US006081909A

# United States Patent [19]

**Luby et al.**

[11] **Patent Number: 6,081,909**

[45] **Date of Patent: Jun. 27, 2000**

[54] **IRREGULARLY GRAPHED ENCODING TECHNIQUE**

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[73] Assignee: **Digital Equipment Corporation**, Maynard, Mass.

[21] Appl. No.: **08/965,603**

[22] Filed: **Nov. 6, 1997**

[51] **Int. Cl.**[7] ..... **G06F 11/00**

[52] **U.S. Cl.** ..... **714/701**

[58] **Field of Search** ..... 714/701

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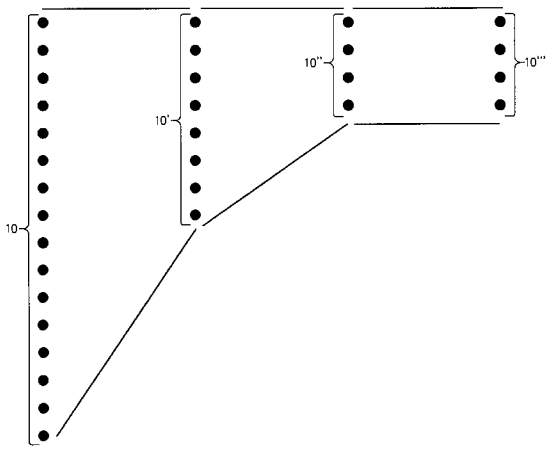
[57] **ABSTRACT**

A method of encoding a message including a plurality of data items, includes identifying maximum and minimum numbers of first edges to be associated with data items. A first distribution of different numbers of first edges, ranging from the maximum to the minimum number of first edges, to be associated with the data items is computed. A first associated number of first edges, within the range, is established for each data item, the different numbers of first edges being associated with the data items according to the computed first distribution. A maximum and minimum number of second edges to be associated with redundant data items are identified. A second distribution of numbers of second edges, ranging from the maximum to the minimum number of second edges, to be associated with the redundant data items is computed. An associated number of second edges, within the range, is established for each redundant data item, the different numbers of second edges being associated with the redundant data items according to the determined second distribution. A threshold number of potentially lost/corrupted data items is established. An encoded message is formed with the redundant data items associated with the data items according to the first distribution and with the data items associated with the redundant data items according to the second distribution only if the number of data items which are recoverable or correctable exceeds the threshold.

**35 Claims, 25 Drawing Sheets**



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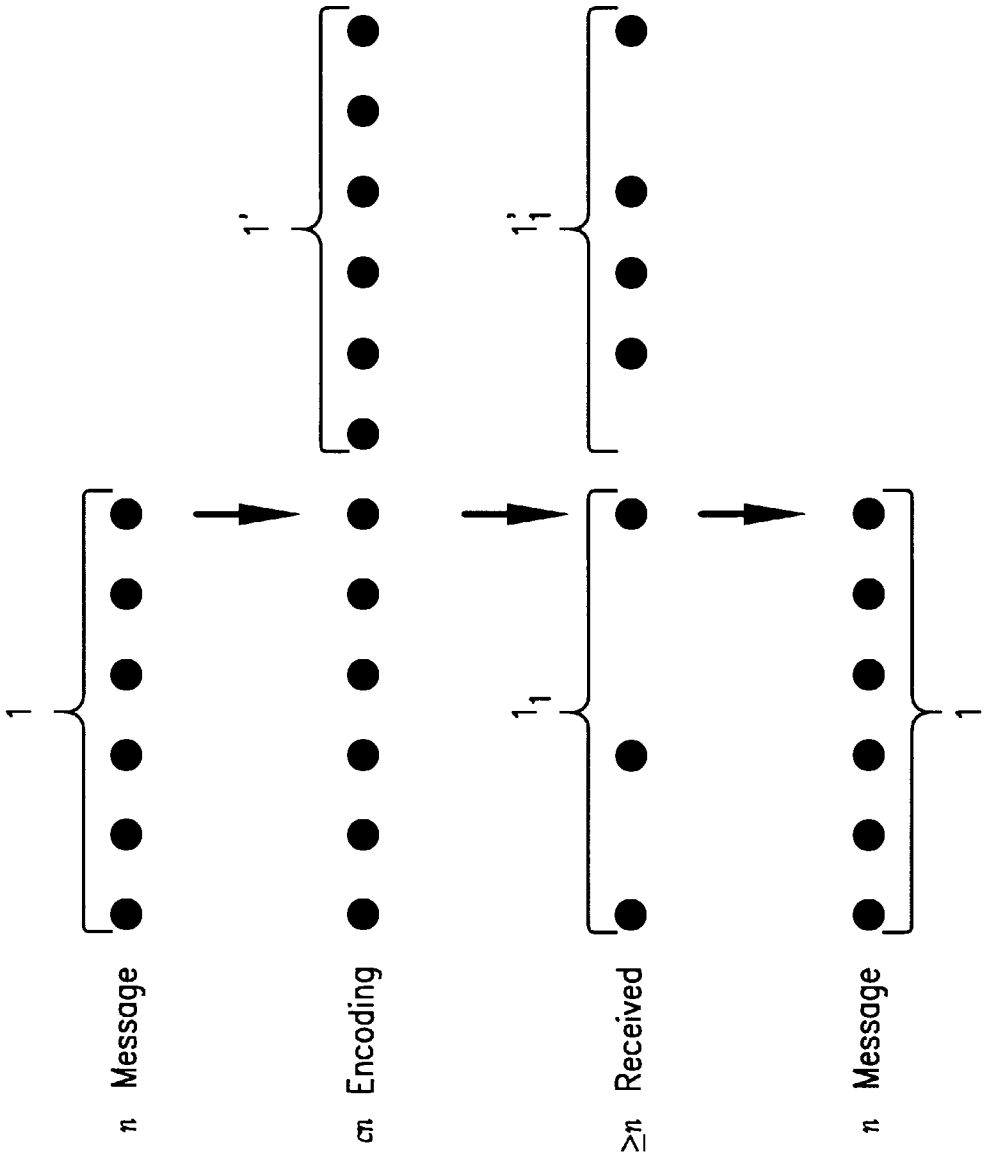


FIG. 1

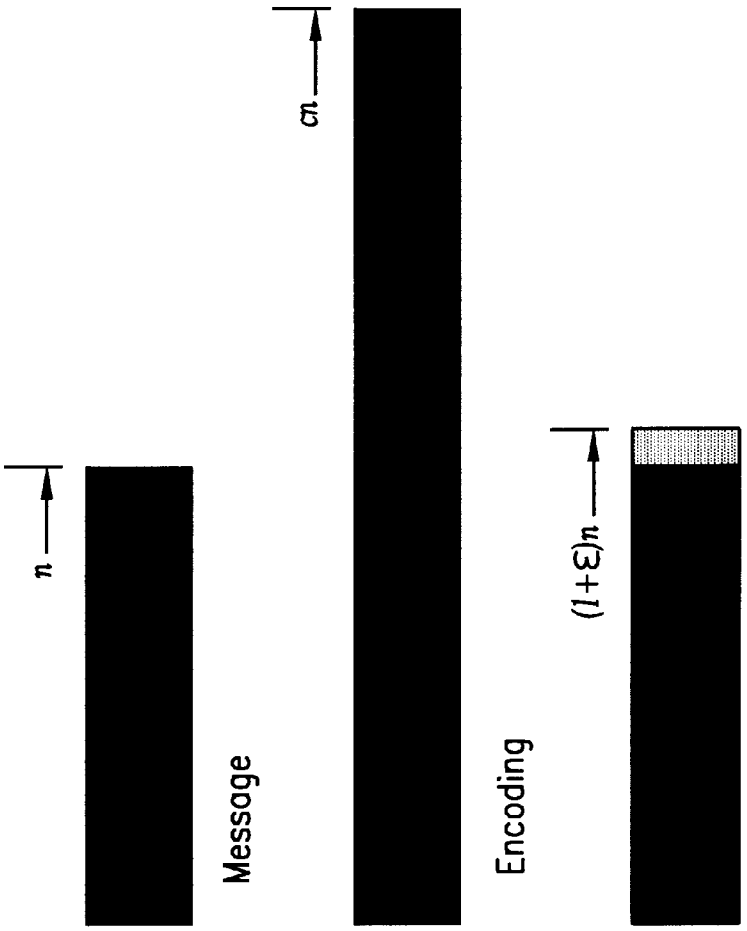


FIG. 2

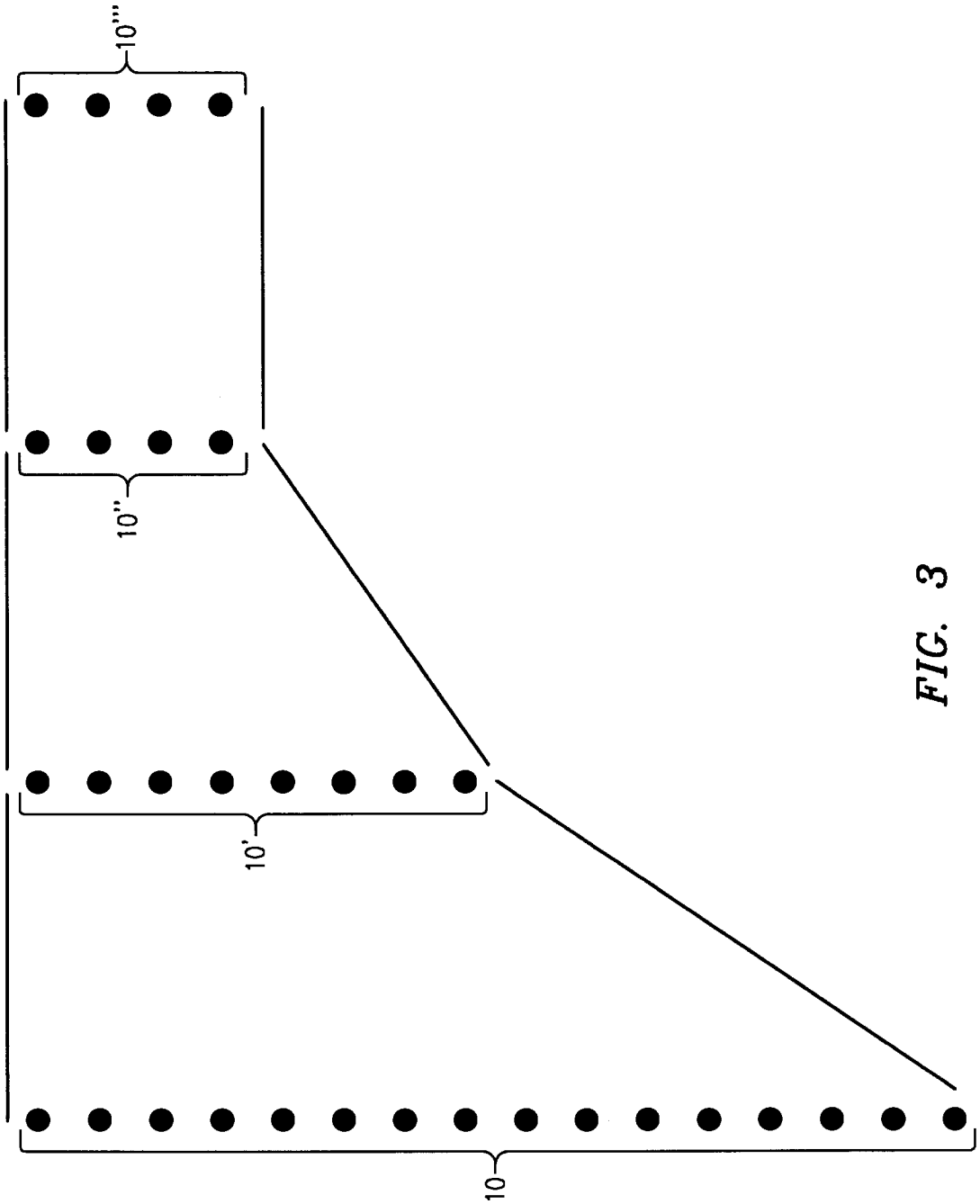


FIG. 3

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