Grounding for High Frequency Transients Due to Arcing Events

Single point grounding schemes are often touted as the best means of grounding an electrical system. Drawn out on a piece of paper, maybe somewhat simplified to represent your complex setup, single point ground systems seem like the logical choice. The real world fact is frequently single point grounding is not feasible to implement due to various real world constraints.

Additionally the truth is single point grounding doesn't work at higher frequencies (i.e., high frequency transients at occur during arcing), where path inductance and standing waves can cause voltage drops. Additionally stray capacitance that the system designer may have no control over, can create alternate paths that can be difficult to account for.

So a functional single point grounding system may be impossible to implement but you still need to execute a grounding scheme, what do you do? Well providing low impedance ground paths is the desirable method to address issues due to high frequency high voltage arc discharges.

How do you do this in the real world? Ground everything as often as possible. Yes, multiple ground connections. But what about ground loops, you ask? In a nutshell, don't worry about ground loops. Once there is more than one ground it's a multiple ground point system and the only practical solution is to make the impedance of the system as low as possible.

This can be done by using wide structural metal members, sheet metal when possible and bolting them together at frequent intervals. If a metal chassis can't be used then the only route left is using cables. This method has its drawbacks as grounding wires, cables and straps can be too inductive above audio frequencies.

So don't get stuck trying to execute and troubleshoot a questionable "ideal" grounding topology, implement what is possible and proven to work in the real world.