



US006069719A

United States Patent [19]
Mizrahi

[11] Patent Number: 6,069,719
[45] Date of Patent: May 30, 2000

- [54] DYNAMICALLY RECONFIGURABLE OPTICAL ADD-DROP MULTIPLEXERS FOR WDM OPTICAL COMMUNICATION SYSTEMS
- [75] Inventor: Victor Mizrahi, Columbia, Md.
- [73] Assignee: Ciena Corporation, Linthicum, Md.
- [21] Appl. No.: 08/902,810
- [22] Filed: Jul. 30, 1997
- [51] Int. Cl.⁷ H04J 14/02
- [52] U.S. Cl. 359/124; 359/127; 359/128; 359/130
- [58] Field of Search 359/124, 127, 359/128, 129, 130, 131; 385/37

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,612,805	3/1997	Fevrier et al.	359/128
5,712,932	1/1998	Alexander et al.	359/127
5,715,076	2/1998	Alexander et al.	359/130
5,748,815	5/1998	Hamel et al.	359/130
5,760,934	6/1998	Sutter et al.	359/127
5,778,118	7/1998	Sridhar	359/130

- OTHER PUBLICATIONS
- Toba, H., et al.; "An Optical FDM-Based Self-Healing Ring Network Employing Arrayed WaveGuide Grating Filters and EDFA's with Level Equalizers"; pp. 800-813; IEEE Journal on Selected Areas in Communications, vol. 14, No. 5, Jun. 1996.
- Toba, H., et al.; "Demonstration of Optical FDM Based Self-Healing Ring Network Employing Arrayed-WaveGuide-Grating ADM Filters and EFDAS"; pp. 263-266; Optical Communication (EC, Firenze, Sep. 25-29, 1994) vol. 1, No. CONF. 20, Sep. 1994.

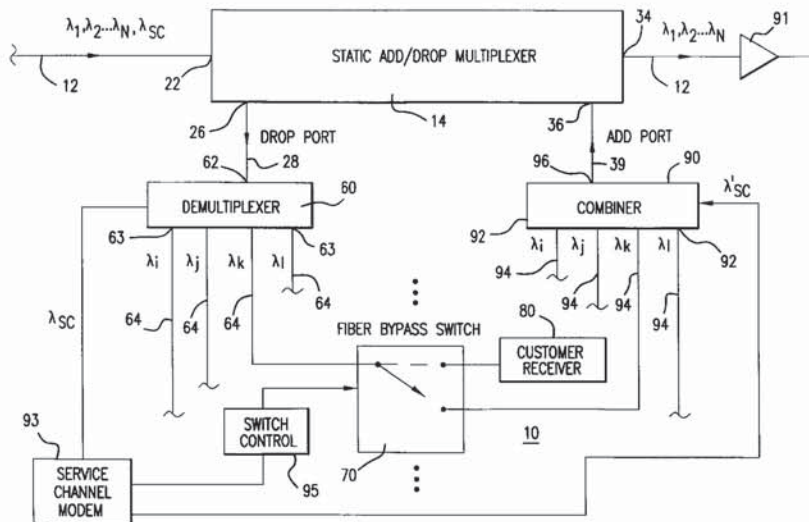
- Kitayama, K. -I; "Subbarrier Multiplexing Based Signaling and Access Control in Optical FDM Networks"; pp. 1996-2002; Telecommunications Conference, Singapore, Nov. 14-16, 1995, vol. 3, Nov. 1995.
- Tachikawa, Y., et al.; "Arrayed-WaveGuide Grating Multiplexer with Loop-Back Optical Paths and its Applications"; pp. 977-984; Journal of Lightwave Technology, vol. 14, No. 6, Jun. 1996.
- Beer, J.; "Photonische Transportnetze"; pp. 20-24; Technische Rundschau Transfer, vol. 88, No. 14, Apr. 1996.
- Chawki, M. J., et al.; "Evaluation of an Optical Boosted Add/Drop Multiplexer OBADM Including Circulators and Riber Grating Filters"; pp. 47-50; Proceedings of the European Conference on Optical Communication, vol. 1, Sep. 1995.
- Notification of Transmittal of The International Search Report or The Declaration, 6 pages.

Primary Examiner—Daniel J. Wu
 Assistant Examiner—John Tweel, Jr.
 Attorney, Agent, or Firm—David L. Soltz; Margaret Burke

[57] **ABSTRACT**

In an optical add/drop multiplexer, an optical switch is coupled to one or more outputs from a demultiplexer. Accordingly, a dropped optical channel can be switched between a receiver optical path for directing the dropped optical signal to an optical receiver and between a combiner optical path for routing the dropped optical channel back towards the optical transmission path, optionally passing the dropped optical channel through a remodulator. Alternatively, the optical switch routes the dropped optical channel towards an optical receiver while permitting a new optical channel to be routed to add port of the static add-drop multiplexer.

10 Claims, 5 Drawing Sheets



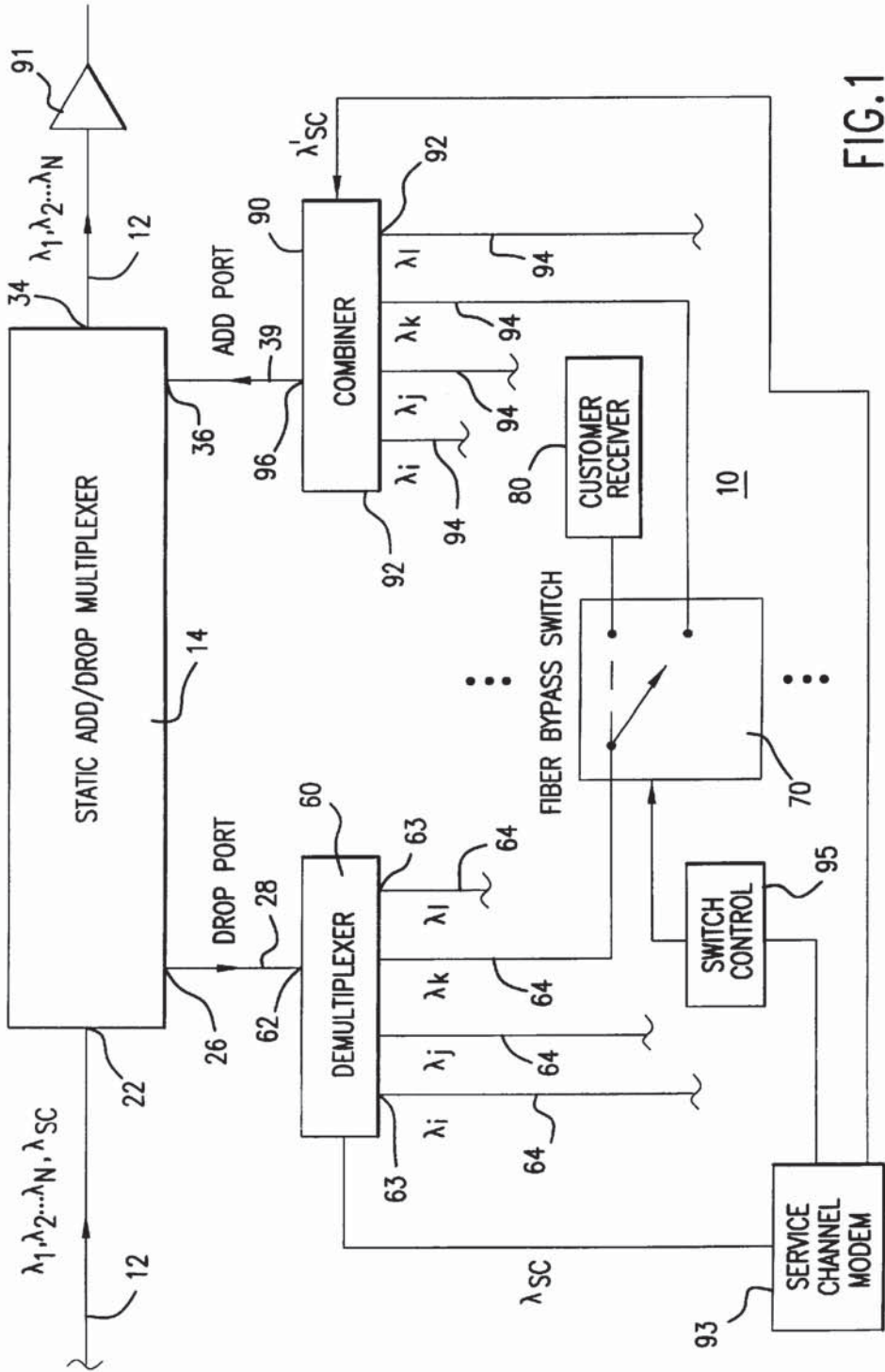


FIG. 1

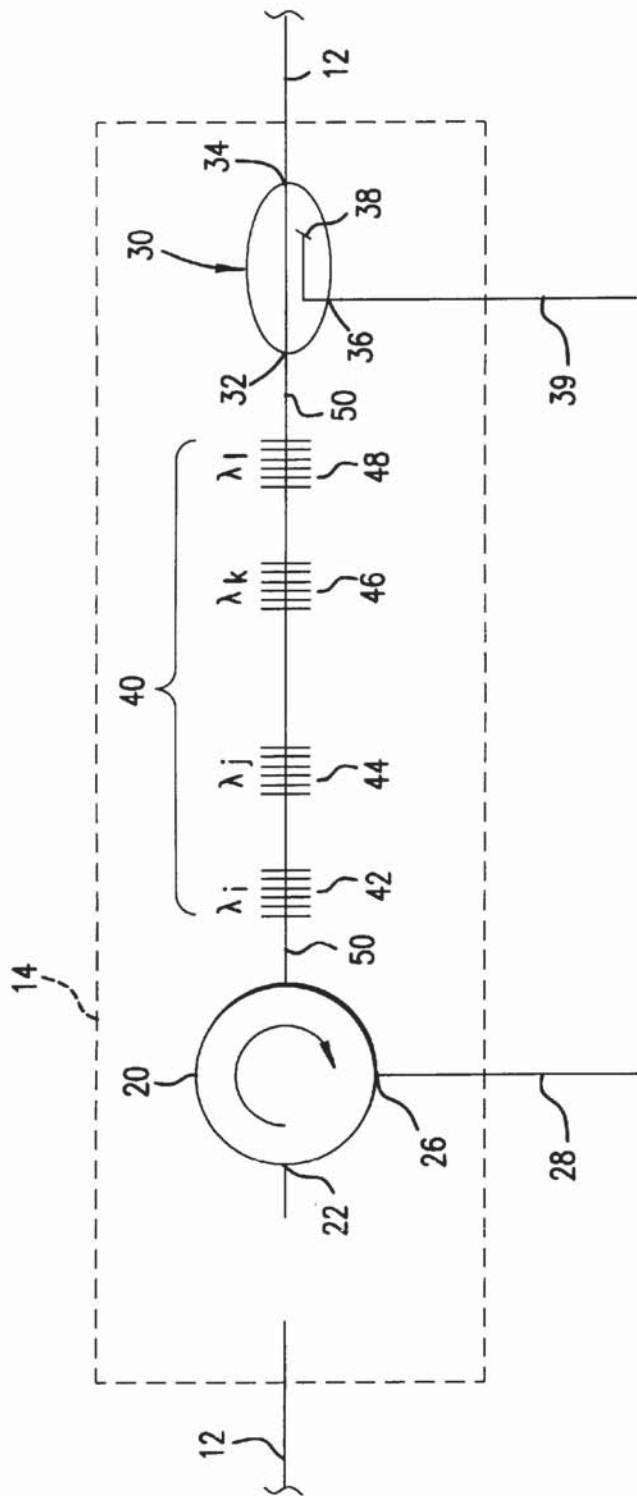


FIG.2

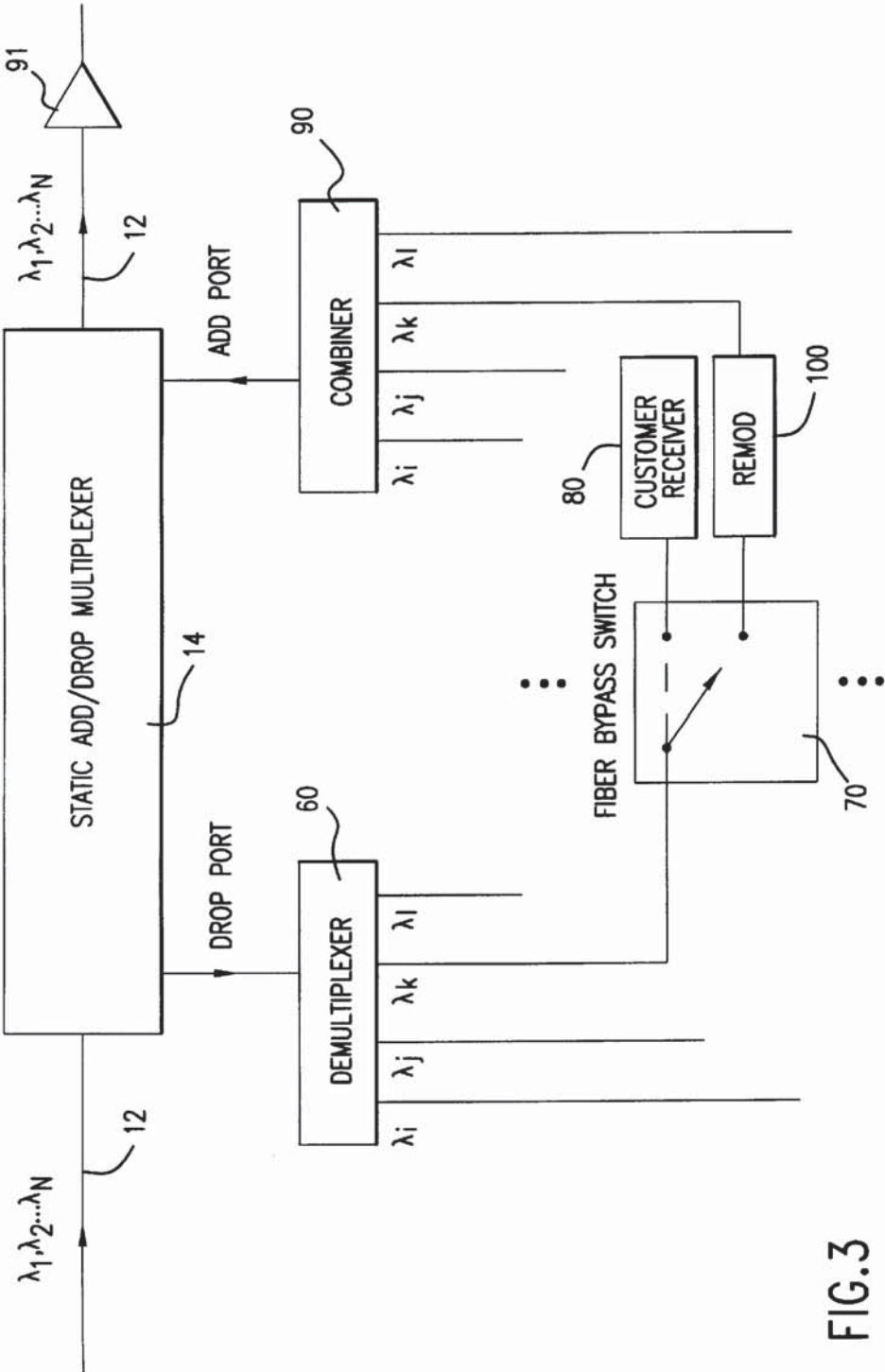


FIG. 3

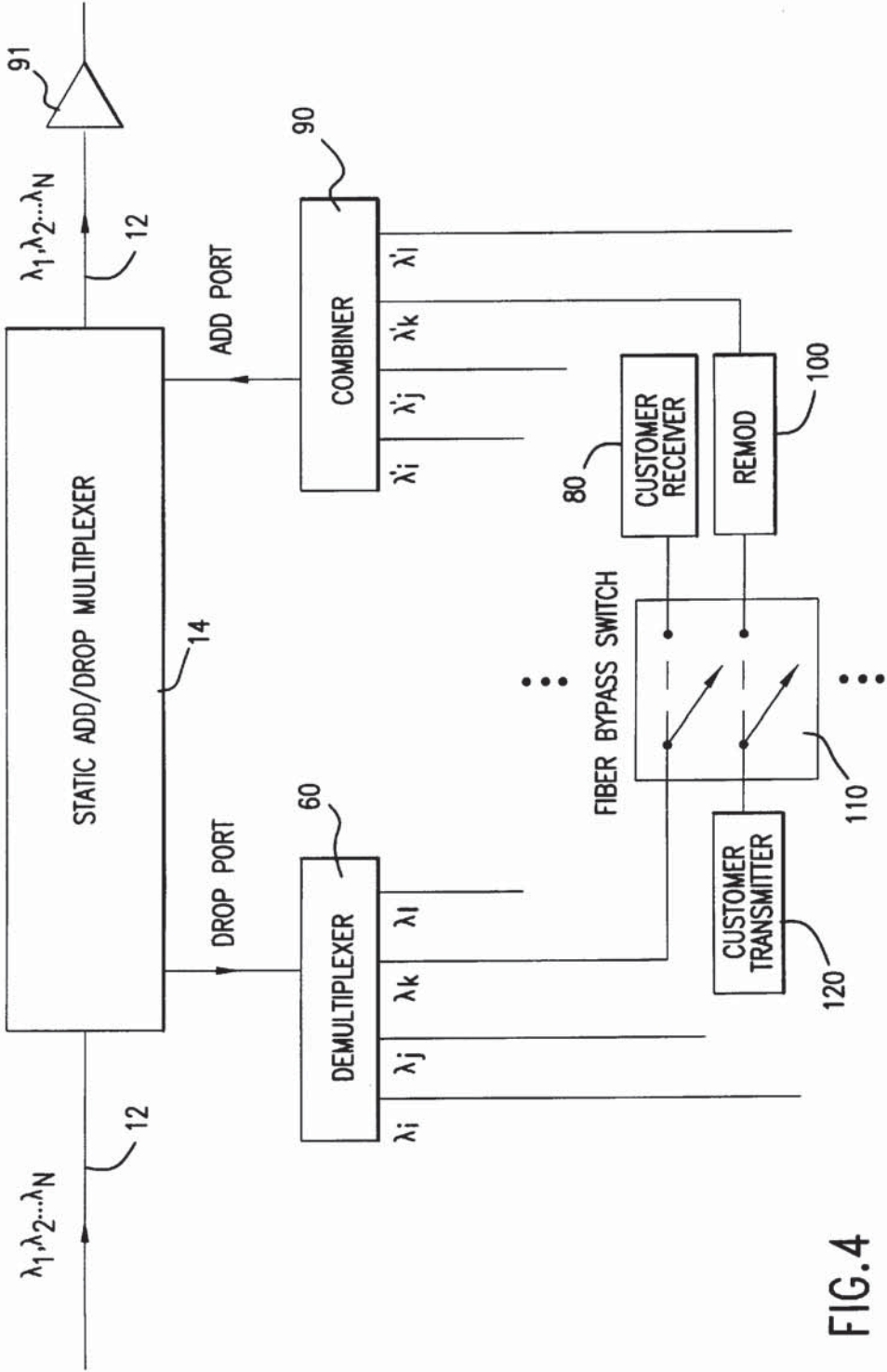


FIG. 4

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.