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Recovery and upgrade of a device using an auxiliary device

Sudha Broslawsky

Jes Klinke

Shelley Chen

Howard Lee

Julius Werner

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ABSTRACT

A laptop or other device that breaks down or freezes, e.g., due to malicious software or malfunction, can be made operational again if it returns to a known healthy state. However, the present state of such a device prevents it from autonomously recovering, upgrading to a stable software version, establishing an internet connection to recover or upgrade, or from reliably identifying itself from the contents of its RAM. Per the techniques of this disclosure, an auxiliary device, e.g., a mobile device, reads the read-only memory of the device-under-repair to determine its make, model, and other parameters. A recent, stable operating system and/or other software package suitable for the make and model of the device-under-repair is determined and downloaded by the auxiliary device. The software package is installed by the auxiliary device onto the device-under-repair to complete recovery.

KEYWORDS

- Device recovery
- Laptop recovery
- Device upgrade
- Frozen device
- Frozen laptop
- Bricked device
- Soft-bricked device
- Auxiliary device

BACKGROUND

Under normal circumstances, laptops or other devices can connect to the internet, and, with user permission, download and install updates to remain in an up-to-date configuration. However, if such a device breaks down or freezes, due to malicious software or malfunction, it is not possible for it to return to a known, health state using the device RAM, e.g., the writeable parts of device memory.

Reinstallation and recovery can however use software in the read-only (ROM) parts of device memory, since the ROM is generally not susceptible to corruption or attack by malware. However, internet SSL root certificates cannot be stored in read-only memory, since these need occasional updating or revocation. Due to these considerations, the device-under-repair (or the contents of its RAM) cannot itself be relied upon to establish an internet connection to download an operating system or software installer.

When faced with a corrupted or non-responsive device, users often download the software or OS installer using another device (typically a general purpose computer), transfer the downloaded software to a memory card, USB drive, or other media, and insert the media into the device-under-repair in an attempt to recover it. This approach has various drawbacks such as:

1. The user needs to have or obtain a storage media large enough to fit the software update, and the storage media has to be of a type that is accepted by the device to be updated.

2. The user needs to be able to navigate the internet and find the correct update that matches the device-under-repair. The same device is sometimes marketed under several labels; occasionally, distinct devices are marketed under almost identical labels. It is not always easy for end users to select the correct version from a list of downloadable updates based on known device make/model information.

3. The update media is sold by the device manufacturer at an unreasonable price.

DESCRIPTION
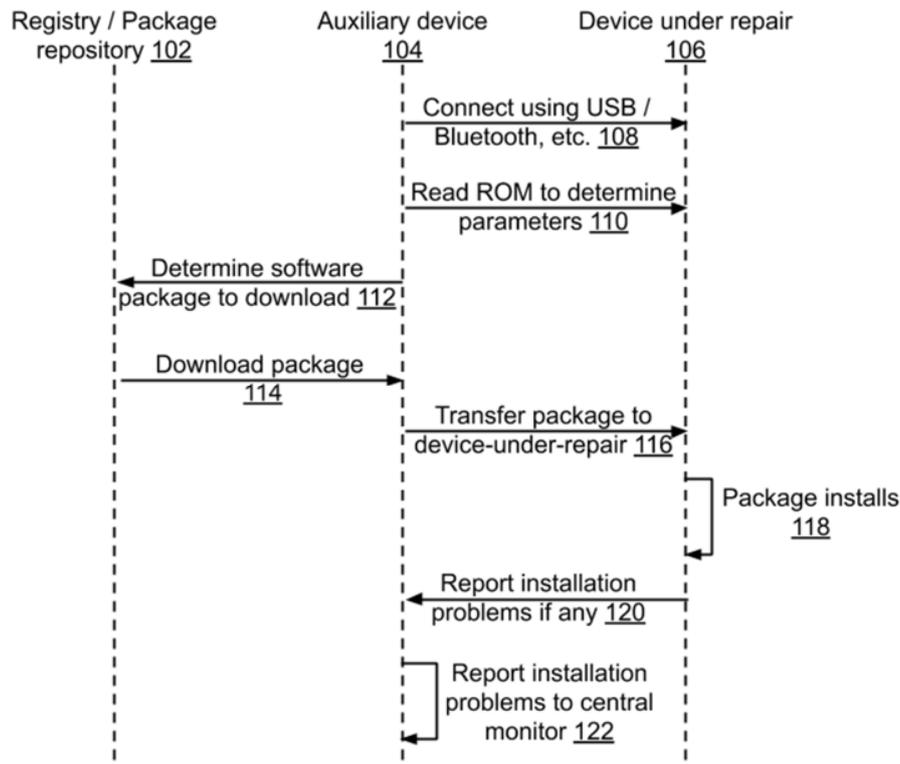
Fig. 1: Recovery and upgrade of a device using an auxiliary device

Fig. 1 illustrates the recovery, upgrade, or configuration of a device-under-repair using an auxiliary device, per techniques of this disclosure. An online registry of software and/or operating system (OS) packages (102) is maintained for each device, type, make and model. To recover a corrupted or non-responsive device (106), the user connects a known, healthy, auxiliary device (104), e.g. a mobile device, to the device-under-repair through a USB cable, Bluetooth connection, or similar connection (108).

An app on the auxiliary device communicates with the device-under-repair to determine, from read-only memory, parameters such as the type, make, model, etc. of the device-under-

repair (110). The app uses the information obtained from the device-under-repair to look up the registry to determine the OS version or software package to download (112). If more than one compatible software package or update is found, the app displays the possible software packages to enable the user to make a choice. The app downloads the software package (114) and transfers the package through the USB cable or Bluetooth connection to the device-under-repair (116). The package installs on the device-under-repair (118).

In this manner, device recovery and/or update is achieved with minimal user intervention and less scope for human error. In case of problems during software installation, the app on the auxiliary device receives reports such problems (120) via its connection to the device-under-repair to a central monitor (122), with user permission.

The auxiliary device and its OS and app have up-to-date root certificates, enabling secure connections to the internet for the purposes of communicating with the registry or downloading software packages. The user is freed of the burden of determining the right update that fits the device-under-repair. The auxiliary device can be a smartphone, which, by its ubiquity and nearly always-on connectivity is more convenient than use of storage media. By enabling feedback of the recovery procedure when permitted by the user, the techniques enable central monitoring of the device fleet, a feature not possible with recovery performed using physical storage media.

The techniques of this disclosure are applicable to software-upgradeable devices. Some use cases include:

- A dashboard-mounted GPS device needs updated map data, but does not itself have an internet connection.
- As part of preparations for the following academic year, a school laptop is completely erased and the operating system is reinstalled.

CONCLUSION

Per the techniques of this disclosure, an auxiliary device, e.g., a mobile device, reads the read-only memory of the device-under-repair to determine its make, model, and other parameters. A recent, stable operating system and/or other software package suitable for the make and model of the device-under-repair is determined and downloaded by the auxiliary device. The software package is installed by the auxiliary device onto the device-under-repair to complete recovery.