CPNP Project

Curac Mihai-Ionuț

Pîșu Cristina

Radu Matei

Savu Cosmin-Claudiu

Group 30443

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# **Wiring**

## **Calculating the number of double outlets**

There must be one double outlet per 10 m2 of a room. In order to calculate the number of DOs we take the room’s surface and divide it by 10m2, to get a rough approximation of our needs:

Example for Room no. 108 (office space):

## **Calculating the quantity of UTP cables**

To determine the number of UTP cables required to cover the entire building, we must first identify the number of double outlets. Next, we measure the distance from each room to its corresponding distribution facility and calculate the average cable length within a room. Using this data, we can determine the cable length needed for each room with the following formula, including a 6-meter cable reserve:

Considering the different room sizes, we compute the cable lengths needed for two rooms in detail, then average these lengths to estimate the cable required for the other rooms based on their surface area.

1. **Big room: room no. 130 (office space)**
2. **Small room: room no. 179 (meeting room)**

Based on the two above examples, one for a large room and one for a small room, we can extrapolate for all the other rooms:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | Room no. | Surface | Double outlets | Room to DF distance | Room AVG distance | DF | No. of cables | Cable per room | |  | | Lounge & Storage | 102 | 188 | 19 | 14 | 24 | MDF | 38 | 1672 | | Meeting Room | 103 | 50 | 5 | 14 | 13 | MDF | 10 | 330 | | Meeting Room | 104 | 44 | 5 | 9 | 12 | MDF | 10 | 270 | | Meeting Room | 105 | 49 | 5 | 5 | 13 | MDF | 10 | 240 | | MDF | 106 | 42 | 0 | 0 | 12 | (MDF) | 0 | 0 | | Office space | 108 | 167 | 17 | 10 | 23 | MDF | 34 | 1326 | | Office space | 109 | 292 | 30 | 10 | 30 | MDF | 60 | 2760 | | Presentation room | 110 | 91 | 10 | 14 | 17 | MDF | 20 | 740 | | Meeting Room | 111 | 16 | 2 | 15 | 7 | MDF | 4 | 112 | | Meeting Room | 114 | 17 | 2 | 21 | 8 | MDF | 4 | 140 | | Kitchen | 117 | 42 | 1 | 17 | 12 | IDF1 | 2 | 70 | | Bathroom hallway | 118 | 42 | 0 | 0 | 12 |  | 0 | 0 | | Bathroom | 119 | 18 | 0 | 0 | 8 |  | 0 | 0 | | Bathroom | 120 | 18 | 0 | 0 | 8 |  | 0 | 0 | | Office space | 121 | 714 | 72 | 14 | 47 | IDF2 | 144 | 9648 | | IDF2 | 123 | 42 | 0 | 0 | 12 | (IDF2) | 0 | 0 | | Meeting Room | 124 | 49 | 5 | 5 | 13 | IDF2 | 10 | 240 | | Meeting Room | 125 | 44 | 5 | 8 | 12 | IDF2 | 10 | 260 | | Meeting Room | 126 | 50 | 5 | 12 | 13 | IDF2 | 10 | 310 | | Kitchen | 128 | 42 | 1 | 16 | 12 | IDF2 | 2 | 68 | | Office space | 129 | 179 | 18 | 19 | 24 | IDF2 | 36 | 1764 | | Office space | 130 | 249 | 25 | 19 | 28 | IDF2 | 50 | 2650 | | Storage | 131 | 27 | 3 | 17 | 9 | IDF2 | 6 | 192 | | Meeting Room | 132 | 17 | 2 | 24 | 8 | IDF1 | 4 | 152 | | Meeting Room | 133 | 17 | 2 | 30 | 8 | IDF1 | 4 | 176 | | Meeting Room | 134 | 17 | 2 | 33 | 8 | IDF1 | 4 | 188 | | Kitchen | 135 | 42 | 1 | 24 | 12 | IDF1 | 2 | 84 | | Bathroom | 137 | 18 | 0 | 0 | 8 |  | 0 | 0 | | Bathroom | 138 | 20 | 0 | 0 | 8 |  | 0 | 0 | | Entertainment room | 139 | 109 | 11 | 12 | 19 | IDF1 | 22 | 814 | | IDF1 | 140 | 31 | 0 | 0 | 10 | (IDF1) | 0 | 0 | | Office space | 141 | 201 | 21 | 2 | 25 | IDF1 | 42 | 1386 | | Laboratory | 142 | 53 | 6 | 5 | 13 | IDF1 | 12 | 288 | | Laboratory | 143 | 53 | 6 | 11 | 13 | IDF1 | 12 | 360 | | Laboratory | 144 | 53 | 6 | 17 | 13 | IDF1 | 12 | 432 | | Meeting Room | 146 | 17 | 2 | 9 | 8 | IDF1 | 4 | 92 | | IDF3 | 147 | 41 | 0 | 0 | 12 | (IDF3) | 0 | 0 | | Meeting Room | 148 | 44 | 5 | 2 | 12 | IDF3 | 10 | 200 | | Meeting Room | 149 | 49 | 5 | 5 | 13 | IDF3 | 10 | 240 | | Meeting Room | 150 | 44 | 5 | 9 | 12 | IDF3 | 10 | 270 | | Meeting Room | 151 | 50 | 5 | 12 | 13 | IDF3 | 10 | 310 | | Kitchen | 152 | 43 | 1 | 17 | 12 | IDF3 | 2 | 70 | | Office space | 153 | 594 | 60 | 2 | 43 | IDF3 | 120 | 6120 | | Office space | 154 | 228 | 23 | 9 | 27 | IDF3 | 46 | 1932 | | Office space | 155 | 263 | 27 | 2 | 29 | IDF4 | 54 | 1998 | | Meeting Room | 156 | 17 | 2 | 21 | 8 | IDF3 | 4 | 140 | | Meeting Room | 157 | 17 | 2 | 24 | 8 | IDF3 | 4 | 152 | | Laboratory | 158 | 53 | 6 | 27 | 13 | IDF3 | 12 | 552 | | IDF4 | 159 | 31 | 0 | 0 | 10 | (IDF4) | 0 | 0 | | Laboratory | 160 | 53 | 6 | 9 | 13 | IDF4 | 12 | 336 | | Laboratory | 161 | 53 | 6 | 14 | 13 | IDF4 | 12 | 396 | | Kitchen | 162 | 43 | 1 | 18 | 12 | IDF4 | 2 | 72 | | Presentation room | 163 | 91 | 10 | 21 | 17 | IDF3 | 20 | 880 | | Storage | 164 | 16 | 2 | 12 | 7 | IDF4 | 4 | 100 | | Entertainment room | 165 | 109 | 11 | 15 | 19 | IDF4 | 22 | 880 | | Bathroom | 166 | 20 | 0 | 0 | 8 |  | 0 | 0 | | Bathroom | 167 | 18 | 0 | 0 | 8 |  | 0 | 0 | | Kitchen | 168 | 43 | 1 | 24 | 12 | IDF4 | 2 | 84 | | Bathroom | 169 | 20 | 0 | 0 | 8 |  | 0 | 0 | | Bathroom | 170 | 18 | 0 | 0 | 8 |  | 0 | 0 | | Meeting Room | 171 | 17 | 2 | 29 | 8 | IDF4 | 4 | 172 | | Meeting Room | 172 | 17 | 2 | 39 | 8 | IDF5 | 4 | 212 | | Meeting Room | 173 | 14 | 2 | 41 | 7 | IDF5 | 4 | 216 | | Storage | 174 | 27 | 3 | 21 | 9 | IDF5 | 6 | 216 | | Lounge & Storage | 175 | 264 | 27 | 5 | 29 | IDF5 | 54 | 2160 | | Office space first half | 176 | 400 | 40 | 17 | 35 | IDF4 | 80 | 4640 | | Office space second half | 176 | 407 | 41 | 2 | 35 | IDF5 | 82 | 3526 | | Kitchen | 177 | 44 | 1 | 18 | 12 | IDF5 | 2 | 72 | | Meeting Room | 178 | 50 | 5 | 14 | 13 | IDF5 | 10 | 330 | | Meeting Room | 179 | 44 | 5 | 9 | 12 | IDF5 | 10 | 270 | | Meeting Room | 180 | 49 | 5 | 5 | 13 | IDF5 | 10 | 240 | | Meeting Room | 181 | 44 | 5 | 2 | 12 | IDF5 | 10 | 200 | | IDF5 | 182 | 41 | 0 | 0 | 12 | (IDF5) | 0 | 0 | | Office space first half | 184 | 250 | 25 | 17 | 28 | IDF4 | 50 | 2550 | | Office space second half | 184 | 248 | 25 | 22 | 28 | IDF | 50 | 2800 | |  |  |  |  |  |  |  |  |  | | Total Double outlets: | 655 |  | Total UTP cable: | 59100 |  | Average per outlet | 46 |  | | Total Number of cables: | 1310 |  | Total UTP 305 boxes: | 214 |  |  |  |  | |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Rooms per DF |  |  |  | Double outlets per DF | Single outlets per DF |  |  |  | | MDF | 9 |  | MDF | 95 | 190 |  |  |  | | IDF1 | 11 |  | IDF1 | 60 | 120 |  |  |  | | IDF2 | 8 |  | IDF2 | 134 | 268 |  |  |  | | IDF3 | 11 |  | IDF3 | 124 | 248 |  |  |  | | IDF4 | 10 |  | IDF4 | 121 | 242 |  |  |  | | IDF5 | 10 |  | IDF5 | 96 | 192 |  |  |  | |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  | | Fiber optics: 6 cables on each connection | 628 | (m) |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |
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As such, by adding all of the extrapolated obtained results together we obtain:

## **Calculating the number of UTP boxes**

In order to calculate the number of boxes needed we must consider that: UTP cable boxes contain 305m of cable per box and we must leave a 10% margin of cable boxes.

## **Calculating the quantity of Fiber Optic**

The quantity of Fiber Optic cables is calculated by adding 6 m of cable reserve each. Since we have 6 distribution facilities and a total of 12 cables we have a total quantity of fiber optic wire of:

# **VLANs and IP address assignment**

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | VLAN\_MANAGEMENT | 192.168.10.x | 192.168.10.1 |
| 2 | VOICE\_VLAN | 192.168.20.x | 192.168.20.1 |
| 3 | VOICE\_VLAN2 | 192.168.30.x | 192.168.30.1 |
| 4 | WLAN1 | 192.168.40.x | 192.168.40.1 |
| 5 | WLAN2 | 192.168.50.x | 192.168.50.1 |
| 6 | WLAN3 | 192.168.60.x | 192.168.60.1 |
| 7 | WLAN4 | 192.168.70.x | 192.168.70.1 |
| 8 | WLAN5 | 192.168.80.x | 192.168.80.1 |
| 9 | VLAN\_ALPHA | 192.168.90.x | 192.168.90.1 |
| 10 | VLAN\_BETA | 192.168.100.x | 192.168.100.1 |
| 11 | VLAN\_GAMMA | 192.168.110.x | 192.168.110.1 |
| 12 | VLAN\_DELTA | 192.168.120.x | 192.168.120.1 |
| 13 | VLAN\_EPSILON | 192.168.130.x | 192.168.130.1 |
| 14 | VLAN\_ZETA | 192.168.140.x | 192.168.140.1 |
| 15 | VLAN\_ETA | 192.168.150.x | 192.168.150.1 |
| 16 | VLAN\_THETA | 192.168.160.x | 192.168.160.1 |
| 17 | VLAN\_IOTA | 192.168.170.x | 192.168.170.1 |
| 18 | VLAN\_KAPPA | 192.168.180.x | 192.168.180.1 |
| 19 | VLAN\_LAMBDA | 192.168.190.x | 192.168.190.1 |
| 20 | VLAN\_MU | 192.168.200.x | 192.168.200.1 |
| 21 | VLAN\_NU | 192.168.210.x | 192.168.210.1 |
| 22 | VLAN\_XI | 192.168.220.x | 192.168.220.1 |
| 23 | VLAN\_OMICRON | 192.168.230.x | 192.168.230.1 |
| 24 | VLAN\_PI | 192.168.240.x | 192.168.240.1 |
| 25 | VLAN\_SIGMA | 192.168.250.x | 192.168.250.1 |

# **Equipment**

## **L2/L3 modular switches and FO modules**

1. **Cisco C9300X-48HX**

The Cisco C9300X-48HX switch is designed to deliver high performance and robust security for modern network demands. This switch offers a comprehensive suite of security features that ensure the integrity of both hardware and software, as well as the protection of all data traversing the switch. The C9300X-48HX model is equipped with 48 ports of 10 Gigabit Ethernet (10GE) and 8 ports of 25 Gigabit Ethernet (25GE) non-blocking, providing flexible connectivity options for a variety of network requirements. It supports advanced network automation, simplified operations, and secure end-to-end connectivity, making it an ideal choice for enterprise and campus networks. In addition, because of its fiber optics uplinks, it can also act as an FO module. Unit price: $23,000.

1. **Juniper EX4650-48Y**

The Juniper EX4650-48Y switch is engineered to provide high performance and advanced security features essential for modern networking environments. This switch ensures the integrity of both hardware and software, as well as the protection of all data passing through the system. The EX4650-48Y model comes equipped with 48 ports of 25 Gigabit Ethernet (25GE) and 8 ports of 100 Gigabit Ethernet (100GE) non-blocking, offering versatile connectivity options to meet a variety of network demands. This switch supports advanced features such as automation, simplified management, and secure, end-to-end connectivity, making it an excellent choice for data centers and enterprise networks. In addition, because of its fiber optics uplinks, it can also act as an FO module. Unit price: $15,600.

**Conclusion:** While both the Cisco C9300X-48HX and Juniper EX4650-48Y offer robust performance and advanced security features, the Cisco C9300X-48HX stands out due to its versatile port options, 24/7 support possibilities and high levels of reliability, often associated with Cisco devices. As such, our choice for the current project will be the Cisco C9300X-48HX.

## **Firewall**

1. **PA-7080** **Firewall (with PA-7000-DPC-A and PA-7000-100G-NPC-A cards to full configuration)**

The PA-7080 Firewall, equipped with PA-7000-DPC-A and PA-7000-100G-NPC-A cards for a fully configured setup, offers advanced threat prevention features such as WildFire cloud-based malware analysis and sophisticated URL filtering. It delivers robust protection against even the most advanced cyber threats. This firewall supports up to 200 Gbps of firewall throughput and up to 100 Gbps of threat prevention throughput, making it highly scalable for large enterprise networks. Its multi-layer security features, including IPS, antivirus, and application control, ensure comprehensive defense against a wide array of threats. Built-in redundancy features such as dual power supplies and hot-swappable fans guarantee high availability and minimal downtime. The PA-7080 is easily managed through the Palo Alto Networks Panorama management platform, providing centralized control over all network devices. It can be deployed as a traditional hardware appliance or as a virtualized instance in cloud or virtual environments. The unit price is $594,000.

1. **Cisco Firepower 9300 SM-56 X 3**

The Cisco Firepower 9300 Firewall, equipped with 3xSM-56 modules, provides advanced threat detection and prevention capabilities, including intrusion prevention, malware protection, and URL filtering. It supports up to 60 Gbps of threat inspection throughput and up to 100 Gbps of firewall throughput, ensuring high scalability and performance for large enterprise networks. The Cisco Firepower 9300 includes advanced security features such as SSL decryption and inspection, advanced malware protection, and file analysis, ensuring comprehensive protection against a wide range of cyber threats. Built-in redundancy features, such as dual power supplies and hot-swappable fans, ensure high availability and minimal downtime. The Cisco Firepower 9300 can be easily managed using the Cisco Firepower Management Center, providing centralized control over all network devices. It can be deployed as a traditional hardware appliance or as a virtualized instance in cloud or virtual environments. The unit price is $535,000.

## **Conclusion**: We have chosen the PA-7080 firewall because it offers maximum throughput, enabling us to manage a single firewall for the entire building. While both options are modular, the Palo Alto Networks model provides greater extensibility, allowing for future expansion.

## **WLESS APs**

1. **Cisco Catalyst CW9166D1-MR**

The Cisco Catalyst CW9166D1-MR is a high-performance wireless access point designed to deliver secure, reliable, and high-speed wireless connectivity. It supports 802.11ax and has Wi-Fi 6 technology support, Multigigabit Ethernet and PoE, while having a 7.78 Gbps max throughput, thus offering improved performance, higher capacity, and better coverage. The CW9166D1-MR features advanced security protocols to protect network integrity and user data. It is ideal for dense deployment scenarios, providing robust support for a large number of concurrent users and devices. Unit price: $1890

1. **Ubiquiti U6 Enterprise**

The Ubiquiti U6 Enterprise is a versatile wireless access point designed for both performance and ease of use. It supports 802.11ax and has Wi-Fi 6 technology support, PoE, Multigigabit Ethernet and a max throughput of 4.8 Gbps, thus ensuring high-speed connectivity and increased capacity for modern network demands. The U6 Enterprise is equipped with advanced features like seamless roaming, robust security, and simplified management through the UniFi Network Controller. It is well-suited for a variety of deployment scenarios, from small businesses to large enterprise environments. Unit price: $280

**Conclusion:** While both Aps provide Wi-Fi 6 technology and support multi-gigabit Ethernet, the Cisco AP does support a higher max throughput (7.78 Gbps, as opposed with the 4.8 Gbps on the Ubiquiti AP). However, due to the significant difference in price between the 2 we have chosen to go with the Ubiquiti U6 Enterprise AP for our Wi-Fi needs.

## **WLESS AP controllers**

1. **Cisco Catalyst 9800-80-k9**

The Cisco Catalyst 9800-80-K9 is a high-performance wireless LAN controller tailored for large enterprise environments. It supports up to 6000 Aps, up to 64,000 clients and has 80 Gbps throughput. The Catalyst 9800-80-K9 is highly scalable, capable of supporting thousands of access points and clients, making it ideal for complex, large-scale deployments. What is to note here is that it does not support Ubiquiti APs. Unit price: $30,000.

1. **Ubiquiti Dream machine Special edition**

The Ubiquiti Dream Machine Special Edition is a versatile and cost-effective wireless LAN controller designed for ease of use. It supports more than 100 UniFi devices and more than 1000 client devies, supports PoE and PoE+, has 3.5 Gbps routing and includes full UniFi application suite support. The Dream Machine Special Edition supports seamless integration with Ubiquiti access points, offering optimal performance and centralized management through the UniFi Network Controller. It includes robust security features and an intuitive user interface, making network management straightforward and efficient. Unit price: $500.

**Conclusion:** Because we have already chosen to go with Ubiquiti APs due to their low cost compared to the Cisco ones, we will also go with a Ubiquiti AP controller, which also has a signifcantly lower cost than its Cisco counterpart, while also being, in essence a software program deployed on a machine inside the rack, for ease of use and access.

## **IP Phone**

1. **Cisco IP Phone 8811**

The Cisco IP Phone 8811 features a high-resolution, backlit display that simplifies access to call information and applications. It supports wideband audio and video, ensuring exceptional voice and video clarity. With the capability to handle multiple calls at once, it supports up to five lines and five programmable line keys. The phone includes a built-in Gigabit Ethernet switch for seamless network connectivity and supports Power over Ethernet (PoE), removing the need for separate power supplies. Security is robust, with secure voice communication, device authentication, and encryption to safeguard data. Additionally, the phone supports third-party applications, offering a versatile solution that can be integrated into various business processes and workflows. Unit price: $400.

1. **Yealink VP59**

The Yealink VP59 IP phone features a large 8-inch color touch screen display, offering easy access to call information and applications. It supports up to 16 SIP accounts and includes built-in Wi-Fi and Bluetooth, allowing users to manage multiple lines and calls simultaneously and connect effortlessly to wireless headsets. Powered by a robust 2.4GHz quad-core processor, the phone ensures fast and efficient performance. It includes security features such as secure voice communication, device authentication, and encryption to protect data. The VP59 also supports video conferencing with an integrated 1080p HD camera and H.264 video codec. It can be easily deployed and managed using Yealink's management platform, offering centralized control over the entire network of devices. Unit price: $566.

**Conclusion:** While the Yealink VP59 offers superior performance and more advanced features, we opted for the Cisco phone due to its cost-effectiveness and ample functionality (PoE, security, switching) suitable for our office building needs.

## **UPS**

* 1. **APC Smart-UPS SRT 3000VA RM 230V SRT3000RMXLI**

The APC Smart-UPS SRT 3000VA RM 230V (SRT3000RMXLI) is a high-performance uninterruptible power supply (UPS) designed for critical applications in server rooms and data centers. It provides 3000VA/2700W of power capacity and operates at 230V, ensuring reliable power backup and protection against power disturbances. This rack-mountable unit features double-conversion online technology, offering consistent and clean power output. Key features include an intuitive LCD interface, hot-swappable batteries, and network management capabilities for remote monitoring and management. Unit price: $4800.

* 1. **CyberPoker PR5000LCDRTXL5U Smart App Sinewave**

The CyberPower PR5000LCDRTXL5U Smart App Sinewave is a high-capacity uninterruptible power supply (UPS) designed to provide reliable power backup for mission-critical systems. It delivers 5000VA/4500W of power and features true sine wave output, ensuring clean and consistent power for sensitive electronics. This rack/tower convertible unit includes an intuitive LCD control panel for easy monitoring and management. Unit price: $3800.

**Conclusion**: While the CyberPower PR5000LCDRTXL5U Smart App Sinewave offers a higher power capacity at 5000VA/4500W, the APC Smart-UPS SRT 3000VA RM 230V (SRT3000RMXLI) is the preferred choice despite its higher cost. The APC model excels with its double-conversion online technology, ensuring the cleanest and most reliable power output. It also features hot-swappable batteries, an intuitive LCD interface, and advanced network management capabilities, thus making it the preferred choice.

## **Cooling**

1. **Carrier 42QHG012D8S**

The Carrier 42QHG012D8S air conditioner is a high-performance unit designed for efficient and quiet operation. With a cooling capacity of 12,000 BTU, it is well-suited for maintaining comfortable temperatures in various environments. The unit features advanced inverter technology, which ensures precise and efficient temperature control, similar to Daikin's inverter compressors. Additionally, the Carrier model boasts high SEER ratings, translating to significant energy savings. Its noise-reducing design makes it an excellent choice for a peaceful indoor environment. Unit price: $600.

1. **Daikin Comfora SB.FTXP35N9/RXP35**

The Daikin Comfora SB.FTXP35N9/RXP35 air conditioner offers a cooling capacity of 12,000 BTU, making it a robust solution for effective climate control. It stands out with its high energy efficiency, achieving up to A++ ratings in both cooling and heating modes. The unit uses R-32 refrigerant, which is more environmentally friendly and energy-efficient compared to the more common R-410A. In terms of sound levels, the Daikin Comfora excels with a silent mode operating at just 20 dBA for cooling and 21 dBA for heating, and a high mode at 43 dBA for cooling and 40 dBA for heating, ensuring a quiet and comfortable indoor atmosphere. Unit price: $900.

**Conclusion:** While both the Carrier 42QHG012D8S and the Daikin Comfora SB.FTXP35N9/RXP35 offer impressive features and performance, the Daikin Comfora edges out as the preferred choice. Its superior energy efficiency with up to A++ ratings, environmentally friendly R-32 refrigerant, and exceptionally low noise levels in both cooling and heating modes make it the more advantageous option.

# 

# **Environment**

**MDF**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
|  |  |  |  |  |  |
|  | Organizer orizontal |  |  |  |  |
|  | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
|  | Controller Wireless | Ubiquiti Dream machine Special edition |  | 50 | 170 |
|  |  |  |  |  |  |
|  | Firewall | Palo Alto PA-7080 | 590Gbps firewall throughput | 2500 | 8530 |
| 5 | UPS1 | APC SUA5000RMI5U | Smart-UPS, 5000VA/4000W, line-interactive | 4000 | 430 |
| 5 | UPS2 | APC SUA5000RMI5U | Smart-UPS, 5000VA/4000W, line-interactive | 4000 | 430 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **25** |  |  |  | **5238** | **18720** |
|  |  |  | **Putere disponibila in UPS** | **8000** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Comfora SB.FTXP35N9/RXP35 |  | 4000 | 12000 |
|  | AC 2 | Daikin Comfora SB.FTXP35N9/RXP35 |  | 4000 | 12000 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Total** | **8000** | **24000** |
| Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 190 |  |  |  |
| Nr prize disponibil in PP UTP in acest rack | 96 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

**IDF1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
|  | Controller Wireless | Ubiquiti Dream machine Special edition | 50AP/1000useri | 50 | 170 |
|  |  |  |  |  |  |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **14** |  |  |  | **2066** | **7743** |
|  |  |  | **Putere disponibila in UPS** | **2700** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Comfora SB.FTXP35N9/RXP35 |  | 4000 | 12000 |
|  |  |  |  |  |  |
|  |  |  | **Total** | **4000** | **12000** |
|  | Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 120 |  |  |  |
|  | Nr prize disponibil in PP UTP in acest rack | 144 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

**IDF2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **25** |  |  |  | **4032** | **15146** |
|  |  |  | **Putere disponibila in UPS** | **5400** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  | AC 2 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  |  |  |  |  |  |
|  |  |  | **Total** | **1460** | **20000** |
|  | Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 268 |  |  |  |
|  | Nr prize disponibil in PP UTP in acest rack | 288 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

**IDF3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **25** |  |  |  | **4032** | **15146** |
|  |  |  | **Putere disponibila in UPS** | **5400** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  | AC 2 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  |  |  |  |  |  |
|  |  |  | **Total** | **1460** | **20000** |
|  | Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 248 |  |  |  |
|  | Nr prize disponibil in PP UTP in acest rack | 288 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

**IDF4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
| 2 | UPS1 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | 2700 | 703 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **25** |  |  |  | **4032** | **15146** |
|  |  |  | **Putere disponibila in UPS** | **5400** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  | AC 2 | Daikin Nepura Perfera FTXTM30S+RXTM30A |  | 730 | 10000 |
|  |  |  |  |  |  |
|  |  |  | **Total** | **1460** | **20000** |
|  | Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 242 |  |  |  |
|  | Nr prize disponibil in PP UTP in acest rack | 288 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

**IDF5**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Spatiu ocupat in U | Denumire/ tip echipament | Model | Scurta descriere/ nr porturi | Putere electrica necesara W | Caldura disipata BTU |
| 1 | Patch Panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | 0 | 0 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
| 1 | Organizer orizontal |  |  |  |  |
| 1 | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
| 1 |  |  |  |  |  |
| 1 | Switch L2 | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M) | 672 | 2290 |
|  |  |  |  |  |  |
|  | Organizer orizontal |  |  |  |  |
|  | Patch Pannel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | 0 | 0 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 5 | UPS1 | APC SUA5000RMI5U | Smart-UPS, 5000VA/4000W, line-interactive | 4000 | 430 |
| 5 | UPS2 | APC SUA5000RMI5U | Smart-UPS, 5000VA/4000W, line-interactive | 4000 | 430 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **24** |  |  |  | **2688** | **10020** |
|  |  |  | **Putere disponibila in UPS** | **8000** |  |
|  |  |  |  | Consum electric AC | Racire AC |
|  | AC 1 | Daikin Comfora SB.FTXP35N9/RXP35 |  | 4000 | 12000 |
|  | AC 2 | Daikin Comfora SB.FTXP35N9/RXP35 |  | 4000 | 12000 |
|  |  |  |  |  |  |
|  |  |  | **Total** | **8000** | **24000** |
|  | Nr prize simple de conectat la acest DF, valoarea se ia din etapa 2 | 192 |  |  |  |
|  | Nr prize disponibil in PP UTP in acest rack | 192 | **Formula se modifica daca utilizati PP cu alt numar de prize, 24, 48 etc.** |  |  |

# **Active equipment list**

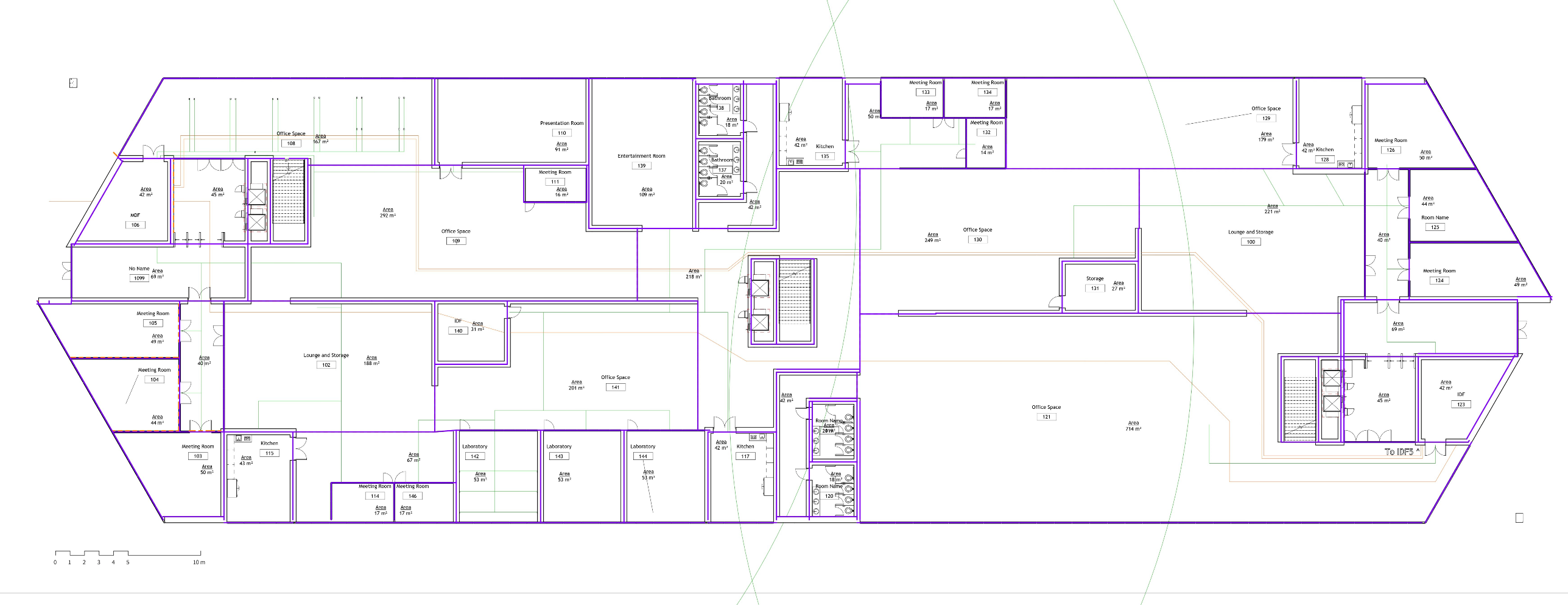
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Model name** | **Characteristics** | **Price** | **Quantity** | **Value** |
| Chasis | Cisco Catalyst 9606R | 6-slot chassis. Two middle slots (slots 3 and 4) are dedicated for supervisors only, and they work in Stateful Synchronization (SSO) mode. The top and bottom two slots are for line cards. | $8,068.00 | 4 | $ 32,272 |
| Power supply | C9600-PWR-2KWAC | Power supply output - 100 to 120 VAC operation -> 12V output — 1050W  200 to 240 VAC operation -> 12V output — 2000W  683 BTU per hour | $ 2,739 | 29 | $79,431 |
| L2/L3 switch + FO module | Cisco C9300X-48HX | 48 port UPOE+, 48x 10G  (10G/5G/2.5G/1G/100M); 4 FO ports for uplinks | $ 22,675.99 | 29 | $ 657,604 |
| Firewall | Palo Alto PA-7080 | 590Gbps firewall throughput | $ 594,000 | 1 | $ 594,000 |
| WLAN AP | Ubiquiti U6 Enterprise | 4.8 Gbps max throughput; 802.11ax support; Wi-fi6 - 6Hz; 1x 2.5 GbE; PoE; Works with software-based controller (UniFi Network Controller) | $280 | 60 | $16,800 |
| AP Controller | Ubiquiti Dream machine Special edition | 1000+ PoE and PoE+; 3.5 Gbps routing; Includes full UniFi application suite for device management; 100+ UniFi devices; 1000+ client devices, 50AP/1000useri | $ 500 | 2 | $ 1,000 |
| IP Phones | Cisco 8811 | Voice Mail, Caller ID, Call Waiting, Call Transfer, Call Hold, Message Waiting Capability | $ 400 | 50 | $ 20,000 |
| UPS1 | APC SUA5000RMI5U | Smart-UPS, 5000VA/4000W, line-interactive | $ 4,990 | 4 | $ 19,960 |
| UPS2 | APC SRT3000RMXLI | Smart-UPS On-Line, 3kVA | $ 2,209 | 7 | $ 15,463 |
| Cooling1 | Daikin Comfora SB.FTXP35N9/RXP35 | BTU 12000, AC consumption 4000 | $ 958 | 5 | $ 4,790 |
| Cooling2 | Daikin Nepura Perfera FTXTM30S+RXTM30A | BTU 10000, AC consumption 730 | $ 1,902 | 6 | $ 11,412 |

# **Material list**

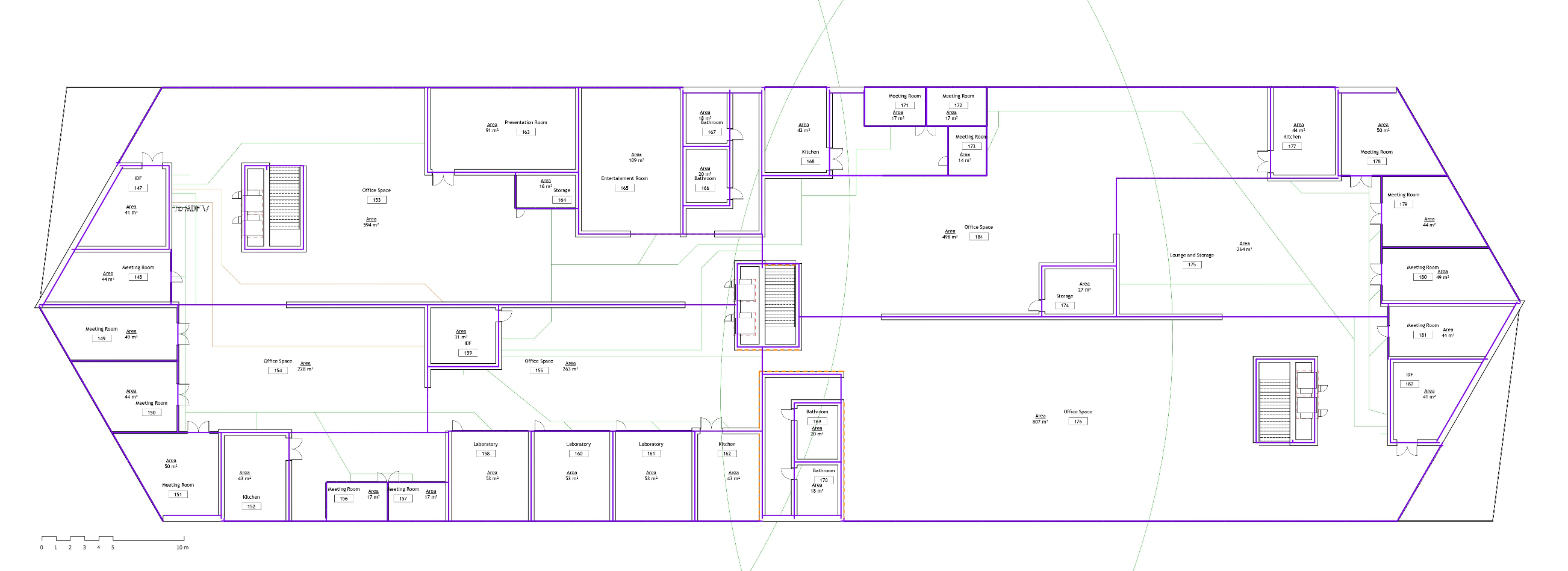
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Model name** | **Characteristics** | **Price** | **Quantity** | **Value** |
| Outlets | BNPUHIU Ethernet Wall Plate - 2 Port Cat 6 Wall Plate with RJ45 Network Female to Female | Keystone Compatible with Cat 7/6/5/5e Ethernet Devices | $ 8 | 655 | $ 5,240 |
| UTP cable | Cablu Negru UTP CAT6 Super Plat, 5m | Cat6 UTP cable enhances the performance for transmission of high speed data, digital and analogue voice, and video (RGB). It features 4-pair Unshielded Twisted Pair cable which ensures performance with high speed Gigabit Ethernet. | $ 1.31 | 1310 | $ 1,716 |
| FO cable | High Quality and Cost-effective 9/125μm Single Mode Bend Insensitive Fiber Optic Cable | LC UPC to SC UPC, 2.0mm, 1m | $ 5.71 | 628 | $ 3,585.88 |
| Patch panel UTP | NewYork Cables B07Y3TJSB9 | Cat6a 48 Port 10 GBit/s | $ 65.99 | 29 | $ 1,913.71 |
| Patch panel FO | FHU 96 Fibers OS2 Single Mode | 48 x LC UPC Duplex | $ 94.29 | 6 | $ 565.74 |
| Patch cords UTP | VALUE 21.99.1566 | Cat6, 5m | $ 2.60 | 1,392 | $ 3,619 |
| Patch cords FO | Emtex patchcord FO SC/PC – LC/PC | MM OM4 50/125 manta LSZH 3.0mm, duplex 2m | $ 4.45 | 116 | $ 516.2 |
| Horizontal organizer | SmartRack 1U Horizontal Cable Manager - Finger duct with cover | 1U 19-inch Horizontal Cable Manager -finger duct with cover | $68 | 35 | $2,380 |
| Rack | Rack HYPERLINE 26U 600x800 | 26U Floor Server Rack, Disassembled, 600x800, glass front door, removable side panels, metal back panel, floor support kit | $ 336 | 6 | $ 2,016 |

# **Drawings**

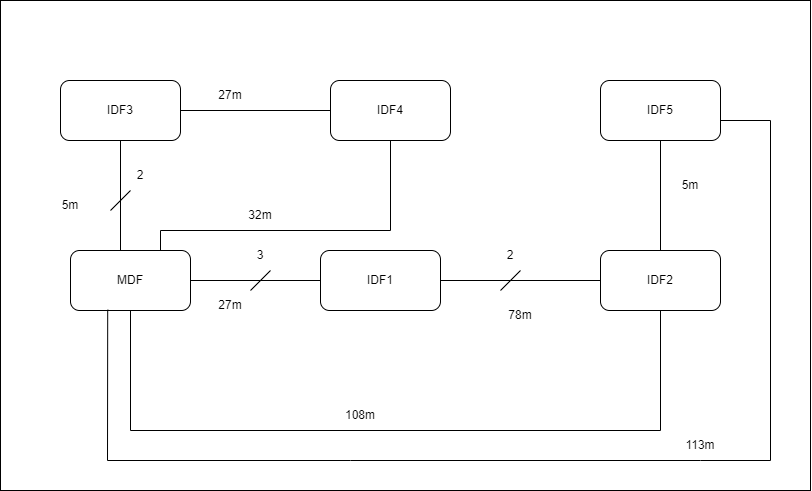
## **Ground floor drawing with cables and fiber**

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**First floor drawing with cables and fiber**

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## **FO Cable layout**



# **References**

Layer 2/3 switches + FO modules

[Cisco C9300X-48HX](https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9300-series-switches/nb-06-cat9300-ser-data-sheet-cte-en.html)

[Juniper EX4650-48Y](https://www.juniper.net/content/dam/www/assets/datasheets/us/en/switches/ex4650-ethernet-switch-datasheet.pdf)

Firewall:

[Palo Alto PA-7080 Firewall](https://www.paloaltonetworks.com/apps/pan/public/downloadResource?pagePath=/content/pan/en_US/resources/datasheets/pa-7000-series)

[Cisco Firepower 9300](https://www.cisco.com/c/en/us/products/collateral/security/firepower-9000-series/datasheet-c78-742471.html)

WLAN APs

[Cisco Catalyst CW9166D1-MR](https://www.cisco.com/c/en/us/products/collateral/wireless/catalyst-9166-series-access-points/catalyst-9166-series-access-points-ds.html)

[Ubiquiti U6 Enterprise](https://dl.ui.com/ds/u6-enterprise_ds.pdf)

WLAN AP controllers

[Cisco Catalyst 9800-80-k9](https://www.cisco.com/c/en/us/products/collateral/wireless/catalyst-9800-series-wireless-controllers/nb-06-cat9800-80-wirel-mod-data-sheet-ctp-en.html)

[Ubiquiti Dream machine Special edition](https://dl.ui.com/ds/udm_se_ds.pdf)

IP phones:

[Cisco IP Phone 8811](https://www.cisco.com/c/en/us/products/collateral/collaboration-endpoints/unified-ip-phone-8800-series/datasheet-c78-731637.html)

[Yealink VP59](https://www.yealink.com/upfiles/products/201907/1562916843207.pdf)

UPS

[APC SRT3000RMXLI](https://www.apc.com/shop/ro/en/products/APC-Smart-UPS-On-Line-3kVA-Rackmount-2U-230V-8x-C13-2x-C19-IEC-outlets-SmartSlot-Extended-runtime-W-rail-kit/P-SRT3000RMXLI)

[CyberPoker PR5000LCDRTXL5U Smart App Sinewave](https://dl4jz3rbrsfum.cloudfront.net/documents/CyberPower_DS_PR5000LCDRTXL5U.pdf)

Cooling

[Carrier 42QHG012D8S](https://www.beijerref.it/AirConditioning-Carrier/wp-content/uploads/2020/06/Informazioni-tecniche-ErP-Information-data-sheet-for-4238QHG012D8S.pdf)

[Daikin Comfora SB.FTXP35N9/RXP35](https://www.daikin.ro/ro_RO/products/product.html/FTXP-N9.html?_gl=1*4a9asw*_ga*MTA3MTEwMDk4MS4xNzE2Njc1MzI2*_ga_V6JD9JF1PY*MTcxNjY3NTMyNS4xLjEuMTcxNjY3NTMzMC41OS4wLjA.)