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

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(54) **DIGITAL NODE FOR HYBRID FIBER/COAX NETWORK**

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(73) Assignee: **ADC Telecommunications, Inc.**, Minnetonka, MN (US)

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

This patent is subject to a terminal disclaimer.

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(51) **Int. Cl.**  
**H04L 12/413** (2006.01)

(52) **U.S. Cl.** ..... **370/445; 370/481**

(58) **Field of Classification Search** ..... 714/746;  
348/476, 14.01; 370/480, 328, 438, 315,  
370/442; 359/167; 340/310.06; 333/103  
See application file for complete search history.

(57) **ABSTRACT**

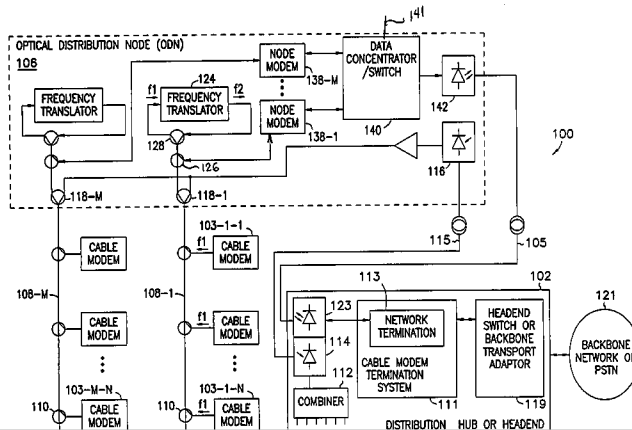
An optical distribution node is provided. The optical distribution node includes a laser transceiver that is coupleable to at least one fiber optic link. The optical distribution node communicates upstream and downstream digital data with the head end over the at least one fiber optic link. The optical distribution node further includes a data concentrator coupled to the laser transceiver. Further, for each of at least one coaxial cable link, the optical distribution node includes a frequency translator and a node modem. The frequency translator receives and translates the upstream digital data from modems on the at least one coaxial cable link to a different carrier to provide a signal to the modems on the at least one coaxial cable link for collision detection. The node modem is coupled between the coaxial cable link and the data concentrator. The node modem demodulates upstream digital data for the data concentrator and modulates downstream digital data for transmission over the coaxial cable link.

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**46 Claims, 3 Drawing Sheets**



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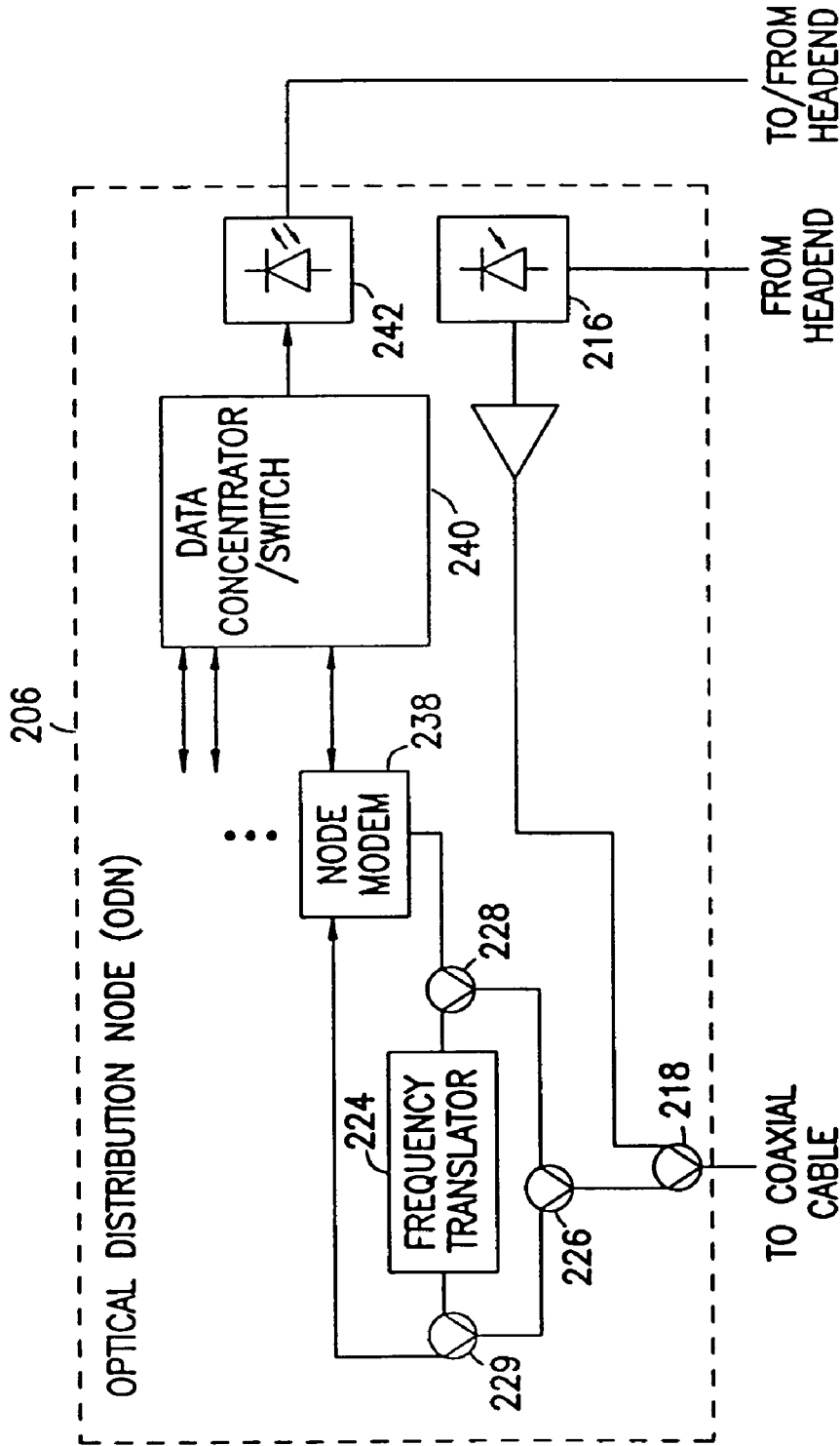


FIG. 2

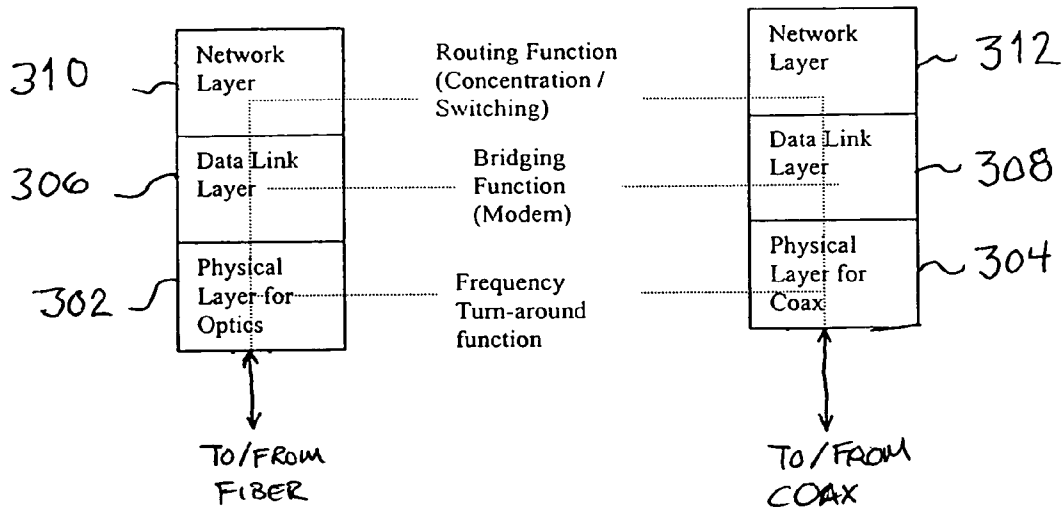


FIG. 3

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