



(12) **United States Patent**  
**Graham-Cumming, Jr.**

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(54) **AUTOMATIC IDENTIFICATION OF APPLICATION PROTOCOLS THROUGH DYNAMIC MAPPING OF APPLICATION-PORT ASSOCIATIONS**

5,719,942 \* 2/1998 Aldred et al. .... 709/228  
5,734,865 \* 3/1998 Yu ..... 709/250  
5,734,887 \* 3/1998 Kingberg et al. .... 707/4  
5,787,253 \* 7/1998 McCreery et al. .... 395/200.61

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(List continued on next page.)

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(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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(57) **ABSTRACT**

Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

A system, method, and software product dynamically determine network applications associated with any ports being used by packets on a network, allowing the packets to be properly routed, counted, and reported according to their applications. In one embodiment, an application-port mapping table stores static associations or mappings between applications and ports, as defined by a standards body or other source. The application-port mapping table is dynamically updated during runtime to reflect dynamic associations between applications and ports as extracted from packet data. The associations are identified by a packet analysis module which performs a two step verification of an application for a packet. In a first step, the packet analysis module applies the ports from a packet to the application-port mapping table to obtain a first application identifier. In a second, separate step, the packet analysis module applies identification logic to the packet to identify an application based on packet data. The second step may be used for each packet or only where the packet is not identified by the application-port mapping table. If a second application is successfully identified, the packet analysis module updates the application-port mapping table by adding a new association between the second identified application, and a port of the packet. To keep the application-port mapping table current, the table is periodically scanned to remove associations which have expired; alternatively, an association is removed when an end of sequence packet for its application is detected.

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(22) Filed: **Jun. 27, 1997**

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 15/173**; G06F 15/16

(52) **U.S. Cl.** ..... **709/238**; 709/224; 709/231; 709/235; 709/238; 709/239; 709/245; 709/246; 709/248; 709/250; 370/389; 370/392; 370/400; 370/401; 370/402; 370/469

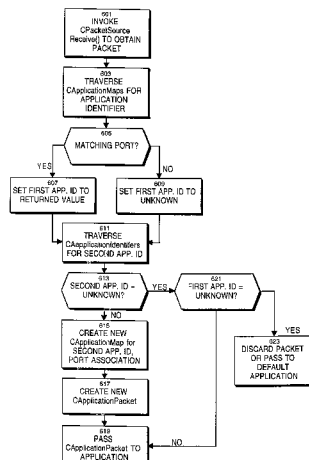
(58) **Field of Search** ..... 395/200.68, 200.61, 395/200.78, 200.65; 370/401, 392, 402, 400, 389, 469; 709/238, 231, 248, 235, 250, 224, 226, 239, 245, 246

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,519,867 \* 5/1996 Moeller et al. .... 709/107  
5,537,417 \* 7/1996 Sharma et al. .... 709/228  
5,566,336 \* 10/1996 Futatsugi et al. .... 395/701  
5,636,371 \* 6/1997 Yu ..... 709/250  
5,640,394 \* 6/1997 Schrier et al. .... 370/389  
5,640,399 \* 6/1997 Rostoker et al. .... 370/392  
5,649,105 \* 7/1997 Aldred et al. .... 709/220  
5,684,800 \* 11/1997 Dobbins et al. .... 370/401  
5,708,659 \* 1/1998 Rostoker et al. .... 370/392

**11 Claims, 6 Drawing Sheets**



U.S. PATENT DOCUMENTS

5,797,041	*	8/1998	Yasue et al. ....	710/52	5,883,945	*	3/1999	Richardson, Jr. et al. ....	379/189
5,835,710	*	11/1998	Nagami et al. ....	395/200.8	5,995,608	*	11/1999	Detampel, Jr. et al. ....	379/205
5,838,920	*	11/1998	Rosborough .....	709/224	6,061,349	*	5/2000	Coile et al. ....	370/389
									* cited by examiner

TCP Header for HTTP Protocol

Source Port = 80	Destination Port
32 bit Sequence Number	
32 bit Acknowledgment Number	
Flags	Window
Checksum	Urgent Pointer

**FIG. 1**

TCP Header for HTTP Protocol for Port 8080

Source Port = 8080	Destination Port
32 bit Sequence Number	
32 bit Acknowledgment Number	
Flags	Window
Checksum	Urgent Pointer

**FIG. 2**

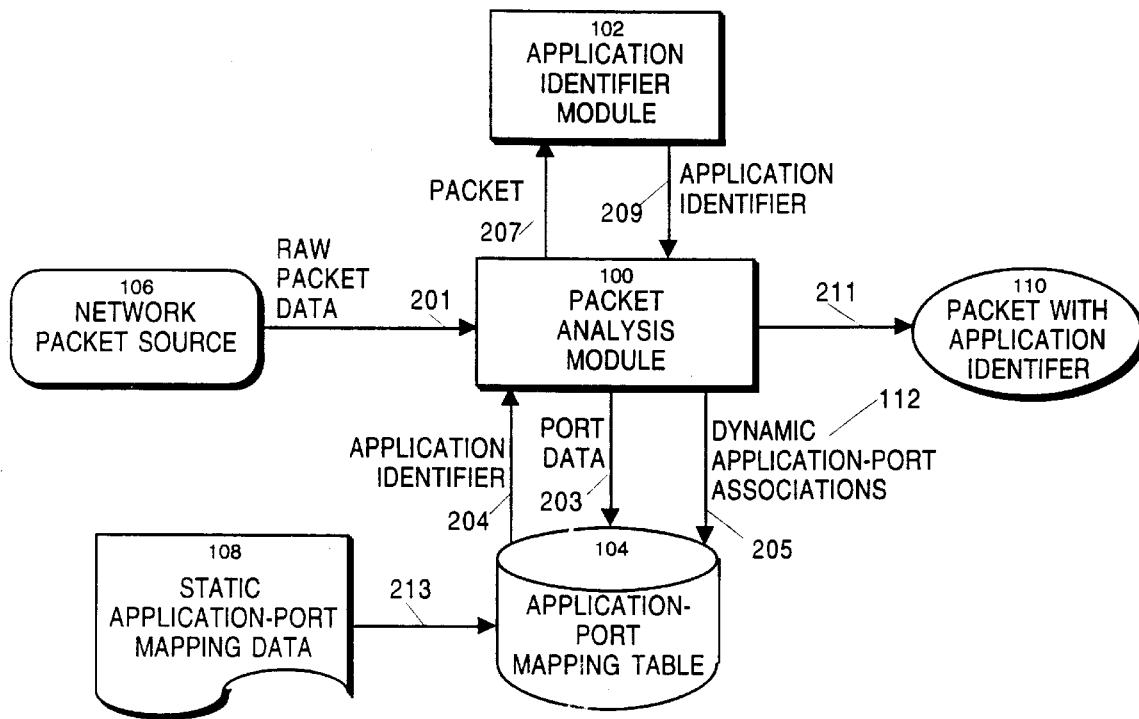


FIG. 3

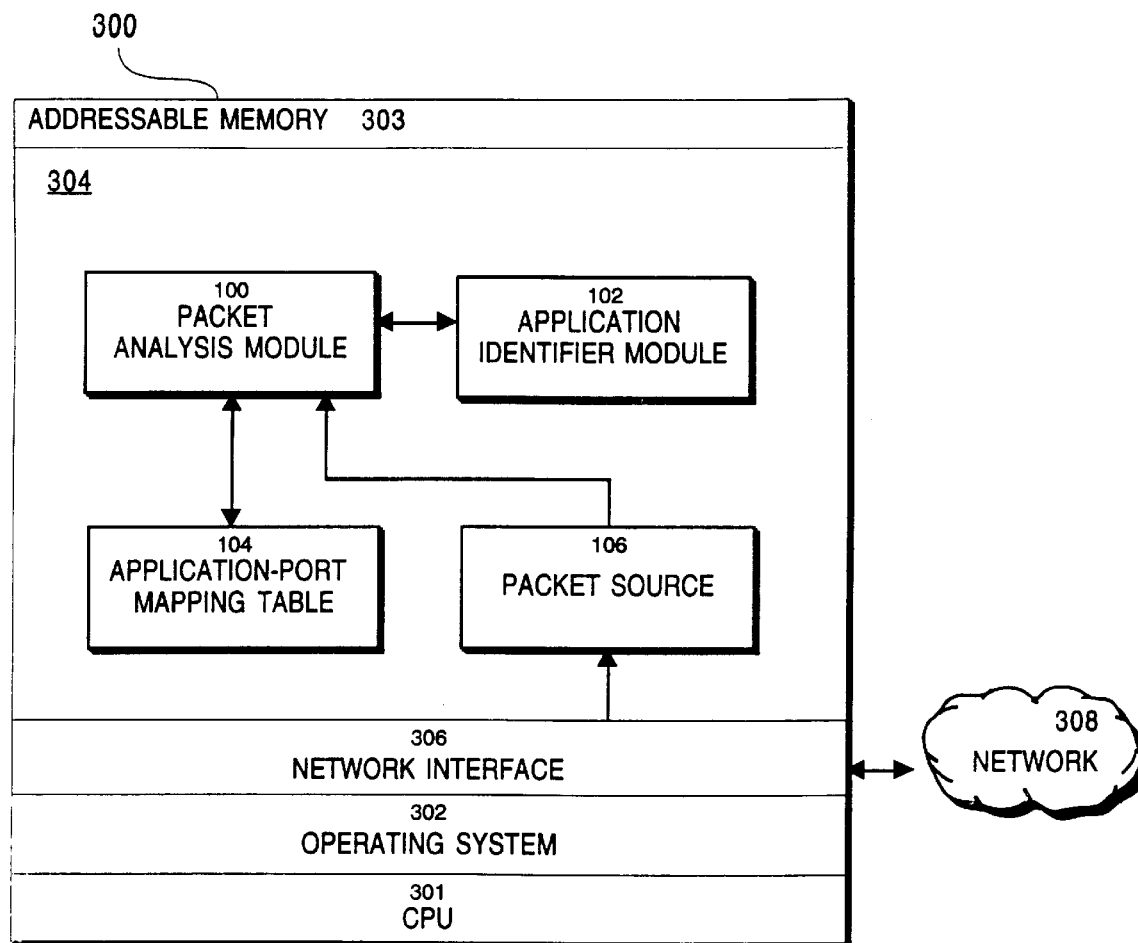


FIG. 4

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