APPARATUS AND METHOD FOR HOUSING ELECTRONIC EQUIPMENT AND INCREASING FLOOR SPACE UTILIZATION

Inventors: Tod A. Wagner, Granite Bay, CA (US); Richard F. Murphy, East Hampstead, NH (US)

Correspondence Address:
DLA PIPER US LLP
2000 UNIVERSITY AVENUE
E. PALO ALTO, CA 94303-2248 (US)

Publication Classification

Publication Date: Oct. 30, 2008

Abstract

An electronic equipment rack allows electronic equipment to be hung vertically to save space for deep components. This is done by providing a vertical rack apparatus with horizontal side panels on which components are mounted vertically. The side panels of the rack are shorter than the depth of the components to be mounted on, to, or within the panels, thus allowing space to be saved. The rack can be expanded based on user’s equipment growth. The apparatus can be mounted on a wall or on a standard EIA relay rack. The apparatus has cable management for equipment that fits into wire channels and allows having a patch panel mounted without taking up a “U” space in the apparatus itself. The apparatus can include a built-in level for ease of mounting, and an integrated earth grounding stud.

1" - 26" max depth varies

1.75"

1U Height

unit width

19"
mounting ears
1" - 26" max depth varies

1.75"
1U Height

17"
unit width

19"
mounting ears

FIG. 1
PRIOR ART

FIG. 2
FIG. 8E

33A cam rotates 90 degrees

33B

23

31

35

4

FIG. 8G
TOP COVER PIVOTS UP AND SLIDES FORWARD INTO LOCKING POSITION

FRONT DOOR PIVOTS FORWARD ENOUGH TO ALLOW TOP COVER TO SWING DOWN AGAINST FRONT PANEL FOR ACCESS

FIG. 11
APPARATUS AND METHOD FOR HOUSING ELECTRONIC EQUIPMENT AND INCREASING FLOOR SPACE UTILIZATION

RELATED APPLICATIONS

[0001] Priority is claimed to Provisional Application Ser. No. 60/926,384 filed on Apr. 26, 2007 entitled Apparatus and Method for Housing Electronic Equipment for High Density which is incorporated herein by reference in its entirety as if fully set forth herein.

TECHNICAL FIELD

[0002] The disclosed subject matter relates generally to a rack for allowing computer equipment to be mounted vertically to save floor space.

BACKGROUND

[0003] The computer industry focuses on manufacturing modular components with uniform widths and incremental heights, expressed as a “U” height where 1U equals 1.75 inches. This invariably results in standard depth cabinets. Thus, each U space is an industry standard 1.75 inches—6U depth would be 14 inches, 8U depth would be 17.5 inches, 10U depth would be 21 inches, and so on. Standard cabinets usually mount components horizontally and have from 25 to 34 inches in allowable component depth, with overall cabinet depths as much as 40 inches. The U height faces the front of a cabinet, and 40U to 42U are available in standard cabinets. In larger “Data Center” applications, these cabinets can house dozens to hundreds of U spaces in equipment. Because these cabinets mount modular components horizontally, they waste a lot of space.

SUMMARY

[0004] Disclosed is a rack for safely securing industry standard rack mounted electronic equipment of all types and system configurations in a non-typical manner, in this case, vertically versus horizontally, allowing substantial savings in required floor space when compared to other equipment cabinets. Our rack can be used in any application and is particularly suited for small and mid-sized companies that need only 4U to 10U in equipment storage and typically do not have a dedicated room or closet for such equipment. However, our rack can provide more U space as required.

[0005] Standard full size, horizontal mount, cabinets need access to front and back doors and often side panels, thus increasing actual floor space requirements even more. To meet space requirements our novel equipment rack allows rack mount form factored equipment to be mounted vertically, instead of horizontally, as a system in a secured environment and allows up to 400 pounds of rack mount form factored equipment to be mounted. Our rack has interchangeable 4U, 6U and 8U bracket sets, bottom panel or bottom fan tray, top lockable cover, and utilizes a common back plate, or base, with a front panel that includes a built-in level for ease of mounting. The rack has an effective working depth of 26 inches for the use of all rack mount form factored equipment, without restriction as to equipment function. Examples include, without limitation, fiber optic nodes, phone systems, broadband hubs, power conditioning, power backup, power distribution and data networking. This working depth is the vertical dimension in our application and can be expanded based on the user’s equipment growth. The apparatus can be mounted on any solid surface such as a wall or a relay rack, for example a two-post rack, and is easily installed by a single technician. The rack can be implemented in a commercial version or a secure version.

Commercial Version of Rack

[0006] In one implementation, our rack allows 4U of vertically mounted rack mount form factored equipment to be mounted in an apparatus with a total depth from wall of only 11 inches. In addition, the apparatus includes an additional 2U of patch panel space available integrated in the main back plate, or base. The rack can also include an integrated common earth grounding stud on the base for safety.

[0007] Our rack allows the use of all rack mount form factored equipment to be optimized in restricted access as well as space applications. This is done by an equipment frame substantially improving the use of all rack mountable equipment optimized in restricted space applications.

[0008] Our rack further allows the use of interchangeable support arms in 4U to 10U (or other suitable dimension) increments that allow for expansion without full replacement of rack mount form factored systems and can be mounted on any solid flat vertical surface and industry standard 19 inch relay racks, e.g., two-post racks. Solid flat surfaces our rack can be mounted on include, but are not limited to, walls such as poured concrete, concrete block, brick and gypsum with wood studs 16 inches on center. An integrated standard mounting pattern for 1U or 2U CAT5e patch panels further increases installation efficiency and space utilization of our system. When used with integrated cable management bridge lances to dress and tie down both power and data cabling, this further increases installation efficiency and space utilization of cabinet systems.

[0009] Our rack also allows data and power cabling access from top, bottom or back. Further, the back panel allows feed through of data cabling and airflow.

[0010] When our rack is used as taught herein, rack mount form factored equipment can be optimized in restricted space applications with two-post mounting configured “back to back”. In this configuration two-post racks can be used. As an example, the two-post rack can be comprised of extruded aluminum with threaded holes on both front and back faces, materials other than aluminum can be used. The rack can mount through this hole pattern and can be set flush to the mounting surface for back-to-back installation for increased component density.

[0011] Another feature of our rack is threaded holes (2 per side in one embodiment) in the back plate to allow retainer screws to be installed through the brackets to keep the brackets from dislodging during equipment installation, service or by accidental impacts.

Secure Version of Rack

[0012] Our rack can also be made in one or more secure versions for installation in places like prison facilities and can have extra levels of tamper resistance that make the rack very difficult to damage, open by picking or prying, disable, sabotage, and other activities that intended to prevent internal equipment from operating. This differentiates a secure version from a commercial version.

[0013] For example, while a commercial version of the rack could have louvers or a venting hole pattern on the top part of the base, and/or the sides or the top cover, for convection
cooling, a secure version can include tamper resistance by adding baffling of ventilation areas, for example in both top and bottom vent patterns.

[0014] As another example, while a commercial version of our rack can have a bottom fan tray that would have fans with wire grills and be applicable in most situations, a secure version can have an additional layer on the outside containing offset baffles wherein the fans cannot be tampered with or easily splashed with liquids.

[0015] Likewise, a commercial version could have a single cam lock without a security collar or escutcheon and be acceptable for most situations. The secure version can have two cam locks with security collars and the standard pivoting cam lever replaced with a custom double cam, thus allowing four points of contact for locking the cover of the cabinet.

[0016] As yet another example, the commercial version could have 2U of space to allow patch panel rack mountable components in most situations, whereas the secure version could prevent using this space on the base so that the secure cover of the rack can use the inside edges to align the cover and thus improve tamper resistance of the cover.

[0017] Finally, the rack can be designed to be assembled in an overlapping fashion which allows no exposed hardware throughout system with the last piece to be assembled being the first to be removed in sequence. A lockable cover, with double cams as set forth above. This feature would usually have no exposed mounting hardware, and nothing to disassemble. Thus it would not allow unauthorized access, damage or theft. In this design the back plate or base can be mounted to a wall or two-post rack. The side brackets would slip into place, as discussed herein, secured in place by screws, as such as set screws in one example. The top cover locks would slide through the front panel cut-outs, can fully enclose the space, and can be secured with one or two locks as set forth above.

[0018] The rack has an optional fan in a fan tray, but can have convection cooling with a vented bottom panel of the base, with vented upper sides of the base if desired. There can be fans housed in the bottom of the panel assembly of the base to force air in or out. There can also be a forced air fan assembly in the bottom panel assembly with an internal thermal switch for increased efficiency and fan life. A thermal sensor switch can be mounted in side the rack cabinet and can turn on when internal temperature reaches a certain level and shut off when the temperature drops to a predetermined level; such as, for example, 25 degrees F. Thus the fan would run only when needed, increasing service life.

BRIEF DESCRIPTION OF THE DRAWINGS

Various aspects of the apparatus will now be described with reference to the following figures, not necessarily drawn to scale.

[0019] FIG. 1 illustrates a standard component of electronic equipment that is rack mounted in computer data centers.

[0020] FIG. 2 illustrates a prior art method of mounting standard components horizontally.

[0021] FIG. 3A illustrates an electronic component showing its dimensions.

[0022] FIG. 3B illustrates schematic view of an embodiment of our rack that mounts standard components vertically.

[0023] FIG. 4A is a front view of the base, or back panel, of our rack.

[0024] FIG. 4B illustrates a more secure version of the base of our rack.

[0025] FIG. 5 is a view of the base of our rack showing two-post mounting.

[0026] FIG. 6 is a view of the base of our rack showing mounting into 16 inches on center solid wood wall studs.

[0027] FIG. 7 is a view of our rack showing the brackets thereof.

[0028] FIG. 8A is a more detailed illustration of one embodiment of the brackets of our rack.

[0029] FIG. 8B is an illustration of one manner of attaching brackets to our rack.

[0030] FIG. 8C is an illustration of longer brackets attached to a secure version of our rack.

[0031] FIG. 8D is an illustration showing the front panel of our rack, and a method of its installation.

[0032] FIG. 8E is an illustration showing the top cover of our rack and a method of its installation.

[0033] FIG. 9 is an illustration of our rack with two components mounted vertically thereon, also showing the location of patch panels and side components.

[0034] FIG. 10A is a perspective illustration showing our rack in “back-to-back” relationship.

[0035] FIG. 10B is an illustration showing a side view of our rack in a “back-to-back” relationship.

[0036] FIG. 10C is a perspective illustration showing our rack in “back-to-back” relationship, also illustrating how the components and the patch panels can be mounted on a rack by screws.

[0037] FIG. 11 shows an alternate embodiment of our panel with a front panel and top panel arranged to allow easier access to the components.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0038] FIG. 1 illustrates a standard component of electronic equipment 1 that is rack mounted in computer data centers. Typical data centers maximize rack cabinet density, and standard cabinets are 30 to 34 inches in depth. Cabinet housings have 1.75 inch unit spacing which conforms to the component multiplier. Standard battery backup power supplies, as an example, are 2U high and 20-26 inches in depth.

[0039] FIG. 2 illustrates a typical prior art method for mounting components of electronic equipment horizontally.

[0040] FIG. 3A illustrates a rack mountable component 1 that typically has a deep measurement of y inches, a height of x inches.

[0041] FIG. 3B shows the rack-mountable electronic component 1 vertically mounted on our rack 2. Rack 2 includes base 4 and brackets 7L and 7R. All parts of our rack can be made of 14 gauge steel. Component 1 is mounted vertically by the brackets or side panels 7L and 7R and can be secured by screws. The brackets or side panels of the rack are of length z which is shorter than the depth y of the rack-mountable component. Hence when the component 1 is mounted as shown, the square footage taken up by the rack with the component mounted is less than in typical configurations used in the industry.

[0042] FIG. 4A shows a front view of the base, or back panel, 4 of our rack. Top access for data cable or power cable is seen at 6a and 6b. Built-in level 5 allows easy installation for single service personnel. Side panel 8 allows attachment of a 1U or 2U patch panel directly inside the back panel without sacrificing any space in the mounting surface of the side panels. Openings 10 and 12 allow ancillary equipment, both rack and non-rack mountable, to be attached to the side
panel by hanging or screwing onto the back panel. Large rear panel access, 14, which may be circular or of other configuration, allows pass-through cable routing in two-post back-to-back mounting applications. Bridge lances 16 are incorporated into the rack to allow data and power cable management for input and output wiring with top or bottom egress, as well as to facilitate service loops. A grounding stud 18 is integrated into the base further assisting quick and convenient system installation. This provides a method for easily attaching the installed equipment to a building’s earth ground system. The back-plate of the rack allows three mounting options. Holes A (both left and right, with right hole A hidden in the figure) accommodate toggle bolts for mounting on block walls or an electrical panel. Slots B are centered at 16 inches for allowing the base to be secured by screws that are screwed into studs or other wood surfaces using #10 or other suitable screws. Holes C allow mounting to a two-post rack such as a standard two-post open frame rack. Finally, the base has cutouts 13 on both sides of the base that match location of tabs on brackets 71 and 7R as illustrated subsequently in FIG. 8A and FIG. 8B.

[0043] FIG. 4B illustrates another, more secure, embodiment of the base of our rack. This embodiment can incorporate certain of the features of FIG. 4A and, in addition, is an elongated version with more secure features. For example, ballasts 17 comprise a baffled air intake that can be on both sides of the base or back plate for secure ventilation. This can work with a temperature controlled fan tray assembly at the bottom of the base, to be explained subsequently. Ancillary equipment such as a patch panel or other equipment can be mounted, in the secure version, in the 4U-10 U (or other suitable dimension) bracket spaces, discussed above, which keeps the system secure.

[0044] FIG. 5 shows base 4 of the rack being mounted to a two-post (20, 22) computer rack. Both top and bottom of the two-post rack should be secured before loading our rack. The base can be installed using #12-24 screws (24, 26) at the top using the integrated level 5 to locate the proper mounting pattern. Usually 10 screws are recommended for a full payload rating of our rack. The extended base 4 of FIG. 4B can be used as well.

[0045] FIG. 6 shows mounting the base 4 into 16 inches on center wood (or other appropriate material) wall studs 50, 52. The studs should be located before marking the top two locations for pilot holes. Pilot holes of 0.150 inch, or other suitable dimension, can be drilled at the top using the integrated level 5 to locate the proper mounting pattern. One can begin installing wood screws 24A, 26A, in the pilot holes at the top and then drill and install the remaining screws in the pattern. Ten screws are recommended for full payload rating of the rack but any suitable number can be used.

[0046] Alternatively, the rack can be mounted to a cinder block or other approved hollow wall using hole pattern C shown in FIG. 4A. This is recommended for high security applications.

[0047] For installation to an approved hollow wall, one would place the base against the wall in the preferred location. Using the integrated level 5, one would adjust the panel to level and then mark a minimum of the top and bottom ½ inch or other suitable dimension clearance hole (hole C). The marked holes can be drilled and compression studs or other associated inserts can be applied as required. The base can be lifted and the bolts can hand tightened, with fender washers, most of the way into the stud and then all screws can be tightened. An approved hollow wall application is considered to be either a cinder block wall or NEC type ¾ inch plywood electrical panel backing using toggle bolts for a safely fully rated load of the rack.

[0048] For mounting on a block wall, ¼ inch by 3 inch toggle bolts can be used to support the base of the rack. The hollow pocket in the block should be located so that the toggle bolt can open properly to support the weight. Toggle bolt clearance hole can be ½ inch.

[0049] FIG. 7 illustrates brackets or side panels 7L, 7R that are attached to the base 4 of the rack. The brackets can be marked in standard 1U (1.75 inch) spacing set horizontally instead of vertically for the typical cabinet. The rack allows attachment of the brackets by hooking spaced spring tabs into cutouts or notches, both the tabs and the notches are shown in FIGS. 8A to 8C. The brackets can be made in sizes such as 4U, 6U, and 8U and typically use the same back-plate.

[0050] FIG. 8A shows brackets 7L and 7R. The illustration of bracket 7L shows its inside surface with tabs 9 running vertically, and bracket security screw hole 11. Bracket 7R is similar.

[0051] FIG. 8B shows a close up view of the bracket 7L being secured to base 4. Securing bracket 7R is done similarly. The base has cutouts 13 that match the location of tabs 9 on bracket 7L. One bracket should be engaged on the base at a time, confirming that all tabs 9 are nested into cutouts or notches 13 on the base, and then slide down to fully set the bracket. The clearance hole 11 in bracket 7L should align with a threaded hole 15 in the base or back plate. A screw such as a #12-24 screw can be tightened through hole 11. Securing the opposite bracket 7R is done in the same manner as described for bracket 7L.

[0052] FIG. 8C illustrates longer brackets 7L, 7R attached to a secure version of our rack. A longer back panel can be used for a secure version of our rack. Longer side brackets 7L and 7R can be used since the back panel can accommodate all bracket sizes available, 4U through 10U, protecting the entire height of the rack. After engaging the tabs, as previously explained, two #12-24 safety screws can be installed through holes 11A and 11B, installed much like element 11 in FIG. 8A and FIG. 8B, through each side bracket. Patch panels, if desired to be used in the secure version, can occupy hanging U space on the inside of brackets 7L, 7R. Tamping the bracket down with a mallet can be advisable, taking care to protect the finish of the rack from marring by using a cardboard buffer while nesting the tabs. The brackets can have slots, here three, 19A, 19B, and 19C, located on the front of each bracket firmly fitting front panel hook, to be described, which slide down to fully set the bracket. The front panel is secured at the top with two #12-24 screws. Slots or cutouts 21 located at the bottom of each bracket will allow a fan tray, describe below, to slide in and be locked when the front panel is installed.

[0053] FIG. 8C also illustrates a fan tray, or fan assembly, 42, discussed briefly above, that is sized to fit, and matched the U space of the brackets and top cover from 4U to 10U cabinets, as one example. The fan tray is aligned with fan grills and wiring facing up and slides into the cutouts 21 at the bottom of each side bracket. The bottom of each bracket 7L and 7R can have bracket 21B affixed thereto by welding or other suitable securing means, to enable the fan assembly to slide appropriately into position. Each fan tray is sized to fit and matches the U space of brackets and top cover from 4U to 10U cabinets. The fan tray assembly has an AC input cord 37 and a temperature sensing module 39 attached. The sensor
can be mounted centrally on the back panel by sliding the tab into one of the convenient bridge lances or by using the supplied velcro® (Velcro is a trademark of Velcro Industries). The AC input plug of the fan tray should be connected to an internal AC source, and a UPS output, (if available), is recommended. The fan tray is secured by attaching the front panel to the left and right side panels of the cabinet as explained more fully in FIG. 8D.

[0054] FIG. 8D illustrates how the front panel is installed via hooks into three slots, 19A through 19F, in the front of both side brackets. Slots 19A and 19B are hidden in this figure but are seen in FIG. 8C. Next, front panel 23 slides downward until security screws 25, 27 can be installed through holes at the top of front panel into holes 27A and 27B in each side bracket.

[0055] As seen in FIG. 8E, once the front panel 23 is secured, the top cover 31 can be slid into place. The high security double cam locks 33A, 33B should be in the unlocked (horizontal) position. Otherwise the cams will not fit through the clearance cutouts 35 in the front panel. It will be recognized by one or ordinary skill in the art that many modifications can be made in the top cover-front cover design without departing from the spirit of the invention. As just one example, while the illustrated top cover actually goes over the front cover with a lock mechanism on the top cover and the receptacle for the lock on the front cover, one could modify the secure rack so that the top cover abuts the front cover behind the front cover, with the lock mechanism on the front cover and the lock mechanism receptacle on the top cover. So the lock mechanism associated with the top panel and the front cover could be mounted on either the top cover or the front cover, depending on how one designs the abutment of those two covers.

[0056] Another alternate embodiment is seen in FIG. 11. In that embodiment, a secure combination front panel and top cover is provided, the front panel and top cover secured at the top. This can be equipped several ways wherein after installation and set up, access to the front face of the mounted equipment can be done without the dismantling of the top cover. One way uses two rails or front frame attaching in various ways, the ways being within one of skill in the art, to the front edges of the side and right brackets. The frame can allow the bottom edge of the front panel pivot points and a stop mechanism to keep the front panel from swinging too far, thus preventing injury to the assembler or the person accessing the mounted equipment. The top edge of the front panel will have contact points for allowing a pivoting top cover to swing forward and engage the back plate in a similar fashion to the design that was described earlier, and be held in place with one or more locks on the front panel. When opening, the top cover can swing down and rest on the front panel, as seen in dashed line format, allowing front access to the mounted equipment.

[0057] FIG. 9 shows the rack loaded with two different types of rack-mountable equipment components, 1, 3 in space saving vertical arrangement. Patch panels 34, 36 can be added at the top of the base. Power distribution unit 38 can be added on the side of the base. Cable management hooks 40 can be added to the top or side to manage cables such as CAT5 cables.

[0058] FIG. 10A is a perspective illustration showing our rack in “back-to-back” relationship to show one of the space saving features described above. Only the base or back plate is shown in FIG. 10A but the reader will appreciate that the entire rack can then be built up from that, as described above.

[0059] FIG. 10B is an illustration showing a side view of our rack in a “back-to-back” relationship. FIG. 10C is a perspective illustration showing our rack in “back-to-back” relationship, also illustrating how the components and the patch panels can be mounted by screws.

[0060] While the rack has been shown in a preferred embodiment, it would be obvious to one of ordinary skill in the art that variations and modifications can be made without departing from the spirit and scope of the invention. Various types of uninterruptible power supplies, automatic transfer switches, maintenance bypass panels, and various other power-related products, could be included. Changes to physical dimensions, increased power capability, alternative plugs and ports, and appropriate cord lengths can also be made. In addition, singular systems, such as a UPS with SNMP, can be configured. Additional modifications can include redundant UPS, automatic transfer switches, power distribution units, and other ancillary equipment.

We claim:
1. An equipment rack for mounting at least one component having a height dimension, a width dimension, and a depth dimension, said equipment rack comprising:
   a back plate capable of being mounted to a surface, said back plate capable of having brackets mounted thereon; and
   two brackets each capable of being mounted to said back plate, each of said brackets, when mounted to said back plate, having a horizontal dimension shorter than said depth dimension, for supporting said at least one component with said height dimension substantially parallel to said horizontal dimension.
2. The equipment rack of claim 1 wherein said surface is a two-post rack.
3. The equipment rack of claim 1 wherein said surface is a wall.
4. The equipment rack of claim 1 wherein said back plate has a top panel, and includes cable access from said top panel.
5. The equipment rack of claim 1 further including cable management bridge lances on said back plate for dressing and tying down cables.
6. The equipment rack of claim 1 wherein said back plate has a mounting pattern for at least one CAT5e patch panel and at least one power distribution unit.
7. The equipment rack of claim 1 including a built-in level.
8. The equipment rack of claim 7 wherein said built-in level is on said back plate.
9. The equipment rack of claim 1 including a grounding stud.
10. The equipment rack of claim 9 wherein said grounding stud is on said back plate.
11. The equipment rack of claim 1 wherein said back plate includes a rear panel having access for allowing pass-through cable routing.
12. The equipment rack of claim 1 wherein said back plate includes slots for allowing said back plate to be secured to wood surfaces by a fastener.
13. The equipment rack of claim 1 wherein said back plate includes holes for allowing mounting to a hollow wall by toggle bolts.
14. The equipment rack of claim 1 wherein said back plate includes holes for allowing said back plate to be mounted on a two-post rack by fasteners.
15. The equipment rack of claim 1 wherein said brackets include tabs and said back plate includes cutouts, and said brackets are attachable to said back plate by nesting said tabs in said cutouts.

16. The equipment rack of claim 1 further including a fan tray attached to the bottom of said back plate for cooling said equipment.

17. An equipment rack for mounting at least one component, said component having height dimension, a width dimension, and a depth dimension, said equipment rack comprising:
   a back plate mountable to a surface, said back plate capable of having brackets mounted thereto;
   two brackets each capable of being mounted to said back plate, each said bracket having a surface oriented as a top surface when mounted to said back plate, the combination of said two brackets when mounted to said back plate capable of having mounted thereto said component oriented with said height dimension substantially parallel to said top surface of said brackets.

18. An equipment rack capable of being mounted in back-to-back relationship with another equipment rack, each of said racks for mounting at least one component having a height dimension, a width dimension, and a depth dimension, wherein each of said equipment racks comprises (i) a back plate mountable on a surface, said back plate capable of having brackets mounted thereto, and (ii) two brackets each capable of being mounted to said back plate, each said bracket having a surface oriented as a top surface when mounted to said back plate, the combination of said two brackets, when said brackets are mounted to said back plate, capable of having mounted thereto said component oriented with said height dimension substantially parallel to said top surface of said brackets.

19. The combination of two equipment racks of claim 18 mounted to a rack in back-to-back relationship.

20. An equipment rack capable of being mounted in back-to-back relationship to each other, each of said racks for mounting at least one component having a height dimension, a width dimension, and a depth dimension, wherein each of said equipment racks comprises (i) a back plate capable of being mounted to a surface, said back plate capable of having brackets mounted thereto, and (ii) two brackets each capable of being mounted to said back plate, each of said brackets, when mounted to said back plate, having a horizontal dimension shorter than said depth dimension for supporting said at least one component with said height dimension substantially parallel to said horizontal dimension.

21. The combination of two equipment racks of claim 20 mounted to a rack in back-to-back relationship.

22. An equipment rack for mounting at least one component having a height dimension, a width dimension, and a depth dimension, said equipment rack comprising:
   a back plate capable of being mounted to a surface; and
   two brackets each mounted to said back plate, each of said brackets having a horizontal dimension shorter than said depth dimension, for supporting said at least one component with said height dimension substantially parallel to said horizontal dimension.

23. Two equipment racks mounted to the same surface in back-to-back relationship to each other, each of said racks for mounting at least one component having a height dimension, a width dimension, and a depth dimension, each of said equipment racks comprising (i) a back plate mounted to said surface, and (ii) two brackets each mounted to said back plate, each of said brackets having a horizontal dimension shorter than said depth dimension for supporting said at least one component with said height dimension substantially parallel to said horizontal dimension.