SPSM Power Load Balancing

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This document describes how to load balance asymmetrical power loading on power supplies when installing the SPSM in your network.

Before beginning the new power design it is *extremely* important that you know the actual power load on each power supply. Although design maps normally show the calculated power load. We have found through numerous tests that the actual load is always different due to equipment performance, cable performance, power supply performance and extensions that have been added to the original design. The technician who collects this information should use a *True RMS meter and/or current loop tester*.

Normal HFC design assumes that power supply loads are constant. When designing the new power system with the SPSM, the AC power blocks are removed to allow power to be switched between devices and power supplies. The SPSM uses a physical connection between two SPSM's to create the backup path, while the intelligence of the SPSM prevents power collisions between the two SPSM backup ports.

In Fig 1 and Fig 2 we see how asymmetric power loading can occur when using the SPSM system.

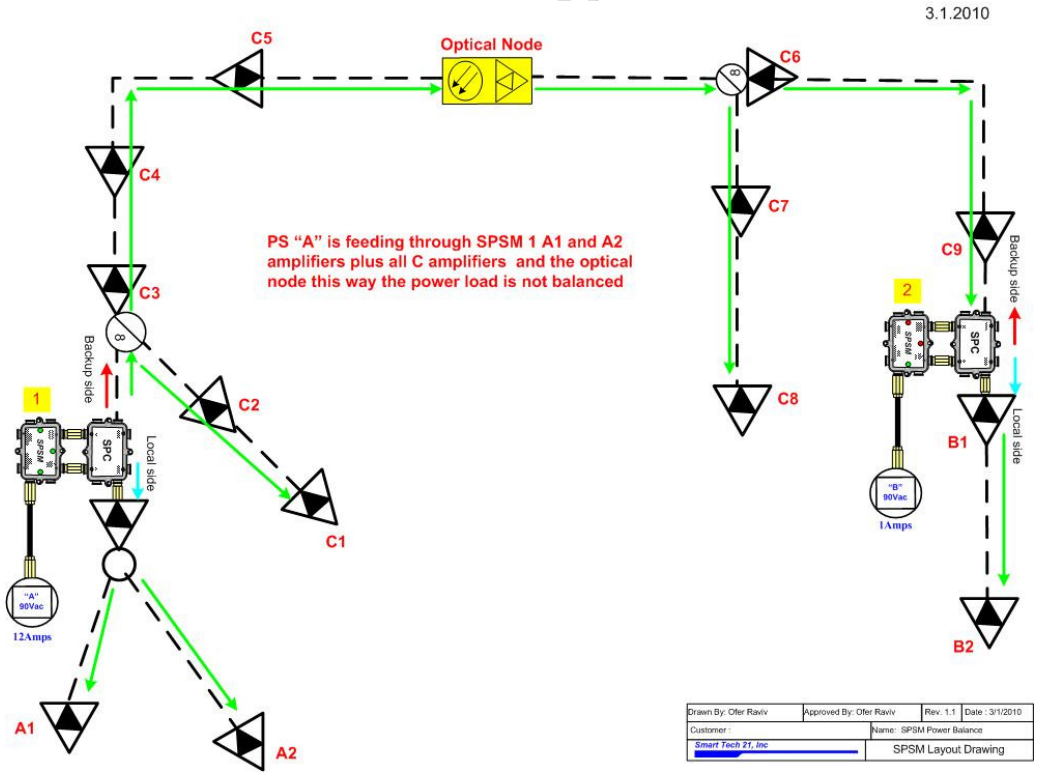

Fig 1

Fig 1 shows how power supply "A" takes most of the 12A load. This is because SPSM 1 is the Primary and it feeds all "A" and "C" amplifiers and the node. This leaves power supply "B" which powers all "B" amplifiers, which has a load of only 1A. To eliminate this problem we must balance the placement of the two SPSM's to improve switching and eliminate an asymmetrical load on power supplies.

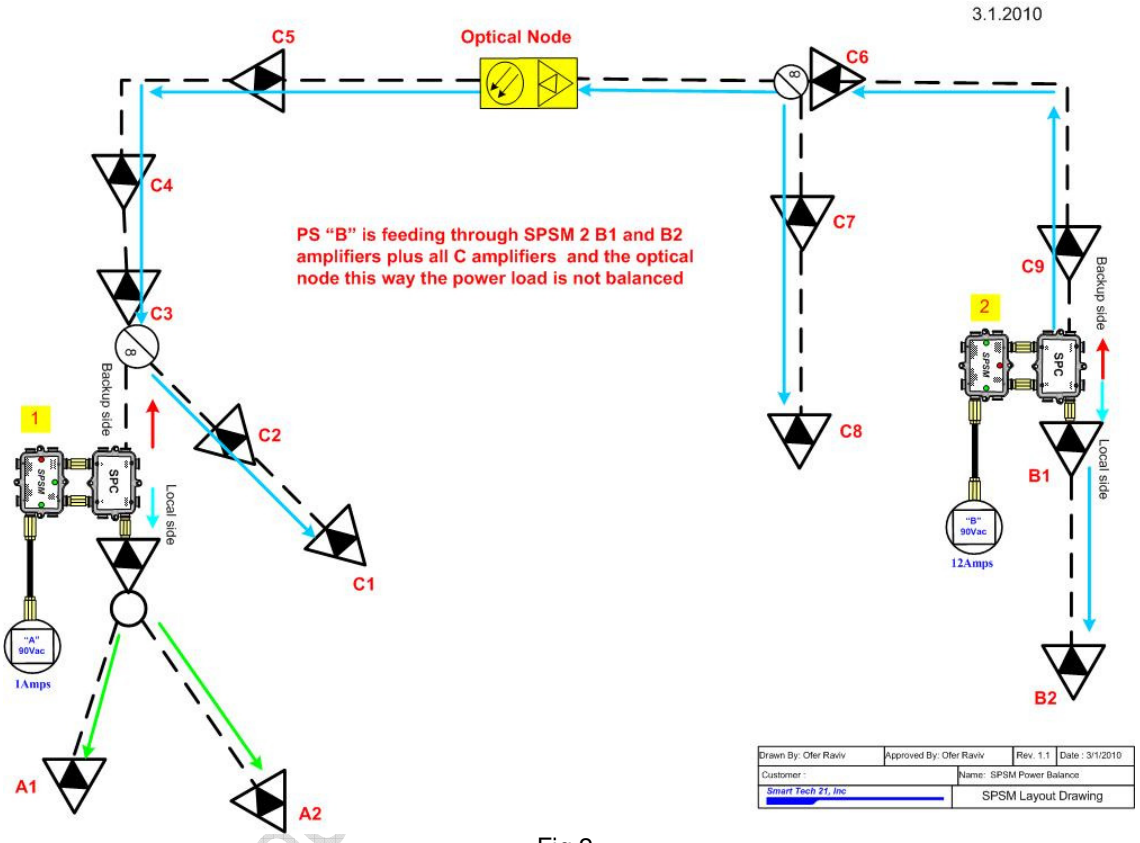

Fig 2

Fig 2 shows the same configuration as Fig 1; however Fig 2 is of a system that has experienced a power failure. Note how the lights on the SPSM in Fig 1 and Fig 2 have changed. These lights, by color, indicate that there has been a failure and that the SPAM's have switched. SPSM 2 is now the "PRIMARY" and SPSM 1 is now the "SECONDARY".

To solve asymmetrical loading on power supplies we need to insure that the minimum number of amplifiers are placed between the two SPSM backup ports.

Fig 3 and Fig 4 are of architectures that will balance power loads.

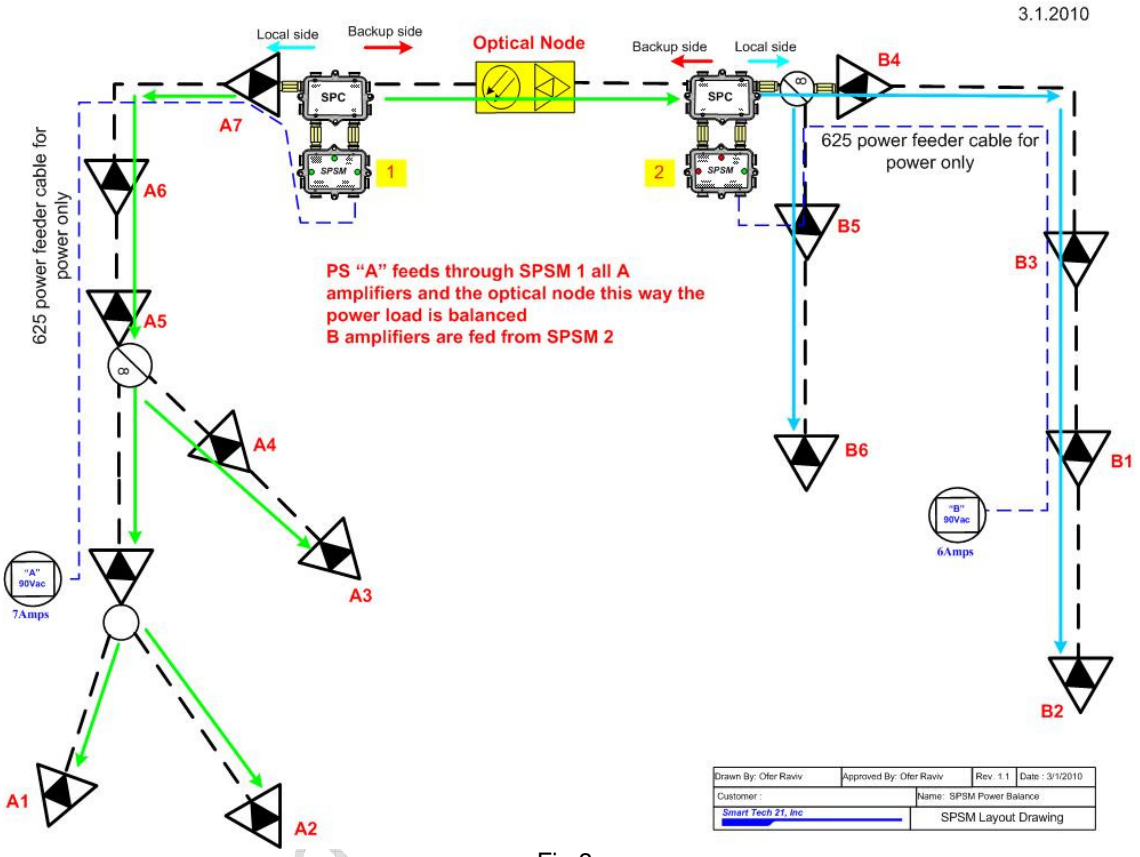

Fig 3

Here we have installed the two SPSM on the input side of the amplifiers with the node in the middle. The power supplies where they were originally installed and installed new 625 power feeder cable (22-25 Ohm for power only) between power supplies "A" and "B" and the SPSM's. This way we minimize the load between the two SPSM's having only the node between the two devices.

Fig 3 shows that when SPSM 1 is the PRIMARY with power supply "A" loaded to 7A and power supply "B" is loaded to 6A.

Fig 4 shows SPSM2 as the PRIMARY with power supply "B" loaded to 7A and power supply "A" loaded to 6A.

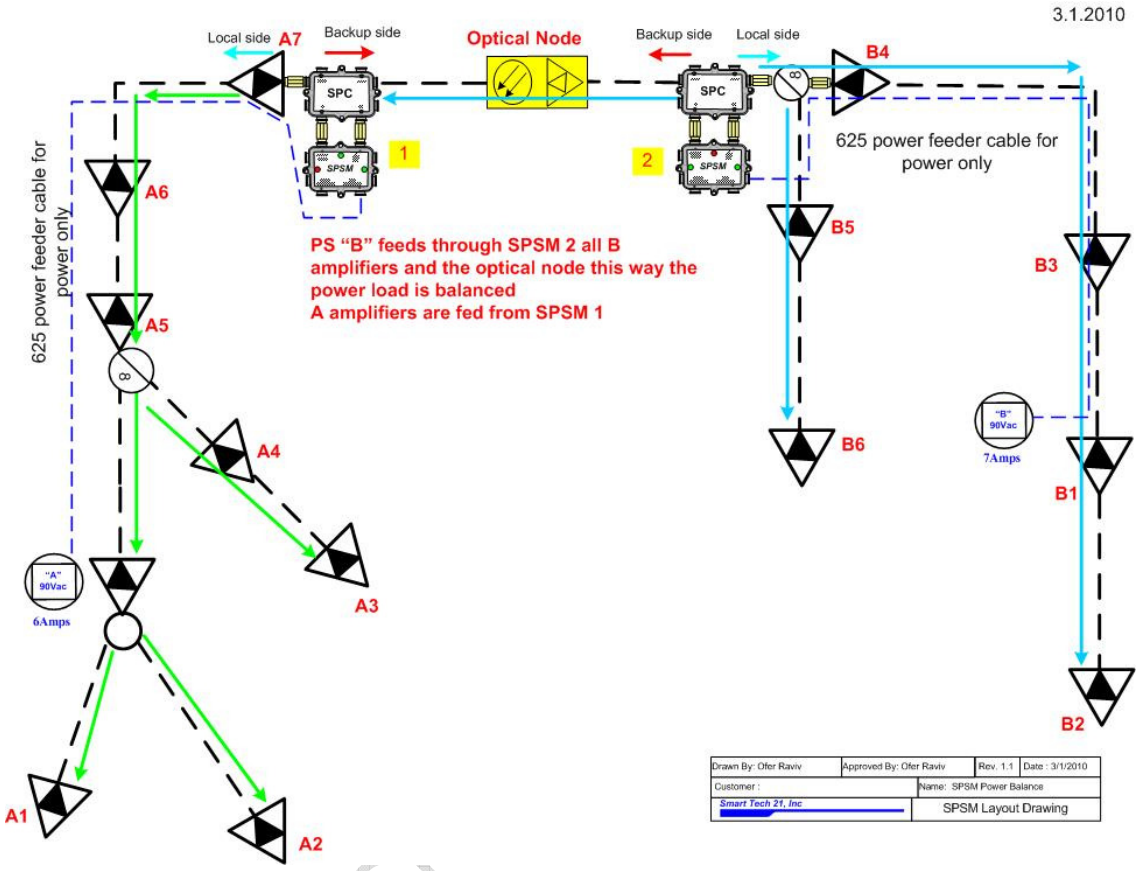

Fig 4

NOTE: The above situation happens only when we use one power supply at each SPSM. When we use two power supplies at each SPSM location, one for local and one for backup (due to high load on local port/power supply) the asymmetrical load on power supplies cannot happen. In this design the local power supply will always feed the local with a constant load and the backup power supply feeds the remote SPSM with constant load.

You can create a similar architecture by moving power supplies to a more balanced location to reduce or eliminate asymmetric power loading as much as possible. When adding the SPSM to an existing network it is a perfect opportunity correct power loading problems by installing power feed cable, moving power supplies, adding power supplies, etc. Once again the flexibility of the SPSM is only limited by the creativity of the designer. See Fig 5 to understand the implications of moving a power supply.

Fig 5 shows another way to balance the load in a system by moving a power supply rather than installing power cable to overcome the unbalanced loading issue. Power supply "A" has been moved to better balance the network. The designer makes the decision to:

- Move a power supply
- Add a power supply
- Install power cable (22-25 ohm)
- Install coaxial cable (normal 75 ohm) as the power cable

The engineering department makes the architectural decisions by establishing the design parameters prior to beginning design of the SPSM power network, however, the designer should be given the flexibility to make changes to the design he/she feels meets the network requirements.

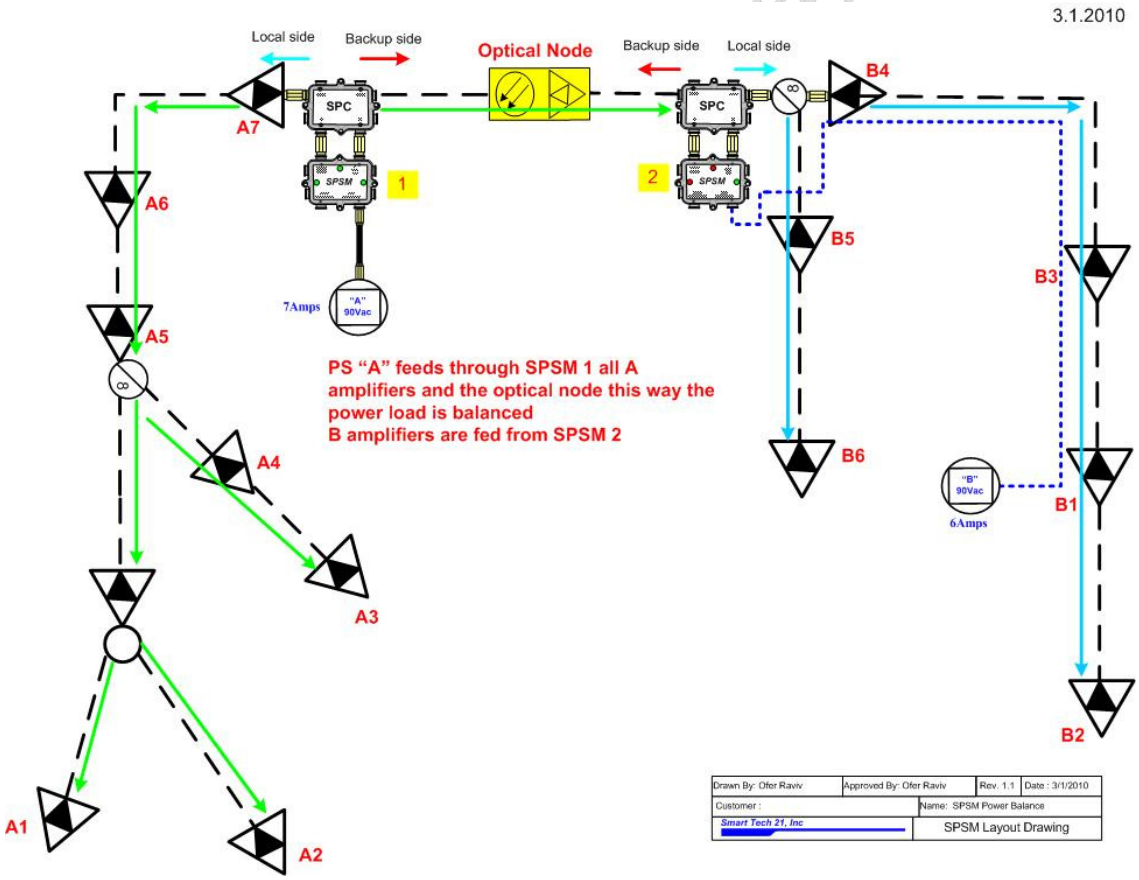

Fig 5