

(12) **United States Patent**
Krumel

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(54) **METHODS FOR PACKET FILTERING INCLUDING PACKET INVALIDATION IF PACKET VALIDITY DETERMINATION NOT TIMELY MADE**

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WO WO 96/34479 10/1996

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 614 days.

(Continued)

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(51) **Int. Cl.**
H04L 9/00 (2006.01)
G06F 15/16 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.** **726/13**; 713/154; 709/229
(58) **Field of Classification Search** 713/201, 713/154; 709/229, 249, 225; 370/356, 389, 370/392, 395.21, 395.32, 401; 726/13, 11
See application file for complete search history.

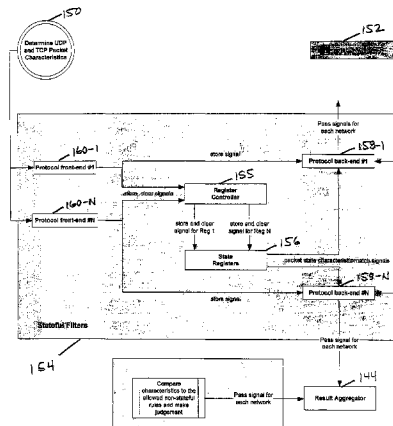
Methods and systems for firewall/data protection that filters data packets in real time and without packet buffering are disclosed. A data packet filtering hub, which may be implemented as part of a switch or router, receives a packet on one link, reshapes the electrical signal, and transmits it to one or more other links. During this process, a number of filters checks are performed in parallel, resulting in a decision about whether each packet should or should not be invalidated by the time that the last bit is transmitted. To execute this task, the filtering hub performs rules-based filtering on several levels simultaneously, preferably with a programmable logic or other hardware device. Various methods for packet filtering in real time and without buffering with programmable logic are disclosed. The system may include constituent elements of a stateful packet filtering hub, such as microprocessors, controllers, and integrated circuits. The system may be reset, enabled, disabled, configured, and/or reconfigured with toggles or other physical switches. Audio and visual feedback may be provided regarding the operation and status of the system.

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66 Claims, 13 Drawing Sheets



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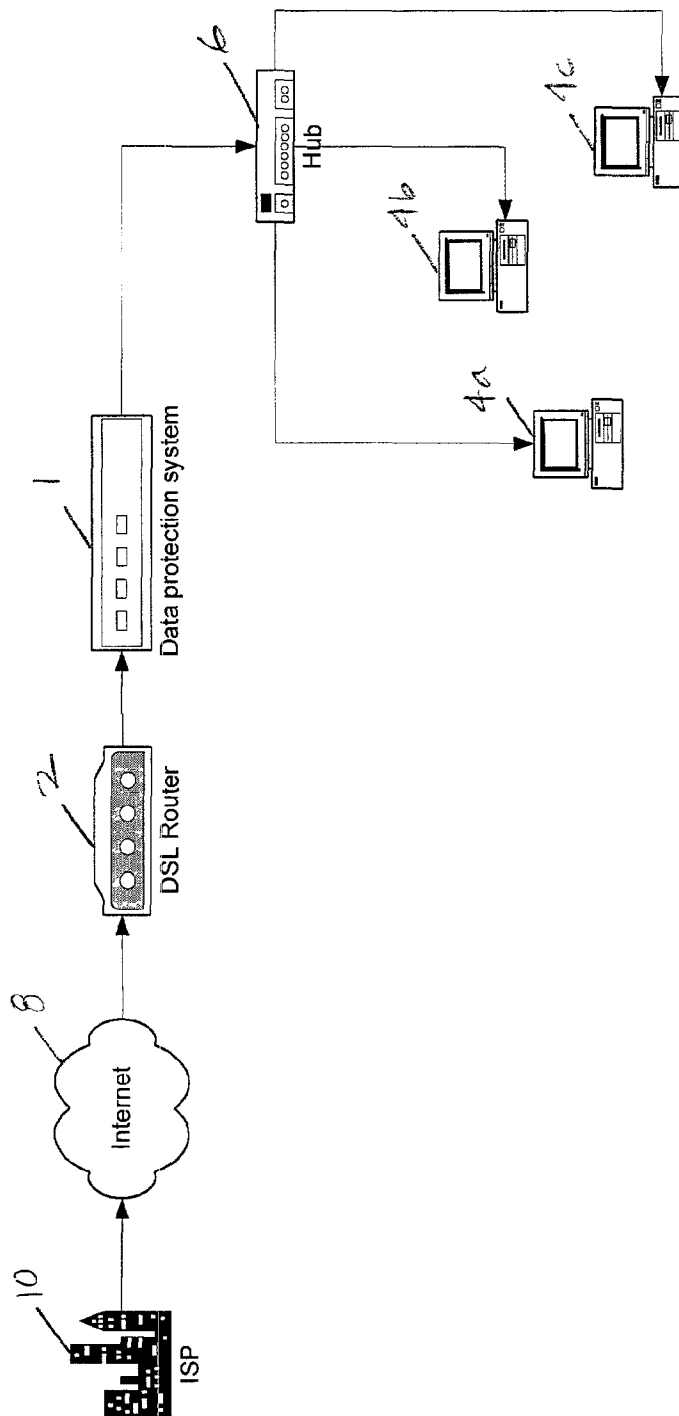


FIG. 1A

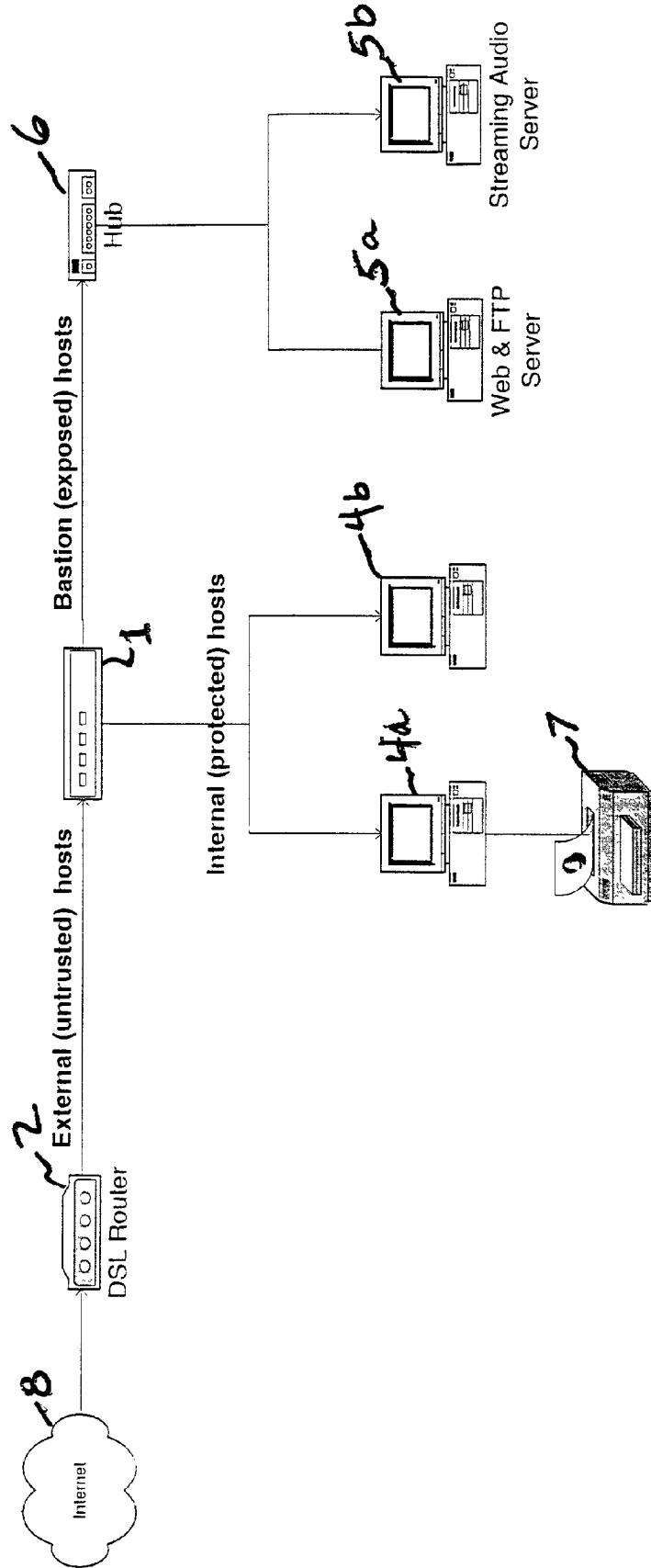


FIG. 1B

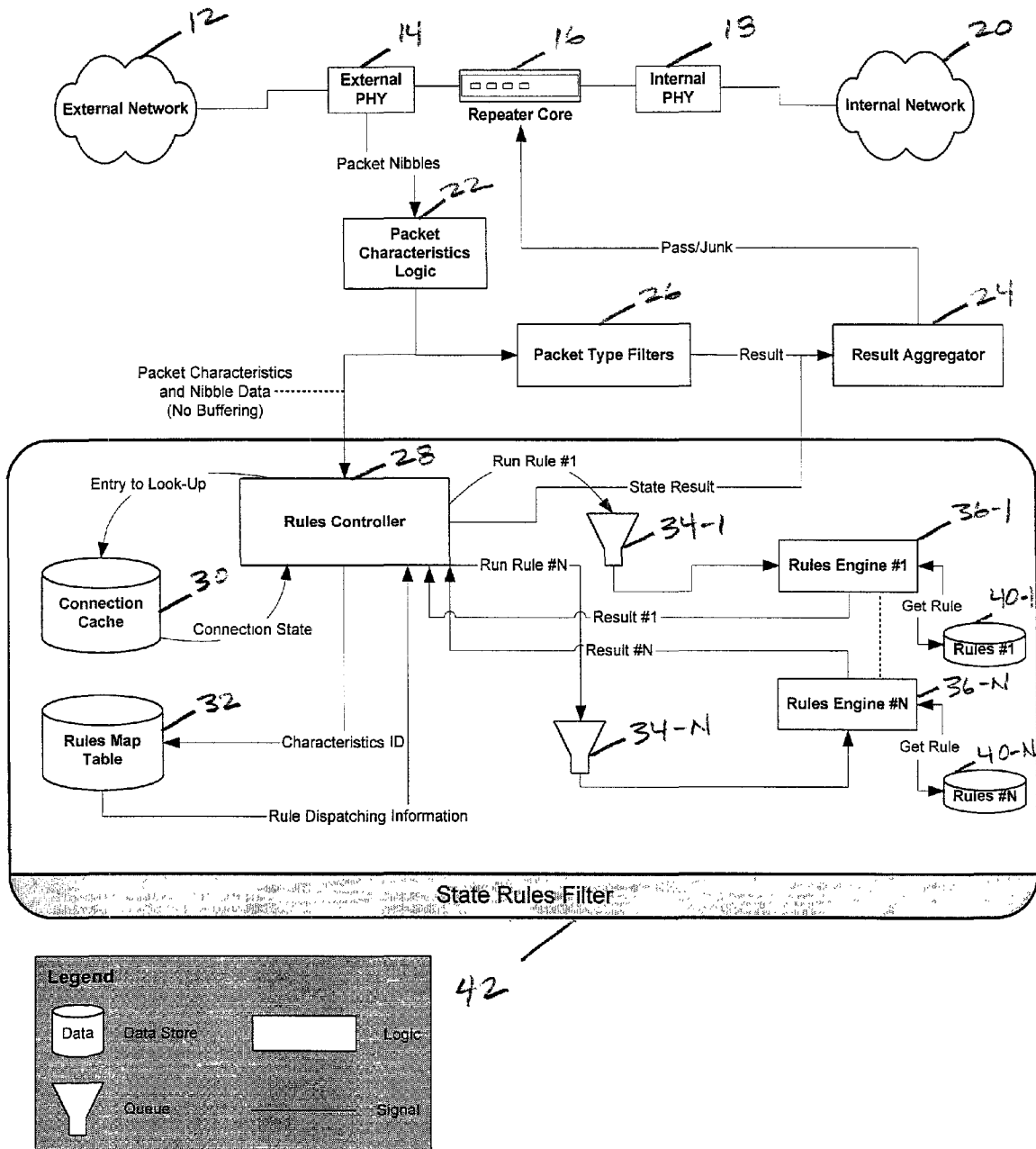


FIG. 2

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