United States Patent [19]

Packer et al.

[54] **METHOD FOR PACING DATA FLOW IN A PACKET-BASED NETWORK**

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Related U.S. Application Data

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[51] **Int. Cl.^{7}** **H04L 12/56**
[52] **U.S. Cl.** **370/231**; 370/235; 370/252
[58] **Field of Search** 370/519, 389, 370/231, 235, 229, 230, 232, 233, 234, 236–238; 709/232, 233, 234, 235

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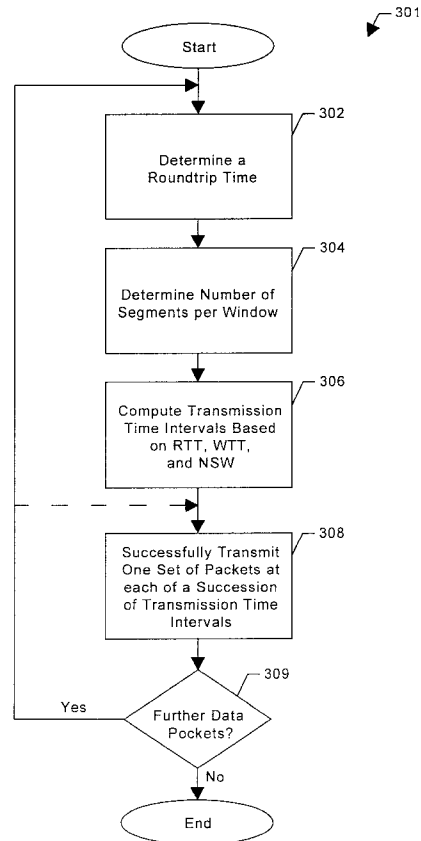|		
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[57] **ABSTRACT**

A method for pacing data flows in packet switched networks by arranging data transmission over a period of time based upon a set of ascertainable factors about the underlying transmission link to derive an intersegment transmission interval. The intersegment transmission interval can be used to pace either data packets or acknowledgment packets. The method is especially useful for pacing the transmission of data in a digital data packet communication environment having a plurality of digital packet transmission stations inter-connectable in a data path and employing the Transmission Control Protocol (TCP) suite.
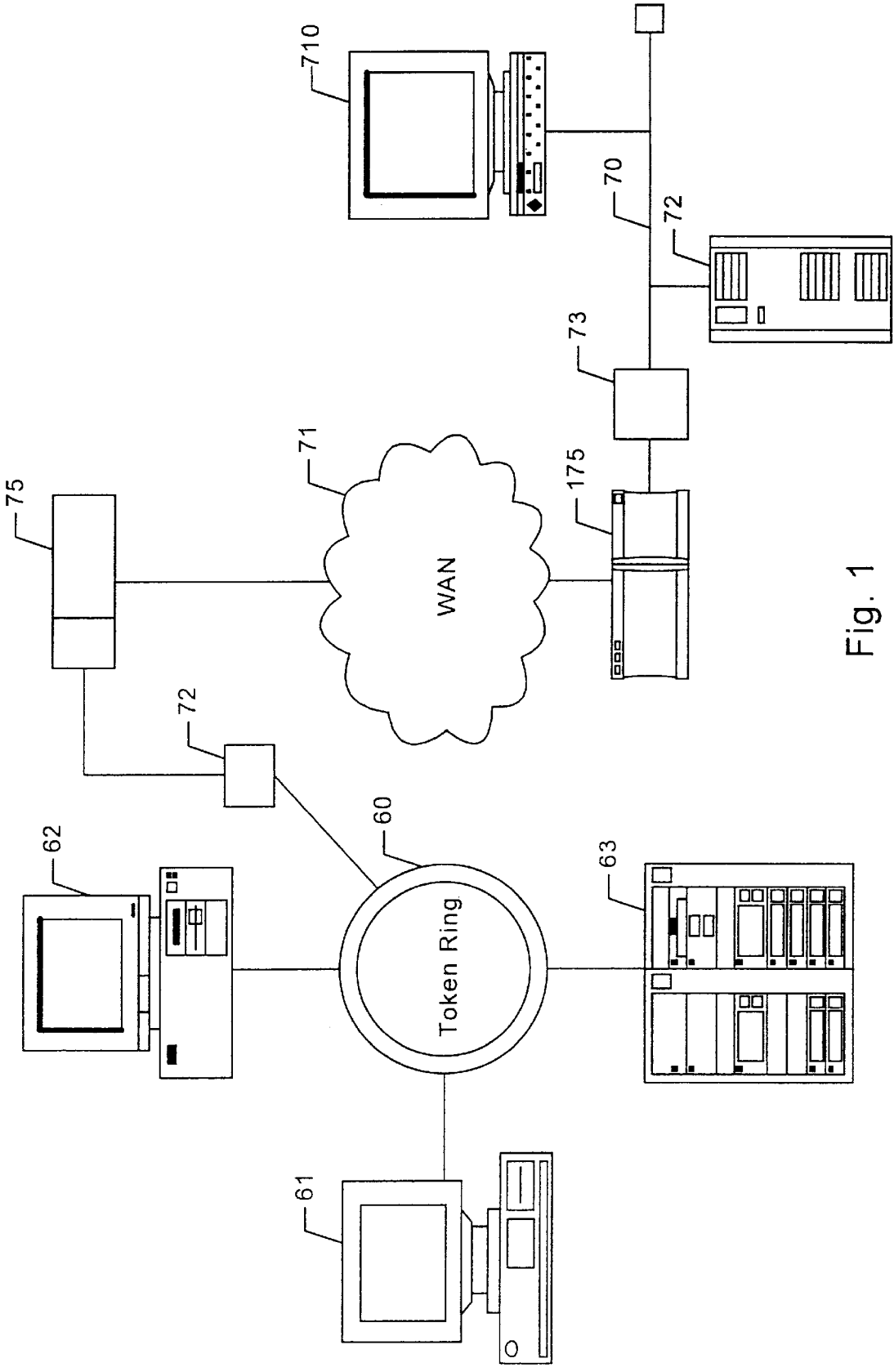
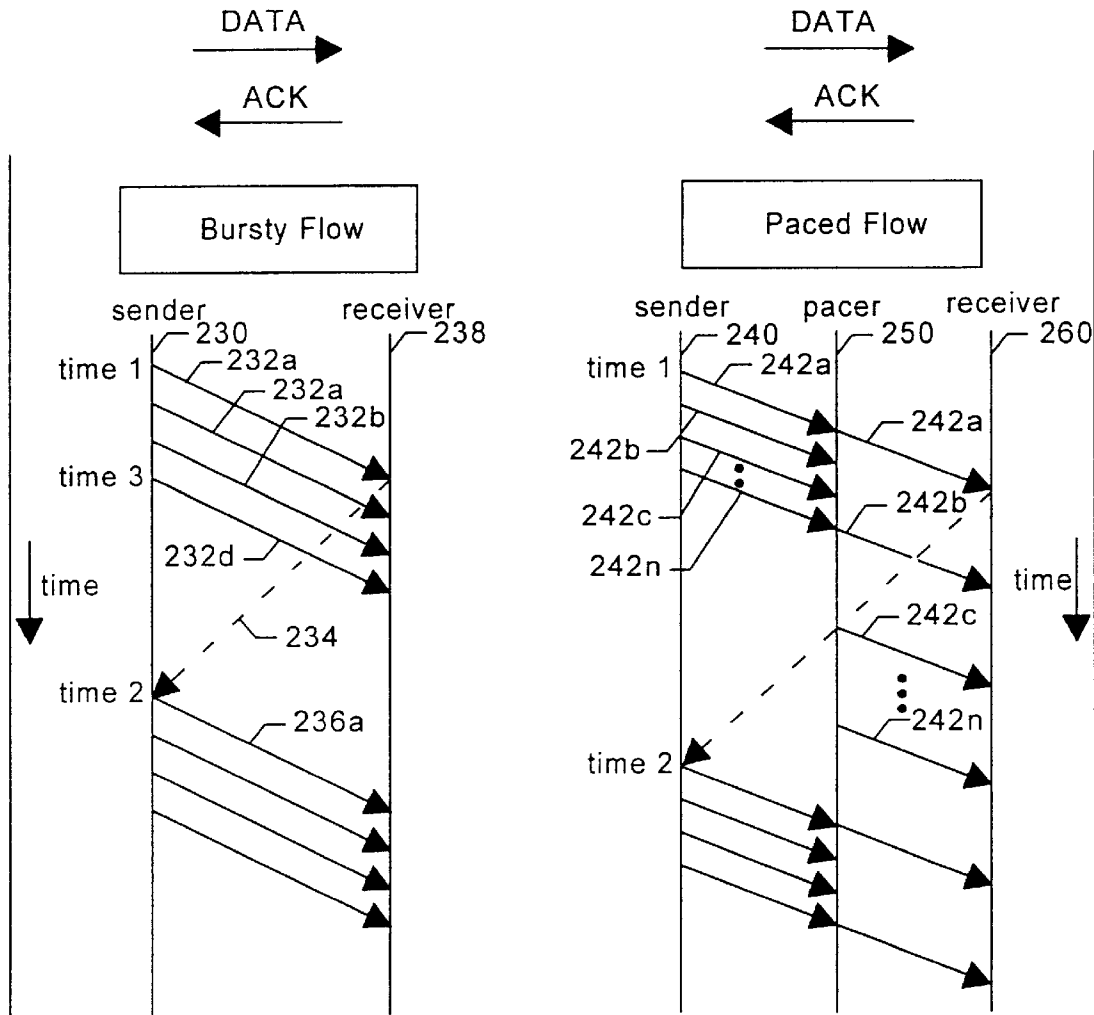**18 Claims, 4 Drawing Sheets**
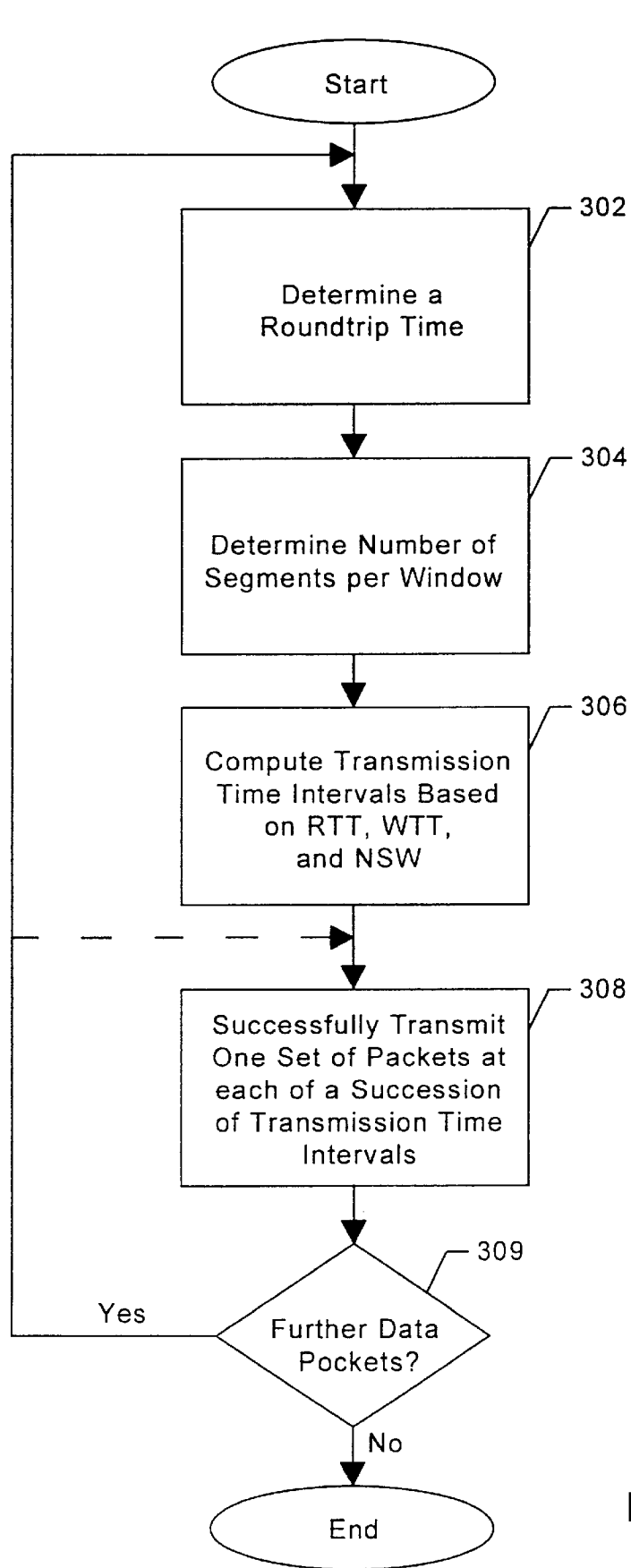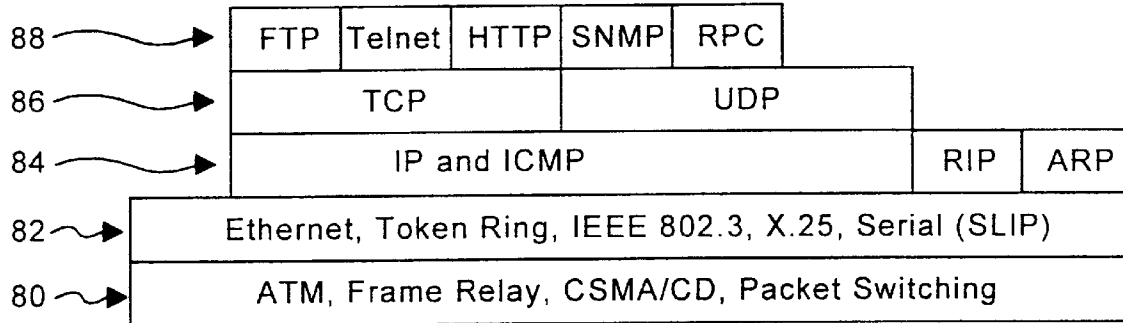
Fig. 1

Fig. 2A

Fig. 2B

301

Fig. 3

Start

302
Determine a
Roundtrip Time

304
Determine Number of
Segments per Window

306
Compute Transmission
Time Intervals Based
on RTT, WTT,
and NSW

308
Successfully Transmit
One Set of Packets at
each of a Succession
of Transmission Time
Intervals

309
Further Data
Pockets?

Yes

No

End

88 → | FTP | Telnet | HTTP | SNMP | RPC |

86 → | TCP | UDP |

84 → | IP and ICMP | RIP | ARP |

82 → Ethernet, Token Ring, IEEE 802.3, X.25, Serial (SLIP)

80 → ATM, Frame Relay, CSMA/CD, Packet Switching

Legend

88   Session/Application Layer

86   Transport Layer

84   Network Layer

82   Data Link Layer

80   Physical Layer

Fig. 4

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