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TECHNICAL MEMORANDUM

To: Authorized Personnel

Project: IT Space Planning

From: David M. Ihnat

CC:

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Subject: Data and Conditioned Power Wiring Overview

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1. INTRODUCTION

This memorandum was originally written in response to a request from a client; once I finished it (and used the guidelines here to successfully design their site infrastructure, with which they're extremely happy today), I realized these are generally useful guidelines for anyone contemplating a build-out. This memorandum discusses issues revolving around data and conditioned power wiring in a new location. While originally targeted at a small office IT closet/room, the concepts (along with other requirements) apply for all IT installations.

1.1 REVISIONS

Date	Author	Notes
17 October 2005	David M. Ihnat	Minor corrections.
29 June 2006	David M. Ihnat	Generalized for public distribution.

2. OVERVIEW

When contemplating a new office space or undergoing a full interior remodeling of an existing space, including electrical wiring and interior walls, there are features that should be designed into the plans while designing the layout to properly support Information Technology (IT), communications, and other sensitive equipment. In particular:

- *Computer Room*. A location should be designated and properly constructed to serve as a computer room and a conditioned power and communications nexus. Of particular concern are thermal conditioning and security.
- *Conditioned Power Runs*. At least one power circuit per office should be terminated in the computer room to permit power conditioning via (a) UPS unit(s).
- *Data and Voice Drops*. The opportunity should be taken to standardize all house wiring on the T568A standard to permit selectable allocation as either data or telephone circuits.

- *Telephone/Broadband Distribution*. All telephone and broadband circuits should be terminated in the designated computer room.
- *Power Distribution Panel*. A power distribution panel should be designed into the computer room to permit selectable connection of circuits to the UPS unit or units.
- *Wiring Distribution Jackpanel*. An RJ-45 Category 6 rack-mount or wall-mount jackpanel should be designed into the computer room to permit selectable allocation of house wiring drops between telephone and data service through simple patch cords.
- *Security*. Provision should be made to install any security panel and wiring terminations in the computer room.

Following sections will elaborate on each aspect as necessary.

3. COMPUTER ROOM

The computer room needn't be elaborate; however, there are some aspects that are of importance for an installation of this size:

- *Isolation/Security*. It is desirable to be able to lock the room to prevent unauthorized access. A simple office or closet space, provided it's large enough to encompass all envisioned equipment, will do well.
- *Ventilation*. The room must have adequate ventilation to keep temperatures within normal operating temperatures; generally, this is at or below 80^0 F. This may usually be accomplished by assuring an adequate air-flow through the room to external spaces.
- *Lighting*. Adequate lighting should be provided.
- *Floor-Mounted Equipment Rack*. A standard 19" equipment rack would be extremely useful for equipment and jack-panel mounting. This rack must be securely bolted to the floor to support the weight of mounted equipment.
- *Plywood Wall-Mounting*. At least one wall in the computer area should have a ½" to ¾" plywood panel of adequate size to provide for wall-mounting of telephone punchdown distribution, any wall-mounted telephone systems, equipment, DSL jacks, etc.
- *Overhead Wire Distribution*. This may be in the form of full racks, or ceiling-mounted U-brackets large enough to allow routing of cables, telephone wiring, etc.

4. CONDITIONED POWER RUNS AND POWER DISTRIBUTION

Essentially, all a conditioned power run means is a designated circuit that looks like a normal power outlet in the office area, but rather than being directly connected to 120VAC commercial power, is actually connected to a conditioned power source. Commonly, such an outlet is designated by a special color wall outlet—usually orange.

To accomplish this in the proposed environment, the wires connected to the office outlets would be run to the computer room. Only one circuit per office is necessary; these will have to conform to wiring code in the same manner as unconditioned power distribution (e.g., conduit).

Termination in the computer room should be to a NEMA L5-30R. An appropriately sized Uninterruptible Power Supply (UPS) with an output cable terminated in a NEMA L5-30P connector should be used. (This is a common configuration.)

4.1 ADVANTAGES

Designing this feature into the office space will give the following advantages:

- Future power needs may be readily met by simply adding a larger UPS unit or additional UPS units in the computer room.
- The incremental cost of individual UPS units per office can be avoided.

4.2 DISADVANTAGES

This approach has only two disadvantages:

- There may be additional cost for the conduit and wiring run.
- There is the additional cost of the power distribution panel in the computer room.

5. DATA AND VOICE DROPS

A common shortcoming of ad-hoc wiring schemes is the practice of custom-wiring telephone jacks for voice service, and data jacks for Ethernet data networking. However, it is possible to avoid this by wiring all jacks to meet the EIA/TIA T658A wiring standard. In this case, the same wall-jack, terminated at an RJ-45 jackpanel, can be used for either data or telephone depending on whether it's patched into the telephone distribution section of the jackpanel, or to an Ethernet switch. (Note that it cannot be used for both at the same time, however.)

5.1 ADVANTAGES

- All house wiring is identical.
- Jacks may be reassigned as needed, avoiding the possible situation of having too few data or telephone jacks in a location while there are unused jacks of the "other" type.

5.2 DISADVANTAGES

There are no known disadvantages to this scheme.

6. TELEPHONE/BROADBAND DISTRIBUTION

Having all telephone and broadband circuits terminate at a punchdown panel in the computer room permits single-point redistribution to telephone systems, jackpanels, etc. Most likely, these will be internal secondary panels connected to Telephone Company (TelCo) panels common to the building. These should be mounted on the plywood wallmount panel in the computer room.

If the office occupies the entire building, it is possible to relocate the TelCo Inside Termination (IT) box in the computer room. This provides both security and convenient wiring for the telephone and security systems.

6.1 ADVANTAGES

- *Security*. These panels provide secure local distribution to data communications equipment in the computer room.

- *Clarity*. The wiring scheme can be laid out with an eye to clarity of design and maintenance.
- *Convenience*. All wiring modifications should be able to be kept in the computer room once these panels are established.

6.2 DISADVANTAGES

The only disadvantage to this is the additional cost of the panels themselves, the internal wiring installation to the building panels, and installation labor.

7. WIRING DISTRIBUTION JACKPANEL

This is a very important part of the house wiring equipment. Essentially, all wiring except computer switch distribution terminates at an RJ-45 Category 6-certified jackpanel. The panel is allocated in three sections:

- *House wiring drops*. Every wall data jack in the office terminates in this section.
- *Telephone system jacks*. All output jacks from any PBX/ACD system terminate in this section.
- *Analog telephone lines*. All analog (POTS) telephone lines (e.g., fax, modem) are terminated here from their punchdown panels.

Note that commonly, all computer distribution is from standard Ethernet switches, and thus requires no source on the jackpanel.

Jackpanels are available with variable numbers of jacks, and may be wall-mounted or rack-mount. The actual size of the required panel (in terms of number of jacks), and the mounting method, must be determined.

7.1 ADVANTAGES

- Rapid and simple reconfiguration and allocation of house wiring drops by untrained personnel.
- Easy reassignment of telephone extension locations without telephone system programming or telephone company involvement.

7.2 DISADVANTAGES

- The cost of the jackpanel itself, and the labor of wiring routing and punchdown.

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