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(12) **United States Patent**
Eidson

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(54) **ENHANCEMENTS TO TIME SYNCHRONIZATION IN DISTRIBUTED SYSTEMS**

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5,537,549	*	7/1996	Gee et al.	395/200
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* cited by examiner

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**

A variety of enhancements to a time synchronization protocol for a distributed system including techniques for improving accuracy by separating a unique timing point from a delimiter for the timing data packet. The enhancements include techniques that compensate for jitter associated with communication circuitry in the distributed system including jitter associated with physical interfaces and gateways in the distributed system. These techniques may involve specialized circuitry in the communication circuitry to compensate for jitter or special processing of received timing data packets or the introduction of follow up packets that inform receiving nodes of measured jitter or a combination of these techniques.

(21) Appl. No.: **09/151,017**

(22) Filed: **Sep. 10, 1998**

(51) **Int. Cl.**⁷ **H04L 12/56**; H04J 3/06

(52) **U.S. Cl.** **370/394**; 390/503; 390/516; 375/371

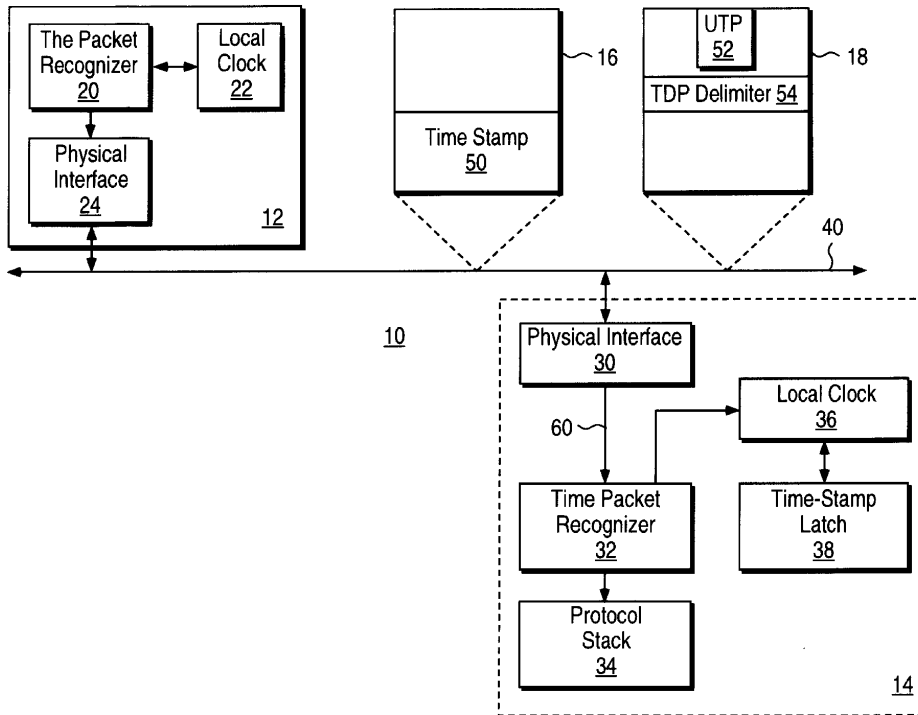
(58) **Field of Search** 703/503; 370/514, 370/520, 516, 394, 509, 518, 510, 512; 375/371, 373, 376, 364; 395/200, 550

(56) **References Cited**

U.S. PATENT DOCUMENTS

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10 Claims, 7 Drawing Sheets



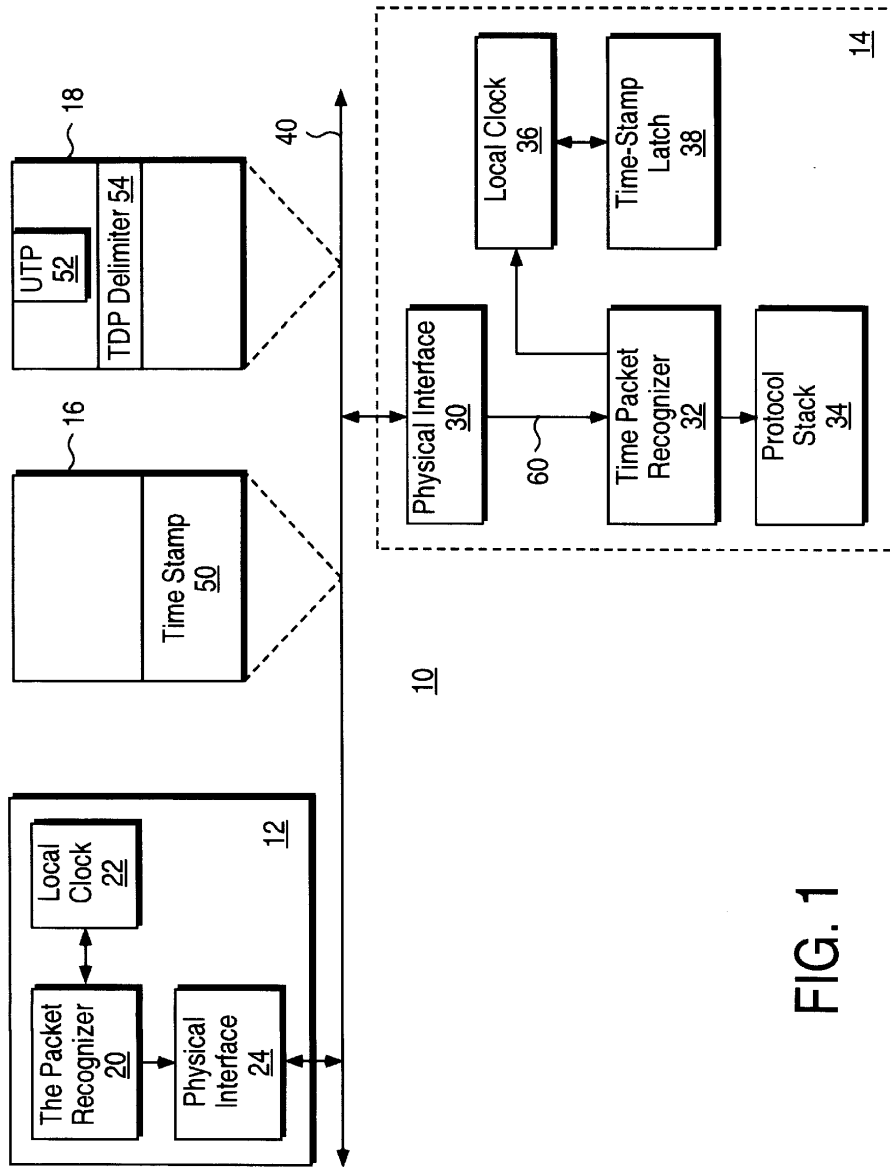


FIG. 1

FIG. 2

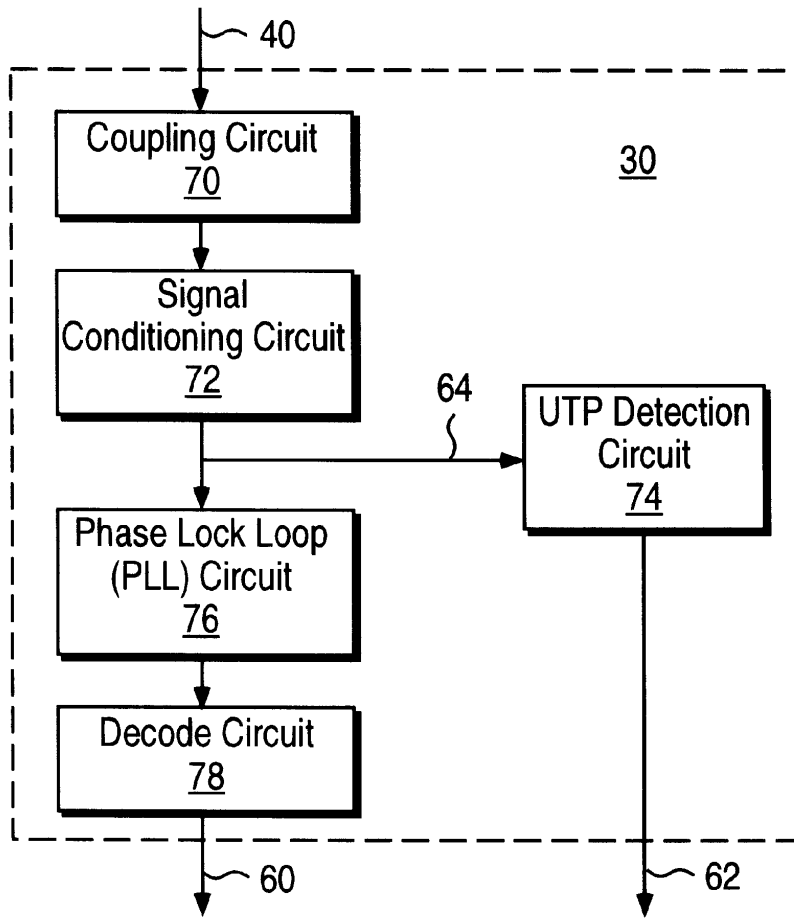


FIG. 3

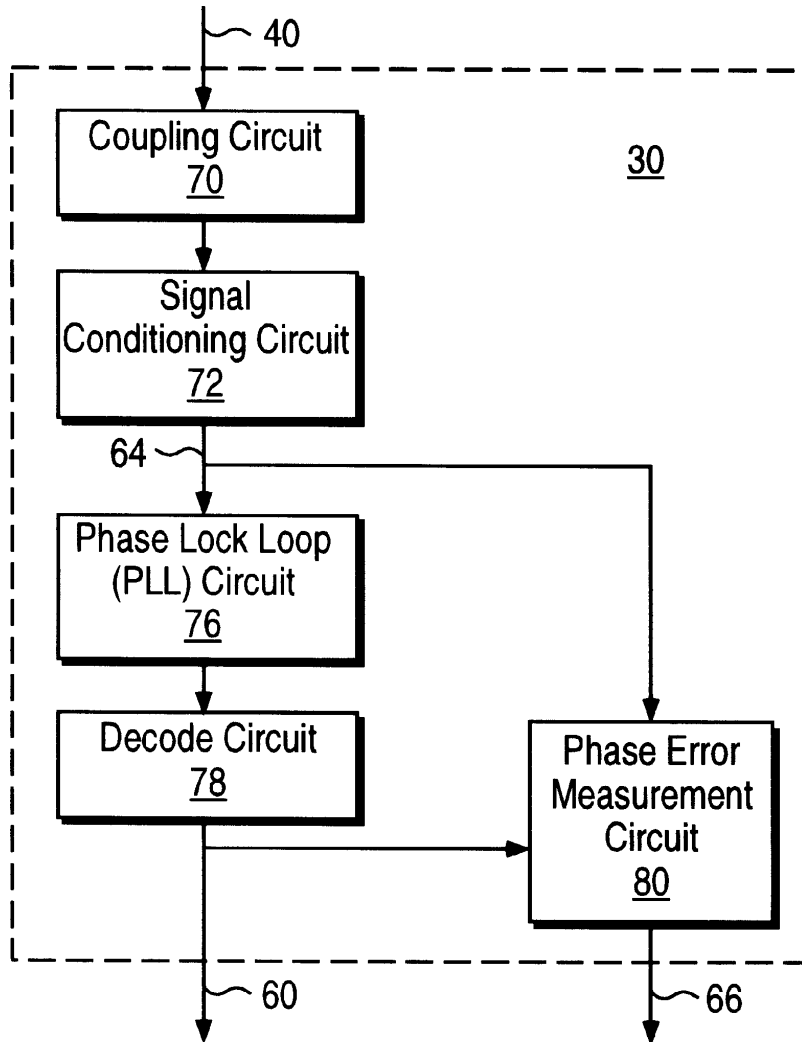
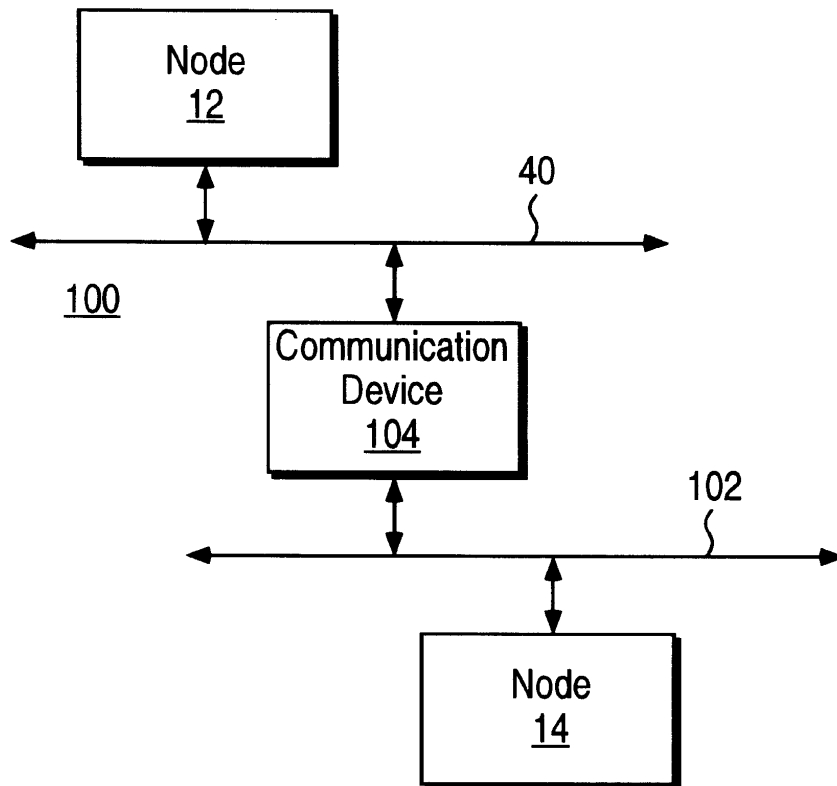


FIG. 4



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