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## Multifunctional Home Battery Energy Storage with Enhanced Network Connectivity

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## **Multifunctional Home Battery Energy Storage with Enhanced Network Connectivity**

### **ABSTRACT**

In the event of a home power outage, loss of power can also be accompanied by loss of network connectivity, and lead to compromised safety and communications, since smart home devices such as security cameras may not be able to reach remote servers. This disclosure describes a smart home with an integrated/multifunctional battery energy storage system (ESS), along with backup connectivity based on satellite networks. The smart home can remain online for long periods of time during power outages, can smartly turn off power-hungry devices to conserve power, use the battery for redundant energy storage, and offer energy storage, connectivity, or other smart features to other homes in the vicinity. The described energy storage system can be a part of a smart home ecosystem.

### **KEYWORDS**

- Smart home
- Power outage
- Satellite connectivity
- Backup power
- Battery backup
- Residential energy storage
- Grid power
- Home security
- Home safety

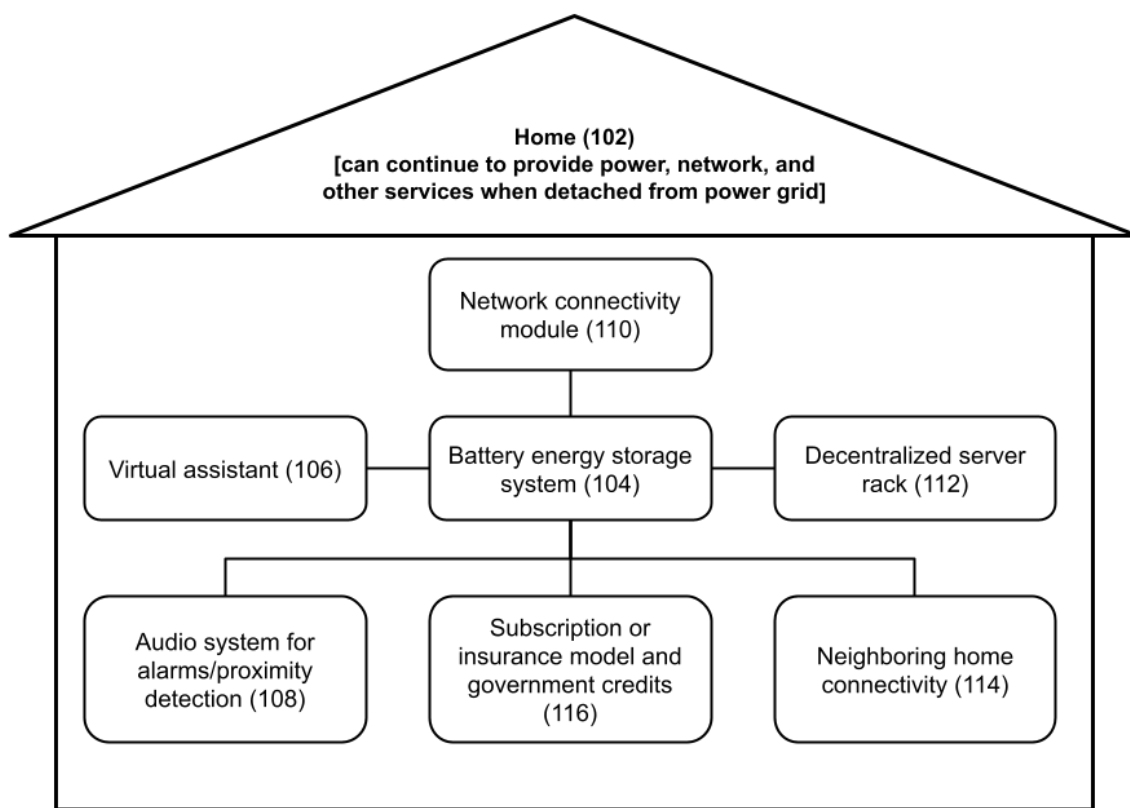
### **BACKGROUND**

Power and connectivity are critical for safety, security, and communications from homes and offices. This is especially true during periods of grid power outages and/or internet connectivity disruptions, e.g., caused by storms or other natural events. Often, when power goes out, wired broadband connection to a home may also stop functioning. Thus, a local power outage can also wipe out local internet connections. While cellular towers may still provide

connectivity, high speed internet services may also shut down or be less available if power outages last long enough.

DESCRIPTION

This disclosure describes residential units that are equipped with an integrated multifunctional battery energy storage system (ESS), along with backup connectivity for always-on internet to improve home safety and communications during power outages.



In a home (102):

- Battery energy storage system (104) provides redundant power in the event of grid failure
- Virtual assistant (106) provides functionality for communication between the battery (104) and electrical devices within the home for managing power utilization during outage
- Audio system (108) provides battery alerts and safety warnings
- Network connectivity module (110) provides WiFi connectivity when available, and cellular/satellite connectivity if the WiFi ISP is down.
- Decentralized server rack services the local area and local businesses, along with service cloud gaming or other localized support (112)
- Connectivity to neighboring home enables sharing of electric power (114)
- Subscription or insurance model and government credits (116) enables homes to generate income by leasing out services and features available at home

**Fig. 1: Multifunctional home battery energy storage with enhanced connectivity**

Fig. 1 illustrates a home equipped with an integrated multifunctional battery energy storage system (ESS) with an enhanced connectivity system and related applications. The residential unit (102) is equipped with hardware and software in an integrated system to enable the continued provisioning of power, network, and other services when the home is detached from the power grid or when the power grid fails. A modularized battery storage system (104) is provided in the home. The battery storage system can provide enough power to keep the residential unit fully powered for a substantial time period, e.g., at least one day, in the event of a power outage. In the case of an extended power outage, critical appliances such as the internet router, refrigerator, heating, etc., can be kept online, extending the ability to provide power for a longer time period, e.g., three to five days.

A virtual assistant (106) includes key functionality and manages communication between the energy storage unit and units in need of power. This is feasible even in the case of certain units at home not being directly connected to the energy storage system. For example, when the power goes out, the virtual assistant can communicate with devices in the home and notify the user regarding which devices/power outlets are to be disconnected to conserve power.

An audio system (108) is also connected to the multifunctional home battery energy storage system. The audio system can be utilized for alarms and alerts, and can also act as a node for safety. For example, audio notifications of potential dangers can be provided to the user. Proximity detection via ultrasound can help alert the user to the possibility of potentially unsafe areas in the immediate vicinity of the residential unit. For example, hyperlocal temperature readings or other environmental factors can be used to alert the user to potential problems in the immediate vicinity.

The battery ESS unit can provide internet connectivity (110) via a cellular or satellite connection when the traditional internet service provider (ISP) is down. During internet outages, network connectivity is prioritized over speed. For example, use of cellular or satellite connection may be prioritized, and internet bandwidth may be shared across individual nodes or devices with mode toggling to ensure prolonged internet connectivity.

If the user permits, decentralized data center units (112) may be provided within a user's home that can service the local area and/or local businesses in the event of a power outage. Additionally, such decentralized data center units can also service cloud gaming or other localized support, while being maintained within a home.

Connectivity to neighboring homes (114) or other units can be established with specialized power cables. Such connectivity can help in providing electricity to neighboring residential units in the event of a local power outage. Such connectivity can also serve to provide neighboring residential units with green energy.

Subscription or insurance model and government credits (116) can also be deployed in a multifunctional home battery energy storage system. This enables the generation of additional income for the homeowner by leasing out services and features enabled at home. For example, coveted parking spaces with electric car charging capabilities, based on locations of events/restaurants/venues, can be made available to visitors in the area for a fee. In the event of extended power outages, connectivity to satellite internet services can be made available via an insurance model. Homes with the described home battery energy storage system can also store power received over a grid during off-peak times as well as green energy generated via renewable energy sources.

The described techniques can be implemented in any smart home and can utilize smart home services, e.g., provided by makers of smart home devices such as thermostats, security/alarm systems, smoke detectors or other sensors, etc. The described techniques enable smart home devices to remain online, whether the power outage is natural or manmade (e.g., attempted burglary), and provide opportunities for homeowners to generate revenue from power/energy sharing, connectivity sharing, storage of excess energy, etc.

## CONCLUSION

This disclosure describes a smart home with an integrated/multifunctional battery energy storage system (ESS), along with backup connectivity based on satellite networks. The smart home can remain online for long periods of time during power outages, can smartly turn off power-hungry devices to conserve power, use the battery for redundant energy storage, and offer energy storage, connectivity, or other smart features to other homes in the vicinity. The described energy storage system can be a part of a smart home ecosystem.

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