configuration for the source device.

18. The source device of claim 10, wherein to determine the transmission time requirements, the file-based protocol sending unit is configured to determine a latest transmission time for one of the MDEs based on a segment availability time for a Segment for which data is included in the one of the MDEs, and wherein the file-based protocol sending unit is further configured to determine segment availability time from a manifest file for the stream of data.

19. A source device for transporting media data, the source device comprising:

a segmenter configured to form a stream of data comprising Segments of media data, each of the Segments comprising a respective individually retrievable file associated with a unique uniform resource locator (URL) or uniform resource identifier (URI);

a physical layer sending unit implemented in circuitry and configured to deliver media delivery events (MDEs) to a client device according to transmission time requirements for the MDEs, wherein the MDEs include data for at least a portion of one of the Segments, wherein the physical layer sending unit is configured with available delivery slots for receiving data to be delivered;

means for receiving a stream of data comprising Segments of media data from the segmenter;

means for determining locations of the MDEs in the stream of media data;

means for determining one or more transmission time requirements for the MDEs representing times at which the MDEs are to be sent to the client device; and

means for providing the MDEs and data representing the transmission time requirements to the physical layer sending unit according to available delivery slots for the physical layer sending unit.

20. The source device of claim 19, wherein the means for determining the locations of the MDEs comprises means for determining the locations of the MDEs using pattern matching.

21. The source device of claim 20, wherein the media data comprises video data, and wherein the means for determining the locations of the MDEs using pattern matching comprises:

means for obtaining data defining a cadence for video frames of the stream, wherein the defined cadence represents an order in which types for the video frames are sent, the types for the video frames including intra-predicted video frames and inter-predicted video frames; and

means for determining at least some of the MDEs based on the defined cadence such that the MDEs are between respective video frame boundaries.

22. The source device of claim 20, wherein the media data comprises audio data, and wherein the means for determining the locations of the MDEs using pattern matching comprises:

means for determining a fixed number of audio frames of the stream to be included in each of the MDEs; and

means for determining at least some of the MDEs to each include the fixed number of audio frames from the stream.

23. The source device of claim 19, wherein the means for determining the locations of the MDEs comprises means for determining the locations of the MDEs using rules, comprising:

means for receiving data representing one or more rules defining one or more of audio frames, video frames, and timed text instances;

means for determining locations of at least one audio frame, video frame, or timed text instance based on the rules; and

means for determining the MDEs based on the locations of the at least one audio frame, video frame, or timed text instance.

24. The source device of claim 19, wherein the means for determining the locations of the MDEs comprises means for determining the locations of the MDEs based on timing information for physical layer synchronization of the physical layer sending unit.

25. The source device of claim 19, wherein the means for determining the locations of the MDEs comprises means for analyzing a hint track including metadata representative of locations of playable data within the stream.

26. The source device of claim 19, wherein the means for determining the transmission time requirements comprises means for determining an earliest transmission time for one of the MDEs based on a system configuration for the source device.

27. The source device of claim 19, wherein the means for determining the transmission time requirements comprises means for determining a latest transmission time for one of the MDEs based on a segment availability time for a Segment for which data is included in the one of the MDEs, the method further comprising determining segment availability time from a manifest file for the stream of data.

28. A non-transitory computer-readable storage medium having stored thereon instructions that, when executed, cause a file-based protocol sending unit of a source device to:

receive a stream of data comprising Segments of media data from a segmenter of the source device that forms the Segments, each of the Segments comprising a respective individually retrievable file associated with a unique uniform resource locator (URL) or uniform resource identifier (URI);

determine locations of media delivery events (MDEs) in the stream of media data, wherein the MDEs include data for at least a portion of one of the Segments;

determine one or more transmission time requirements for the MDEs representing times at which the MDEs are to be sent to a client device; and

provide the MDEs and data representing the transmission time requirements to a physical layer sending unit of the source device according to available delivery slots for the physical layer sending unit.

29. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the locations of the MDEs comprise instructions that cause the processor to determine the locations of the MDEs using pattern matching.

30. The non-transitory computer-readable storage medium of claim 29, wherein the media data comprises video data, and wherein the instructions that cause the processor to determine the locations of the MDEs using pattern matching comprise instructions that cause the processor to:

obtain data defining a cadence for video frames of the stream, wherein the defined cadence represents an order in which types for the video frames are sent, the types for the video frames including intra-predicted video frames and inter-predicted video frames; and

determine at least some of the MDEs based on the defined cadence such that the MDEs are between respective video frame boundaries.

31. The non-transitory computer-readable storage medium of claim 29, wherein the media data comprises audio data, and wherein the instructions that cause the processor to determine the locations of the MDEs using pattern matching comprise instructions that cause the processor to:

determine a fixed number of audio frames of the stream to be included in each of the MDEs; and

determine at least some of the MDEs to each include the fixed number of audio frames from the stream.

32. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the locations of the MDEs comprise

instructions that cause the processor to determine the locations of the MDEs using rules, comprising instructions that cause the processor to:

receive data representing one or more rules defining one or more of audio frames, video frames, and timed text instances;

determine locations of at least one audio frame, video frame, or timed text instance based on the rules; and

determine the MDEs based on the locations of the at least one audio frame, video frame, or timed text instance.

33. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the locations of the MDEs comprise instructions that cause the processor to determine the locations of the MDEs based on timing information for physical layer synchronization of the physical layer sending unit.

34. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the locations of the MDEs comprise instructions that cause the processor to analyze a hint track including metadata representative of locations of playable data within the stream.

35. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the transmission time requirements comprise instructions that cause the processor to determine an earliest transmission time for one of the MDEs based on a system configuration for the source device.

36. The non-transitory computer-readable storage medium of claim 28, wherein the instructions that cause the processor to determine the transmission time requirements comprise instructions that cause the processor to determine a latest transmission time for one of the MDEs based on a segment availability time for a Segment for which data is included in the one of the MDEs, the method further comprising determining segment availability time from a manifest file for the stream of data.