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Kidder et al.

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(54) **SIGNATURES FOR FACILITATING HOT UPGRADES OF MODULAR SOFTWARE COMPONENTS**

6,332,198, which is a continuation-in-part of application No. 09/588,398, filed on Jun. 6, 2000, now abandoned, which is a continuation-in-part of application No. 09/574,341, filed on May 20, 2000, and a continuation-in-part of application No. 09/574,343, filed on May 20, 2000, now Pat. No. 6,639,910.

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(51) **Int. Cl.**⁷ **G06F 9/00**
(52) **U.S. Cl.** **713/191; 713/200; 713/177**
(58) **Field of Search** **713/191, 200, 713/177**

(73) Assignee: **CIENA Corporation**, Linthicum, MD (US)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 814 days.

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(57) **ABSTRACT**

The present invention provides a method and apparatus for facilitating hot upgrades of software components within a telecommunications network device through the use of "signatures" generated by a signature generating program. After installation of a new software release within the network device, only those software components whose signatures do not match the signatures of corresponding and currently executing software components are upgraded. Signatures promote hot upgrades by identifying only those software components that need to be upgraded. Since signatures are automatically generated for each software component as part of putting together a new release a quick comparison of two signatures provides an accurate assurance that either the software component has changed or has not. Thus, signatures provide a quick, easy way to accurately determine the upgrade status of each software component.

25 Claims, 269 Drawing Sheets

(21) Appl. No.: **09/777,468**

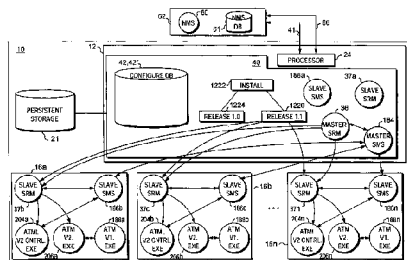
(22) Filed: **Feb. 5, 2001**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 09/718,224, filed on Nov. 21, 2001, which is a continuation-in-part of application No. 09/756,936, filed on Jan. 9, 2001, which is a continuation-in-part of application No. 09/711,054, filed on Nov. 9, 2000, which is a continuation-in-part of application No. 09/703,856, filed on Nov. 1, 2000, which is a continuation-in-part of application No. 09/687,191, filed on Oct. 12, 2000, now abandoned, which is a continuation-in-part of application No. 09/669,364, filed on Sep. 26, 2000, which is a continuation-in-part of application No. 09/663,947, filed on Sep. 18, 2000, now abandoned, which is a continuation-in-part of application No. 09/656,123, filed on Sep. 6, 2000, now abandoned, which is a continuation-in-part of application No. 09/653,700, filed on Aug. 31, 2000, now abandoned, which is a continuation-in-part of application No. 09/637,800, filed on Aug. 11, 2000, which is a continuation-in-part of application No. 09/633,675, filed on Aug. 7, 2000, which is a continuation-in-part of application No. 09/625,101, filed on Jul. 24, 2000, which is a continuation-in-part of application No. 09/616,477, filed on Jul. 14, 2000, which is a continuation-in-part of application No. 09/613,940, filed on Jul. 11, 2000, which is a continuation-in-part of application No. 09/596,055, filed on Jun. 16, 2000, which is a continuation-in-part of application No. 09/593,034, filed on Jun. 13, 2000, now abandoned, which is a continuation-in-part of application No. 09/574,440, filed on May 20, 2000, now Pat. No. 6,654,903, and a continuation-in-part of application No. 09/591,193, filed on Jun. 9, 2000, now Pat. No.



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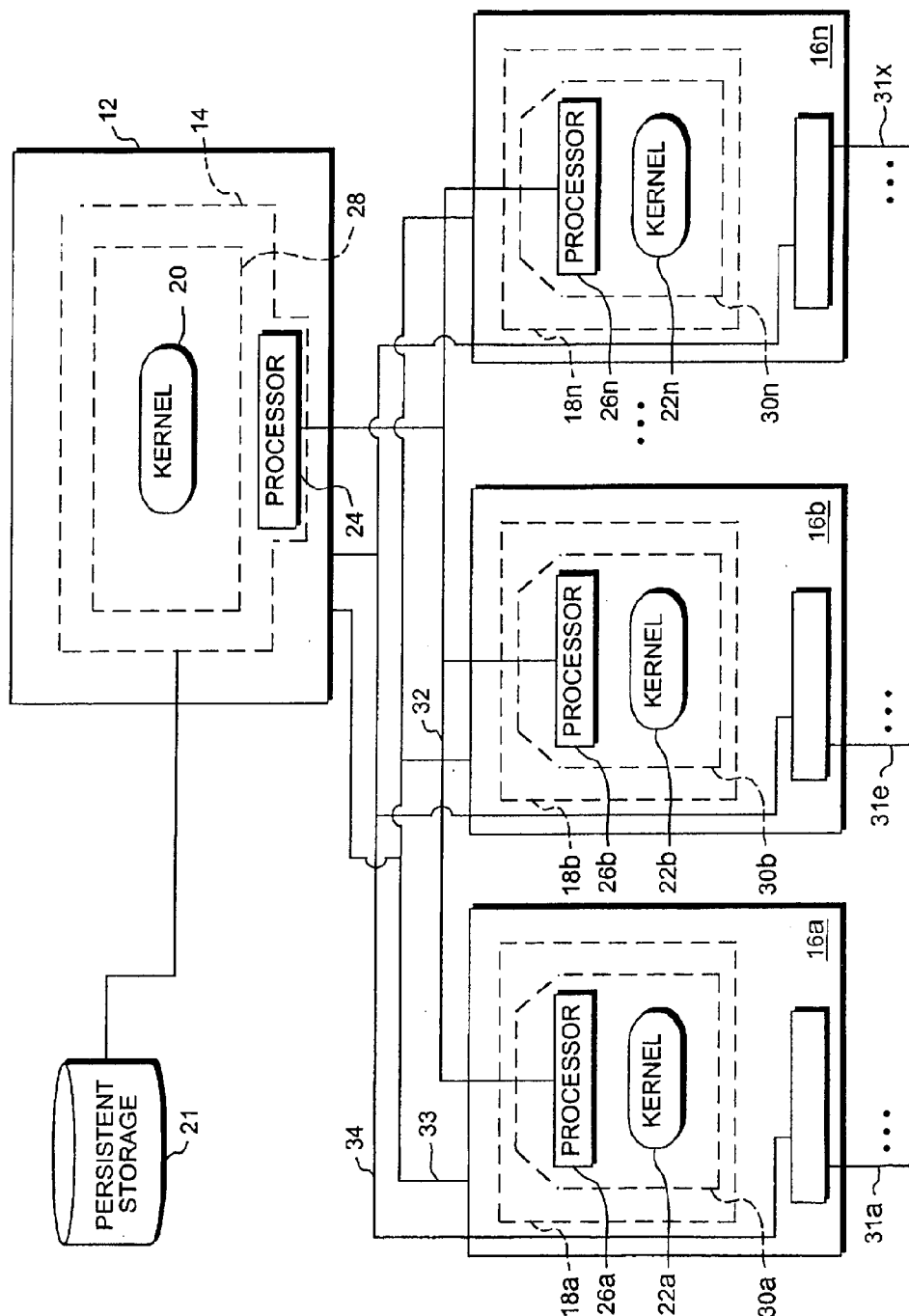
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FIG. 1

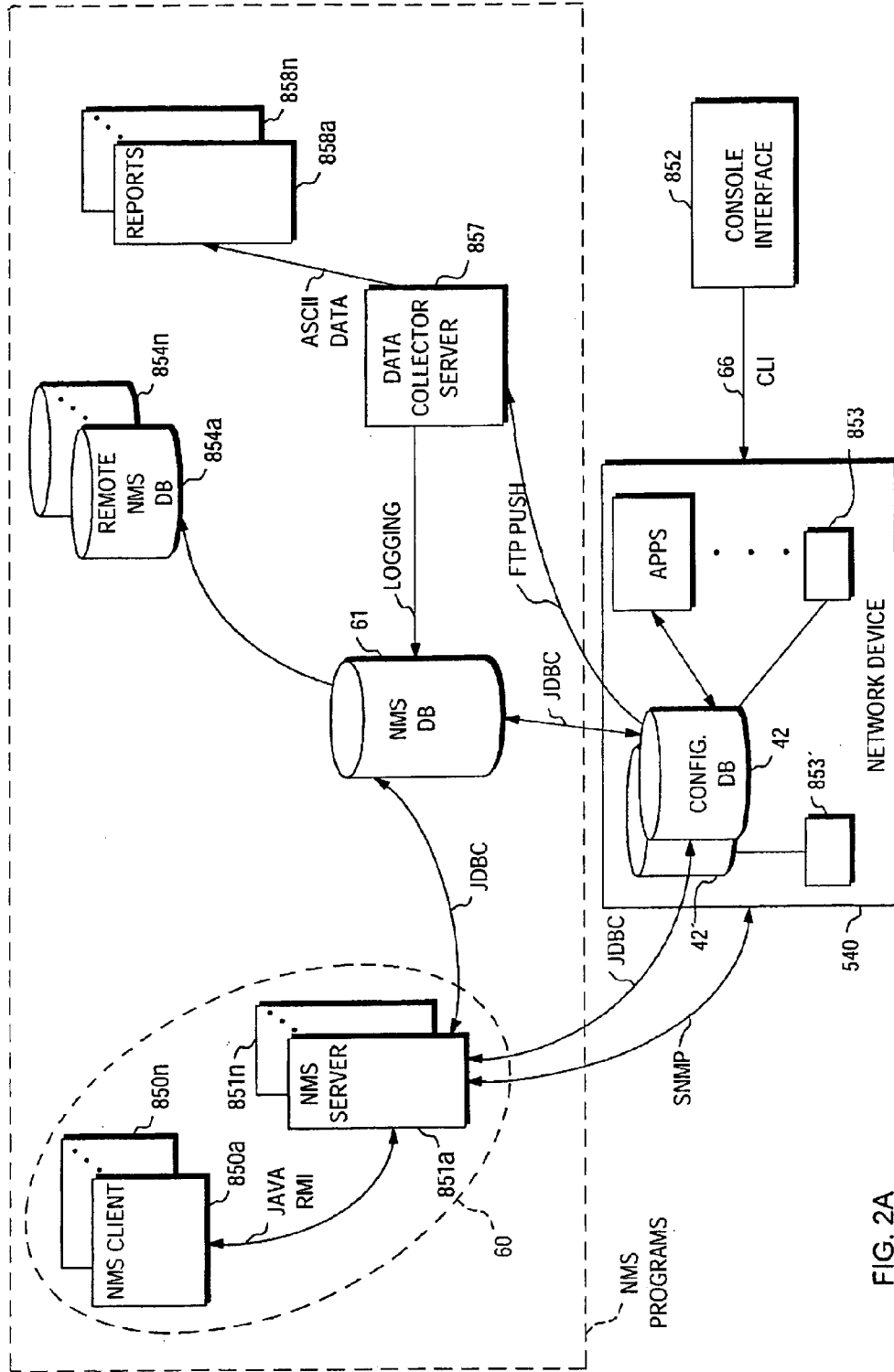


FIG. 2A

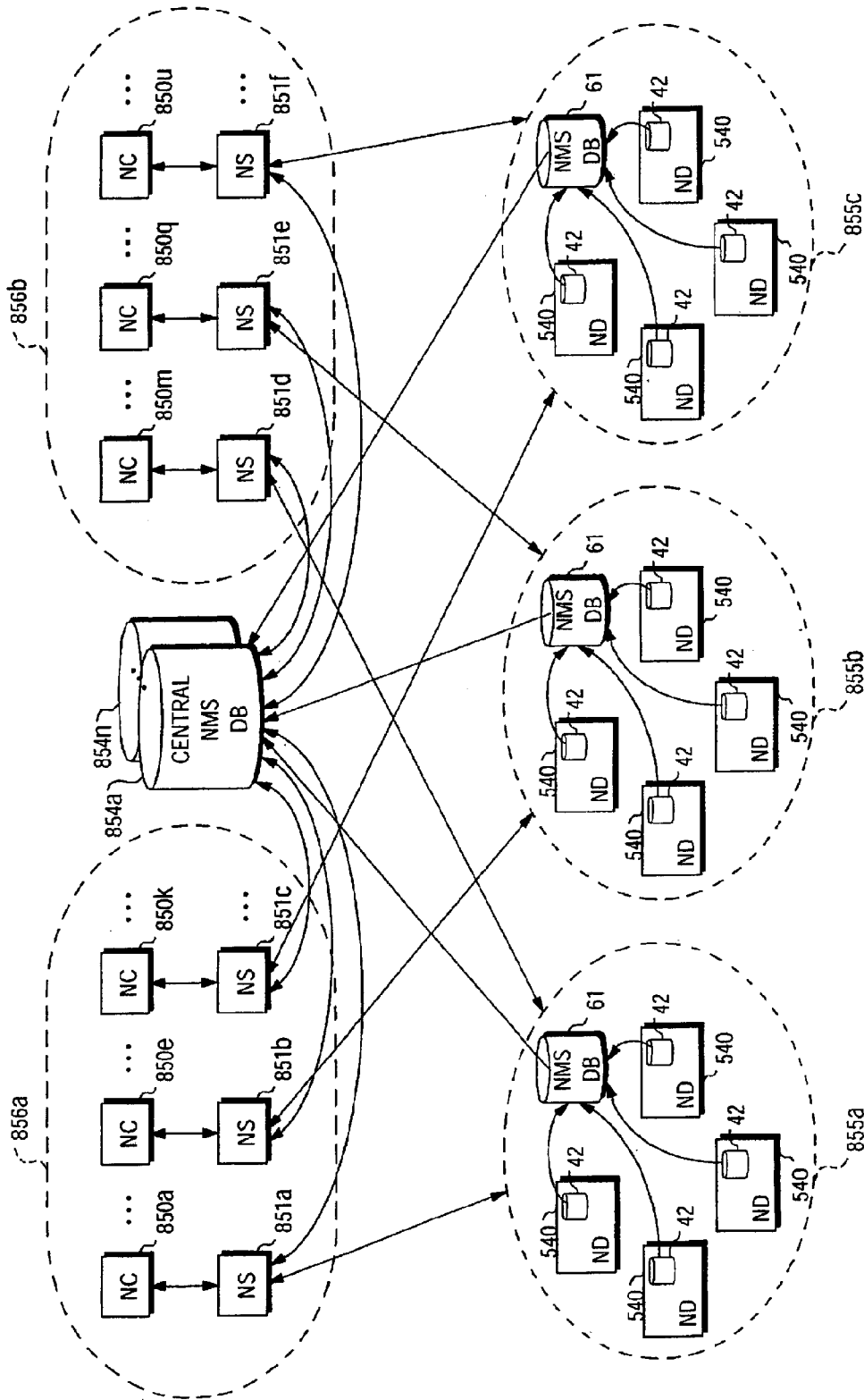


FIG. 2B

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