

## Enclosures Aren't Just Boxes; They Are Parts of the System



### Protecting Your Investment

There are good reasons why the critical equipment used to provide the voice and data services deployed by network operators must be well engineered. Not only are these systems technologically sophisticated, but they must also work flawlessly, sometimes for up to 10 years or longer.

Excess heat can degrade the performance of any advanced electronics system and shorten its effective operating lifetime. Every computer designer and smartphone manufacturer has exacting requirements for heat dissipation in their PC enclosures or handset covers. Data center operators wouldn't think of operating their server racks anywhere other than in a perfectly climate-controlled facility.

Network operators cannot afford to neglect thermal management either. It is imperative to select cabinets and shelters that can fully protect equally delicate communications gear and can support optimal service reliability and availability.

Telecom companies and data center managers share another concern that isn't much of a consideration for PC and smartphone suppliers, however. Data center facilities are deliberately designed to accommodate equipment upgrades, and must also include capacity for service expansion. The same is true for network operators, albeit on a smaller scale.

The best cabinet choice for the wireless network is one that is engineered to provide the best possible operating environment while being able to accommodate equipment upgrades and capacity expansion. This cannot be emphasized enough: the equipment cabinet is an integral component of a properly engineered deployment of communications equipment.

### More Than Just a Box

The choice of a cabinet for telecom equipment starts with its durability. Cabinets must stand up to the elements. That includes precipitation, extremes of both heat and cold, and the amount of environmental dust and debris, among many other considerations.

Climate change complicates this choice. Network operators can't afford to assume that current environmental conditions will be the same in the coming years. In addition to producing extreme weather conditions, climate change is increasing the frequency and severity of lightning strikes in places where lightning is already common. It is also increasing the likelihood of lightning in places where it was once rare. Natural disasters aside, grid power has always been prone to fluctuate.



Figure 2. Ground Cabinet Enclosure



Figure 3. Compact Power Protection Cabinet (PPC)

To mitigate against both problems, network operators can consider incorporating advanced surge protection technology directly into their cabinets.

There's also the environment inside the cabinet to consider. The amount of waste heat generated by telecom equipment itself must be considered in conjunction with whatever is likely to happen with outside temperatures. Can a wholly sealed cabinet be justified given the specific equipment installed in the allotted space? Should the cabinet be larger? Will active cooling be useful or necessary, now or in the future?

When it comes to equipment and service rollouts, there are two costs that network operators can exercise some control over in advance: installation and maintenance. If a cabinet is hard to install, labor costs go up. A cabinet vendor should offer multiple mounting options for the many different places that telecom equipment is likely to be deployed (pads, poles, roofs, etc.). Installers appreciate it when mounts are sensibly designed. Knockouts should be situated where they are most likely to be useful for installers, not where it would be convenient for the cabinet manufacturer to put them.

Maintenance might be considered a downstream issue, but it shouldn't be. Planning ahead is far easier and significantly less expensive than replacing a cabinet. As noted, environmental conditions are changing. Meanwhile, a thriving service might require more equipment to provide additional coverage or upgrade performance, or both. What these two instances have in common is that they will both change thermal conditions inside the cabinet.

It is consequently important that cabinets be constructed in such a manner that additional thermal management measures are supported. Having flexible space that supports shifting equipment into a physical orientation more conducive to heat dissipation is the easiest measure. Another option is to

add ventilation or more ventilation. The final option would be adding active cooling.

The need to be able to upgrade active equipment without the costly proposition of ripping out and replacing cabinets is especially acute for 5G network operators. 5G is evolving and the enabling technologies keep improving. New slices of the spectrum keep becoming available, necessitating upgraded equipment or new systems entirely. New profiles with different performance requirements continue to be specified. Usage patterns keep changing. Ongoing evolution has already required equipment changes, and future 5G and 6G developments will no doubt necessitate more.

## Cabinet Expertise

Anybody can build a box. It takes skill to engineer an enclosure that will keep integrated equipment protected and operating at optimal levels for years.

Raycap has been building cabinets for a long time; we've put a lot of thought into them. We have a wide range of standard products, from fiber demarcation kits to pole-mounted shrouds and power protection cabinets that combine the main disconnect switch, manual transfer switch, load center, surge protection and other integral components into compact or large enclosures. We manufacture our cabinets to be durable; our products are typically aluminum with insulation, or steel.



Figure 4. Raycap Telecom Cabinet housing active components

Our engineering team can help network operators devise appropriate solutions for specific deployment challenges. With our in-house expertise in thermal analysis, we can recommend thermal management techniques and technologies conducive to the optimal performance of communications equipment. If active cooling is necessary, Raycap engineers can recommend the solution (fans, heat exchangers, air conditioning) that is right-sized from an OPEX perspective.

We deliberately design our cabinets with provisions for changing conditions and based on customer requests. That includes supporting thermal management options, or reconfigurable racks and rails to accommodate the installation of new equipment for service expansions or upgrades. Raycap cabinets are designed to be easily installed. Standard mounting brackets can be used in any of four different ways. Knockouts are where they should be.

Raycap is, of course, known for its unmatched surge protection technology. Our cabinets can be equipped with our Strikesorb® technology to protect against damage from overvoltage.

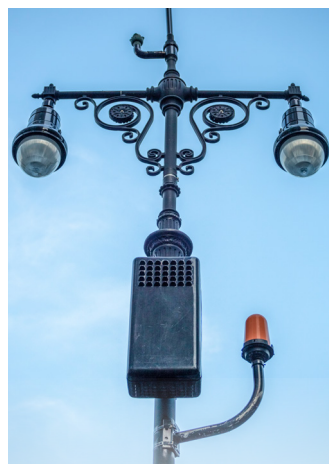


Figure 5. Pole-Mounted Shrouds

## Raycap Differentiation

Raycap has large enclosure and cabinet manufacturing facilities right in the USA, close to many of its customers. With our engineers, designers, and production facilities under the same roof, Raycap has the ability to use its broad portfolio of cabinets and enclosures to create custom designs to meet local conditions and regulations.

Raycap is a one-stop shop from conception to completion for whatever enclosure is needed to house the intricate technology for both the current and future needs of the wireless network. Whether it be pole mount, top mount, or ground mount, Raycap either has or can design a solution that will meet or exceed the needs of the customer.

## About Raycap

Raycap is an international manufacturer and technology leader with decades of experience providing innovative infrastructure solutions for customers in the telecom, energy, defense, transportation, and other industrial markets. Its solutions protect mission-critical applications and ensure the best possible system availability. The company's product portfolio includes lightning and surge protection technologies, structured cabling and connectivity solutions, power management systems, custom enclosures, cabinets, and wireless network concealments. Since its founding in 1987, the company has experienced continuous growth. Its engineering expertise, test laboratories, and multiple manufacturing facilities guarantee quality, reliability, and innovation. Product design, testing, and approval processes comply with all international safety standards. Raycap operates in the United States, Germany, Greece, Cyprus, Slovenia, and Romania.

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# Raycap

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