



US006937566B1

(12) **United States Patent**  
Forsl w

(10) **Patent No.:** US 6,937,566 B1  
(45) **Date of Patent:** Aug. 30, 2005

(54) **DYNAMIC QUALITY OF SERVICE  
RESERVATION IN A MOBILE  
COMMUNICATIONS NETWORK**

(75) Inventor: **Jan E. Forsl w**, Stockholm (SE)

(73) Assignee: **Telefonaktiebolaget LM Ericsson  
(publ)**, Stockholm (SE)

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

(21) Appl. No.: **09/087,496**

(22) Filed: **May 29, 1998**

**Related U.S. Application Data**

(60) Provisional application No. 60/054,469, filed on Jul. 25, 1997.

(51) **Int. Cl.**<sup>7</sup> ..... **H04L 12/26**

(52) **U.S. Cl.** ..... **370/231; 370/332; 370/395.21**

(58) **Field of Search** ..... 370/231, 235,  
370/236, 252, 310, 322, 329, 332, 338,  
341, 348, 392, 401, 404, 407, 411, 412,  
429

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,524,006 A	6/1996	Hluchyj et al.	
5,638,371 A *	6/1997	Raychaudhuri et al. ....	370/347
5,708,655 A	1/1998	Toth et al.	
5,729,537 A	3/1998	Billstr�m	
5,729,542 A	3/1998	Dupont	
5,790,534 A	8/1998	Kokko et al.	
5,852,718 A	12/1998	Van Loo	
5,970,062 A *	10/1999	Bauchot .....	370/345
5,991,292 A	11/1999	Focsaneanu et al.	
6,021,263 A *	2/2000	Kujoory et al. ....	709/232
6,081,517 A	6/2000	Liu et al.	
6,094,435 A *	7/2000	Hoffman et al. ....	370/414
6,094,581 A	7/2000	Fried et al.	
6,097,733 A	8/2000	Basu et al.	
6,122,263 A	9/2000	Dahlin et al.	
6,157,648 A	12/2000	Voit et al.	

6,188,697 B1 *	2/2001	Umehira et al. ....	370/412
6,374,112 B1 *	4/2002	Widgren et al. ....	455/452
6,603,738 B1 *	8/2003	Kari et al. ....	370/230.1

**FOREIGN PATENT DOCUMENTS**

EP	0 789 499 A	8/1997
WO	95/25407 A	9/1995
WO	96/09708 A	3/1996
WO	97/47112 A	12/1997

**OTHER PUBLICATIONS**

H. Schulzrinne et al., Network Working Group, Request for Comments: 2326, Category: Standards Track, Apr. 1998, "Real Time Streaming Protocol".

C. Rigne, Network Working Group, Request for Comments: 2139, Obsoletes: 2059, Category: Informational, Apr. 1998, "RADIUS Accounting".

R. Braden et al., Network Working Group, Request for Comments: 2205, Category: Standards Track, RFC 2205, Sep. 1997, Resource ReSerVation Protocol (RSVP)—Version 1 Functional Specification.

(Continued)

*Primary Examiner*—Man U. Phan

*Assistant Examiner*—Toan D. Nguyen

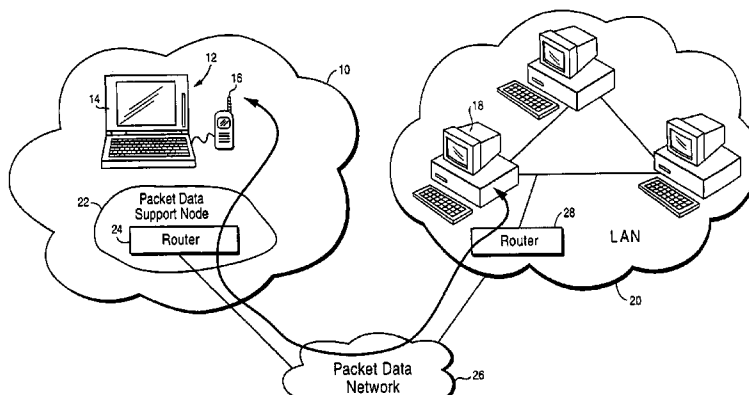
(74) *Attorney, Agent, or Firm*—Nixon & Vanderhye P.C.

(57)

**ABSTRACT**

In a mobile communications system, a mobile host communicates packet data with an external network by way of a packet gateway node. The mobile host establishes a packet session during which plural application flows are communicated with an external network entity. Each application flow includes a corresponding stream of packets. In addition, a corresponding quality of service parameter is defined and reserved for each of the plural application flows. In this way, different quality of service parameters may be defined and reserved for different ones of the application flows. Packets corresponding to each of the application flows are then delivered, for example, from the external network entity all the way to the mobile host in accordance with the quality of service reserved for that application flow. Different qualities of service may have different allocated bandwidths, delays, and/or reliabilities.

**33 Claims, 14 Drawing Sheets**



## OTHER PUBLICATIONS

R. Droms, Network Working Group, Request for Comments: 2131, Obsoletes: 1541, Category: Standards Track, Mar. 1997, "Dynamic Host Configuration Protocol".

C. Rigney et al., Network Working Group, Request for Comments: 2138, Obsoletes: 2058, Category: Standards Track, Apr. 1997, "Remote Authentication Dial In User Service (RADIUS)".

W. Simpson, Network Working Group, Request for Comments: 1661, STD: 51, Obsoletes: 1548, Category: Standards Track, Jul. 1994, "The Point-to-Point Protocol (PPP)".

H. Schulzrinne et al., Network Working Group, Request for Comments: 1889, Category Standards Track, Jan. 1996, "RTP: A Transport Protocol for Real-Time Applications".

Michael Patrick, DHC Working Group, Nov. 24, 1997, "DHCP Relay Agent Information Option".

A. Valencia et al., PPP Working Group, Internet Draft, Category: Internet Draft, Title: draft-ietf-pppext-12tp-11.txt, May 1998, "Layer Two Tunneling Protocol 'L2TP'".

O. Gudmundsson et al., DHC Working Group, Internet Draft, Mar. 1998, "Security Requirements for the DHCP Protocol".

Alexander, "DHCP Options and BOOTP Vendor Extensions", Mar. 1997, rfc2132.

Braden et al., Recommendations on Queue Management and Congestion Avoidance in the Internet, Apr. 1998, draft-irtf-e2e-queue-mgt.00.txt.

Braden et al., "Resource Reservation Protocol Version I Functional Specification", Sep. 1997, draft-ietf-rsvp-spec-14.ps.

Gudmundsson, Security Architecture for DHCP, Mar. 1997, draft-ietf-dhc-security-arch-00.txt.

Patrick, "DHCP Agent-Supplied Options", Dec. 1996-draft-ietf-dhc-agent-options-00.txt.

Sathaye, "ATM Forum Traffic Management Specification Version 4.0", Apr. 1996, af-tm-0056.000.

Shenker et al., "General Characterization Parameters for Integrated Service Network Elements", Oct. 1996, draft-ietf-intserv-charac-02.txt.

GSM 02.60, "Digital Cellular Telecommunications System" (Phase 2+), GPRS, Service Description, Stage I, version 1.9.0, Oct. 1996.

GSM 03.60, "Digital Cellular Telecommunications System" (Phase 2+), GPRS, Service Description, Stage 2, version 2.0.0, May 1997.

GSM 03.64, "Digital Cellular Telecommunications System" (Phase 2+), GPRS, Overall Description of GPRS Radio Interface, Stage 2, Version 2.0.0, Mar. 1997.

\* cited by examiner

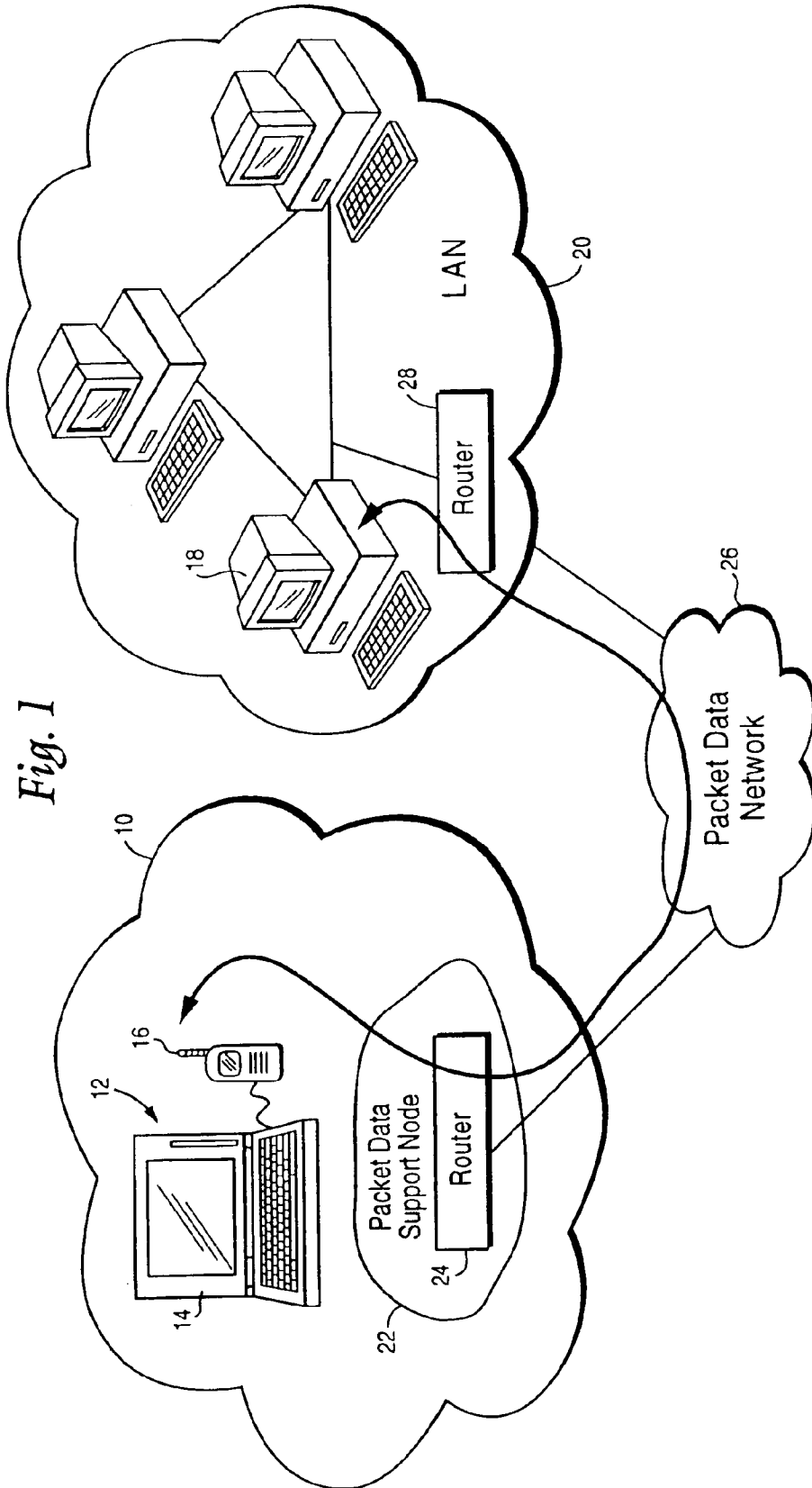
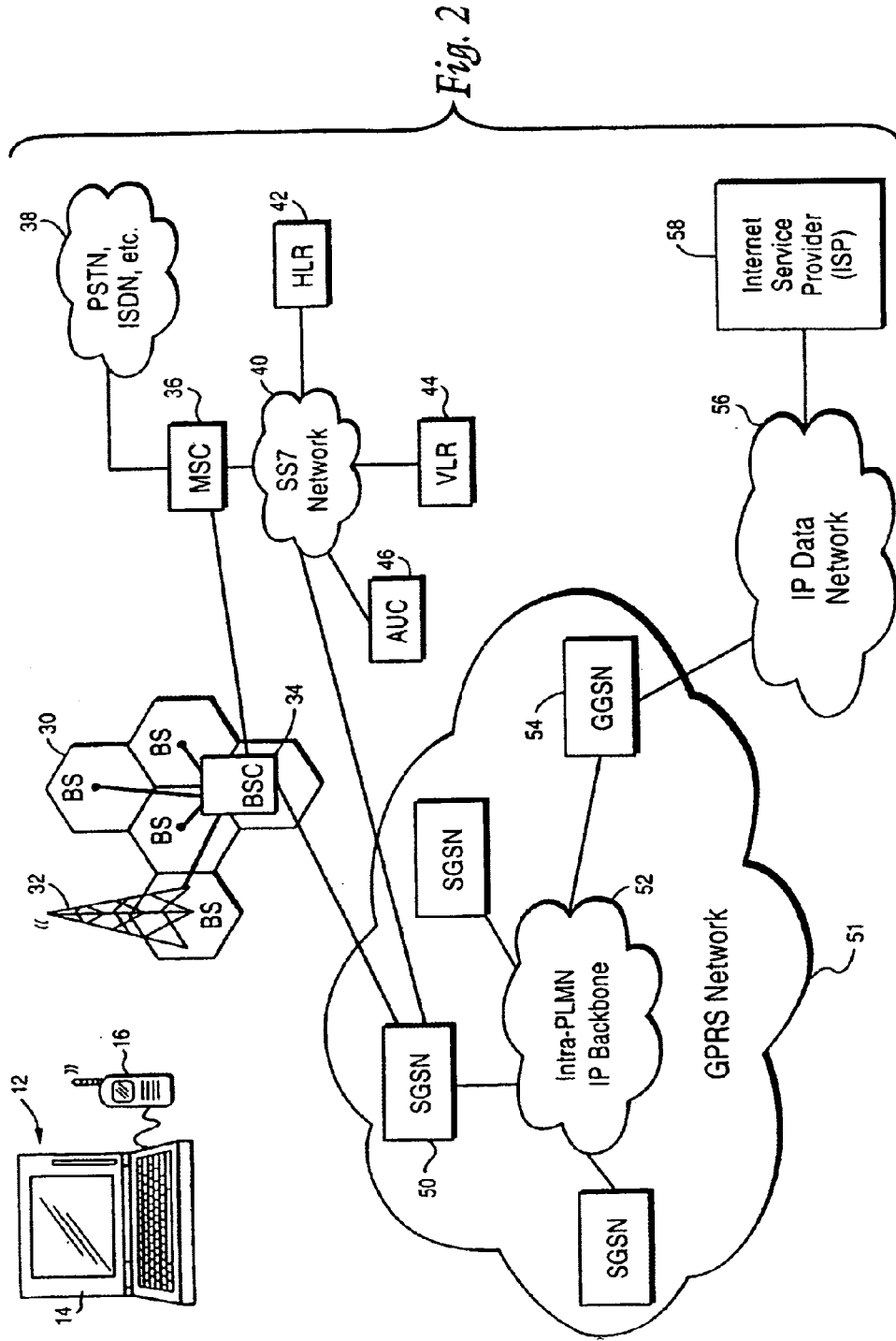


Fig. 1



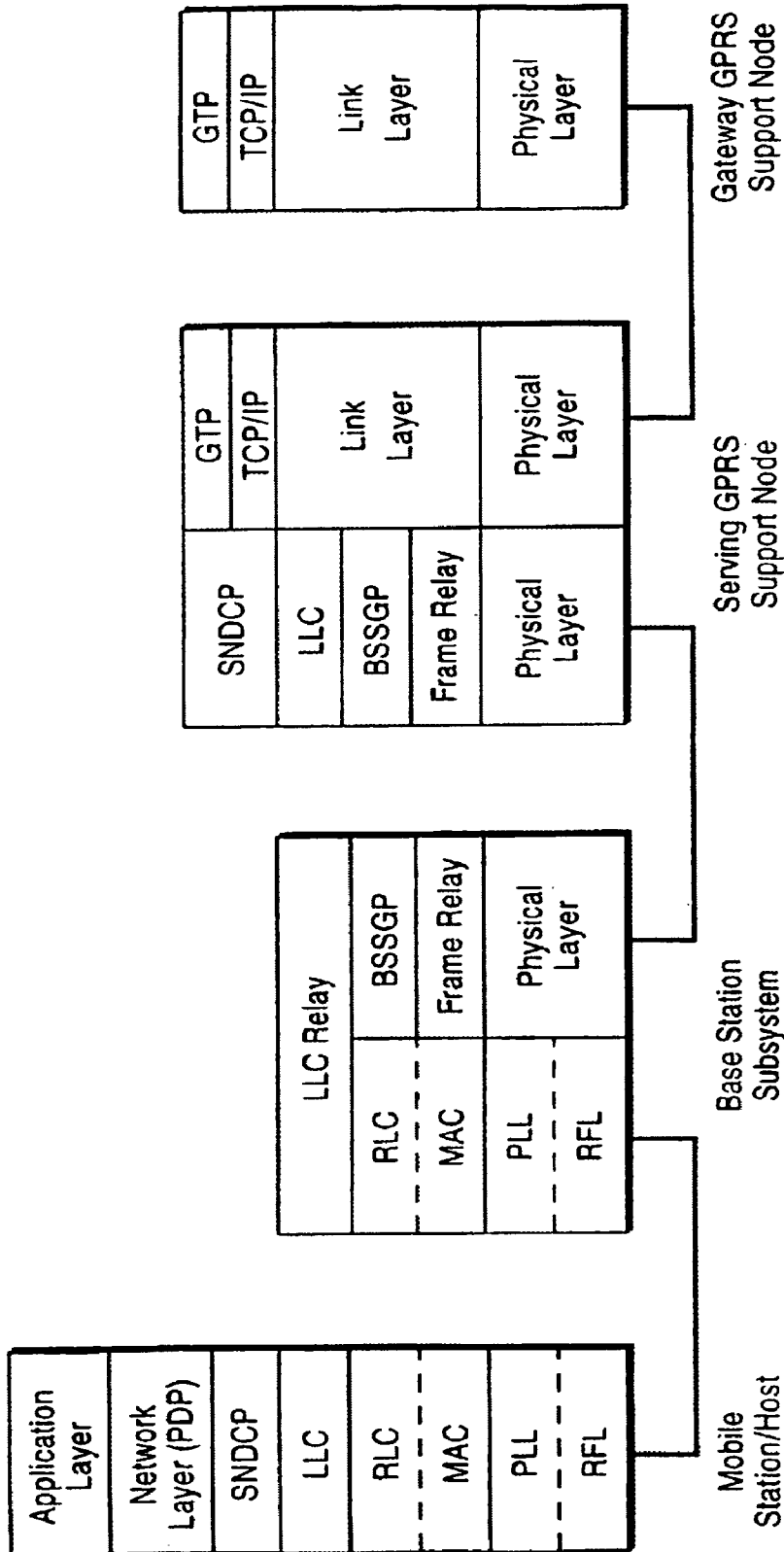


Fig. 3

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.