CLAIMS

1. A method (400) for decoding a video bitstream, the video bitstream comprising a sequence of pictures including a gradual decoding refresh, GDR, picture and a recovery point picture, wherein the GDR picture starts a recovery point period and the recovery point picture ends the recovery point period, the method comprising:

obtaining (s402) the video bitstream; and

decoding (s404), from a picture header or a network abstraction layer, NAL unit type being carried in the video bitstream, a normative indication of the recovery point period, wherein the normative indication of the recovery point period indicates that the GDR picture starts the recovery point period.

2. The method of claim 1, comprising:

determining a position of the GDR picture;

decoding information for identifying the recovery point picture;

decoding, without outputting, the GDR picture and all pictures, if any, in the recovery point period following the GDR picture in decoding order until the recovery point picture is identified and decoded; and

outputting the decoded recovery point picture, thereby refreshing a decoding of the video bitstream.

3. The method of claim 1 or claim 2, wherein the sequence of pictures is a coded video sequence, CVS, and the CVS begins with the GDR picture.

4. The method of any one of claims 1 to 3, comprising:

decoding the indication that the GDR picture starts the recovery point period from a NAL unit type syntax element in a VCL NAL unit.

5. The method of any one of claims 1-4, wherein the normative indication of the recovery point period indicates a temporal position of the GDR picture in the sequence of pictures.

6. The method of any one of claims 1-5, wherein a picture in the recovery point period references an unavailable reference picture, and the method further comprises:

generating the unavailable reference picture before decoding at least one of the pictures in the recovery point period.

7. The method of any one of claims 1-6, comprising:

decoding the normative indication of the recovery point period from a non-video coding layer, non-VCL, NAL unit.

8. The method of any one of claims 1-7, comprising:

decoding the normative indication of the recovery point period from a GDR access unit.

9. The method of any one of claims 1-8, comprising:

decoding the indication that the GDR picture starts the recovery point period from one of a picture parameter set, PPS, a sequence parameter set, SPS, or a tile group header.

10. The method of any one of claims 1-6, further comprising

decoding a picture type of each picture in the sequence of pictures from a picture type NAL unit; and

decoding picture data for each said picture from a picture data NAL unit, wherein the indication that the recovery point period starts with the GDR picture is decoded from a picture type NAL unit.

11. The method of any one of claims 1-10, comprising:

decoding a normative indication that the recovery point picture ends the recovery point period from a picture header.

12. The method of any one of claims 1-11, wherein decoding the normative indication of the recovery point period comprises:

determining that a NAL unit in the video bitstream has a specific NAL unit type;

decoding the NAL unit in the video bitstream comprising a picture header NAL unit for the GDR picture that includes a syntax element indicating that the GDR picture starts the recovery point period; and

decoding a syntax element for identifying the recovery point picture.

13. The method of claim 12, comprising:

determining that the GDR picture starts the recovery point period by decoding a syntax element from a picture header, and/or

determining that the recovery point picture ends the recovery point period by decoding a syntax element from the picture header.

14. The method of any one of claims 1-13, wherein the bitstream contains a syntax element in at least one of a sequence parameter set, SPS, a video parameter set, VPS, and a decoding parameter set, DPS, indicating whether or not a recovery point period may be available in the bitstream.

15. The method of any one of the previous claims, wherein the normative indication of the recovery point period and the GDR picture belong to the same access unit.

16. The method (600) of any one of the preceding claims, comprising:

receiving (s602) a network abstraction layer, NAL, unit contained in the bitstream, the NAL unit containing a type value;

determining (s604) that the type value specifies that the NAL unit comprises recovery point picture information that enables the recovery point picture to be identified; and

identifying (s606) the recovery point picture based on the recovery point picture information.

17. The method of any one of claims 1-16, comprising:

performing a random access operation at the start of the recovery point period.

18. A method (450) for encoding a bitstream, the method comprising:

determining (s452) that a particular picture in a sequence of pictures in the bitstream is to be a start of a recovery point period, wherein a last coded picture in decoding order in the recovery point period is to be a recovery point picture;

defining the particular picture as a gradual decoding refresh, GDR, picture; and

encoding, in a picture header or a network abstraction layer, NAL unit type in the video bitstream, a normative indication of the recovery point period in the bitstream, wherein the normative indication of the recovery point period comprises information indicating that the recovery point period starts with the GDR picture.

19. The method of claim 18, wherein encoding the normative indication of the recovery point period comprises specifying a position of the GDR picture that starts the recovery point period in the sequence of pictures.

20. The method of claim 18, comprising:

specifying the position of the GDR picture as a temporal position of the GDR picture in the sequence of pictures.

21. The method of any one of claims 18-20, comprising:

encoding the GDR picture and the recovery point picture as the same picture.

22. The method of any one of claims 18-21, comprising:

including information specifying the position of the GDR picture and/or information for use in identifying the recovery point picture in the sequence of pictures in one or more syntax elements of a picture header.

23. A carrier containing a computer program comprising instructions (744) which when executed by processing circuitry (702) causes the processing circuitry (702) to perform the method of any one of claims 1-22, wherein the carrier is one of an electronic signal, an optical

signal, a radio signal, and a computer readable storage medium (742).

24. A decoding apparatus (700) for decoding a video bitstream comprising a sequence of pictures including a gradual decoding refresh, GDR, picture and a recovery point picture, wherein the GDR picture starts a recovery point period and the recovery point picture ends the recovery point period, the decoding apparatus being configured to:

obtain the video bitstream; and

decode, from a picture header or a network abstraction layer, NAL unit type being carried in the video bitstream, a normative indication of the recovery point period, wherein the normative indication of the recovery point period indicates that GDR picture starts the recovery point period.

25. The decoding apparatus (700) of claim 24, the decoding apparatus being configured to perform the method of any one of claims 2-17.

26. An encoding apparatus (700) for encoding a bitstream, the encoding apparatus being configured to:

determine that a particular picture in a sequence of pictures in the bitstream is to be a start of a recovery point period, wherein a last coded picture in decoding order in the recovery point period is to be a recovery point picture;

defining the particular picture as a gradual decoding refresh, GDR, picture;

determining the recovery point picture; and

encoding, in a picture header or a network abstraction layer, NAL unit type in the video bitstream, a normative indication of the recovery point period in the bitstream, wherein the normative indication of the recovery point period comprises information indicating that the recovery point period starts with the GDR picture.