

APPLICATION NOTE

Limit Inrush Current and Manage Device Power-On Dependencies on GU2 Switched PDUs

Introduction

This application note provides supplementary information about outlet power-on sequencing with GU2 PDUs.

The power-on sequencing function can be used to define the order for powering outlets after a PDU has been shut off or has unexpectedly lost power.

The power on sequence action is enabled by factory default. It can be reconfigured or disabled by logging into the PDU through a web browser.

The power-on sequencing function is often used in one or both of the following situations

1 Limiting power-on inrush current

Inrush current might become a problem when multiple devices are powered on at the same time. In such applications, sequencing can be used to power on devices in a user-defined order. This limits inrush current by staggering the time at which outlets switch on, eliminating nuisance overcurrent protection device trips.

2 Managing device power-on dependencies

Some configurations require that equipment be powered on in a specific order. For example, a storage array may need to be powered-on before a server to ensure that the storage array is available when the server starts. In this example, power-on sequencing may be used to ensure that critical system dependent devices are on-line and stable prior to powering up latent independent devices.

Geist's GU2 PDUs allow users to define independent outlet power output actions to establish power-on delays and control power-on sequencing



PDU Power-On Actions

The PDU power-up settings can be configured per outlet and determine the outlet power state when the PDU is powered-on after being turned off or after losing power. The available power on actions are:

On: The outlet is switched on after PDU power-on.

Off: The outlet remains off after PDU power-on.

Last: The outlet assumes the prior state. Outlets that were off before the PDU was turned off (or lost power) will stay off after power is restored, and the outlets that were on before the PDU was turned off (or lost power) are turned back on in the sequence defined by the Power-On Delay settings.

Note:

The status of each outlet is indicated by LED as follows:

Green = On

Red = Off

Amber: = Fault

The factory default setting is “Last” for all outlets and assumes the prior state was “On.”

Note:

GU2 PDUs employ bi-stable outlet relays which magnetically latch in the selected state and, therefore, do not require constant power to remain latched, (increasing PDU efficiency and reducing energy costs). GU2 outlet relays include smart functionality which ensures that the relays open upon PDU switch off (or PDU power loss), allowing for the user selected outlet sequencing to execute upon PDU power resumption.



Outlet Power-On Delay Setting

Power-on Delay

Power-on delay settings can be specified per outlet and define the time to wait after the PDU is energized. The outlet power-on delay is defined in seconds and can have values in the range of 0 to 600 seconds. The delay value can be specified in quarter second increments (e.g., 0.25, 0.50, 0.75, 1.00) to allow fine control of outlet power-on sequencing.

The factory default power-on delay settings are shown below and result in the outlets sequencing on from the lowest to the highest numbered outlet, with an interval of 0.25 seconds. So for a six outlet PDU the factory outlet power-on default sequence would be:

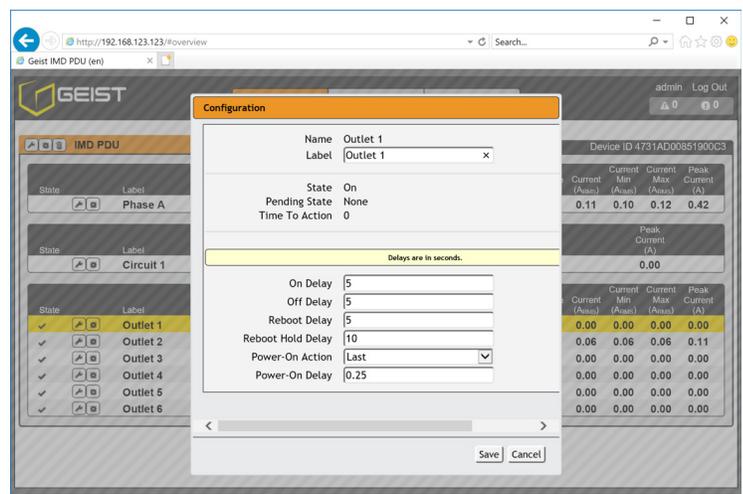
- Outlet 1: 0.25 seconds**
- Outlet 2: 0.50 seconds**
- Outlet 3: 0.75 seconds**
- Outlet 4: 1.00 seconds**
- Outlet 5: 1.25 seconds**
- Outlet 6: 1.50 seconds**

All outlets specified with a power-on delay of zero seconds will be sequentially activated from lowest to highest number, with a delay of less than 0.10 seconds between outlets, as soon as power is applied to the PDU.

Configuring PDU Power-On Sequencing

To configure power-on sequencing, use a web browser to navigate to the PDU IP address and log in to the PDU as an administrator. See the GU2 User Manual for step-by-step details. Navigate to the Sensors>Overview page where the power-on action and power-on delay settings may be displayed by selecting the spanner symbol (wrench symbol) adjacent to the outlet being configured.

To change settings, enter new values for power-on action (Power-On Action) and power-on delay time in seconds (On Delay), and click Save before navigating away from the page. Repeat as needed for other outlets.



Power-On Sequencing Example

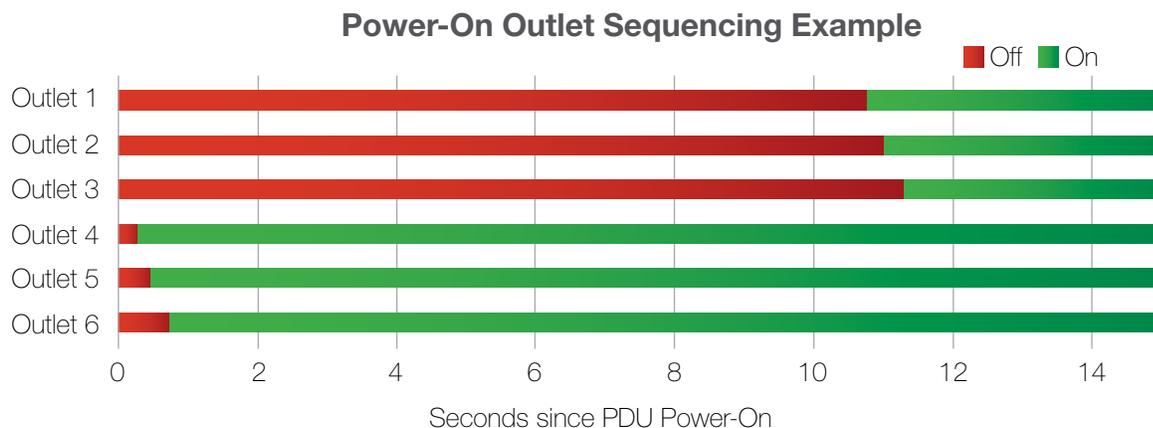
Consider an equipment rack loaded with three servers and three storage arrays. The servers are located towards the top of the rack with the storage arrays located towards the bottom of the rack. For proper operation, the storage arrays must be powered on at least 10 seconds prior to the servers. And to limit inrush current issues, both the servers and storage arrays must be powered on one at a time. Finally, equipment power cord length are limiting connectivity to a subset of the available PDU outlets, thus the servers are connected to PDU outlets 1, 2 and 3, while the storage arrays are connected to PDU outlets 4, 5 and 6.

To meet these requirements the PDU could be configured as defined below:

Outlet 1	Power-On Action: On	Power-On Delay: 10.75 seconds
Outlet 2	Power-On Action: On	Power-On Delay: 11.00 seconds
Outlet 3	Power-On Action: On	Power-On Delay: 11.25 seconds
Outlet 4	Power-On Action: On	Power-On Delay: 0.25 seconds
Outlet 5	Power-On Action: On	Power-On Delay: 0.50 seconds
Outlet 6	Power-On Action: On	Power-On Delay: 0.75 seconds

Note:

- If outlet power state is also managed manually, the power-on action should be set to **Last**. This ensures that at PDU power-on, the state of any outlets previously set to off, is preserved.
- The same configuration would typically be required for a second PDU when the rack uses dual redundant (A and B) PDUs





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