

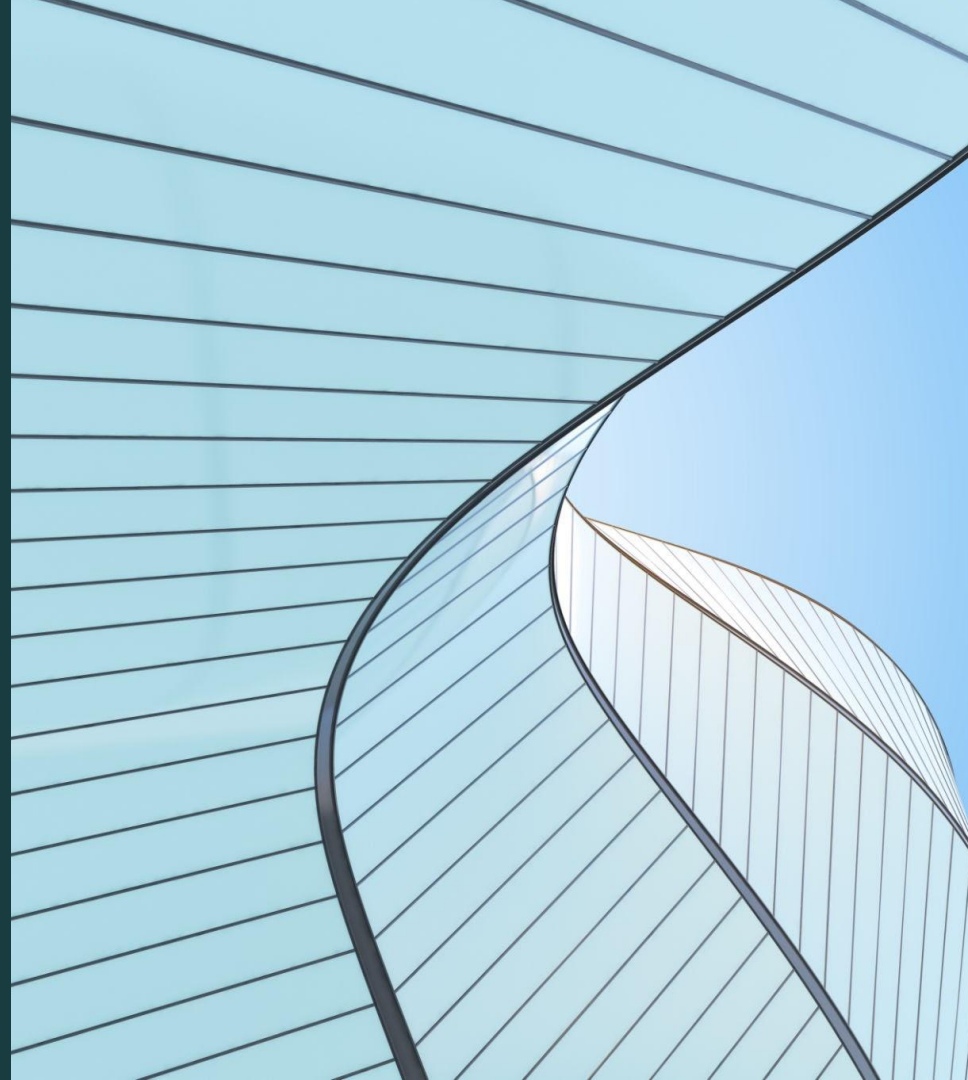
Gabriel Jacobson
3/5/26

Hands on #3 Wiring Constant Hall

BLUF

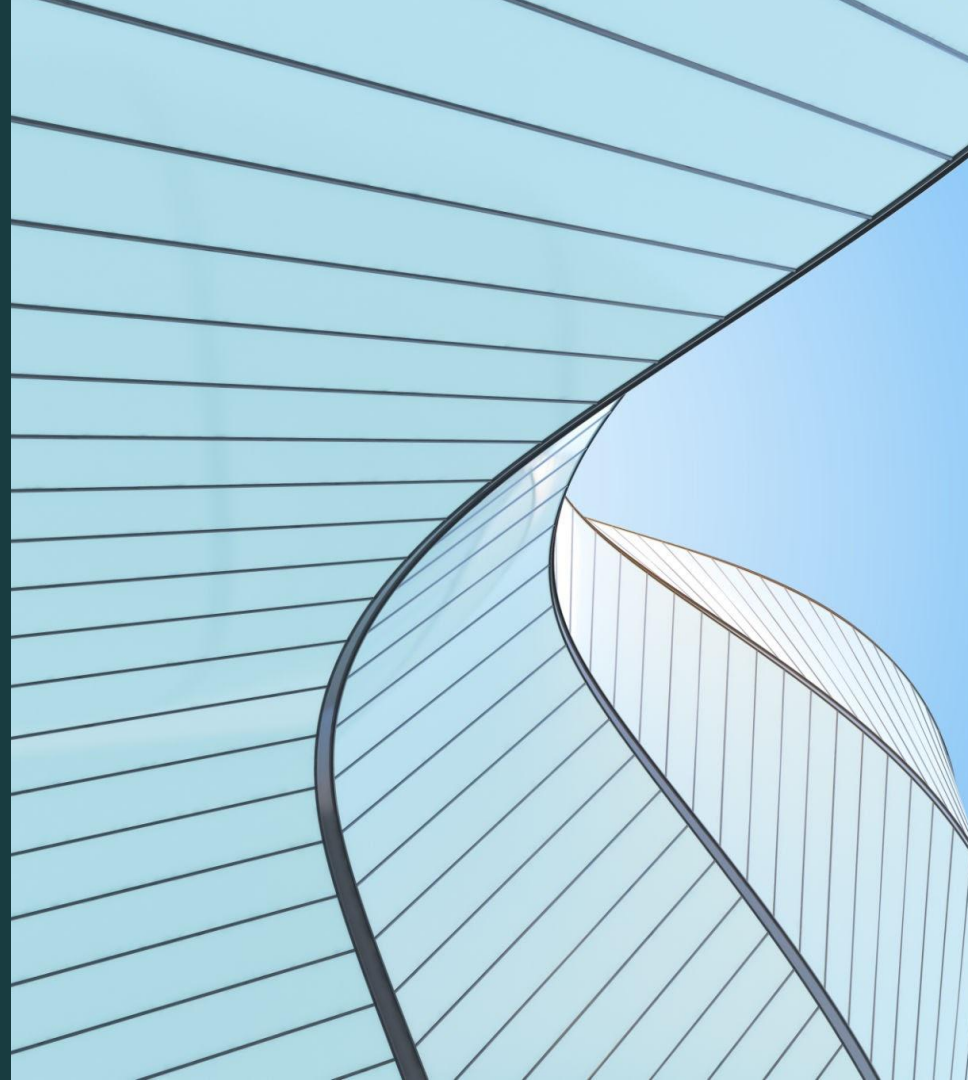
Designing a Cat5e Network for Constant
Hall

Determining cable requirements and
material costs for the assignment



Requirements

- Each Room has 2 data outlets
 - Use star / extended star topology
- Ensure cable runs are under the max (90 meters)
- Find Locations for Equipment room and telecomm closets
- Estimate the total cost and cable needed



Building Specifications

- Building width is 65 meters
- Ceiling height is 3 meters
 - Two story building
- First floor has 45 rooms
- Second floor has 144 rooms
- Each room needs 2 Ethernet outlets



First floor Layout & cable Estimate

- Extended Star topology used

Rooms on first floor: 45

45 rooms x 2 cables = 90 cables

Estimates:

Shortest Cable run

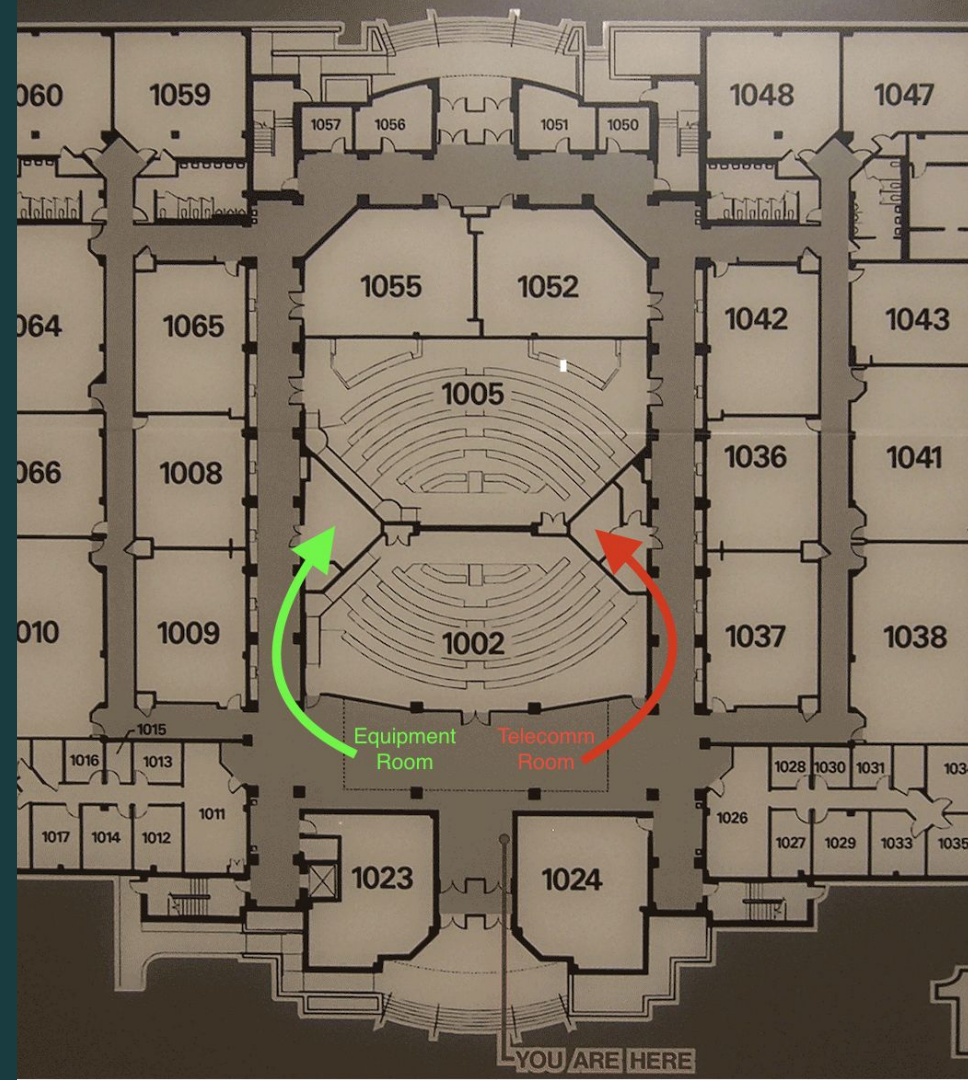
- 5 m Horizontal
- 3 m Vertical = 8m total

Longest Cable run

- 45 m Horizontal
- 3 m Vertical = 48m total

$(8+48) / 2$

Average Cable Length: 28m



Second floor Layout & cable Estimate

Rooms on Second floor: 144

144 rooms x 2 cables = 288 cables

Estimates:

Shortest cable run

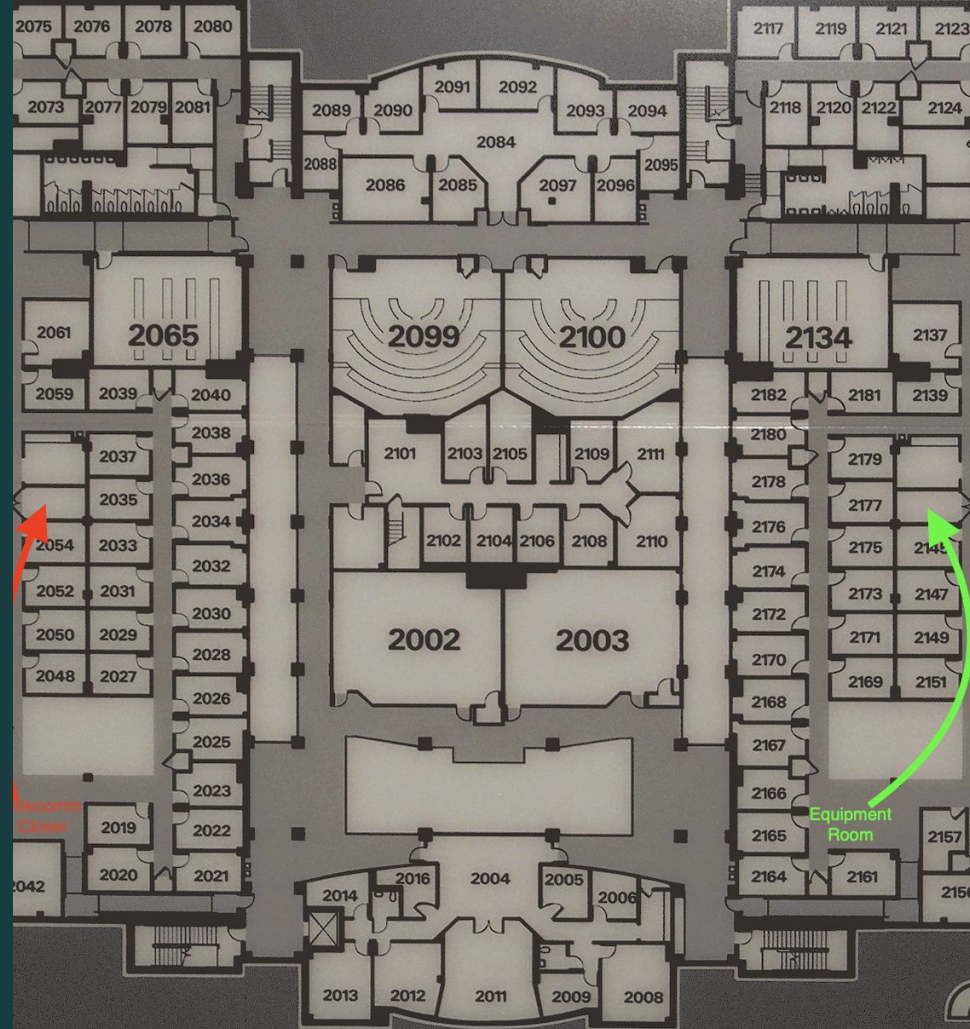
- 7 m Horizontal
- 3 m Vertical = 10m total

Longest cable run

- 60 m Horizontal
- 3 m Vertical = 63m total

$(10+63) / 2$

Average Cable Length: 36.5m



Total Cable Required

First floor cable:

$$90 \times 28 \text{ m} = \mathbf{2,520 \text{ meters}}$$

Second floor cable:

$$288 \times 36.5 \text{ m} = \mathbf{10,512 \text{ meters}}$$

Total cable required:

$$2,520 + 10,512$$

$$= \mathbf{13,032 \text{ meters}}$$



Estimated Materials Needed

Total outlets required: $189 \times 2 = 378$

- Equipment racks already installed

Material	Quantity
Cat5e Cable	13,032 meters
Ethernet Jacks	378
Faceplates	189
Patch Panels (24-port)	16

Materials Budget

Total Estimated Cost = \$5,546

Amazon. (n.d.). *Cat5e RJ45 keystone jack punch-down network connector*. Amazon.
<https://www.amazon.com/>

Amazon. (n.d.). *2-port keystone wall plate for Ethernet network outlets*. Amazon.
<https://www.amazon.com/>

Amazon. (n.d.). *24-port Cat5e patch panel rack mount Ethernet panel*. Amazon.
<https://www.amazon.com/>

4XEM. (n.d.). *1000 ft Cat5e UTP network patch cable roll*. 4XEM.
<https://www.4xem.com/products/4xem-1000ft-cat5e-utp-network-patch-cable-roll-white>

Item	Quantity	Estimated cost
Cat5e Cable (1000ft box)	43	\$3,868
RJ45 Keystone Jacks	378	\$903
Faceplates (2-port)	189	\$471
Patch Panels (24-port)	16	\$304