

(12) **United States Patent**
Hill et al.

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(54) **METHODS, APPARATUSES, AND SYSTEMS ALLOWING FOR BANDWIDTH MANAGEMENT SCHEMES RESPONSIVE TO UTILIZATION CHARACTERISTICS ASSOCIATED WITH INDIVIDUAL USERS**

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(57) **ABSTRACT**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 788 days.

Methods, apparatuses and systems allowing for bandwidth management schemes responsive to utilization characteristics associated with individual users. In one embodiment, the present invention allows network administrators to penalize users who carry out specific questionable or suspicious activities, such as the use of proxy tunnels to disguise the true nature of the data flows in order to evade classification and control by bandwidth management devices. In one embodiment, each individual user may be accorded an initial suspicion score. Each time the user is associated with a questionable or suspicious activity (for example, detecting the set up of a connection to an outside HTTP tunnel, or peer-to-peer application flow), his or her suspicion score is downgraded. Data flows corresponding to users with sufficiently low suspicion scores, in one embodiment, can be treated in a different manner from data flows associated with other users. For example, different or more rigorous classification rules and policies can be applied to the data flows associated with suspicious users.

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(51) **Int. Cl.**
G06F 21/00 (2006.01)

(52) **U.S. Cl.** **726/2**; 713/194

(58) **Field of Classification Search** 713/1, 713/2, 188, 194, 193; 380/200, 201, 255, 380/277; 726/2, 3, 11–15

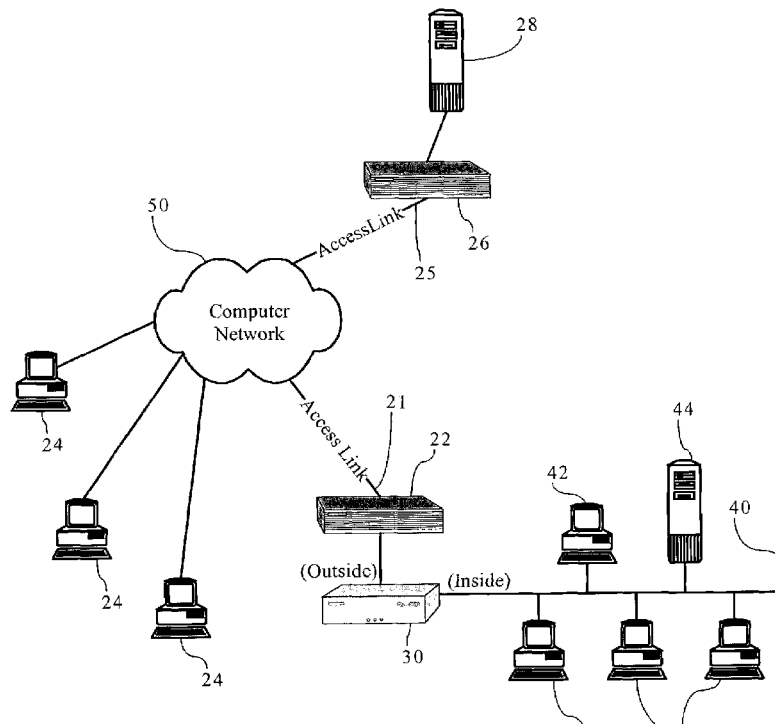
See application file for complete search history.

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34 Claims, 7 Drawing Sheets



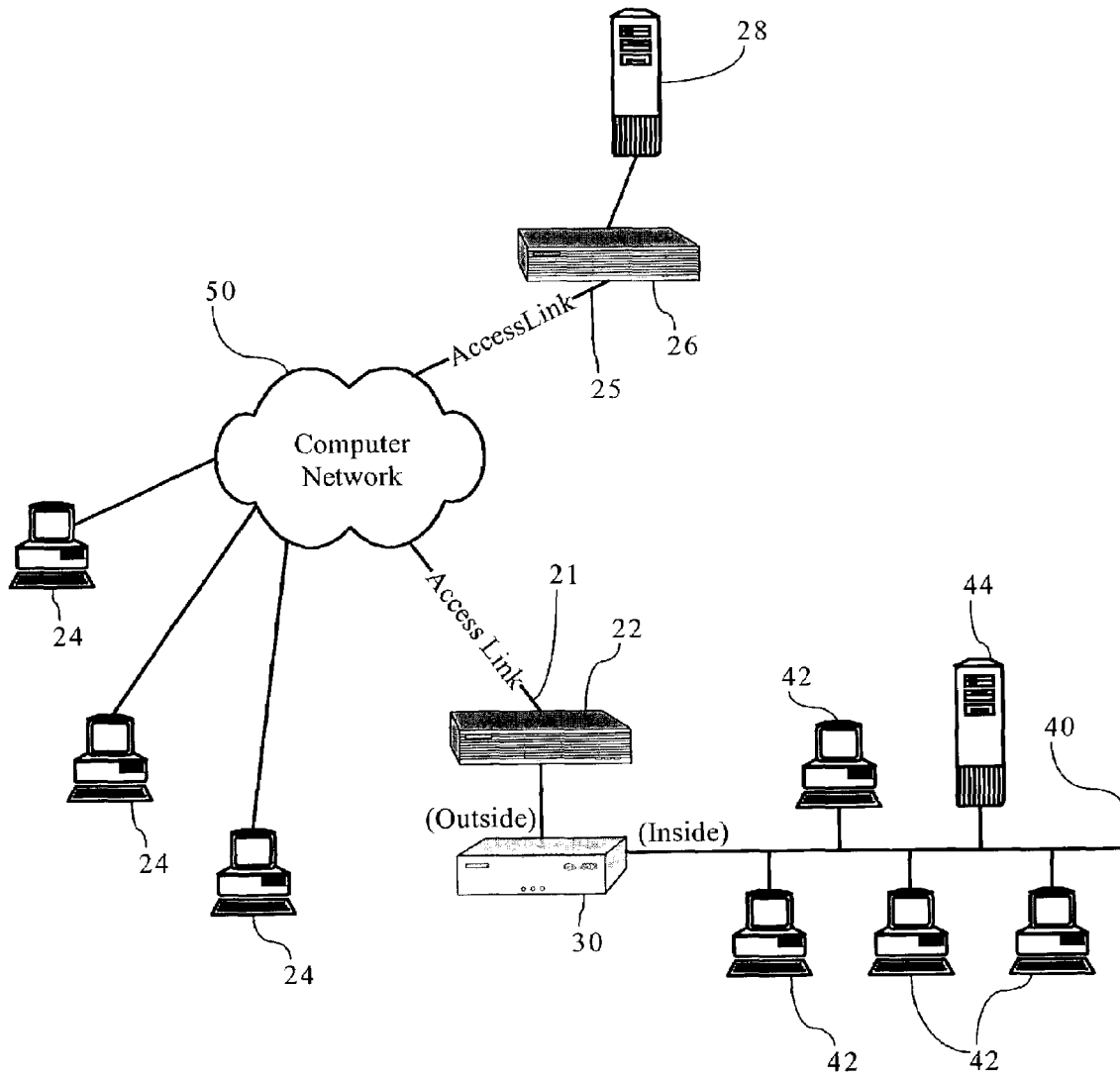


Fig._1

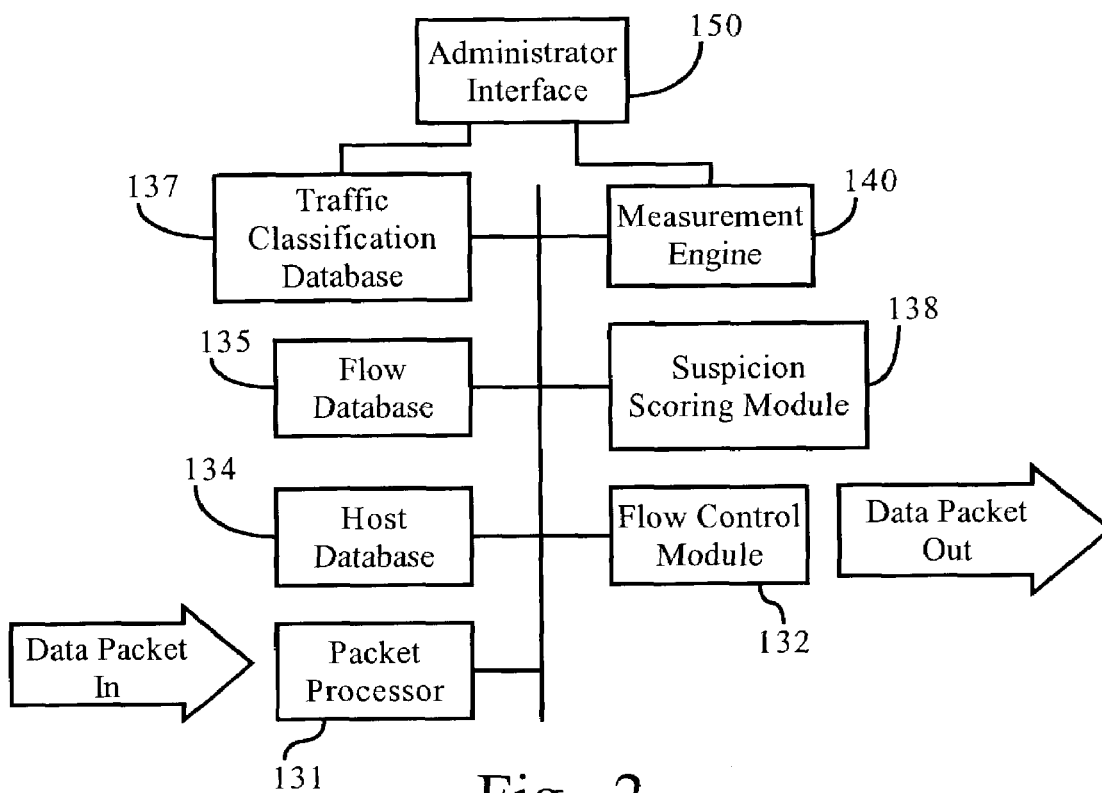


Fig. 2

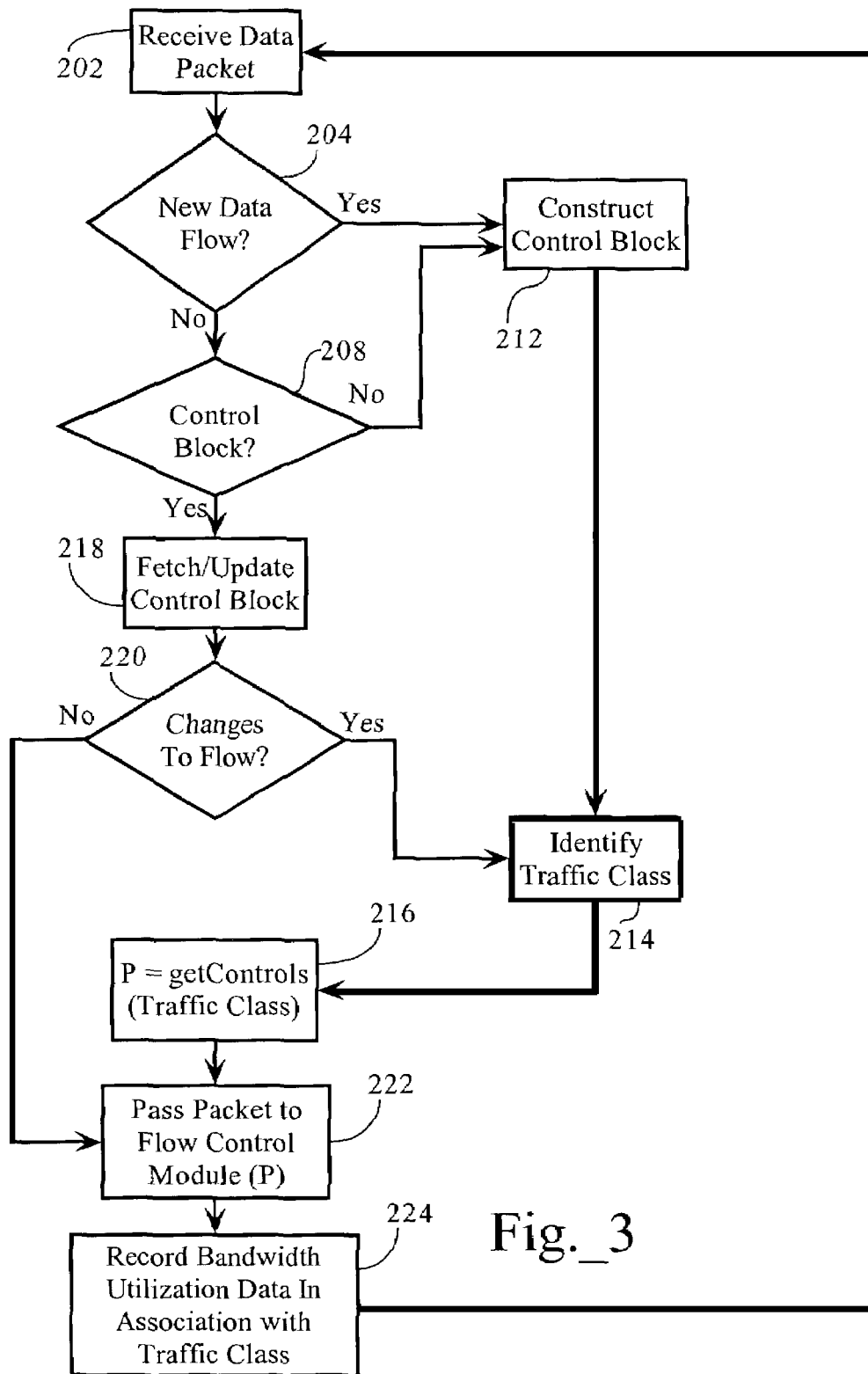


Fig. 3

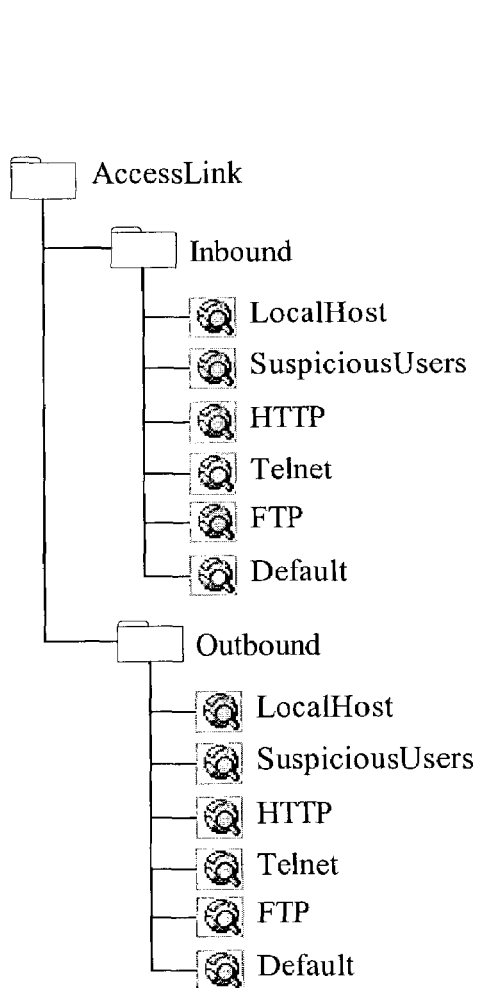


Fig. 4A

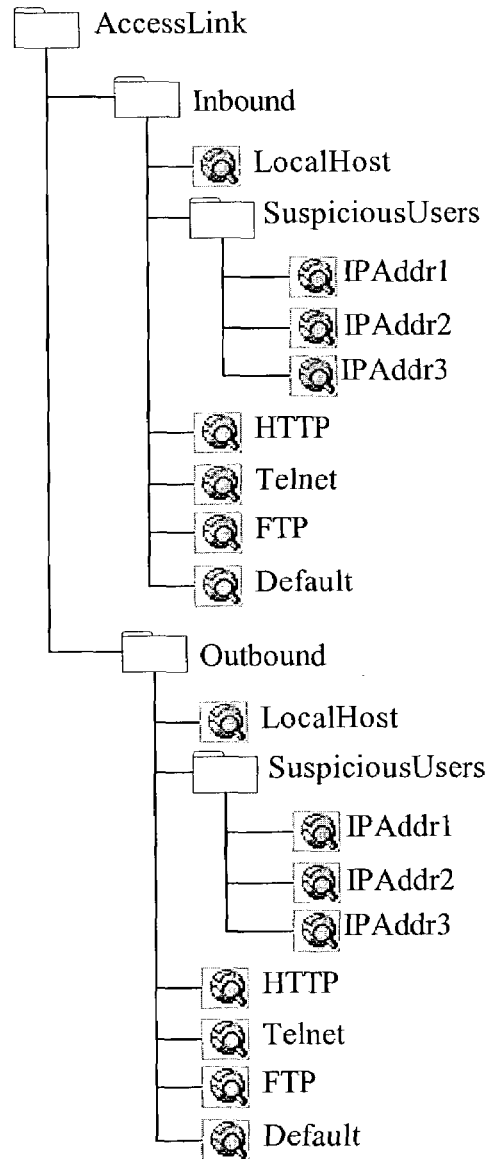


Fig. 4B

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