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Konda

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(54) **FULLY CONNECTED GENERALIZED MULTI-STAGE NETWORKS**

(56) **References Cited**

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(73) Assignee: **Konda Technologies Inc.**, San Jose, CA (US)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 439 days.
This patent is subject to a terminal disclaimer.

U.S. PATENT DOCUMENTS
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* cited by examiner
Primary Examiner — Dang Ton
Assistant Examiner — Lionel Preval

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§ 371 (c)(1),
(2), (4) Date: **Sep. 6, 2009**
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PCT Pub. Date: **Sep. 12, 2008**

(57) **ABSTRACT**
A multi-stage network comprising $(2 \times \log_d N) - 1$ stages is operated in strictly nonblocking manner for unicast, also in rearrangeably nonblocking manner for arbitrary fan-out multicast when $s \geq 2$, and is operated in strictly nonblocking manner for arbitrary fan-out multicast when $s \geq 3$, includes an input stage having

$$\frac{N}{d}$$

switches with each of them having d inlet links and $s \times d$ outgoing links connecting to second stage switches, an output stage having

$$\frac{N}{d}$$

(65) **Prior Publication Data**
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switches with each of them having d outlet links and $s \times d$ incoming links connecting from switches in the penultimate stage. The network also has $(2 \times \log_d N) - 3$ middle stages with each middle stage having

$$\frac{s \times N}{d}$$

Related U.S. Application Data
(60) Provisional application No. 60/905,526, filed on Mar. 6, 2007, provisional application No. 60/940,383, filed on May 25, 2007.
(51) **Int. Cl.** **H04L 12/28** (2006.01)
(52) **U.S. Cl.** **370/388; 710/316; 379/342**
(58) **Field of Classification Search** **370/388, 370/390**

switches, and each switch in the middle stage has d incoming links connecting from the switches in its immediate preceding stage, and d outgoing links connecting to the switches in its immediate succeeding stage. Also each multicast connection is set up by use of at most two outgoing links from the input stage switch.

See application file for complete search history.

21 Claims, 29 Drawing Sheets

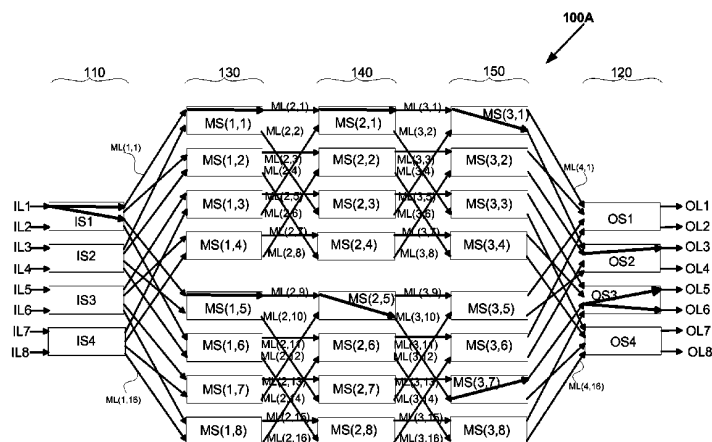


FIG. 1A

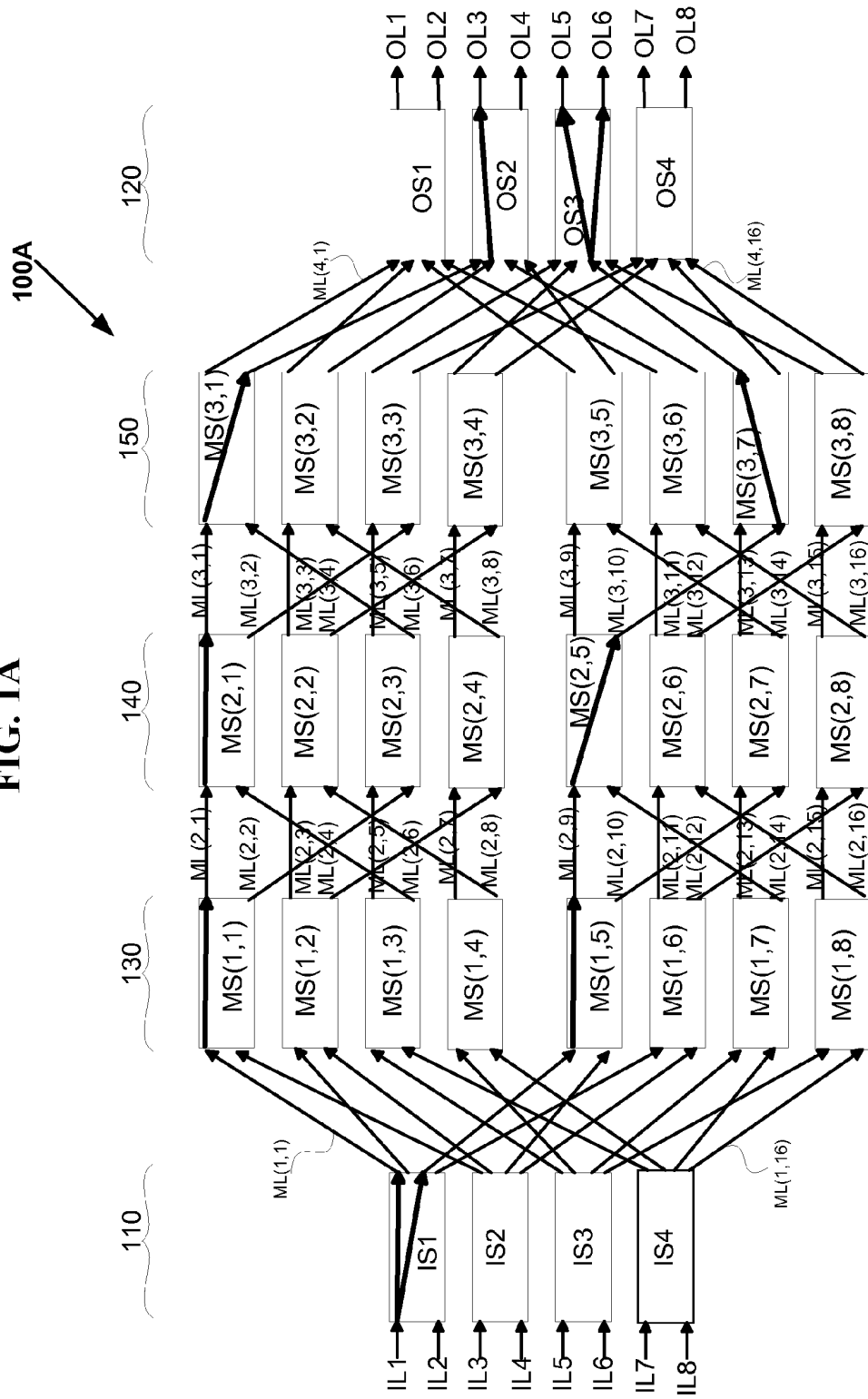


FIG. 1A1

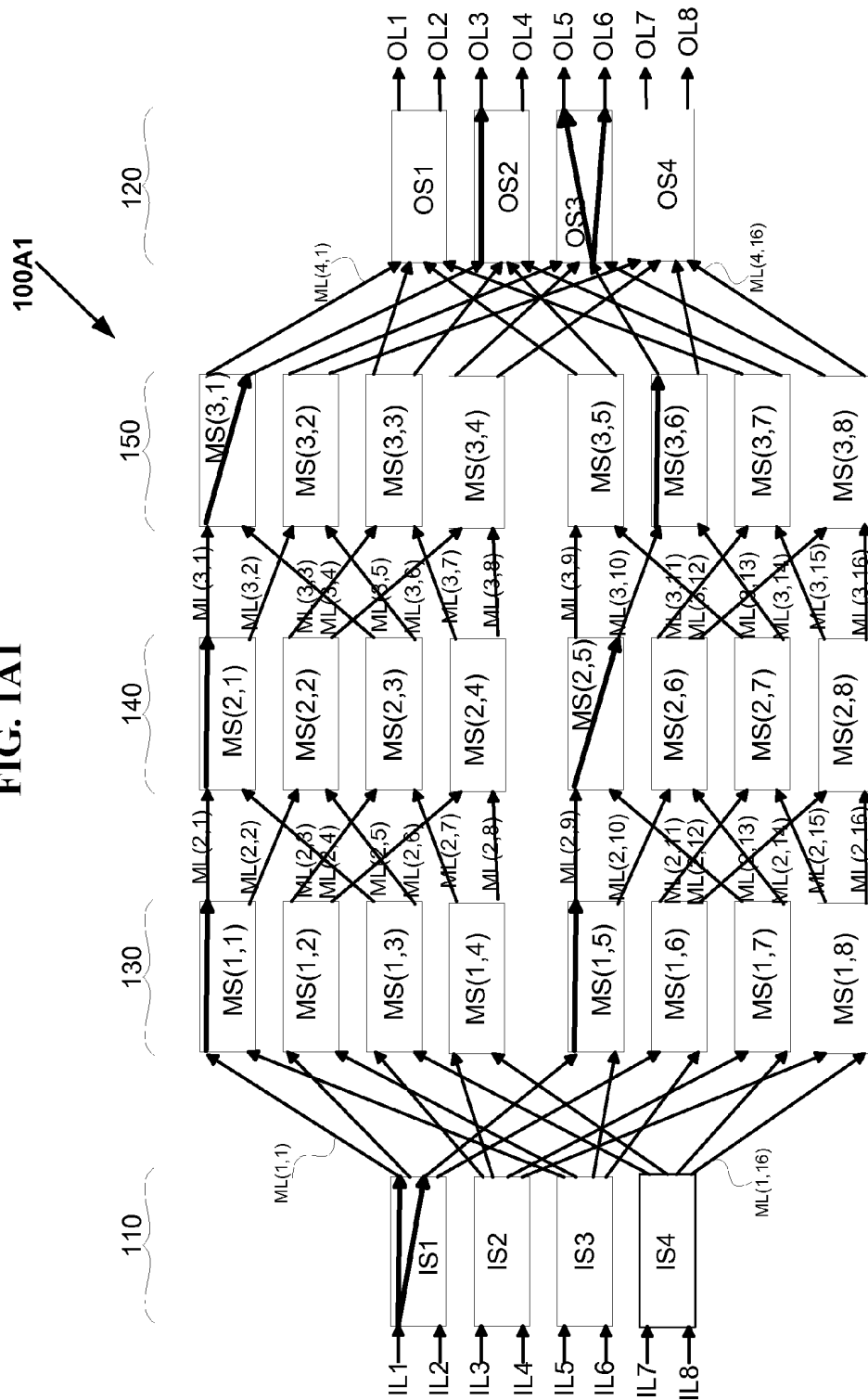
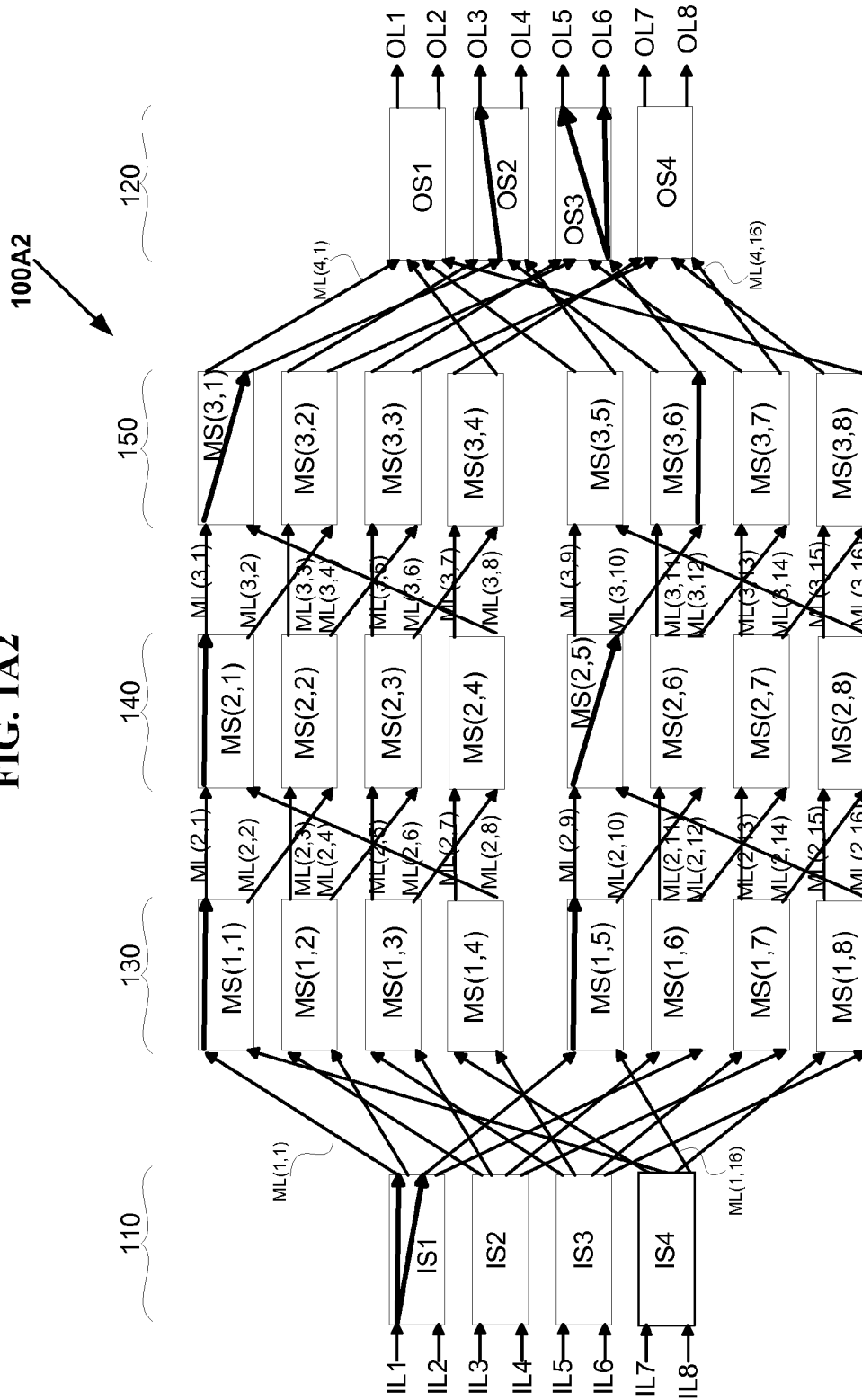
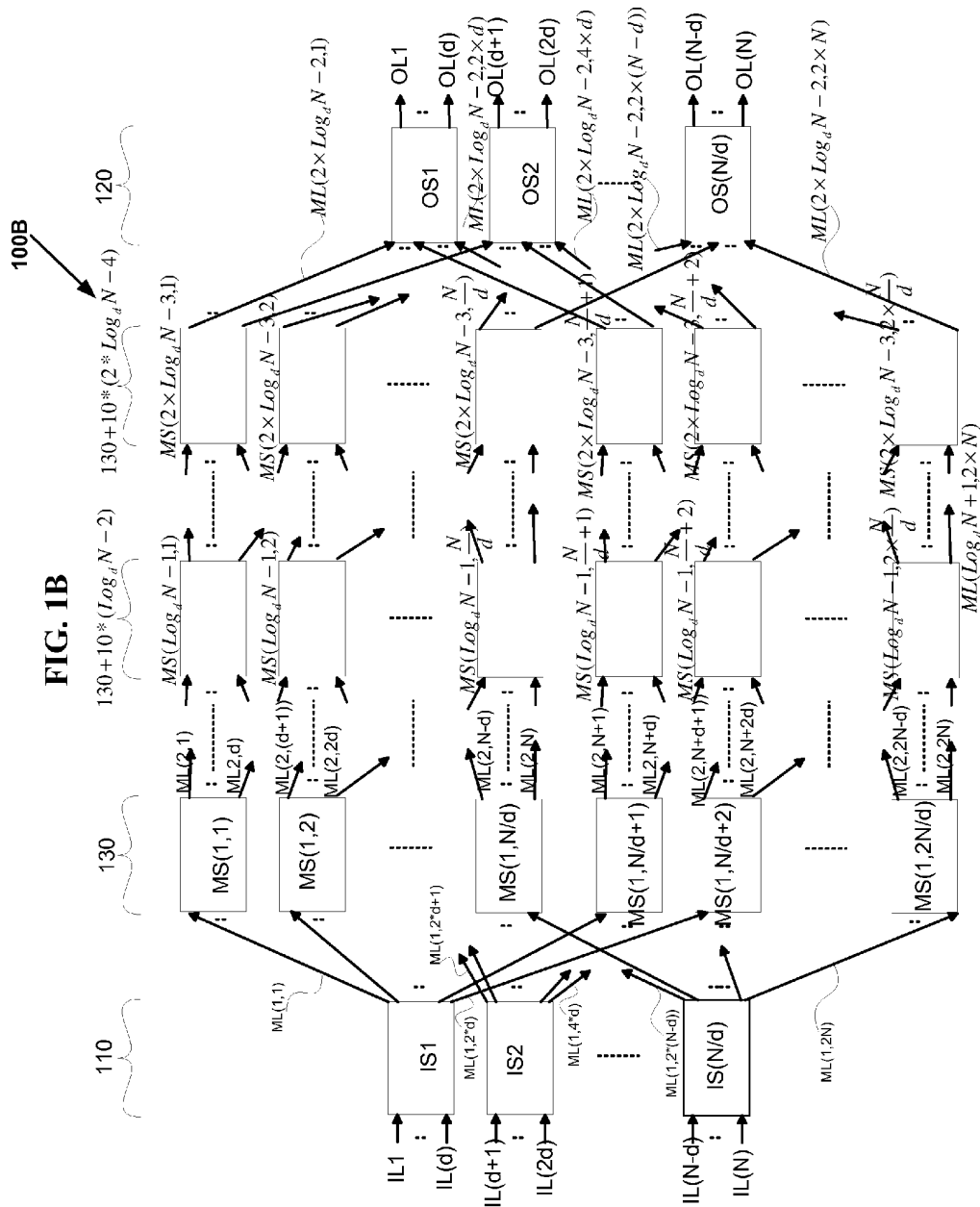


FIG. 1A2





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